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August 2004
No. 171

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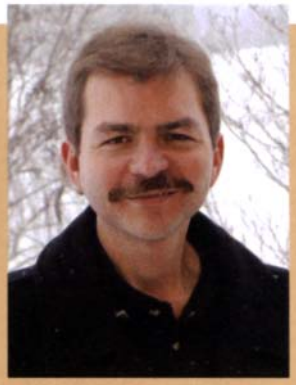
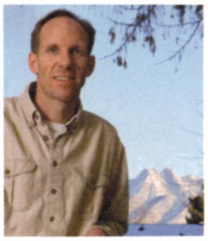


Lonnie Bird ("Pennsylvania Tall Clock") got bit by the woodworking bug when he was a youngster living in Virginia. Just out of high school, he took a job as an apprentice in a small cabinetmaking shop that specialized in reproductions of 18th-century furniture, where he received an exquisite education in the trade. Bird taught woodworking for years at a college in Ohio before he moved to the foothills of the Smoky Mountains, where he lives on a 12-acre farm with his wife, two children, and a herd of horses and dogs. In a separate shop adjacent to the house, in Dandridge, Tenn., Bird teaches woodworking courses to interested students of all skill levels (www.lonniebird.com).

Sean Clarke ("A Durable Tabletop Finish") grew up in London, England, where he apprenticed as a French polisher at the age of 15. He worked as a restorer/French polisher for 10 years until emigrating to the United States in 1992. He and his wife, Angela, opened a restoration and refinishing business in Valencia, Calif., in 1999. A recent addition to the company, Connor Dominic, prompted a move to Columbus, Ohio, so that he could grow up among family. Clarke spends much of his spare time on home-remodeling projects. He welcomes questions and comments at www.clarkecompany.com.

Chris Gochnour ("Shoulder Planes Reviewed") will miss the Wasatch Range, both for the dramatic view from his Salt Lake City shop and because he is an avid skier. He is following his wife to Washington, D.C., where she works for the Environmental Protection Agency. Because his East Coast woodworking will be confined to a townhouse, Gochnour has made himself a new, collapsible workbench and will be relying exclusively on hand tools in his furniture making—including, of course, his collection of shoulder planes.



Dan Faia (Master Class) has been a professional furniture maker and educator for more than 10 years. He is a graduate of North Bennet Street School in Boston and has been a long-time workshop instructor there. He also teaches Windsor-chair making at The Windsor Institute in Hampton, N.H. "Crafting fine furniture has been a passion of mine from the beginning, and teaching others is just as rewarding," Faia said.

Kim Carleton Graves ("Laminate Trimmers") has written several articles for *Fine Woodworking*. His last contribution was a Master Class on veneering in issue #155. Readers who pay close attention to photos may notice that Graves looks a little different. He was pleased to tell us that he's lost 40 lb. by maintaining a strict diet and getting plenty of exercise. His newfound health has allowed him to rediscover the sport of his youth: rock climbing. On his days off, you can find him on the rocky cliffs known as the "Gunks" in New Paltz, N.Y. Graves owns and operates Carleton Woodworking in Brooklyn, N.Y. (www.carletonwoodworking.com).

Steve Latta ("Graceful Glass Doors") teaches woodworking at Thaddeus Stevens College of Technology in Lancaster, Pa., and he's a student himself, working toward a master's degree in American studies at Penn State University. Latta also serves on the executive council of the Society of American Period Furniture Makers. He lives in the heart of Pennsylvania Dutch country with his wife, Elizabeth, and three children, Fletcher, Sarah, and Grace.

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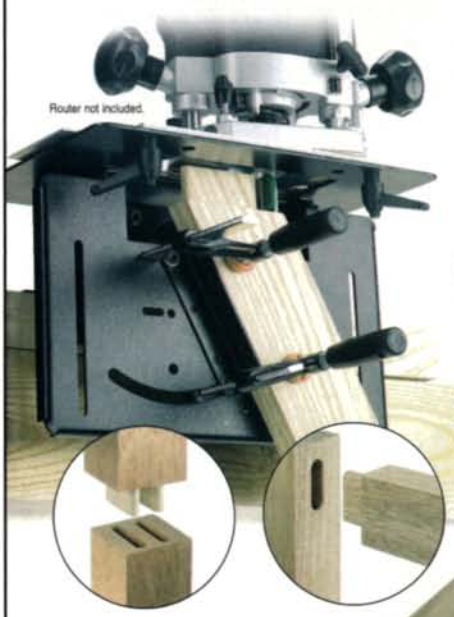

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Letters

Do you make your own tools?
The next *Tools & Shops* issue is only a few months away, and we are seeking photos of tools that you have built for yourself: handplanes, marking tools, machine tools, benches, and more. Please send images (print, transparency, or high-resolution digital file) to *Fine Woodworking*, Current Work Department, 63 S. Main St., Newtown, CT 06470, or email mberger@taunton.com.

Corrections and clarifications

The article "Scaling Furniture From Photos" (*FWW* #170, pp. 59-63) includes a graphic that caused some confusion. On p. 62, the red vertical lines (marked #2) represent the outer edges of the tabletop (not the gallery on top). The line on the right is slightly off (too far to the left). The black-and-white photo to the right is a more accurate depiction of the actual location of the vertical lines.

Several astute readers pointed out that the fire extinguisher pictured in Q&A (*FWW* #170, p. 98) was not a carbon-dioxide model. For more on the subject, see the letter below.

Fire in the shop

Mike Dunbar's response to Anne Green's question on fire extinguishers (*FWW* #170, p. 98) missed the mark. A dry chemical extinguisher (as you pictured) using monoammonium phosphate will outperform a carbon-dioxide fire extinguisher (as Dunbar and his source suggested) in all situations expected to be encountered in a typical woodworker's shop, including flammable liquid vapor fires. The determination of what type, how many, and location(s) of fire extinguishers comes only after assessing what are the anticipated or realistically foreseeable hazards.

The second point I would take issue with in Mike's response is the claim that the "number-one cause of fires in woodshops is an overloaded circuit." I don't know his source for this, but I have been unable to find any data through reporting agencies that would support that statement. My personal experience from over 30 years of investigating and analyzing fires is that "overloaded circuits" would not be the prime cause of woodshop fires. He claims that the second-leading cause is other electrical problems such as loose connections, screws, etc. Again, I know of no data source to support this claim.

Dunbar lists "highly flammable wood dust" as the third-leading cause of woodshop fires. What he has done is confuse the cause of a fire—i.e., ignition source—with the fuel source for a fire. Wood dust is combustible and, when suspended in air in the right proportions, can burn rapidly, resulting in an explosion. I certainly wouldn't argue with the view that wood dust is a fuel for fire in a woodshop, but it is not a cause.

—John M. Hoffmann, Warren, Mich.

Thanks for the tool reviews

I had just a few minutes to look at your fine article on bandsaw blades (*FWW* #169, pp. 76-79) while having a coffee at Barnes & Noble. Excellent article. You help us save money by testing tools.

—Ken Karlene, Oregon, Ohio

Varnishing secrets unveiled

Congratulations to David Sorg (*FWW* #168, pp. 39-43). You have taught a woodworker that varnish works when properly applied.

I tried to follow your instructions from an earlier article but could not get [satisfactory] results with even the best brush I could buy.

However, you have now revealed what has truly been a secret to me and guided me through the process of producing the finish I have long wished I could accomplish. For many woodworkers, I suspect, applying the finish has been a frustrating and disappointing part of many projects, until you provided the information that I have been missing.

Varnish is now a valuable weapon in my arsenal, rather than a frustrating mystery. Thanks again.

—Jim Merrill, Burlington, Ont., Canada

Seeing even better

Instead of buying expensive triple-vision lenses, as was suggested by a letter writer (*FWW* #170, p. 12) to see things overhead, try the plastic add-ons that are intended to make "instant bifocals," but put them at the top of regular glasses. I have seen these at Walgreens and other such stores. They are made of soft plastic that adheres to smooth surfaces but can be peeled off when not needed—no adhesive. They are available in various powers of magnification.

—Milford Brown, via email

Question on dovetails

Whenever your new issue arrives at my shop, it is sure to include one or two articles with helpful information for whatever project I'm building: at present a southern "hunt" style mahogany sideboard. So I read with special interest Michael Pekovich's excellent feature ("Cherry Chest of Drawers," *FWW* #170, pp. 50-58), including his method for making lipped drawers, which I need for my sideboard.

I'm with him all the way (p. 58) as far as "3" in the photo caption, where he removes waste between the pins with a router. But how does he control lateral movement to avoid cutting into the pins? My experience is that with chips flying and the base of the router obscuring vision, it's nigh impossible to keep the router on course and not damage or destroy the pins.

If he's got any tips, please pass them on! Thanks.

—Bruce H. Burnham, Pittsfield, Mass.

MICHAEL PEKOVICH REPLIES: I share your frustrations. Short of investing in a dovetail jig, there isn't a foolproof way to

About your safety
Working wood is inherently dangerous. Using hand or power tools improperly or ignoring standard safety practices can lead to permanent injury or even death. Don't try to perform operations you learn about here (or elsewhere) until you're certain they are safe for you. If something about an operation doesn't feel right, don't do it. Look for another way. We want you to enjoy the craft, so please keep safety foremost in your mind whenever you're in the shop.

—Anatole Burkin, editor

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rout out the waste between the pins. I minimize the risk by making sure I've got a sharp router bit, and I take light passes as I near the scribe lines.

Government is liberal with accuracy

After reading Rules of Thumb (*FWW* #169, p. 86), I became curious about government standards on accuracy. I decided to look them up on the Web, as many manufacturers claim to "...meet Federal specifications for accuracy." When I found the government Web site, I was surprised at how liberal the standards are for measuring devices. How liberal, you say? For "measuring devices," a 3⁄16-in. error over 6 ft. is acceptable.

When the Cooper rep came out to my craft-club meeting, I was enamored with the company's Lufkin Quikread tape. I bought one that week, and it was exactly 3⁄16 in. off at the 6-ft. mark. I guess I can't complain.

–Vance Burns, via email

You are on the right track

Since 1986 I have been a subscriber to *Fine Woodworking* and feel guilty that I have not written before to tell you how much I appreciate your publication. I am near 80 years old and have been an avid woodworker for almost 50 years. There has never been an issue from which I haven't learned something new. Keep up the excellent job you're doing. You always have a good balance of articles that are very educational. Thanks again for what you have done for me in the past and continue to do with each issue.

–Bob Damon, Appleton, Wis.

Inexpensive alternative to use with abrasives

I could not help but notice that in its most recent catalog, Woodcraft is offering machinist's granite surface plates and recommending them as bases for sharpening with wet-or-dry sandpaper. They are nice and flat, to be sure, and so seem to make handy surfaces for the sharpening of plane irons, chisel blades, and such. And I cannot help but think that *Fine Woodworking* deserves some of the blame for this. Let me affirm immediately that I am not one of those people who thinks there is a "right" (or rather "my own") way of doing things—far from it. I have taken as much malicious satisfaction as anyone as I have observed the furious "right-way wars" that are periodically waged by readers in your pages—the ongoing battle about the right way to place a handplane on a workbench comes immediately to mind as the sort of thing I do not care to participate in.

But, to be honest, I have been bothered for some time by the repeated suggestion by your authors of such a use for surface plates. And now look how you have infected others! I had been intending to write my protestations, but the future of woodworking has always seemed quite secure in your hands, and I never got around to it.

But this Woodcraft catalog is the last straw. I take pen in hand, as it were, and leap into the fray. I myself am the owner of one of these tools, and when I received it also received a certificate of accuracy and a short caveat from its manufacturer warning that even casual contact with abrasives was a danger to its accuracy. And this is the bone I would like to pick on. It just does not seem, well, seemly to use a tool in a way that violates its nature and design. Abrasives are a danger to the accuracy of surface plates, yet you recommend their use in such situations, and their accuracy is precisely the reason for recommending them in the first place—if there is no one "right" way, there certainly can be a wrong way, and I would call it wrong if it is disrespectful to the nature of a tool and destructive of its character.

But all is not lost—I have a substitute to recommend. For the very low price of about one dollar, you can buy a small, solid cinder block at any home-improvement store. Check them out; they are amazingly flat and uniform, readily available, light in weight, need no special care or coddling, are easily and cheaply replaced, and their nature is not harmed by contact with abrasives—they themselves are abrasive. I made a nice little wooden frame for mine, and it has been functioning for quite some time as my all-purpose base for flattening and sharpening with sandpaper. And if it ever wears or cracks, I'll buy another for a dollar. The only danger you might encounter is embarrassment caused by the incredulous stares and frankly abrasive comments you might get from the contractors you could encounter on the check-out line—buying one cinder block will earn you no respect from them and their ilk.

–John M. Dougherty, Edgewater, Md.

Regarding my vacuum gouge

I didn't anticipate the clogging problems described by Ernie Conover (*FWW* #170 p. 31), but others have dealt with them successfully, and given me feedback.

One user has his vacuum mounted on a 55-gal. drum, which he sometimes fills twice a day with green wood debris from the vacuum gouge.

Two things cause most clogs. The opening in the gouge is 80% smaller than a 2-in.-dia. vacuum hose, choking off the air supply. That is solved by allowing more air between the vacuum hose and the gouge. A tube connecting the two can have holes drilled in it, allowing in extra air. The gouge doesn't require much air volume, but larger hoses do and work better than the small hose Ernie is shown using.

The second clog producer is the diverter inside the drum of some vacuums, designed to prevent debris from damaging the filter. This diverter can be replaced by a plumbing fitting called a street elbow, which has a smooth curve. If the gouge clogs at the cutting edge, it is easily cleared after turning off the vacuum.

Updated directions on preventing clogs are included with each gouge. (The one Ernie tested was shipped in March of 2003, before I was aware of the problems.)

Although I have always offered a satisfaction guarantee, including shipping charges both ways, only two gouges have been returned because of clogging, with over 300 sold.

–John O'Neill, CleanTurn Tools, Rochester, N.Y.

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Methods of Work

EDITED AND DRAWN BY JIM RICHEY

A reward for the best tip

Keith Rust was facing the prospect of cutting dovetails by hand for a chest that contained 10 drawers of varying sizes. Not happy with eyeballing the sawcuts, he wanted something more reliable to guide his saw, which was the inspiration for his pin and tail guides shown above. Rust manages a recording studio in Dallas. For his winning tip, he'll receive a set of hand-forged chisels (www.barrtools.com). Send your best tip, along with any photos or sketches (we'll redraw them), to Methods of Work, Fine Woodworking, *PO Box 5506, Newtown, CT 06470-5506.*

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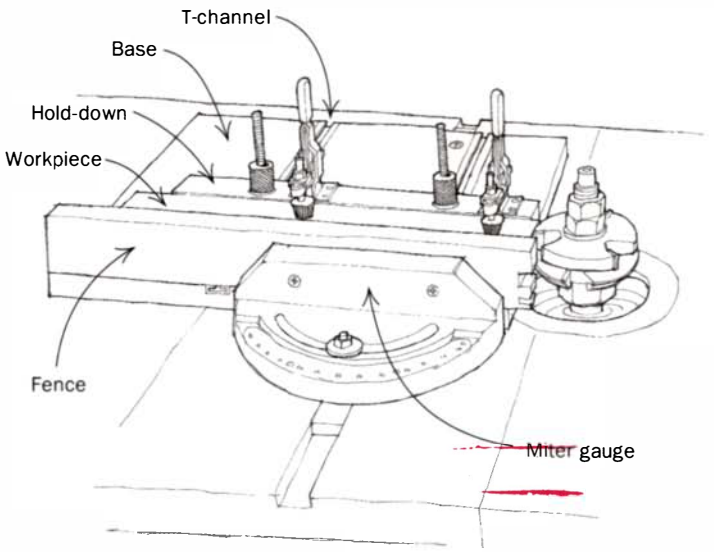
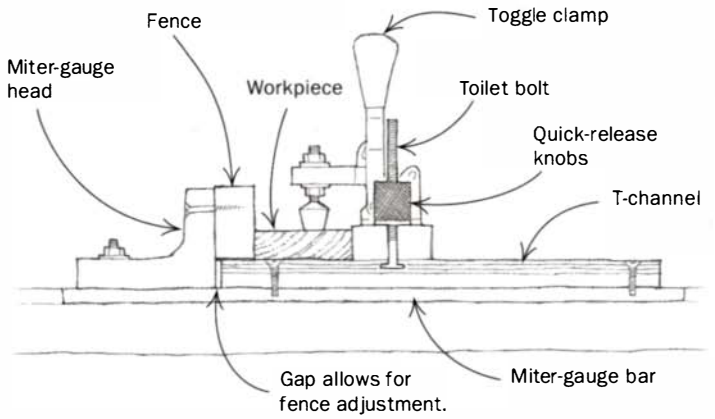
Shaper jig for cutting end-grain joints





Cutting end-grain joints on the shaper has always been a challenge for me. I have made several unsuccessful jigs and even purchased, broke, and returned in a single day a commercially available shaper jig. My latest effort is a remarkable success.

The chassis for my new shaper jig is an aftermarket miter gauge. Any inexpensive, moderately robust miter gauge will work. Start by drilling and tapping several holes down the center of the steel bar that rides in the miter slot. Select a nice piece of ¾-in.-thick hardwood plywood sized for your shaper or router table and attach it to the bar using machine screws in the tapped holes. Position the working side of the plywood base just clear of the cope-and-stick cutters. Also, leave a bit of room between the base and the miter gauge so that you can square up the miter gauge later, if necessary. Now remove the base, cut two grooves, and install two lengths of aluminum T-channel down the length of the base and parallel with the miter slot in the shaper table.

Reattach the base to the miter gauge and secure a fence to the face of the miter gauge with two screws through the back. Remove the adjuster handle from the rear of the miter gauge and toss it into your box of useful stuff. Replace the handle with a good-quality nut so that you can tighten the gauge better with a wrench when you get the settings just right.

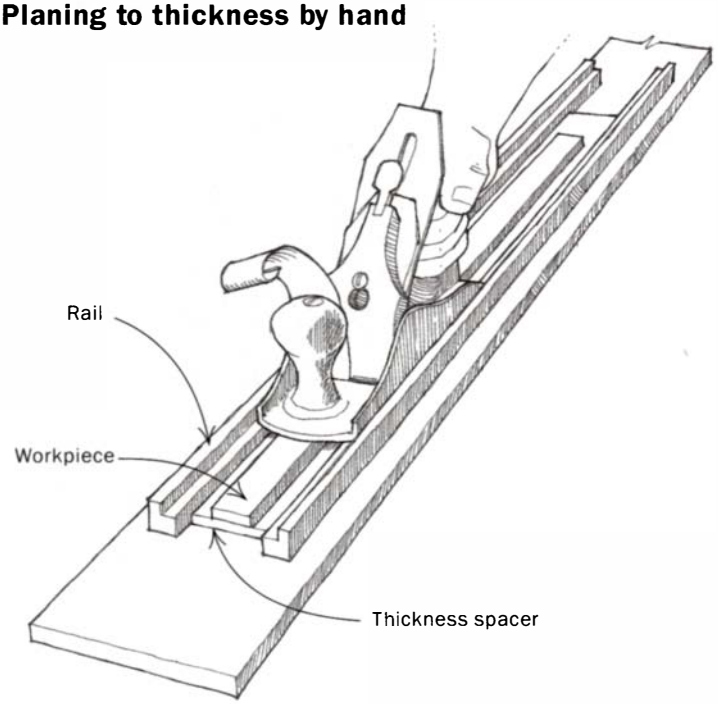
Install a rub collar onto the shaper and, using a large square and a feeler gauge, run the miter gauge forward and backward, measuring between the square and the rub collar until you have the sacrificial fence exactly perpendicular to the travel of the jig.

For the hold-down, use a piece of scrap that is about the same thickness as the items you need to shape. Drill holes through the hold-down to line up with the T-channel, and attach the hold-down to the jig using nuts and washers. I used those handy quick-release knobs sold by Lee Valley (800-871-8158). Screw toggle clamps to the hold-down and adjust everything for a nice, firm grip on the workpiece.

That's it. Simply insert a workpiece, clamp it down, and let 'er rip. I think you will be very happy with the performance of this little jig.

—Marshall Fletcher, Dover, Del.

Planing to thickness by hand



I often need thin pieces of wood for laminating or for making small boxes and drawers. Also, I like to use hand tools as much as possible because I enjoy hearing the world outside my shop while I'm working. This simple handplaning fixture takes care of both these needs.

My fixture is 7 ft. long, but you can make one any length that will fit your needs. It consists of two L-shaped rails attached firmly to a flat base. I made the rails from oak for its durability, and then put a heavy coat of paste wax on them. The width between the rails is determined by what size handplane you will be using. My rail spac-

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ing is 2⅞ in., and I made the base extralong to allow for clamping it to the workbench. I place a spacer under the workpiece to control the final thickness. The rails are ⅝ in. deep from the bottom of the plane to the top surface of the base; so a ⅛-in.-thick spacer gives me a ½-in. thickness, a ¼-in.-thick spacer gives me a ⅜-in. thickness, and so on. For some situations, it's best to use a spacer that is backed with sandpaper or double-sided tape to prevent the workpiece from bowing when longitudinal pressure is applied to it.

Making new spacers is easy, too. Simply put wood of the final desired thickness in the fixture and top it with a spacer workpiece slightly thicker than desired. Run the plane over the spacer until it no longer produces shavings. Keep an even pressure on the plane throughout the cut.

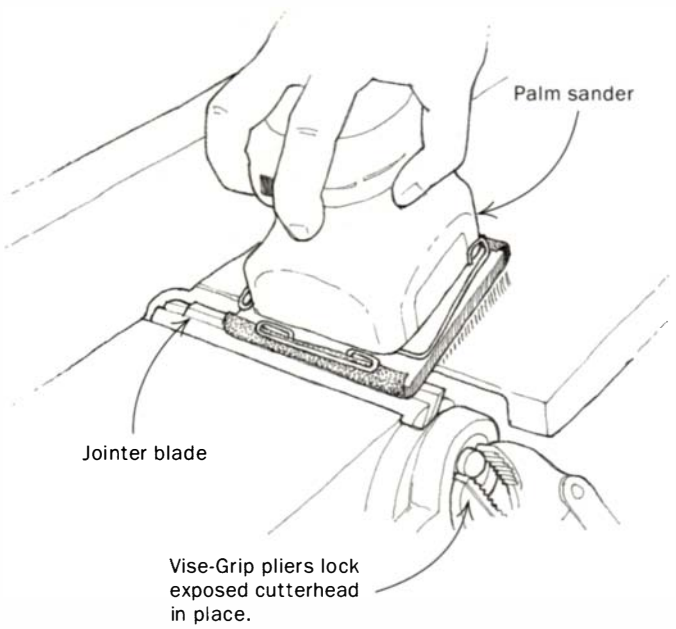
To use the fixture, I clamp a piece of wood to the end of the base to act as a stop, making sure the surface of the stop is below the level of the piece being planed. Then I rough-cut workpiece blanks slightly oversize on the bandsaw, jointing the rough edge each time before cutting the next blank. That way I'm always presenting a smooth surface to the bandsaw. I cut a bunch of rough slats and then settle in for some good old-fashioned woodworking, during which I can hear the birds, the ballgame, and the steady swish of the plane.

—Carl Miller, Lakewood, Ill.

Quick tip: When carving wood that has been in the shop a long time and is so dry that it's as hard as a brick, try dousing the wood with hot water to soften it up a bit. Be sure to wet both sides of the wood to avoid differential swelling, which could cup the board.

—Hilliard Stone, Irving, Texas

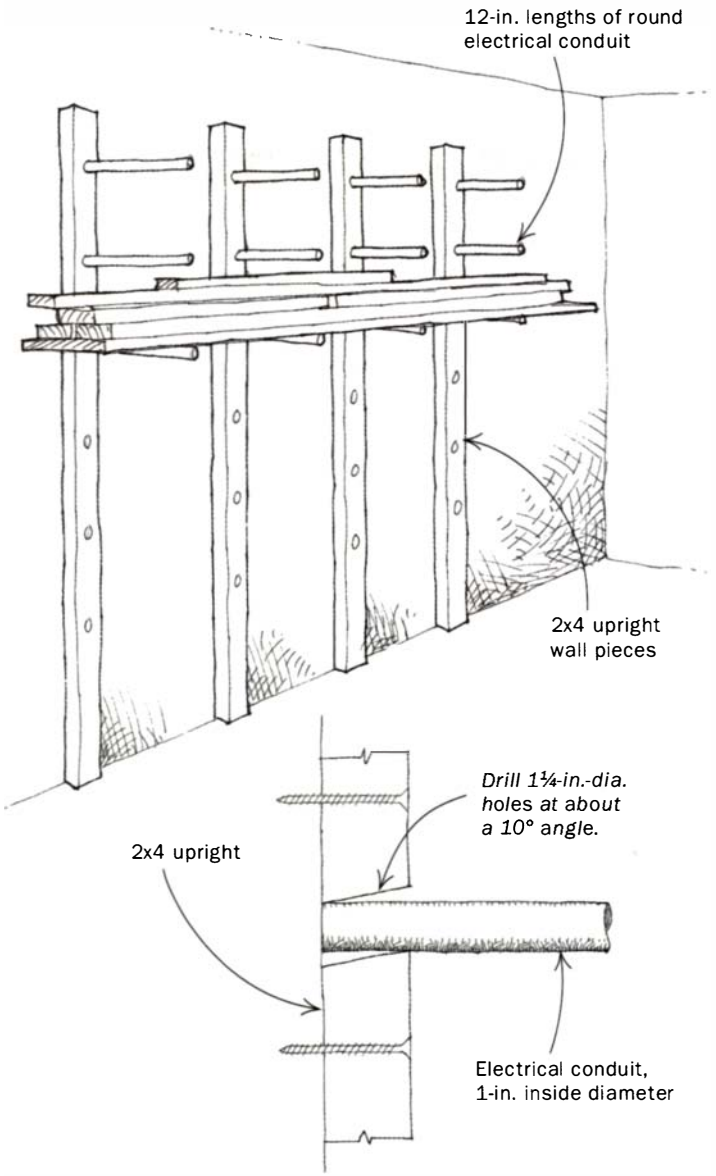
Dress cutting edges with a palm sander



When my jointer blades are scored or need sharpening, and I don't have time to remove them, I dress them quickly and easily using a palm sander. For example, if I have a nick in a jointer blade, I lock the cutterhead in place using Vise-Grip pliers. Then, maintaining the bevel angle of the blade, I use the palm sander to polish the blade and remove the nick. I use 3M Sandblaster paper and find that 120 grit gives me an adequate edge. This palm-sander technique also works well for getting a relatively straight edge on drawknives, axes, and other tools.

—Jimmy Carter, Plains, Ga.

Wood-storage system



When I started looking for an inexpensive but sturdy way to store all the leftover wood scraps that I've accumulated over the years, I came upon this adjustable system that I use not only for storing leftovers but also for shelving in the garage.

I buy 10-ft. lengths of 1-in. I.D. (inside diameter) metal electrical conduit and cut the conduit into pieces about 12 in. long. Then I drill 1¼-in. holes in 2x4s, 12 in. apart, at an upward angle of about 10°, being careful to use the exact same spacing on every 2x4. The holes will be slightly oversize, which makes the conduit pieces easy to remove when you want to change the setting. The upward angle compensates for a heavy load.

I secure the 2x4s to wall studs with decking screws, taking care

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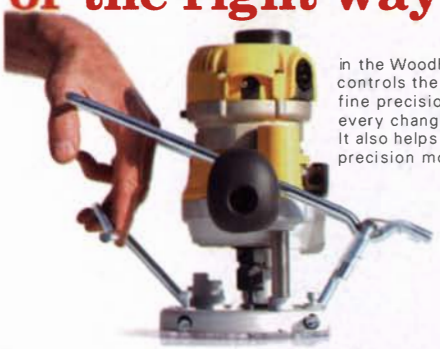

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As used by Scott Phillips

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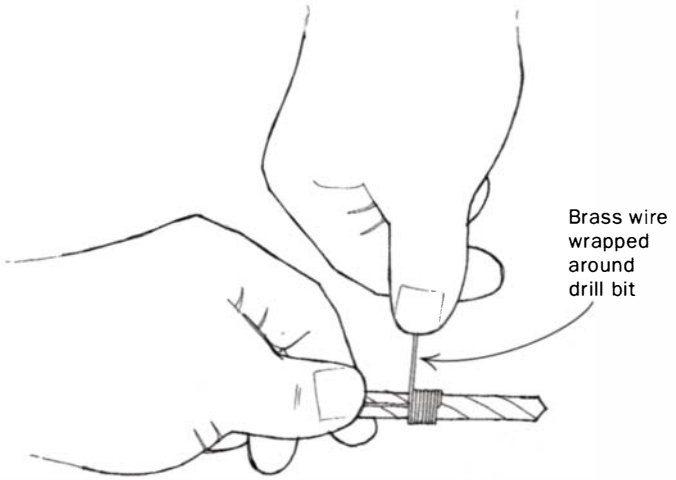
to align them so that all the holes line up. Then I simply slip pieces of conduit into the holes as needed for storage. For shelving, I place 1x12s on top of the pipes, and I'm done.

This system supports a lot of weight for a relatively small cost. And, of course, it is adjustable to allow for just about any width, depth, and height of shelving you need.

—John E. Stair, Wilmington, N.C.

Brass-wire depth gauge



Here's an improvement on the old tip of wrapping masking tape around a drill bit to make a depth gauge. The tape deteriorates quickly from the waste and the heat that build up when drilling a lot of holes. A length of brass wire is just as simple to use, and it makes a more accurate, longer-lasting depth gauge.

Starting with thin brass wire (about 1/64 in. thick), cut a length about 30 times the bit diameter (7½ in. or so for a ¼-in.-dia. bit). Hold the bit in one hand and coil the wire around the bit with your other hand, as shown above. Wind the wire in a clockwise direction as you face the tip end of the bit. That way the wire won't uncoil as you drill a hole. Don't use iron wire because it's too brittle, and it has some springback.

—Vincent Lavarenne, Brunoy, France

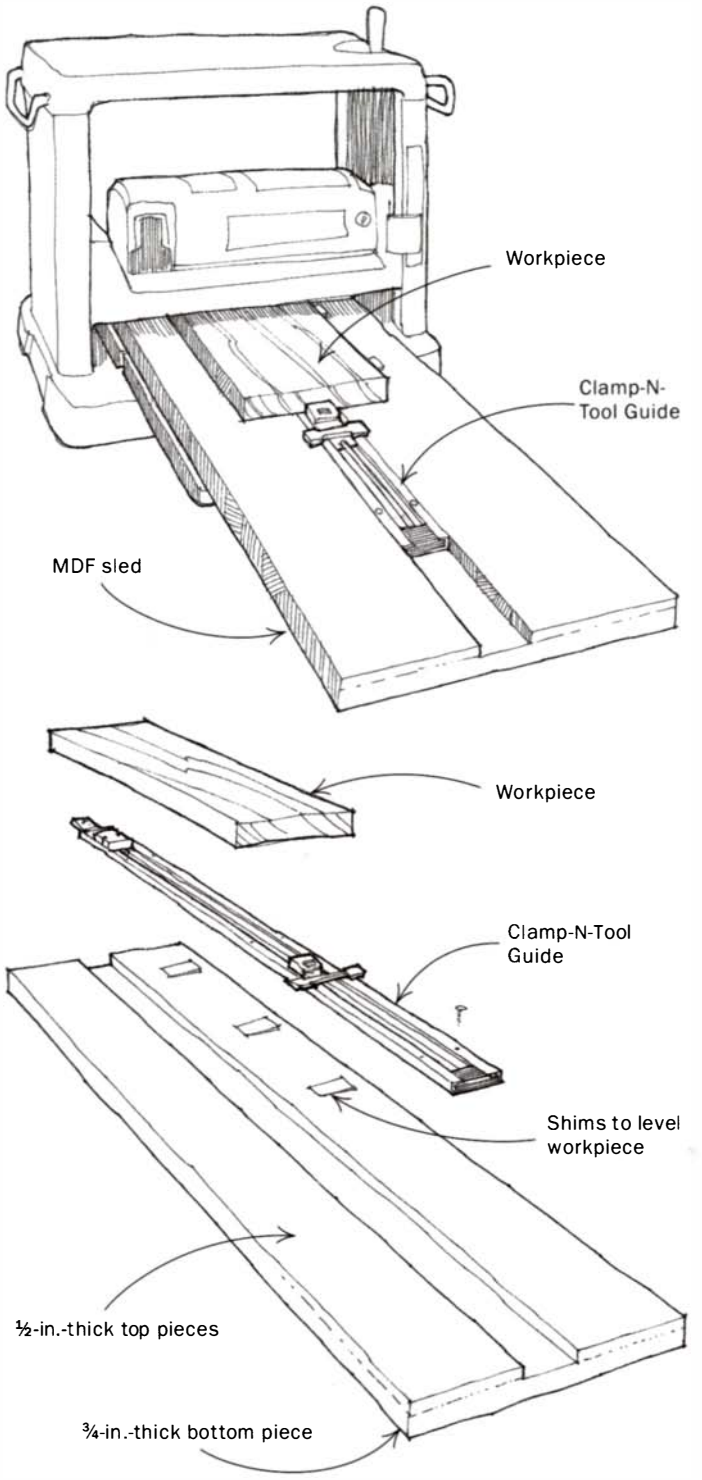
Quick tip: Even worn-out computer-mouse pads have lots of useful life still in them. They're great for lining your toolbox or workbench drawers. The pads are durable, and planes and chisels can rest on them without being nicked or dulled.

—R.B. Himes, Vienna, Ohio

Face-jointing boards in the planer

Here's a jig that I use to face-joint boards when they're too wide for my 6-in. jointer. Basically, the jig is a sled made with two thicknesses of medium-density fiberboard (MDF) and a Clamp-N-Tool Guide clamp. The length of the Clamp-N-Tool Guide determines the length of the jig and the length of a board the jig can handle.

To make this jig, glue the two top pieces of ½-in.-thick MDF to the bottom piece of ¾-in.-thick MDF, leaving a gap in the middle to inset the Clamp-N-Tool Guide. Position the clamp lever over the end of the jig so that you can flip it up and down, and screw the clamp in place. It will help to add some shims underneath the clamp before securing it, just enough so that the clamp dog will slide easily.



To use the jig, simply clamp a board in it. If the board rocks in the jig, twist it either right or left and insert wooden shims under the other side until it can't rock. Initially, I used hot-melt glue to secure the shims. Later, I found masking tape to be just as effective but easier to apply and remove. I've been using this sled in my planer for a couple of years and find myself preferring it over the jointer to face-joint stock, even when I have the choice.

—Daniel Broadbelt, Robesonia, Pa.

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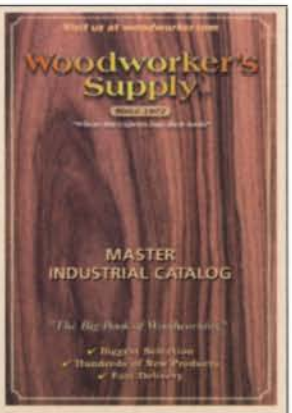

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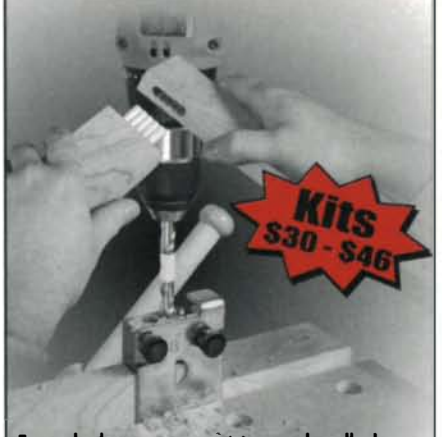

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Notes & Comment

Tage Frid, 1915-2004

Scan the mastheads of *Fine Woodworking* from the current issue all the way back to the first one in the winter of 1975, and only one name appears as a contributing editor on all of them: Tage Frid (his first name is pronounced TAY). The staff of the magazine was saddened to learn that Frid died on May 4, 2004, after several years suffering from the effects of Alzheimer's disease.

When Paul Roman, the founding editor and publisher of *Fine Woodworking*, was launching the magazine, he turned to Frid for contributions. And so began an active collaboration that lasted more than 20 years.

Frid had an enormous influence on the resurgence of handmade furniture in the United States during the latter half of the 20th century. As many of his students will attest, he pulled no punches in his critiques of students' work. His criticism was delivered with a forthright honesty but often was tinged with a sense of humor, such as this one: "Congratulations, you've just figured out the most complicated way to hold a board 30 inches off the floor."

Frid was unique in his ability to bridge the gap between the old world and the new. A native of Denmark, at the tender age of 13, he apprenticed to a master craftsman named Gronlund Jensen. Five years later he was awarded journeyman status. He continued to pursue a university degree in interior architecture while working in a cabinet shop. In 1948 Frid moved to the United States to

(Continued on p. 24)

Remembering Tage Frid

by Paul Roman

I first met Tage Frid in the summer of 1975 when I was putting together the first issue of *Fine Woodworking*.

While spending a long, hot evening with Tage and his wife, Emma, at their house, I explained what the magazine was going to be about and asked for his support. Tage, a well-known teacher and craftsman, was at age 60 far from retirement and certainly didn't need to risk his reputation by putting his name behind some dubious journalistic venture with a complete stranger 15 years his junior.

But by the time I left their house, he had agreed to help me. I learned later that it was only because of Emma's persuasiveness. Emma, thank you again.

After he received the first issue in the mail, Tage phoned me and in a surprised voice said, "Paul, it's beautiful!"

His endorsement opened a lot of doors, giving me access to a large group of knowledgeable woodworkers and teachers who, like Tage, wanted to share what they knew with aspiring woodworkers. And the success of *Fine Woodworking* gave Tage a platform from which to share his woodworking knowledge not only in the magazine but also in his authoritative three-book series *Tage Frid Teaches Woodworking*. He also became a popular woodworking lecturer, traveling around the country leading seminars.

Tage was one of those few gifted teachers who forever changes your aspirations and your life. In visiting his college woodworking classes over the years, I always was amazed at how his students weren't trying to be little Frids. Their furniture designs were all over the lot but certainly not "Fridian." He wanted them to find their own design voices.

Tage himself was a talented designer. The first time he and Emma visited my family's house, they ate at a dining-room table I had built years earlier. It was made of ¾-in.-thick oak plywood with a built-up edge of 1-in.-thick solid oak and an unseen strip of Masonite. It wasn't long before his hands discovered the inelegant construction, which he bluntly described as "Mickey Mouse."

That was my lesson in design integrity, which I never forgot. It was also consonant with the journalistic honesty I was trying to put into *Fine Woodworking*.

While Tage eventually retired from teaching, he never stopped designing. Even into his early 80s, he would come down to The Taunton Press offices and talk about his latest projects. Tage was always thinking, trying to do new things and never satisfied with simply milking old ideas.

His woodworking design and construction precepts influenced how we think and talk about the subject. He was not alone, of course, but he spoke with a clear voice that was widely heard.

Mahogany cabinet by Tage Frid.

Photos, this page: Vincent Laurence (top); Susan Kahn (bottom)

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Tage Frid

(Continued from p. 22)

take a job teaching woodworking at the School for American Craftsmen, first at Alfred University and then later at Rochester Institute of Technology. During those early years as a teacher, Frid continued to make and sell furniture in his trademark Danish-modern style.

In 1962 Frid launched the first college-level program in woodworking and furniture design at Rhode Island School of Design (RISD), where his influence flourished for the next quarter century. Many of his students went on to become teachers themselves. From 1979 to 1985, Frid wrote the classic series of books *Tage Frid Teaches Woodworking*. Volumes 1 (Joinery: Tools and Techniques) and 2 (Shaping, Veneering, Finishing) were so well received that they were combined into one text and reissued in 1993.

Although he was classically trained, Frid's take on furniture making was forever practical, grounded perhaps by his time-is-money experience as a working craftsman. He was as equally comfortable using a belt sander as he was a handplane. As he said in an interview that appeared in *Fine Woodworking* (issue #52, pp. 66-71), "A lot of people get romantic about their tools. I don't care about the tools. I use anything that will get the job done. The end result is what counts."

For more about Frid, read the article by former RISD student Hank Gilpin (*FWW* #146, pp. 80-85), a touching and humorous account of learning from the master. You also can learn more about the man in his own words in the very first article Frid wrote, titled "Woodworking Thoughts," in *FWW* #1.

—William Duckworth, associate editor

Reproduction table and chairs at center of Louisiana Purchase bicentennial

Part of history. *Greg Arceneaux's Creole-style table was used at a reenactment of the signing of the Louisiana Purchase, a bicentennial event attended by dignitaries from France, Spain, and the United States.*

When the 200-year anniversary of the Louisiana Purchase was reenacted recently in New Orleans, with dignitaries present from France, Spain, and the United States, it was the end of a long road for Louisiana cabinetmaker Greg Arceneaux.

In 1988, after a fire destroyed part of the Cabildo, the old territorial capital, Arceneaux was asked to reproduce the 15-ft. mahogany table upon which the land treaty was signed, as well as 15 pecan chairs that surrounded the table. He worked from original specifications and completed the project in time for the reopening of the museum in 1991.

The December 2003 reenactment concluded a year-long celebration in Louisiana of the deal that netted the embryonic United States more than 800,000 square miles—an area that now comprises 15 states—for the relatively paltry sum of $15 million. Actors used Arceneaux's table and chairs to recreate the 1803 event.

The furniture is an example of the Creole style, which was popular in the Mississippi River valley for more than 100 years (roughly 1705 to 1825).

As requested, Arceneaux aged and distressed the pieces. He said his family still laughs about the time his 12-year-old daughter, who had been enthralled with the project and helped to rush the seats, took a field trip to the newly reopened Cabildo and proudly announced to the museum's tour guide, "My daddy built these."

The docent replied, "No, darlin'. That table is 200 years old. He couldn't have."

—Asa Christiana, managing editor

Headley wins the Cartouche Award

Mack Headley, master cabinetmaker at Colonial Williamsburg's Anthony Hay Shop in Williamsburg, Va., received the 2004 Society of American Period Furniture Makers' Cartouche Award at Colonial Williamsburg's "Working Wood in the 18th Century" symposium last January.

The award, named and designed for the decorative carving on top of case furniture, is given for lifetime achievement. It acknowledges Headley's woodworking skills, his knowledge of early cabinetwork, and his contributions over 23 years as a teacher, lecturer, and author. Headley creates reproduction furniture for Colonial Williamsburg's exhibition buildings. His work has appeared in *Fine Woodworking* (#150, p. 84), and he has written about shell carving, cabriole knees, and ball-and-claw feet in past issues of the magazine.

—Marcia Ryan, assistant editor

Photos, this page: Courtesy of Greg Arceneaux Cabinetmakers (top);

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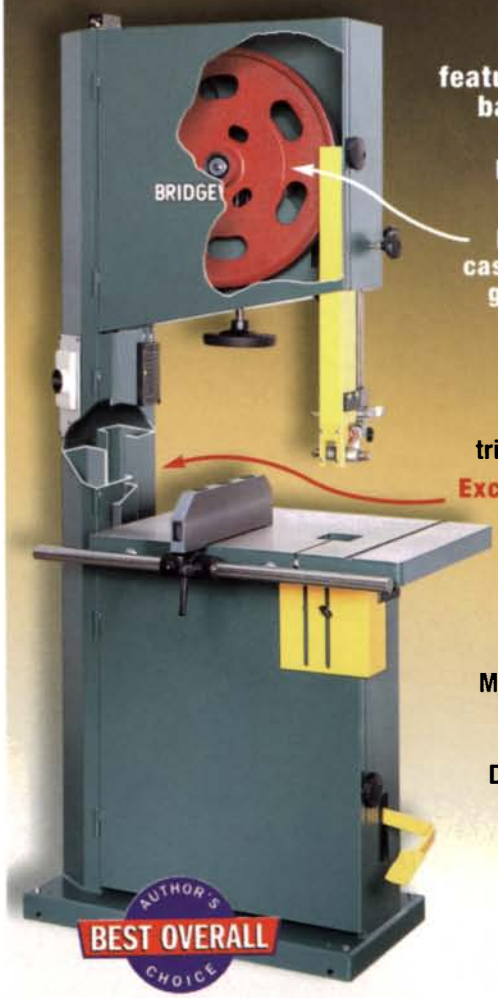

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BY PHILIP C. LOWE

Making split turnings

Split turnings have been incorporated into furniture since the 17th century and continue to be used as ornamental details in modern designs and reproductions. As the name suggests, these elements are turned round and then split into segments. Most often, split turnings are applied to the facade of furniture or buildings.

I have worked on a few antiques that incorporate incredibly fine split-turned elements. Some featured half-round turnings as surface decorations, while quarter-round turnings often decorated the interior or exterior corners of a piece. There are examples of other fractions of a round. Three-quarter turnings, for instance, were adopted in architecture to serve as a "bumper" to protect the outside corner of a wall.

For the most part, early split turnings were turned round and then sawn apart by hand—a precarious job, to say the least. After the turning was split, the maker handplaned the back side and applied it to furniture. This technique is apparent in many museum pieces on which half-round split turnings are not exactly half round. The modern process is more reliable and involves far less risk of making a mistake. Dimensioned parts are glued into a single turning block, or billet, with a piece of kraft paper between each joint. After the billet has been turned on the lathe, it is split apart at the paper joints, which produces matching parts.

Add a layer of paper to the glue joints

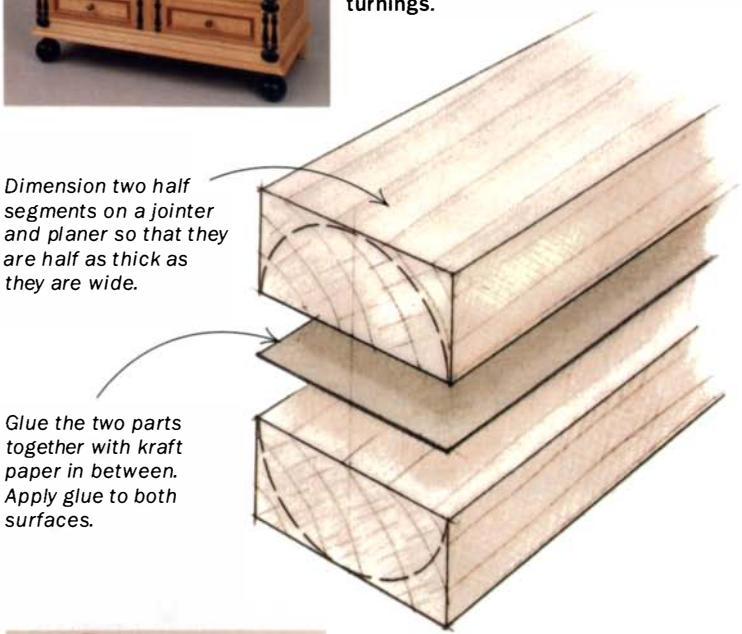
To make a quarter-round split turning, glue up four segments that are equal in width and thickness into a billet. Between each segment place a sheet of brown kraft paper, which will provide a secure bond for turning on the lathe but will make the joint easy to break after the billet has been turned. The paper should be of medium to heavy weight (40 lb. to 75 lb.). The thicker or heavier the paper, the easier the billet will be to split. I often use recycled brown packing paper or grocery bags.

Apply glue to the surfaces of both adjoining segments. You can think of the paper as a very thin piece of veneer: It must have a glue bond with both segments. Water-soluble adhesives, such as hide, white, or yellow glue, work best because they are easy to remove after the parts are split.

Glue up in stages—Quarter-round split turnings require two stages of glue-up. First, glue up two pairs of quarter segments with paper in between, and then plane a flat surface on each piece. Follow the same gluing procedure to assemble the two halves into the final turning billet. When preparing the stock for quarter segments, you can dimension the pieces so that they are slightly thicker than

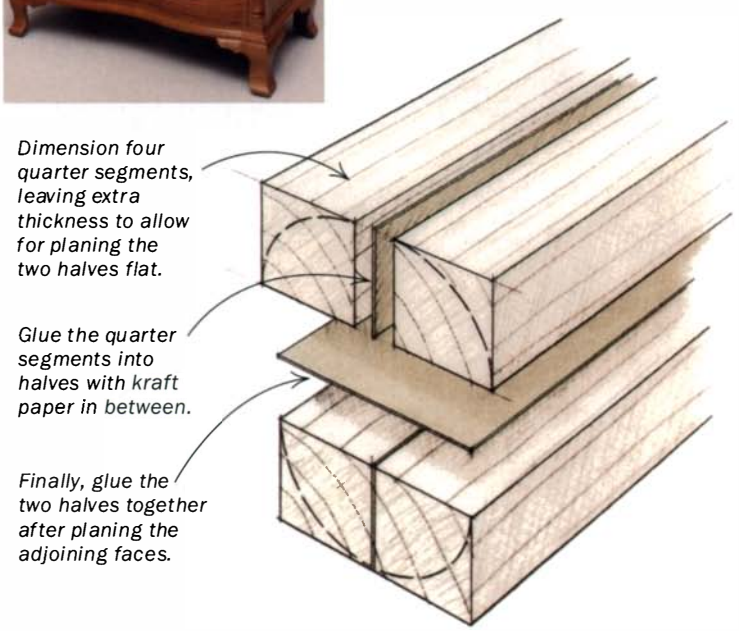
HALF ROUND

The facade of this 17th-century reproduction cupboard by Bill Brown features half-round split turnings.



QUARTER ROUND

This serpentine chest of drawers by Steven Franklin illustrates how quarter-round split turnings are used on exterior corners.



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GLUE UP SEGMENTS INTO A TURNING BLANK

*For a quarter-round split turning, begin by gluing up segments in pairs. Apply glue to both surfaces and clamp them with a piece of kraft paper in between (**1**). Hand-plane the surface of each half to remove any glue squeeze-out (**2**), and then glue up the halves with kraft paper between them (**3**). Clamp the halves (**4**). Make sure the glue is completely set before mounting the billet on the lathe, to prevent premature separation.*

they are wide. That way, when they are glued up into halves, you can plane one surface flat and run it through the thickness planer to make the surfaces parallel. Providing this extra material from the start allows you to remove material and still come up with a square piece when the two halves are joined.

Follow the same basic steps when preparing split turnings of other fractions. For instance, half-round split turnings consist of two glued-up pieces dimensioned so that the thickness is equal to half the width.

Center the billet on the lathe

Before mounting the billet on the lathe, drill a pilot hole in each end for the headstock and tailstock centers. If you drive the conical points on the centers into the ends without making pilot holes, the billet may split prematurely. This can make for an unsafe situation, as the billet has a greater chance of breaking apart and flying off the lathe while you are turning it. It's also important that the headstock and tailstock centers hold the billet as close to the middle as possible. Mounting the billet perfectly centered ensures that the pieces, once separated, will be exactly the same size. Use the intersection of the paper joints as a centerpoint. Also, if you use a spur center, don't align the spurs with the joints.

Turn with gouges and a skew chisel—Once the billet is mounted on the lathe, begin by rough-cutting a cylinder with a large flat gouge. Map out the profile of the design on a story stick and mark the location of various elements (for example, the beginning and end of a cove) on the cylinder. A parting tool, along with calipers adjusted to the appropriate diameters, is used to turn any fillets or flats and to establish critical dimensions. I generally turn beads and quarter-rounds with a skew and use gouges of the appropriate size to cut the coves. I also use a gouge to cut a taper, or a slightly convex profile known as an entasis. The final step is sanding.

Remove from the lathe, and split

When the turning is complete, remove it from the lathe. With the turning upright on a solid surface, break it apart with a stout mallet and the widest chisel you have. Place the cutting edge of the chisel on the paper joint. As you strike the chisel, angle it so that the bevel and the flat side of the chisel are at equal angles to the

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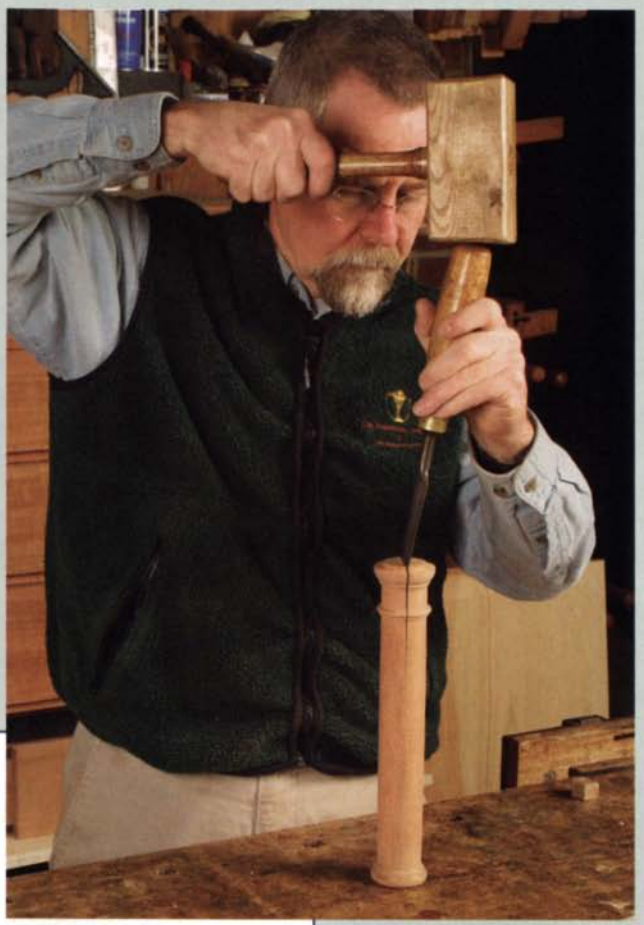
SPLIT THE TURNING

Finish the turning. *Use a roughing gouge, a spindle gouge, a skew chisel, and a parting tool to turn the billet to its final shape.*



Split with a chisel. *Wedge the chisel into the glue joint and tap it carefully with a mallet until the turning begins to split apart.*

work and cleave the turning along the glueline. The fibers of the paper will begin to separate.

As you drive the chisel farther into the turning, it may be necessary to rotate the chisel on its side to prevent the handle from hitting the workpiece. Continue to drive the chisel down the turning by striking the chisel on its edge until the segments pop apart. Try to restrain the halves so as not to drop and bruise them. Follow the same procedure to split apart the quarter segments.

Remove glue and paper before application

Wipe down the flat side of the turning with a damp cloth soaked in hot water to remove the excess paper and glue that remain. As the adhesive softens, scrape it off gently with a wide chisel, card scraper, or hook scraper. To speed things along, you can waft the glue surface with heat from a heat gun, but be careful not to burn the edges. Repeat this until all of the residue is gone.

Apply a finish—You have two options for finishing. If you decide to apply a finish to the turning on the lathe before it is split, you will need to use a varnish or polyurethane product, which won't be affected by the water and heat used during the glue-removal process. You also can finish the turning after it is split and clean of glue and paper. Temporarily mount the turning on the furniture piece with wood screws from behind or with double-faced tape. Mark the turning's location, then remove it and mask off the area to leave a clear spot where you will apply glue. Finish the furniture piece and the turning separately, and then glue the turning into place. □

Scrape away leftover glue and paper with a chisel. *Drag the chisel over the surface with the bevel facing forward. Hide glue is easier to remove with water and heat than yellow glue, but either choice is fine.*

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Tools & Materials

New 14-in. bandsaw from Rikon offers good value

Rikon Power Tools recently introduced a 14-in. bandsaw, model 10-320. And considering its relatively low cost, the saw proved to be a solid performer.

It has a frame built from folded sheet metal, a construction commonly used by European bandsaw manufacturers. The resaw and rip capacities measured 6⅛ in. and 13⅝ in., respectively, numbers typical of most 14-in. bandsaws.

Power is provided by a 1-hp, 9-amp, 120v, totally enclosed fan-cooled (TEFC) induction motor. Unlike non-enclosed induction motors, a TEFC motor is much less likely to be affected by dust.

The saw has two speeds: 1,445 ft. per minute (fpm) and 2,950 fpm. The slower speed generally is used for cutting plastics and nonferrous metals. Changing from one speed to another was relatively quick and easy.

In terms of flatness, the table showed a dish of 0.005 in., well within acceptable tolerances. Both wheels were only slightly out of round: the top wheel by 0.004 in., and the bottom wheel by 0.005 in. Both values are acceptable.

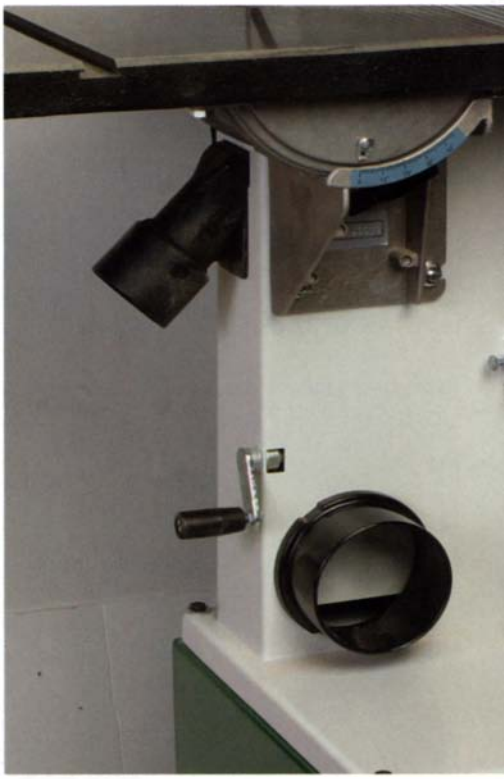
As a rule, a bandsaw blade is easiest to track when the upper and lower wheels are in the same plane. I found the wheels to be perfectly parallel when viewed from above. But when viewed from the side, the two wheels were misaligned by 0.200 in. That compares with an average misalignment of 0.106 in. in a previous review of 14-in. bandsaws (see *FWW* #153, pp. 92-99). Despite the higher-than-average misalignment, however, the blade tracked just fine.

A rip fence is included with the saw. And while it won't likely be mistaken for a heavy-duty accessory, the fence does offer plenty of adjustment for blade drift. Also, it locked securely in place and was square to the top of the table.

I ran a little test to get a sense of how well the Rikon could handle a heavy cut. First, I installed a sharp, ½-in.-wide, 3-tpi, carbon-steel blade in the saw. Then, using a commercial tension gauge, I tensioned the blade to 15,000 psi. After that, I made several resawing cuts in 6-in.-wide soft maple with the saw set at the higher speed. The Rikon made each cut with little effort.

The Rikon 10-320 sells for about $450. For more information, contact Rikon toll-free at 877-884-5167 or visit www.rikontools.com.

—Tom Begnal is an associate editor.



Rikon includes a pair of dust-collection ports. *The top port accepts hoses from most shop vacuums. The bottom port works with larger dust-collection systems.*

Craftsman QuickRout wrenchless router chuck

Craftsman has introduced a router chuck that allows bits to be snapped in and out of a router without having to wrestle with wrenches. The system has two components: a new chuck that replaces the router's standard chuck and adapters that mount to the shank of each router bit. Craftsman makes the new chucks in three versions to fit various models of Craftsman routers, and one version that will fit any Porter-Cable router.

The QuickRout chuck works much the same way as quick-release fittings used on compressed-air hoses. The bit is held in the chuck by spring-loaded balls that snap into a groove in the adapter.

Adapters are made for both ¼-in.-dia. and ½-in.-dia. shank bits. The ¼-in. adapter attaches with setscrews, while the ½-in. version has a true collet. Although they're removable, the adapters are meant to be left permanently installed on the bits. This means that using

Photos, except where noted: Tom Begnal

Small tenon saw rips and crosscuts precisely

Smooth-cutting handsaw. *Clean, smooth cuts were the norm with this small (12-in.) tenon saw from Adria Toolworks.*

Recently, I had a chance to use a small tenon saw from Adria Toolworks, a company in Vancouver, B.C., Canada, known for making high-quality handsaws. For several weeks, I gave the saw a good workout.

Visually, the saw is a beautiful blend of steel, brass, and African rosewood, also called bubinga. But the saw offers more than good looks.

A 12-in.-long polished blade, made from spring-steel hardened to Rc54, measures 2½ in. wide under the back. It has 13 tpi in a rip pattern. The saw has minimal set, producing a narrow kerf of 0.025 in. The thin (0.020-in.) blade is housed in a sturdy brass back that holds it steady and gives the saw nice heft.

I used the saw to cut dovetails in a cherry chest. Held in the typical three-fingered grasp, the handle fit my hand nicely. The angle of the blade, in relation to the handle, also felt natural.

I liked the thin kerf because it enabled the saw to cut through the wood with little resistance. And the minimal set ensured that once the cut was established, it stayed the course without drifting. The saw was a bit grabby at the start of the cut, but with a really light touch, the cut was established and proceeded smoothly.

I also used the saw to cut some tenons for a chair. In spite of its rip teeth, the Adria still cut cleanly across the grain when sawing tenon shoulders.

In short, I was impressed with the performance of this saw. It's available for about $125 from Tools for Working Wood. For further details, call 800-426-4613 or go to www.toolsforworkingwood.com.

—Chris Gochnour is a furniture maker and woodworking teacher.

Attach the adapter, and the rest is a snap. *Buy an adapter for each commonly used router bit, and then they will snap into your router chuck without the need for wrenches.*

the system will require buying as many adapters, at three for $9.99, as you have router bits. The chuck itself sells for $19.99.

I was pleased to discover that while not flawless, the new Craftsman chuck worked well without degrading the performance of the router or increasing runout. The chuck's instructions warn that only ⅛-in.-deep cuts should be taken, but I found that ½-in.-deep cuts with a ¾-in.-dia. straight bit were not only possible but also were as smooth as cuts made with the same bit in the router's stock chuck. One or two bits seemed to have a little more vibration when used in the QuickRout chuck, but the difference wasn't dramatic.

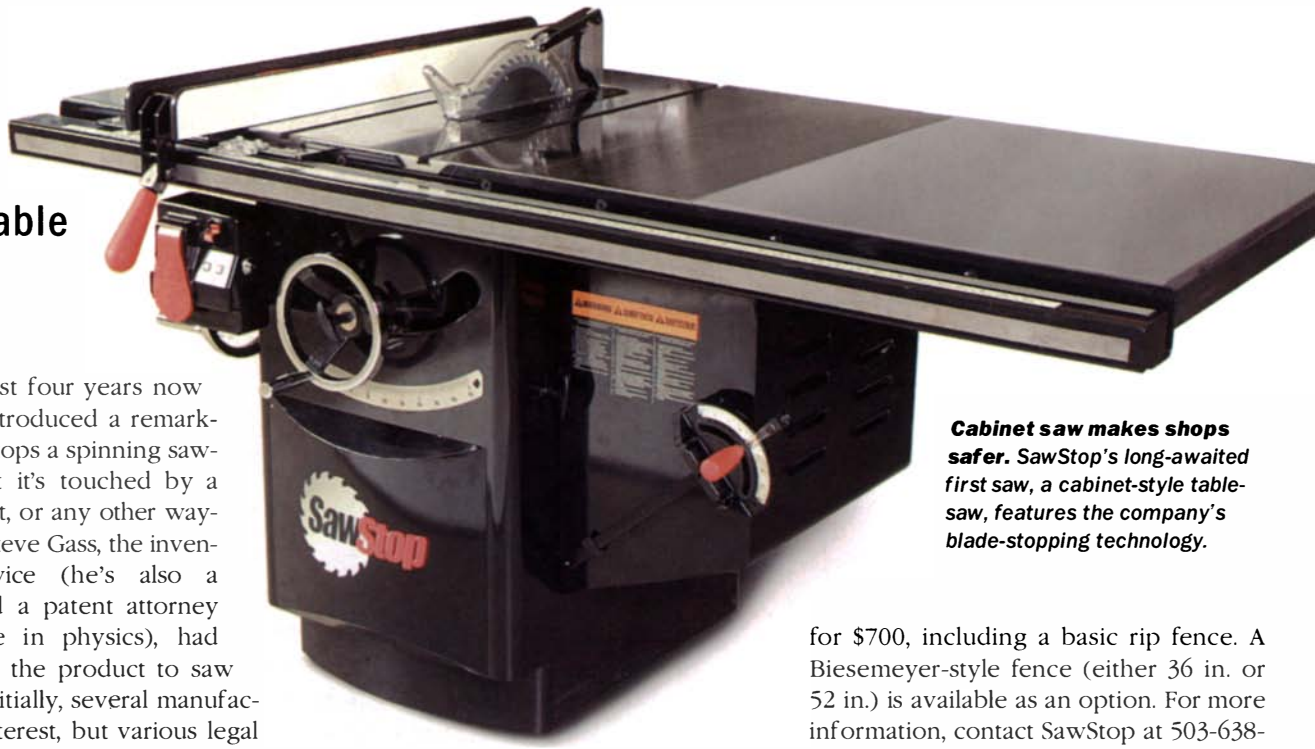
Initially, the bits did not release properly, so I had to blow dust out of the chuck with compressed air and keep a film of oil on the surface of the adapters, both of which were recommended in the instructions. One drawback to using the QuickRout chuck on Craftsman routers is that the chuck is almost an inch longer than the stock chuck, which reduces the available height-adjustment range considerably. The Porter-Cable version of the chuck positions the bit only ¼ in. farther from the motor, which shouldn't cause problems in most setups.

For more information, contact Craftsman at 800-697-3277; www.sears.com.

—John White manages the workshop for Fine Woodworking.

Photos, this page: Chris Gochnour (top); Rodney Diaz (bottom left and right)

SawStop cabinet saw soon to be available



Cabinet saw makes shops safer. *SawStop's long-awaited first saw, a cabinet-style tablesaw, features the company's blade-stopping technology.*

It has been almost four years now since SawStop introduced a remarkable device that stops a spinning sawblade the instant it's touched by a finger, hand, wrist, or any other wayward body part. Steve Gass, the inventor of the device (he's also a woodworker and a patent attorney with a doctorate in physics), had hoped to license the product to saw manufacturers. Initially, several manufacturers showed interest, but various legal and economic issues soon got in the way. Convinced he had a valuable product, and aware that more than 64,000 tablesaw-related injuries occurred in 2001 alone, many from contact with the blade, Gass felt his only good option was to start making his own brand of 10-in. tablesaws.

An experienced Taiwanese tablesaw manufacturer was willing to work with his fledgling company on the project, and together they set about building both a cabinet saw and a contractor's saw under the SawStop name. That was almost two years ago. A few weeks ago, however, abstract ideas became reality as the first preproduction SawStop cabinet saw arrived at company headquarters near Portland, Ore. That's where I got to see it up close.

The SawStop cabinet saw was designed to compete with the popular Delta Unisaw and Powermatic 66 saws. In addition to the SawStop blade-stopping device, the saw has a 3-hp, 220v motor, with a 5-hp motor as an option. The motor includes a five-year guarantee.

For those occasions when the blade guard interferes with a cut, it can be removed (or replaced) in just seconds. To help prevent kickback, the saw also includes a riving knife that attaches as easily as the blade guard.

The first production run of the cabinet saws is expected to be available this summer. The basic 3-hp saw sells for $2,200, not including a rip fence. SawStop offers two Biesemeyer-style rip fences. The 36-in. fence sells for $250; the 52-in. version costs $350.

The 1½-hp contractor's saw, also expected to be available this summer, will sell for $700, including a basic rip fence. A Biesemeyer-style fence (either 36 in. or 52 in.) is available as an option. For more information, contact SawStop at 503-638-6201 (www.sawstop.com).

Look for a comprehensive review of a production-line version of both saws in upcoming issues of *Fine Woodworking*.

—*T.B.*

Push block has a retractable heel

A lot of push blocks have flat bottoms and nonslip surfaces that let you push against the face of a board as it's fed into a tablesaw blade or jointer knives. Other push blocks include a heel that hooks over the end of a board to provide exceptionally secure pushing force. Now, however, you can get both features in one tool. The Joy-Block has a spring-loaded heel that hooks over the end of a board but retracts into the block when pushed against the face of a board.

It's a clever idea that works well. The Joy-Block sells for about $13. For additional information, contact Woodworker's Supply at 800-645-9292 (www.woodworker.com).

—*T.B.*

Two-in-one push block. *With a spring-loaded and retractable heel, the Joy-Block push block can push a board from the face surface (top) or by hooking the heel over the end (bottom).*

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Build a Greene & Greene Side Table

Pinned and plugged joints add beauty and strength

BY GARY ROGOWSKI

Simple is beautiful, so they say. But I also know that simple and beautiful together are challenging to achieve. This became apparent when I set out to reproduce this Greene and Greene side table, which embodies the details and construction techniques practiced by the prolific furniture-making brothers Charles and Henry Greene in the early 20th century.

The table base is assembled with pinned mortise-and-tenon joints; square ebony plugs decorate the pinned joinery; breadboard ends keep the tabletop flat; and the piece features a cloud-lift motif.

Although the construction details are fairly simple, the challenge lay in translating the beauty of the table from photograph to the real thing. At first, I made a scale drawing from the photo, but the table looked oversize and chunky. To overcome my dilemma, I built a full-scale mock-up out of cardboard. This took only a few hours of slicing pieces of cardboard and assembling them with hot-melt glue. If a part seemed too big, I cut it down and rebuilt the model.

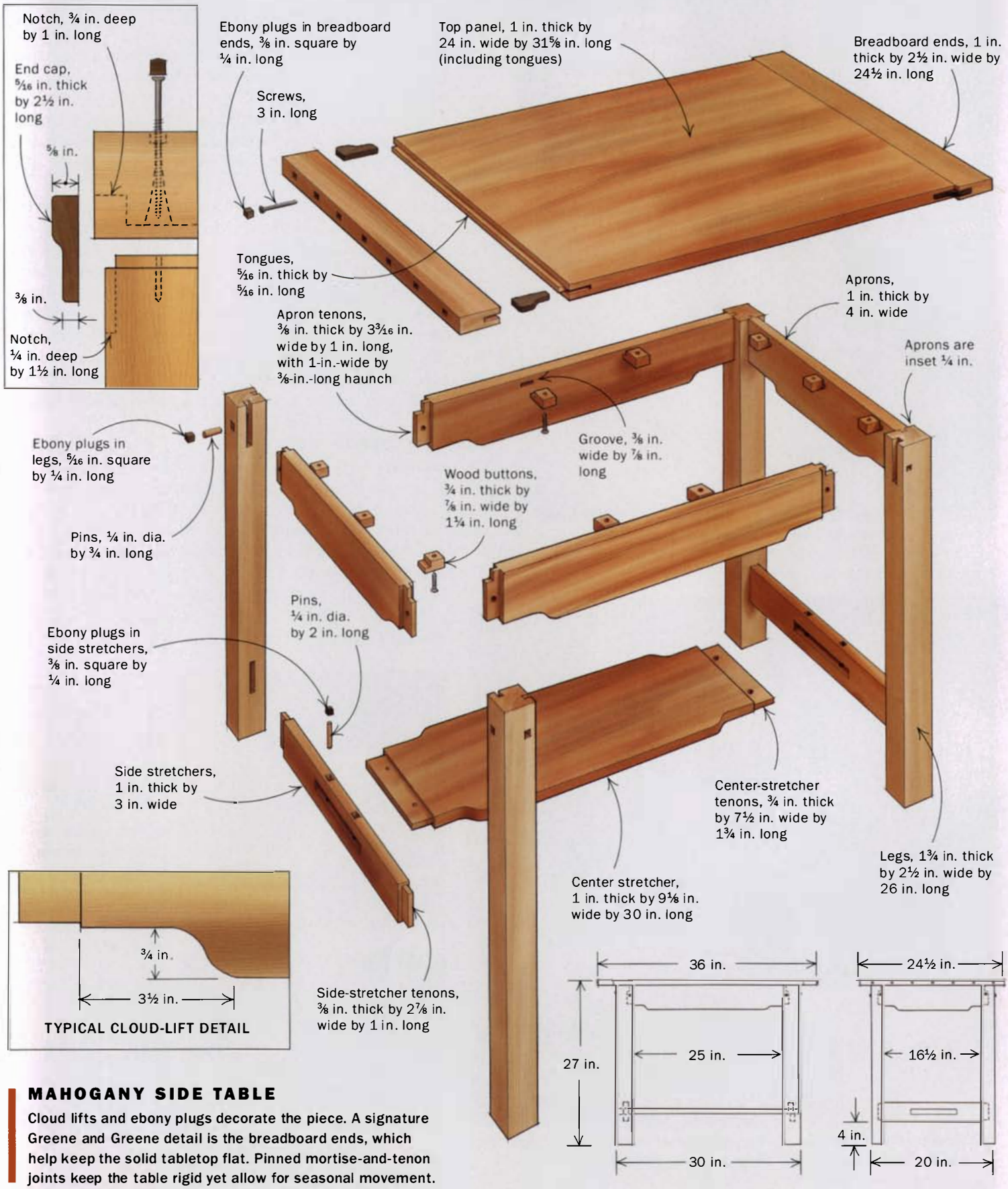
For the tabletop, the aprons, and the stretchers, I chose a thickness of 1 in., which matched the strong appearance of the legs. When I was happy with the look of the cloud lift, I made a template for it out of ¼-in.-thick medium-density fiberboard (MDF) and then transferred the shape to my cardboard aprons. After I drew the breadboard ends on the cardboard top, the design felt and looked right. Now it was time to mill some wood.

Cut mortise-and-tenons first

The table is assembled with mortise-and-tenon joinery that is pinned and plugged. Thick legs provide ample room for the mortise-and-tenon joints from the aprons and stretchers without having them run into each other. All eight mortises for the aprons are the same size, and the tenons are haunched on top. The four mortises for the side stretchers also are the same size, but the tenons are not haunched.

The first step is to mill the legs to final dimension. Once the legs are complete, cut and fit the aprons and the side stretchers. These pieces

Photos, except where noted: Matt Berger; this page: Michael Pekovich

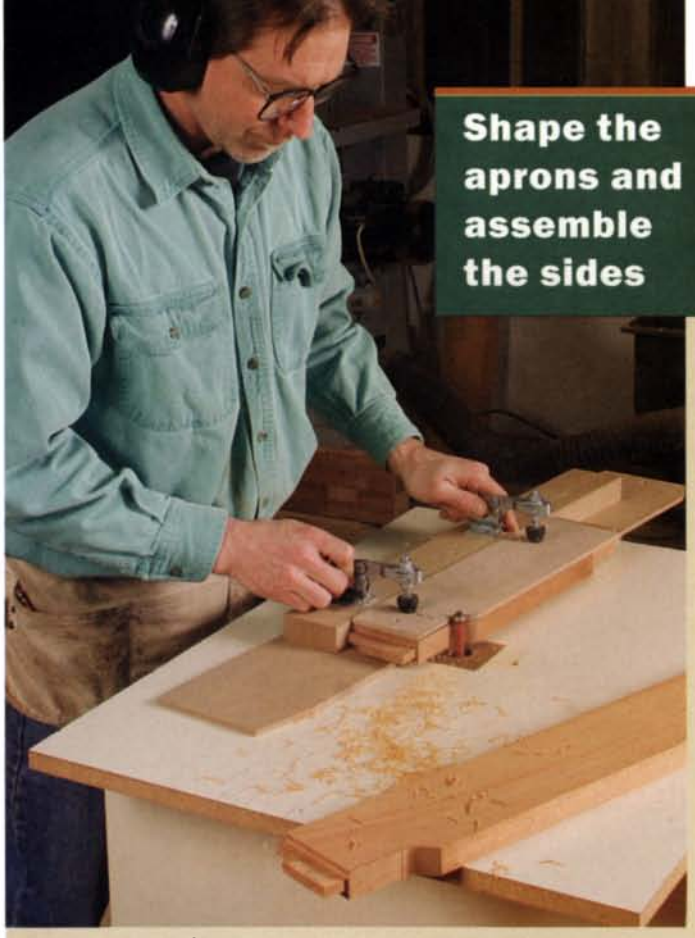


MAHOGANY SIDE TABLE

Cloud lifts and ebony plugs decorate the piece. A signature Greene and Greene detail is the breadboard ends, which help keep the solid tabletop flat. Pinned mortise-and-tenon joints keep the table rigid yet allow for seasonal movement.

Drawings: Chuck Lockhart

Shape the aprons and assemble the sides



Cut the cloud lift with a template and router table. *Rout the cloud-lift motif on the aprons after cutting and fitting the apron tenons in the leg mortises.*

Assemble the table sides. *Apply glue to the tenon cheeks and the mortise walls and then assemble each side separately, checking to make sure they go together square and true.*

should be cut and fitted before shaping the cloud lifts. The tenons can be cut on the tablesaw or on the router table. Fine-tune with a shoulder plane until you achieve a sweet fit.

Cut the through-mortises in the side stretchers—The center stretcher isn't absolutely crucial for the strength of the table, but it is an important visual element. The center stretcher is connected to the two side stretchers with pinned through-mortise-and-tenons. To allow the center stretcher to expand and contract as needed, the holes in the tenons are elongated, and no glue is used in the joint.

Cutting the through-mortises in the side stretchers requires removing a lot of wood, so it's best to do this in steps. First, remove most of the waste on the drill press with a brad-point bit sized slightly smaller than the mortise. Use a fence to keep the bit centered in the workpiece, and clamp a piece of scrapwood to the table under the exit point of the bit to prevent any blowout on the bottom of the workpiece. Next, set up your router table with a ¾-in.-dia. straight bit and make a series of passes to clean out the rest of the mortise. To set the length of cut, clamp stops onto the router-table fence. Finally, square up the mortise ends with a chisel.

Shape the cloud lift

Once all of the joinery on the table base has been cut (except for the tenons on the center stretcher), you can shape the cloud-lift pattern on the aprons. Shaping always comes after joinery so that you can utilize the flat faces and edges for measuring and indexing your cuts. Use a template to trace the cloud lift on each end of the aprons, then rough-cut the shape on the bandsaw. Cut close to the line, within 1/16 in., then use the template as a guide to rout the final shape.

For speed and safety, I made a holding jig for template-routing the cloud lifts (see the top photo at left). Make the

PIN AND PLUG THE JOINTS

Drive in a dowel with glue below the area chiseled square (top). Cover the squared hole with an ebony plug. Bevel the top of the plug on four sides with a chisel (bottom). A piece of veneer placed under the chisel protects the table leg from damage as you pivot the chisel upward on its bevel edge.

Make the stretchers and assemble the base

Dry-fit the base and measure for the center stretcher. *A piece of wood between the bottoms of the legs (above) prevents them from bowing inward. Then center the stretcher and mark for the tenon shoulders (below).*

router cut downhill on the end grain to prevent blowout. If cut properly, it will take only a bit of sanding with 180- and 220-grit paper to clean up the edges. The long edges of the aprons can be scraped or planed where needed, and the corners are rounded first by chamfering with a block plane and then sanding lightly.

Drill and chop for the square plugs

The mortise-and-tenons are pinned for strength and are capped with square ebony plugs. It's easier to drill and square up the holes before assembling the table. Chuck a ¼-in. brad-point bit in the drill press and drill about ¼ in. into the legs where the plugs will be roughly centered in the tenon. Then square up each hole with a chisel. If your squaring is a little off, don't worry. The square plug stock is made a hair oversize and will fill up any little indiscretions. The holes for the pins will be drilled after table assembly.

Now's a good time to sand the parts because it's much simpler to do before assembly. On this table, I planed, scraped, and sanded all of the parts, except for the inside faces of the aprons, which I simply handplaned. Leaving any tool marks will make the piece worth more someday on *Antiques Roadshow.*

Glue up the two side assemblies

This table is easier to glue up in sections, beginning with the side assemblies (legs, aprons, stretchers). But before you break out the glue bottle, test the fit of all parts with a dry run. Dry-assembling any piece is not just a good idea—it's the law in my shop. I know it's hard to stop the building momentum, but just a few minutes of planning and practice will keep your pulse rate nice and low and make for smoother glue-up.

Glue up the base. *Clamp one side of the table to a workbench to help support the project during final glue-up.*

Pins secure the unglued through-tenon. *Drive a dowel through the stretcher and cap it with a square ebony plug. No glue is necessary to hold this joint together.*

First, pull out all of the clamps and clamping pads that will be required and run through the sequence to determine where you need to apply pressure. When you're satisfied with the fit, assemble the parts with glue. Once the clamps are on, check the legs with a straightedge to make sure they are flat and square. If the assemblies are out of square, adjust the clamp pressure as needed. Plane the aprons flush to the tops of the legs after the glue dries.

Pin and plug the joinery—When the assembled table sides are dry, drill for the pins everywhere you made square holes for the

Attach breadboard ends to the tabletop

Cut a groove in each breadboard end. *Center the groove in the board but reference all of the related cuts off the top side of each workpiece.*

Rout a stopped groove for the ebony end caps. *Cut a deep groove in the edge of the breadboard end and a shallow groove in the tabletop panel.*

Rout the tongue. *Creep up on the fit by routing just shallow of the final fit on both sides. Then fine-tune the fit with a shoulder plane.*

Fit the tongue-and-groove joint. *Handplane a slight concave on the breadboard ends to create a tight spring joint.*

ebony plugs. Drive the pins below the surface of the legs with a drift pin. Now you're ready to add the ebony plugs. You can prepare the plug stock ahead of time; just remember that the project requires two sizes of pins and plugs. Mill the plugs square but a bit oversize on the tablesaw, then fine-tune the fit with a block plane. Before cutting off each square plug, chamfer one end of the ebony stock.

The plugs are glued in place with some help from a hammer. When you're driving in a wood plug, you can tell that it's gone far enough when blows from the hammer make a pinging sound. Finally, bevel the plugs to a pyramid with a chisel.

Cut and fit the center stretcher

To size the center stretcher, you first have to dry-fit the base with the long aprons clamped in place. Put a spacer between the bottoms of the legs that is the same length as the long apron (from shoulder to shoulder) to keep the legs from bowing inward. Rest the center stretcher over the side stretchers, then mark the location of the tenon shoulders directly on the workpiece.

Once the shoulder-to-shoulder dimension of the center stretcher

has been determined, establish the tenon shoulders on the tablesaw and cut away the cheeks using the router table. I put 1/16-in. shoulders on the sides of the tenons to conceal any inconsistencies in the fit. These shoulders can be cut on the bandsaw and finished with a chisel. Finally, use a shoulder plane to fit the through-tenons. When fitting a tenon, check it for shiny spots after each test fit. These spots indicate where the tenon is rubbing against the wall of the mortise. Plane a little off these spots until the joint fits perfectly. Finish the tenons by chamfering the ends with a block plane.

Last, rout the cloud-lift patterns on the center stretcher at the router table with the cloud-lift template.

Finish assembling the table base

Final assembly should be done on a flat surface. Once again, dry-fitting the parts is essential before getting out the glue. Put the long aprons into their mortises on one side. Then install the center stretcher. Line up the other side assembly and put all of the tenons into place. Once the base has been glued up, check it for square across its diagonals and adjust as needed.

After the glue dries, stand the table on all four legs and hammer the pins into the mortise-and-tenons on the stretcher system and on the long aprons. Then glue in the ebony plugs on top of the pins.

Shift your sights to the breadboard ends

When gluing up the tabletop, make sure the boards are aligned for looks and grain direction. Milled to the same thickness as the top, the breadboard ends are ½ in. longer than the top is wide. The ends attach with a tongue-and-groove joint and screws set in slotted holes.

On the router table, cut the groove in the breadboard ends first. Then cut the tongue on the top using a plunge router. I sneak up on a good fit by routing the tongue close to size and then using a shoulder plane to fine-tune the fit. Don't force this fit or you'll split the breadboard end along the groove.

Once the breadboard ends are fitted onto the tongues, drill holes for the screws. Elongate the screw holes (making them wider as you move out from center) so that the tongue can shrink and expand inside the groove. Use the tang (handle end) of a ¼-in. round-saw file to ream the hole from the inside. Similar to the pinned and plugged leg joinery, the screw holes in the breadboard ends are squared for ebony plugs.

Another detail to these Greene and Greene style breadboard ends are the shaped ebony caps on the sides of the breadboard end joints, which mimic a spline. These caps are set into stopped grooves cut in the breadboard ends as well as the tabletop. The caps are glued only to the top panel. That way, as the top expands and contracts, it will move inside the breadboard ends and disguise the movement of the top panel (see the top left drawing on p. 37). These stopped grooves are cut on the router table before the parts are assembled, using the same fence setting used for cutting the grooves in the breadboard ends.

Last, handplane a slight concave on the groove side of the breadboard ends. This creates a spring joint to hold the ends tightly to the tabletop. During assembly, apply glue only to the center 2 in. of the tongue. Then drive 3-in.-long screws through the elongated holes. Once the parts have been assembled, plug the screw holes with ebony and chisel the square plugs into pyramids.

The tabletop is fastened to the base with wood buttons that fit into slots on the inside of the table aprons about ½ in. down from their top edges. Make sure the buttons have room to move back and forth in their slots to accommodate any wood movement.

If you've planed, scraped, and sanded all of the parts ahead of time, the table should be ready for a finish. I used three coats of garnet shellac rubbed out with rottenstone for an even, durable coat. □

Gary Rogowski teaches classes at The Northwest Woodworking Studio in Portland, Ore., where he lives.

DECORATE THE BREADBOARD ENDS WITH PLUGS AND CAPS

Drive screws through the breadboard ends. *The holes on either side of center should be elongated to allow the panel to expand and contract.*

Apply the ebony plugs and end caps. *Glue the ebony end cap only to the tabletop panel so that it can move freely in the breadboard end.*

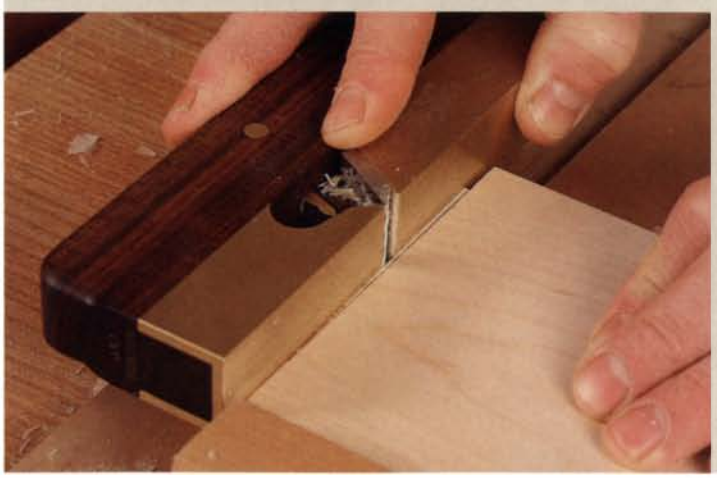
Shoulder Planes Reviewed

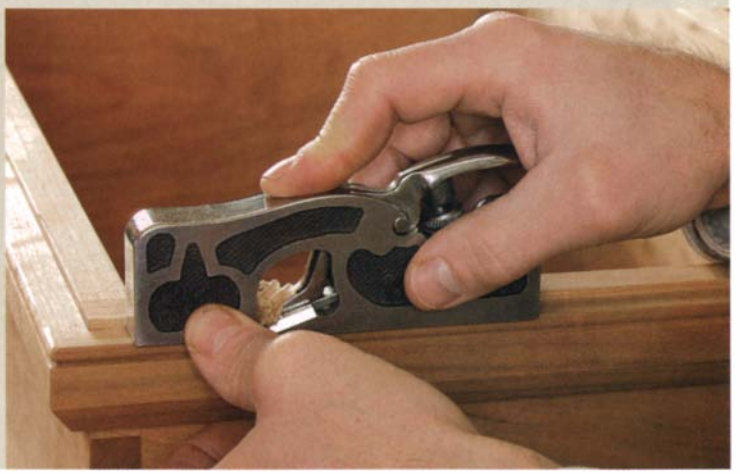
Furniture makers can choose from a wide variety of high-performance tools

BY CHRIS GOCHNOUR

Three tools that always find their way to my workbench are the smoothing, block, and shoulder planes. Of the three, the shoulder plane commonly is viewed as a specialized tool with limited application, but this is not true. In a college furniture-making class I teach, students generally bring their own smoothing and block planes but end up borrowing my shoulder plane daily. Their actions confirm what I concluded some time ago: There is a never-ending list of tasks for a well-tuned shoulder plane.

A shoulder plane is a member of the rabbet-plane family. Its body has open sides, and the blade projects slightly from each side of the plane. Unlike the rabbet plane, which is designed to create





SUITED FOR A VARIETY OF TASKS

Shoulder planes excel at fitting tenon cheeks (top left), tuning shoulders (bottom left), and cleaning up trim (below). These tools cut cross-grain, long-grain, and end-grain wood.

CLIFTON

www.highlandhardware.com 800-241-6748
www.thebestthings.com 800-884-1373

420
Body: ¾ in. wide by 8 in. long
Weight: 2 lb. 10 oz.
Price: $220

3110 3-IN-1 PLANE
Body: 1⅛ in. wide by 6 in. long
Weight: 2 lb. 1 oz.
Price: $230

410
Body: ⅝ in. wide by 5½ in. long
Weight: 1 lb. 2 oz.
Price: $215

Clifton is a maker of hand tools in Sheffield, England, a historic mecca for steel- and tool-making.

Each of the Clifton planes has a cast-iron body, which is ground and polished. The lever caps are made from unbreakable, malleable iron. The machining of the Clifton 420, 3110, and 410 was of high quality; except for the sole of the 3110, which required slight lapping, the soles and sides of these planes were straight and true.

The ⅛-in.-thick blades, made from oil-hardened tool steel, contributed to a solid, chatter-free cut. Blade adjustments are made by knurled captive nuts that engage the blade via a slot in its back. Although smooth and precise, with minimal backlash (slop), the nuts inadvertently slightly altered the blade's lateral position.

The wide blades on the Clifton planes require them to be set either to the left or to the right for use. To avoid this adjustment, the blades can be ground narrower.

The Clifton 420 is an excellent general-purpose shoulder plane, well suited for a wide variety of trimming and tuning tasks. Its moderate weight and narrow body made it easy to grasp. The tool's tall profile provided good clearance from obstructions for the palm and fingers, while its lever cap served as a comfortable palm rest and, in certain situations, could be grasped as a handle. However, it was not as easy to hold while the plane was used on its side to shoot tenon shoulders. The tool's narrow mouth helped minimize torn grain and made nice end-grain and cross-grain shavings possible.

Versatile plane. *Removing the nosepiece from the Clifton 3110 converts the tool to a chisel plane for cleaning up tight areas.*

The Clifton 410 is a smaller version of the 420. Its light weight and slender body made it easy to hold in one hand, so the plane could be used to access awkward or confined places, such as when cleaning the bottom of dadoes and grooves.

The Clifton 3110 is a fine general-purpose shoulder plane in its own right, but it has the added benefit of being able to convert to a bullnose plane or a chisel plane.

In shoulder-plane mode, the 3110 covered ground quickly, working tenon cheeks cross-grain. Its width also made it the easiest of the Clifton planes to hold while shooting tenon shoulders. The tool had a tight mouth and came with two additional shims, enabling me to regulate its opening.

The 3110 can be converted to a bullnose plane by unscrewing the long nosepiece and replacing it with a shorter one. By removing the nosepiece altogether, the 3110 becomes a chisel plane.

a joint rapidly, the shoulder plane's purpose is to refine and perfect existing joinery. I use it to trim the cheeks of a tenon so that the joint has a pistonlike fit; to pare a tenon's end-grain shoulders to make an invisible glue joint; to eliminate machine marks from rabbet joints; to refine molding details and perfect their alignment; and to perform tasks that require a plane capable of working into a corner. The heft of the tool, its tight mouth, and comfortable fit in hand make controlled and precise cuts easy.

Shoulder planes can be made from either metal or wood. And even though they look quite different, both versions are capable of producing quality results. Metal shoulder planes generally have blades bedded at a low angle (20°) with a 25° bevel facing upward. The effective cutting angle is about 45°, low enough for end- and cross-grain work yet still capable of producing good results working with the grain.

Watch it on the Web — **For more on using shoulder planes, go to www.finewoodworking.com.**

The blades of wooden-body planes, on the other hand, are bedded at a much steeper angle, and their bevels face downward. This makes for a steeper

Photos: Mark Schofield

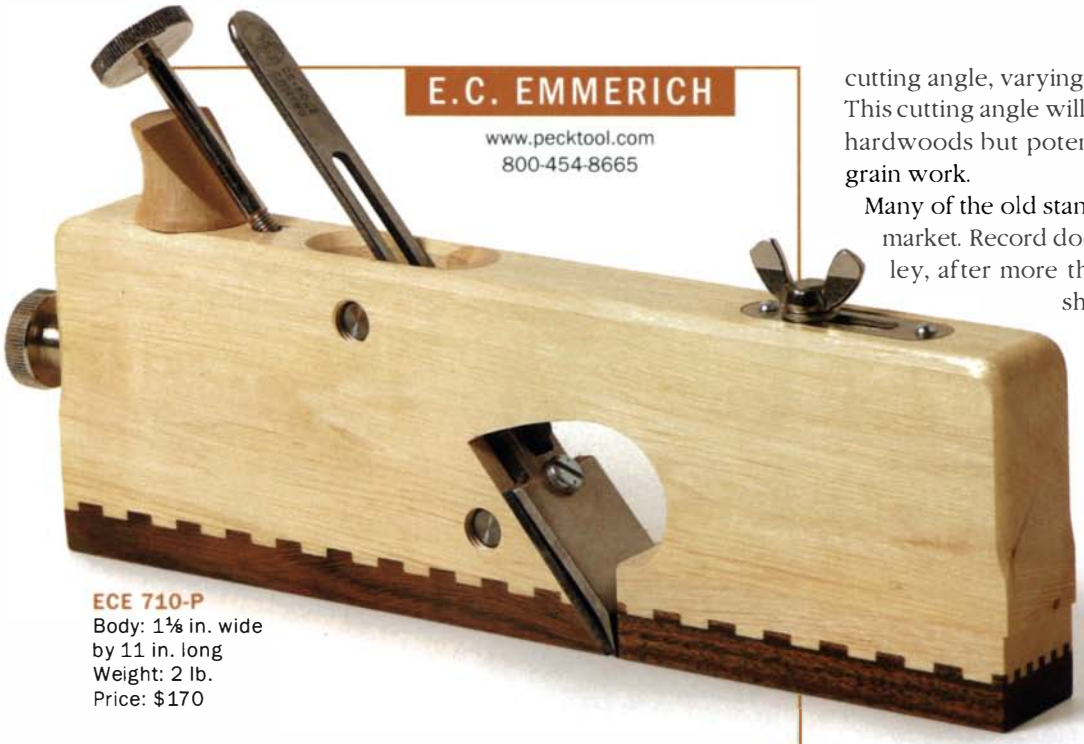
cutting angle, varying from 50° to 65°, depending on the model. This cutting angle will excel in long-grain work with challenging hardwoods but potentially can limit the plane's utility in end-grain work.

Many of the old standard shoulder planes are no longer on the market. Record doesn't make hand planes anymore, and Stanley, after more than 100 years of manufacturing excellent shoulder planes, has stopped production. The good news is that many smaller manufacturers around the world have stepped up to fill the void, producing some of the finest and most diverse hand-planes ever made.

I looked at 14 shoulder planes in a wide range of styles and sizes from seven manufacturers. To be as objective as possible, I sharpened all of the plane blades at 25° and then honed them with a 2° microbevel, polishing to 8,000 grit using waterstones. I then put each plane through a series of tests on a variety of woods.

E.C. EMMERICH

www.pecktool.com
800-454-8665

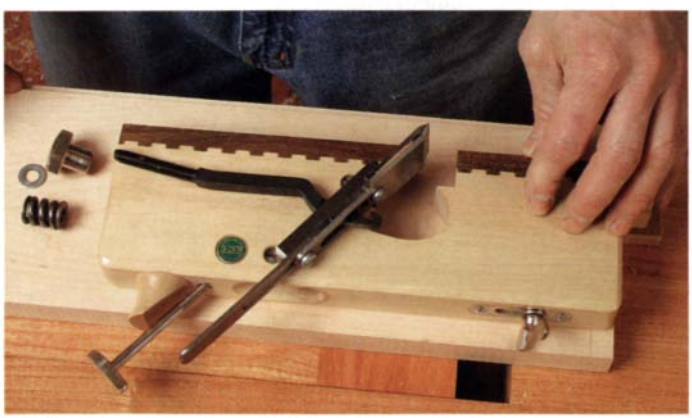


ECE 710-P
Body: 1⅛ in. wide by 11 in. long
Weight: 2 lb.
Price: $170

This German-made tool is the only all-wood-body plane I tested. The horn-beam body is toothed to a rock-hard lignum vitae sole that glides over wood. The plane I received was slightly out of true, but flattening its sole required little effort. The mouth is adjustable not only for use but also because the double iron that's installed from the plane's sole requires the mouth to open wide and allow the iron's passage.

Unlike most wooden planes, the E.C. Emmerich doesn't use a wedge to hold its blade. Rather, it uses the Primus adjustment mechanism (see the photo below). The depth adjuster works in harmony with a spring bar to reduce backlash and blade chatter, but this system made blade changes cumbersome. Two adjusting screws on the plane's side did an excellent job of setting the blade laterally.

The plane was best suited for two-handed use—a one-handed grasp was awkward—and the plane's tall profile gave my fingers ample clearance from obstructions. Although the plane was capable of end-grain work, it excelled at long-grain rabbet work, and its 50° pitch reduced torn grain in figured wood.



Unique adjustment. *The E.C. Emmerich plane employs a Primus blade-adjustment mechanism, which has a spring-loaded bar that hooks the center of the chipbreaker/blade and pulls it against the bed.*

H.N.T. GORDON

www.craftsmanstudio.com 888-500-9093

Whatever type of work you do, there's a Gordon shoulder plane to fit your needs. Made in Australia, the plane is available in four sizes, ranging in width from ½ in. to 1¼ in. Choices for the beautiful hardwood bodies include rosewood, ebony, ironwood, and gidgee. The wood is housed in a brass channel to ensure that the sole and sides stay true through extended use. Held firm by a wedge that abuts a pivoting brass block, the blade is bedded with its bevel down at a steep 65° pitch. Flip over the blade so that the bevel faces up, and the tool becomes a scraping plane. This is a nice bonus if you're working challenging grain. Blade adjustments are done with a

½-IN. PLANE
Body: ½ in. wide by 5⁵⁄₁₆ in. long
Weight: 10 oz.
Price: $120

¾-IN. PLANE
Body: ¾ in. wide by 7 in. long
Weight: 1 lb.
Price: $130

I began by machining 1½-in.-long tenons on 5-in.-wide hard maple. Then I cut the shoulders 1° out of square and kept the tenon cheeks oversize. I used each plane to correct the out-of-square shoulders and trimmed the cheeks to fit.

I also used each of the planes to fine-tune the fit of an oversize tongue on a matched joint in quarter-sawn white oak. Finally, I cleaned up sawmarks from a rabbet joint in figured bubinga.

I assessed each tool's performance regarding ease of setup and adjustment, and the blade's ability to hold a keen edge. I evaluated how well they could make a solid and unwavering cut that was chatter-free with minimal torn grain. Finally, I considered the ergonomics, comfort, and balance of the tool in my hands. Test evaluations for each tool are discussed on pp. 43-47.

Chris Gochnour is a frequent contributor to Fine Woodworking *on hand tools.*

LIE-NIELSEN

www.lie-nielsen.com
800-327-2520

073
Body: 1¼ in. wide by 8¼ in. long
Weight: 3 lb. 12 oz.
Price: $225

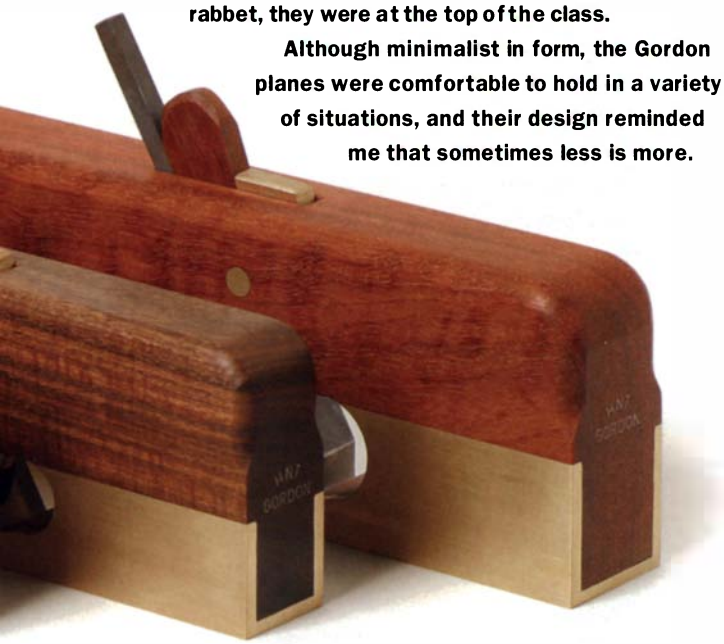
½-IN. BRONZE
Body: ½ in. wide by 5½ in. long
Weight: ½ lb.
Price: $160

small wood hammer; this takes a bit of getting used to, but the instructions offer some helpful guidance.

I was impressed with how consistent and well-made the Gordon planes were. All four had tight mouths, the sole and sides were square and true, and the blades fit the planes perfectly.

I was skeptical of how planes with such a steep pitch would handle end- and cross-grain work. But these tools had no problem working maple end-grain shoulders, repeatedly taking full-length shavings. With blades sharp, the Gordon planes also had no problems with cross-grain work, and when planing the figured bubinga rabbet, they were at the top of the class.

Although minimalist in form, the Gordon planes were comfortable to hold in a variety of situations, and their design reminded me that sometimes less is more.



1-IN. PLANE
Body: 1 in. wide by 7¾ in. long
Weight: 1½ lb.
Price: $135

1¼-IN. PLANE
Body: 1¼ in. wide by 8$^{11}/_{16}$ in. long
Weight: 2¼ lb.
Price: $145

Lie-Nielsen's 073 is an all-metal shoulder plane based on the classic English design of Edward Preston. The body is cast from ductile iron, a strong and resilient material that is less brittle than gray iron. The tool has a highly polished bronze lever cap, and the mouth opening can be adjusted easily by a movable toe shoe. A screw in front regulates the movement in and out, and a screw on top locks the shoe in place.

The cryogenically tempered A2 steel blade adjusted smoothly with very little backlash, but changing the depth did have the problem of slightly altering the blade's lateral position.

The body was ground absolutely flat and square, although some of the edges were a bit sharp. The blade fit the body well, allowing me to use the plane on either side without having to adjust the blade. Honing the blade prior to use was all it took to put the Lie-Nielsen 073 into action.

The plane's tall body gave fingers and palms good clearance from longer tenons, and the wide blade covered ground quickly when sizing tenon cheeks. I found the 073 to be excellent on large work that required a two-handed grasp, but the tool's length, width, and weight made it less ideal for one-handed use.

This plane is a rock-solid performer. If you're looking for a larger shoulder plane, the Lie-Nielsen 073 is sure to please.

In the tradition of fine English infill planes, the Lie-Nielsen ½-in. plane is cast manganese bronze filled with rosewood. The A2 blade is secured in place with a wooden wedge that also serves as a pad for the palm of your hand. Blade adjustments are made in the traditional way with a setting hammer.

The machining of the tool was exact: It had a flat sole and square sides, the mouth was tight, and the blade fit the body closely. Despite the tool's diminutive size, its bronze and rosewood body provided surprisingly good heft. Too small to be a general-purpose shoulder plane for cabinetmakers, it excels as a small plane for fine detail work, miniatures, or models.

ST. JAMES BAY

www.stjamesbaytoolco.com
800-574-2589

1-IN. INFILL
Body: 1 in. wide by 8 in. long
Weight: 3 lb. 10 oz.
Price: $300

Custom-made by a small company in Mesa, Ariz., this infill plane is cast from bronze and has a cocobolo infill and wedge. The Norris-type blade adjuster fit loosely in the body but still worked well. However, in some situations, the long blade and adjustment knob were right where I wanted my palm to rest. The blade is made from oil-hardened tool steel and really held an edge well when repeatedly punished on some white-oak end grain.

This is one of the heaviest planes I looked at, with consequent advantages and disadvantages. It was tiring to hold for long periods of time, especially with one hand. Conversely, its great heft made it absolutely solid in trimming end-grain shoulders and figured hardwood. Akin to a train, the tool was slow to get moving, but once set in motion, there wasn't much to slow it down. This plane is finely crafted, aesthetically pleasing, and gave a solid performance.

Prominent depth adjuster. *The St. James Bay plane's blade adjuster works well, but its great length sometimes makes holding the plane awkward.*

Tuning a shoulder plane

A shoulder plane is a precision tool and must be fine-tuned to get the most out of it. First, check that the plane's sides are parallel with each other. if they are not, it is probably best to return the plane to the manufacturer. You also should check that the plane's sole is square to its sides and flat.

If it is necessary to true the sole, clamp a square block of wood to a dead-flat abrasive surface. With the plane assembled, tensioned, and ready for use, but with the blade retracted into the plane's body and flush with the plane's side, hold the tool square against the wooden guide block and lap the sole true.

Next, check that the blade fits the plane body accurately. it should be parallel to the plane's sole and sides, projecting slightly (0.004 in. to 0.005 in.) from each side. This projection is a bit like the set in a handsaw; it provides necessary clearance. If the blade does not project from the side, the tendency is for the plane to be pushed farther out of the cut with each successive pass, resulting in a cut that is not at an accurate 90°. If it projects too much, the blade can mar the edge adjacent to the surface being worked.

Narrow the blade. *Use writing paper as shims to grind the blade so that it projects 0.004 in. to 0.005 in.*

To correct a blade that is misaligned or too wide, carefully grind the blade into alignment. Extra care must be taken not to make the blade sides too narrow or out of parallel, which would render the blade useless.

I have a favorite method for aligning the blade with the plane's sides and providing accurate side projection. First, secure the blade in the plane's body. Make sure the blade's cutting edge is in alignment with the sole and its sides project equally from both sides of the plane's body. Lock the blade in place and set or position two pieces of 0.004-in. to 0.005-in. shim stock (medium-weight writing or printer paper will do) 1¼ in. apart on an abrasive lapping plate. With the side of the plane resting on the shim stock and the blade exposed to the abrasive, lap the blade into alignment on each side. Be careful to keep the shims free of abrasive particles so that you don't scratch the plane.

Check for squareness. *The sole of the plane should be 90° to the sides. If it's only slightly off and the sides are parallel, correct the problem by flattening the sole. Set up a guide block (right) 90° to the abrasive surface. Check for squareness after each couple of strokes.*

SHEPHERD

www.shepherdtool.com 519-624-7350

1½-IN. STEEL
Body: 1½ in. wide by 8 in. long
Weight: 2 lb. 13 oz.
Price: $264

¾-IN. BRASS
Body: ¾ in. wide by 8 in. long
Weight: 1 lb. 13 oz.
Price: $289

The Shepherd Tool Co. is a small outfit that makes handplanes and kits in Ontario, Canada, reproducing infill planes based on the patterns of legendary planemakers Stewart Spiers and Thomas Norris. The shoulder planes I tested were two different sizes of a Spiers style No. 8. The bodies, made from plates of steel or brass joined with interlocking double dovetails, were appealing because they don't have the internal stresses that can distort a cast plane body. The sides of the planes, however, were slightly out of parallel from bottom to top; this is a situation that would make tuning the planes a challenge. The company assured me that the planes are warranted and that any manufacturing defects would be corrected or the planes replaced.

The dovetail body is filled with attractive cocobolo, which is secured in place with steel pins that are riveted from side to side. The blade is supported its full length by a bed of wood and steel that readily dampens vibration. A sculpted wedge, which doubles as a palm rest, holds the blade in place. Blade adjustments are made with a hammer, and the hook at the rear of the iron makes it possible to retract the iron. On each plane, the blade is much wider than the body and required shifting from side to side in use. I'd make it narrower.

There's nothing quite like an infill plane. If you have shied away from them because of the scarcity of antique originals or because of high-priced reproductions, a Shepherd plane in kit or finished form may be the answer.

Blade adjustment with a hammer. *Both of the Shepherd planes require a hammer to adjust the depth of the blade and to free the blade for sharpening.*

VERITAS

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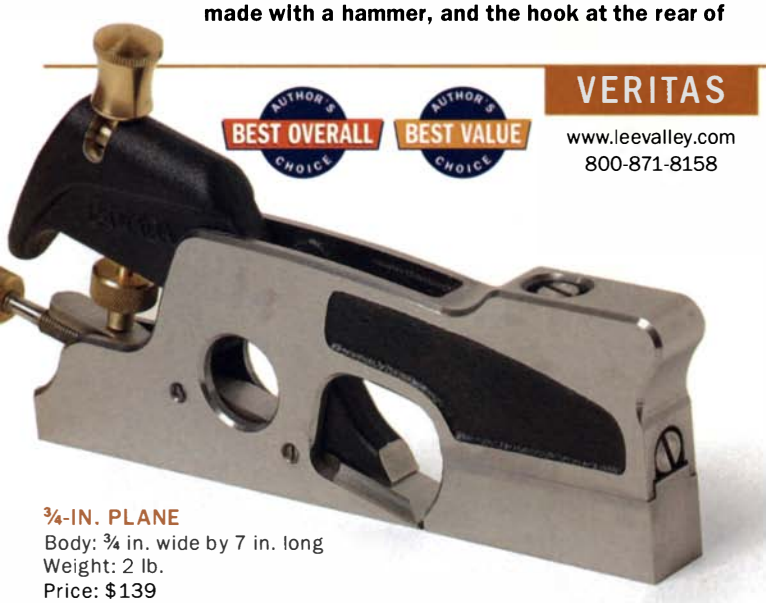
www.leevalley.com
800-871-8158



¾-IN. PLANE
Body: ¾ in. wide by 7 in. long
Weight: 2 lb.
Price: $139

A pivoting hand rest. *The Veritas plane has a knob on the top of the lever cap that acts as a hand rest and pivots 180°.*

Veritas is the latest company to enter the shoulder-plane market. The company's design team is well known for taking a fresh look at traditional designs, and true to form, this plane has some unique and innovative ideas.

The plane's body is cast from ductile iron, and all of its edges are nicely eased. It has an adjustable mouth that is regulated by two screws, one that moves the toe piece in and out and another that locks it in place. The ⅛-in.-thick blade is made from A2 steel and is regulated with a very precise Norris-style adjuster that didn't affect the blade's lateral setting when I tested it.

The blade on the Veritas was a mere 0.003 in. wider than its body, but with setscrews in the plane's side, the blade could be set and held in perfect alignment. The blade projected only 0.0015 in. from each side, which made for accurate and consistent planing into corners.

One of the most unique features of the Veritas plane is its lever-cap design. It has a pivoting knob that let me adjust the plane to fit my hand and holding style. This feature, in conjunction with the finger hole cast in the plane's body, makes the plane suitable for many different situations. I really liked the way the Veritas plane felt in my hands and the excellent results it produced. The price of this plane, its novel features, and all-around good performance make the Veritas a worthy winner.

Inspiration for a Bedside Cabinet

Subtle details complement form and function

BY MICHAEL FORTUNE

When designing a piece of furniture, I never know where an idea is going to come from. Indeed, it sometimes evolves quietly from an unlikely place. That certainly was the case when I designed this bedside cabinet.

During my college days, my apartment had virtually no furniture. One day, however, I had the good fortune to find an old pine chest of drawers in a ditch by the side of the road. I hauled the piece back to my apartment, all the while anticipating the luxury of getting my clothes off the floor.

I figured the chest to be about 200 years old. It was apparent that the builder was both clever and expeditious, as evidenced by back legs that simply were cut out of solid-wood side panels. I ended up living with that chest for 35 years. During that time, I came to appreciate the brilliance of the simple back-leg design. And when I began to design this bedside cabinet, I included the leg curve from that wonderful old chest.

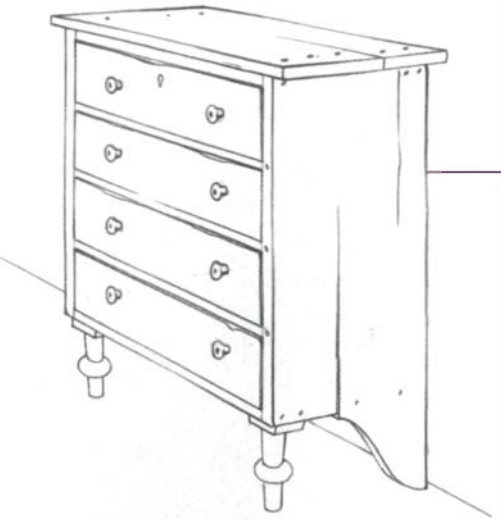
The bedside cabinet also includes a wide cove that runs top to bottom along the back. Initially, it was to serve as a channel for cords from a lamp and an alarm clock. But some rough sketches I made, followed by more detailed drawings, revealed that the cove also introduced an interesting rhythm to the back surfaces of the form.

Photos: Michael Cullen, Trent Photographics

I included the semicircular cutout detail on the bottom of the doors to draw attention to the space under the cabinet. The door cutout also complements the cove at the back of the cabinet.

I wanted to avoid using European-style concealed hinges for the door. Although you can't see these hinges when the doors are closed, European hinges become very visible once a door is opened. I thought the mechanism would look too big on a somewhat smallish piece. I solved the problem by incorporating a bead detail on both sides of the front legs. Then I put two butt hinges within each bead. As a result, the barrel of the hinge simply becomes part of the bead detail. First, though, I had to find a hinge with the appropriate thickness, and then I sized the bead to match the barrel of the hinge.

I've used this bead-and-hinge detail before, with an ebony bead and brass hinges acid-etched to make them black in color.



This found chest was the author's design inspiration for dozens of pieces.

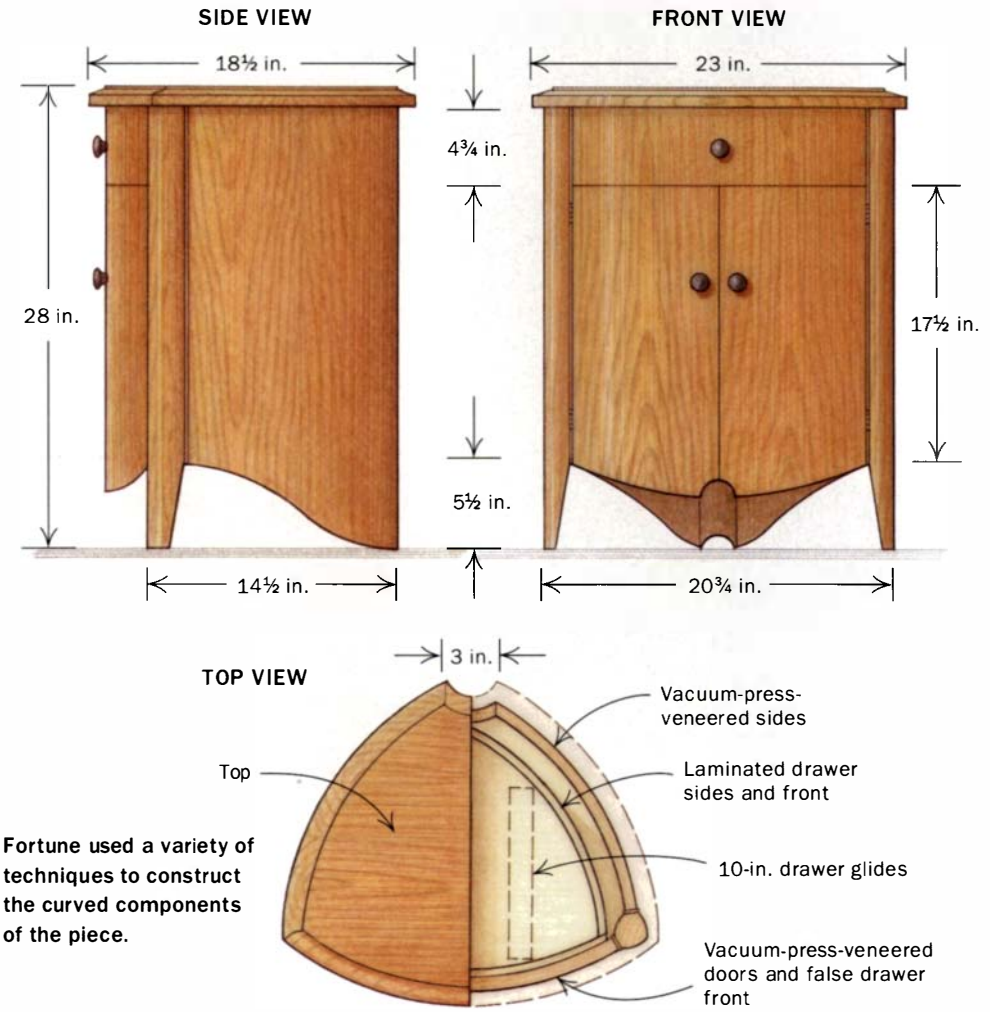
When installed, the hinges all but disappear into the bead, especially after coating them with the same clear lacquer used on the cabinet.

The drawer was planned as a simple curved-front box that would be hung on drawer glides mounted to the underside of the top. But then I realized once the drawer was opened, the rectangular shape would be out of character with the curved lines of the cabinet. So, using bent-lamination techniques, I curved the drawer sides to match the curve of the cabinet.

Designing furniture can be a wonderful challenge. The process of waiting to see if the completed piece matches the one envisioned can sustain you through the long hours spent in the workshop. And when the finished piece matches perfectly with your design vision, the joy of making furniture goes up tenfold. □

Michael Fortune is a furniture maker in Lakefield, Ont., Canada.

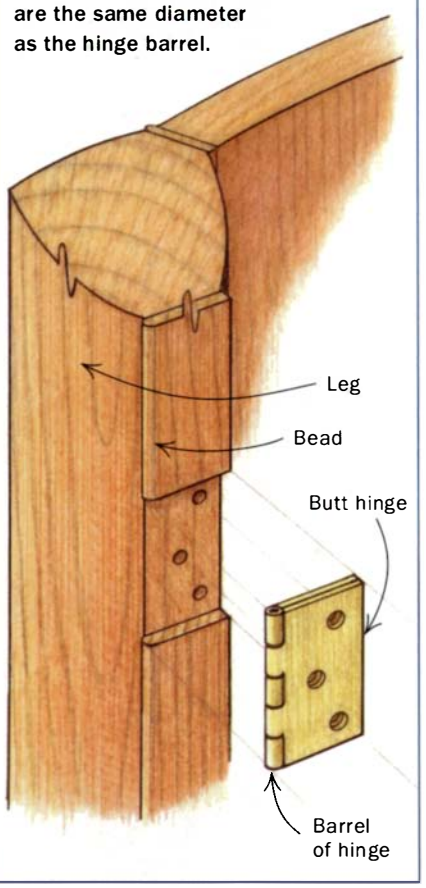
A CABINET WITH CURVES



Fortune used a variety of techniques to construct the curved components of the piece.

BEAD MIMICS HINGE BARREL

To camouflage the hinges, the long beads in the legs are the same diameter as the hinge barrel.



Drawings: Vince Babak

My Favorite Dovetail Tricks

Five ways to increase accuracy and reduce the time it takes to execute this hand-cut joint

BY CHRISTIAN BECKSVOORT

Several years ago I contributed to an article, along with Tage Frid, that argued the merits of cutting pins or tails first (*FWW* #116, pp. 81-86). Frid prefers pins first; I'm a tails-first guy. But ultimately, as I tell my students, it matters little which part you cut first because once the joint goes together, no one can tell the difference. Over the years I've been building furniture, I've cut thousands of dovetail joints by hand, and during that time I've developed a number of tricks to make the job faster and easier. These are my five favorites.

Christian Becksvoort makes custom furniture at his shop in New Gloucester, Maine.

1 Cut two pieces at once

One of the reasons I think it's more efficient to cut the tails first is that you need to lay out the dovetails on only one piece, then use those marks to cut the tails on two pieces at the same time. And when you transfer those longer layout lines across the end grain of two workpieces and use the lines to sight your saw, you get a more accurate cut. Also, when you cut two pieces at the same time, such as two drawer sides, the resulting joints match visually. So whether you are cutting case parts or drawer sides, lay out the tails, clamp the two workpieces together, and save yourself some time.

Mark the layout on the face of only one piece. *Use a chisel to mark the cutouts where the pins will go, then use the same chisel to chop out the waste.*

Transfer the tail marks. *Use a pencil and a small square to lay out the tails across the ends of a pair of drawer sides.*

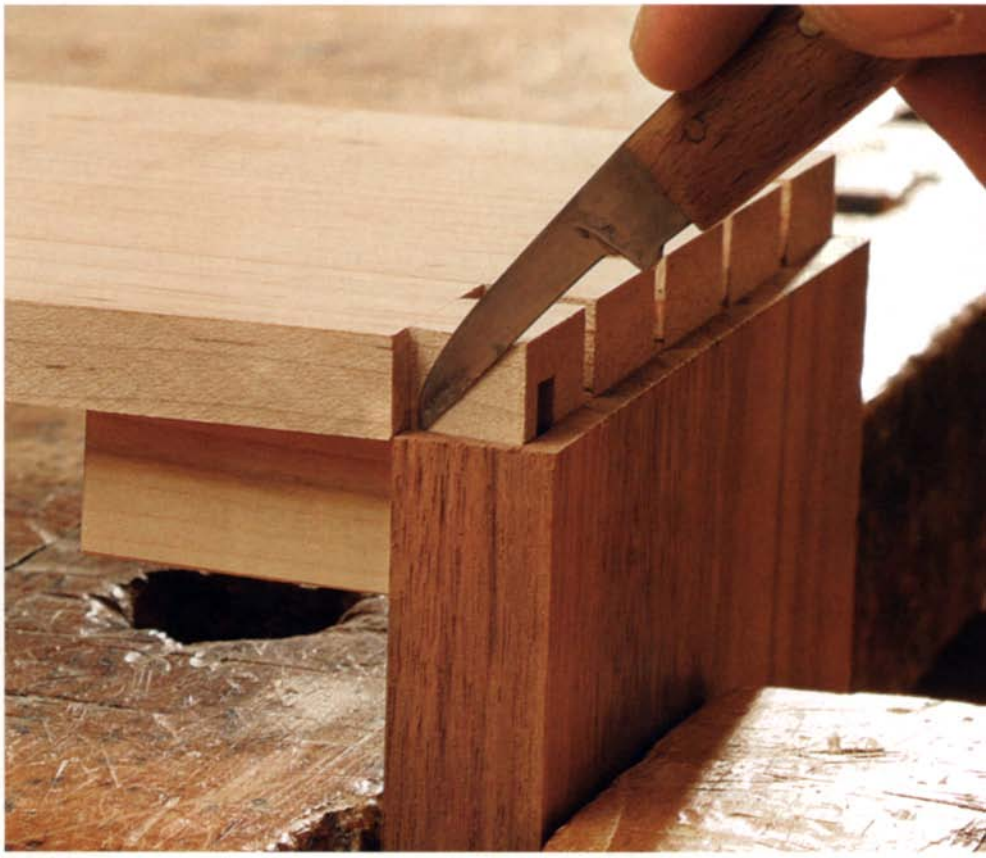
Make the tail cuts in both workpieces. *By cutting the tails in both pieces at the same time, it's actually easier to maintain the sawkerf at 90° to the face of the boards.*

Photos: William Duckworth

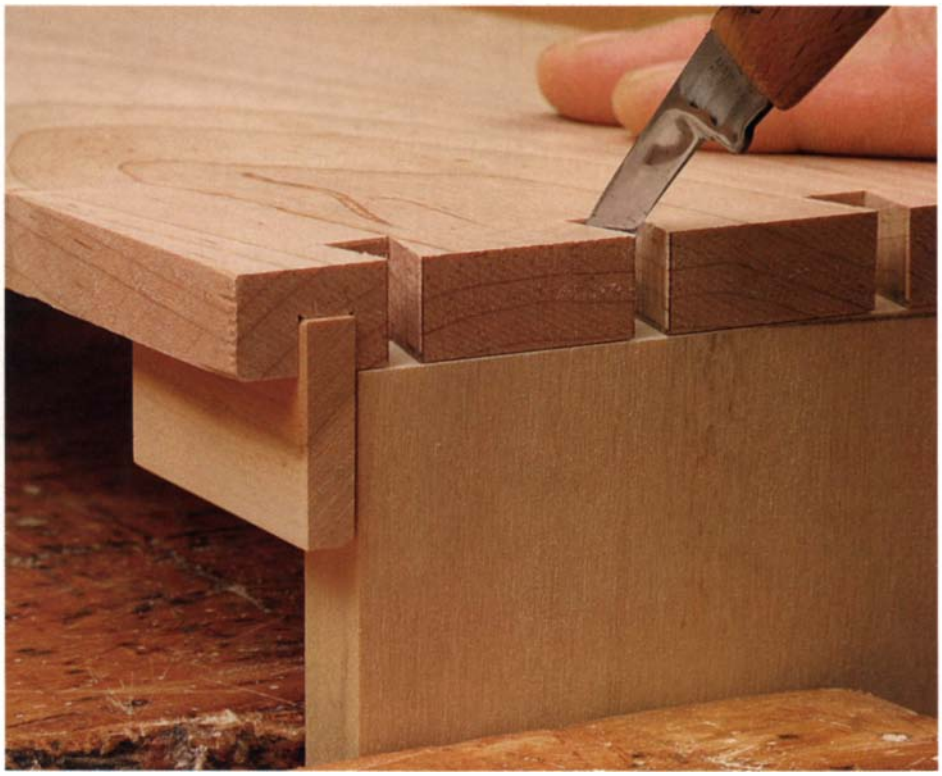
2 Use alignment blocks when marking drawer parts

Spacers for alignment. *Becksvoort keeps a small box of spacers handy. He records the thickness on each one (to three decimal points), and finds one that fits snugly into the grooves for a drawer bottom.*

Have you ever dovetailed a drawer, glued it up, fitted it to the opening, and found that everything looked great until you slid the drawer bottom in place and discovered that the front and side grooves weren't aligned? I've done that, and learned from my mistake. Now I cut the bottom grooves first, using the tablesaw, before I lay out dovetails and cut and chop the tails on the side pieces. To transfer the tail cuts onto the drawer front, I use an alignment spacer made of a small block of hardwood (usually cherry). I keep a bunch of spacers on hand, about 1 in. wide by 2 in. long, machined to different thicknesses, and choose the one that fits best in the grooves I've just cut. The spacer should slide into the groove and stay put. I push it into the groove on the drawer front so that it projects about ¼ in., and then place the drawer side onto the spacer, which makes the bottom grooves align perfectly. I mark the dovetail pins with a slim knife, finish cutting all of the joints, and voilà, all of the drawer pieces align perfectly when the bottoms are slid into place.



The spacer registers the parts precisely. *By locking the sides to the front (above) and back (below) with the bottom spacer, pins will mate with the tail cuts perfectly. Becksvoort uses cherry for most of his spacer blocks because it's stable.*



3 Adjust the fit with graphite marks

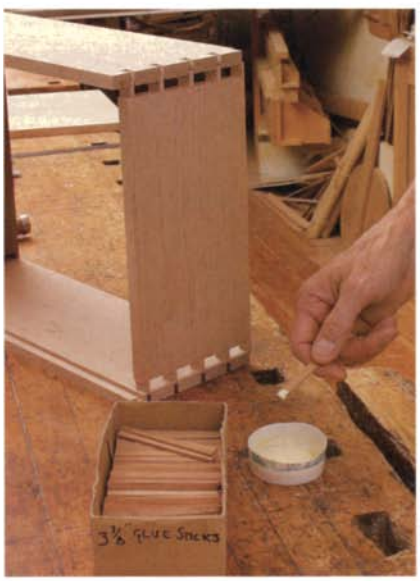
If your dovetails are too loose, keep practicing; if they are too tight, no problem. If the knife marks are still there, or there is a substantial amount of wood on the waste side of the knife mark, you'll have to remove the bulk of it first, just to get the joint to engage. Once the joint starts to engage, here is a trick that I've used for years to find the places that bind. I mark the bottoms of the tails with a pencil. Then I put the workpieces together and assemble the joint as far as it will go, pound it firmly with my fist, and then take it apart. The graphite will rub off on the tight spots on the pins, indicating exactly where I still need to remove some material. I carefully shave away the pencil marks with a chisel, shaving from the top if the grain is parallel to the length of the pin, or shaving from the inside or the outside if the grain runs in the other direction.

Mark the leading edge of all of the tails. *A soft (#2) pencil works best.*

Test the fit. *Use your fist to engage the two workpieces, and then pull them back apart.*

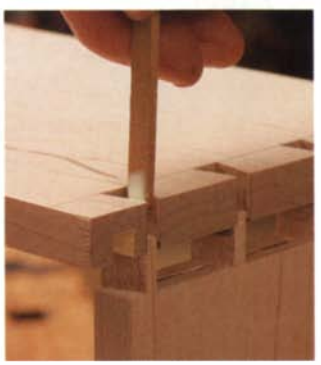
Shave off the excess with a chisel. *The graphite left on the sides of the pins will tell you where you still need to remove material to get the joint to fit perfectly.*

4 Get corners started before adding glue



Glue sticks galore. *Becksvoort keeps a supply of small sticks on hand. Dipped in glue, the sticks make it possible to get adhesive into all the crevices of the dovetail joints.*

Gluing up a small drawer or box usually is not a problem. However, unless you have as many arms as an octopus, gluing up a blanket chest or even a large drawer can be intimidating. First of all, you can stack the odds in your favor by dry-fitting all four corners and getting your clamps and clamp pads ready. Also, remember that polyvinyl acetate (white) glue gives you a longer open assembly time than aliphatic resin (yellow) glue. I much prefer yellow glue, though, so I developed a strategy to reduce the stress of glue-ups. I partially assemble all four corners, engaging each only about ⅛ in. Then, using a square-ended glue-spreading stick (cut off the end of a popsicle stick, or make your own), I spread glue on all face-grain cheeks of both tails and pins—all four corners, all the way around the piece. Finally, I pound the corners home and clamp the parts together—done.



Engage the joints before adding the glue. *Get all four corners started before applying the glue. Then work quickly to apply the adhesive to all mating surfaces.*

5 Keep the clamp pads simple

Use pine for clamp pads. *Becksvoort prefers to use scraps of pine to protect the drawer cases from being damaged when clamping pressure is applied during glue-up.*

I once taught at a place where another instructor told students that they should make corner clamping cauls, or pads, with cutouts similar to finger joints that would fit around the ends of the pins that protrude slightly. He said you needed those spaces in the clamp pads to pull the dovetail joints together properly. I humbly disagree. I don't waste a lot of time on something that is not part of the finished piece—especially something that will be discarded when the clamping is done. Instead, for clamp pads I use a scrap of white pine the length of the joint, by whatever thickness and width is handy. I find that the end grain of hardwood pins always digs into the softer pine, even the end grain of pine—it's no contest. So, unless you want to kill a lot of time, forget the tedium of making elaborate clamping cauls, and just use a strip of pine to clamp the dovetail joints together.

Apply pressure evenly from all sides. *Use spring clamps to hold the clamp pads in place, then use the bar clamps to pull the joints together. Indentations left in the pine clamp pads indicate that they did the job to bring the drawer pieces together tightly.*

A Durable Tabletop Finish

Wiped-on polyurethane is a surefire way to achieve a beautiful surface

BY SEAN CLARKE

A kitchen table is subject to more abuse than any other piece of furniture in the house: Heat, liquids, and dropped forks are just a few of the daily assaults this table must withstand. When choosing a finish for a kitchen table, you need something extremely durable. Polyurethane is an excellent choice because it rates highly as a water and solvent barrier, and it also has a high impact resistance.

Traditionally, woodworkers have brushed on polyurethane to obtain a finish thick enough to be durable. Too often the result is a surface marred by runs and brush marks, with an overall plastic appearance. My wipe-on method builds the finish layer by layer and is almost impossible to mess up. However, it is not a method for those in a hurry.

Pick your polyurethane

Polyurethanes, a class of varnish that is tough and fast-drying, are available in solvent- or water-based forms; I recommend the former for this wiping method. Solvent-based polyurethane (hereafter simply called polyurethane) can be thinned by 20% to 30% using mineral

BUILD UP A THICK BASE FOR LONG-TERM PROTECTION

1. THIN THE FINISH AND APPLY SEVERAL COATS

The polyurethane must be thinned to be wiped on. For sufficient protection, numerous coats must be applied, particularly to areas most subject to wear.

A thinned finish is easier to wipe on. *Use mineral spirits to thin oil-based polyurethane by 20% to 30% (above). The first coat will soak into the wood, so apply it generously (right). Allow each coat to cure four to eight hours.*

spirits to make the viscosity suitable for wiping. Water-based polyurethane can be diluted by only 10% with water before the chemical makeup becomes unstable.

There are many brands of polyurethane. I have had great results with Pro Finisher gloss and semigloss, made by Parks and available at The Home Depot. Whatever brand you purchase, follow the recommendations on the can for thinning and drying times.

Build up the base coats

As in any finishing process, this one starts with good prep work. Smooth all surfaces with 220-grit sandpaper. Remove most of the dust with a vacuum or a clean cloth, then wipe the surfaces lightly with a tack cloth to remove any residual dust.

This is the point to do any staining. Don't use an oil stain under wiped-on solvent-based polyurethane because streaking may occur. Instead use a water- or alcohol-based stain. For this trestle table, I stayed with the natural color of the cherry.

Start by thinning the polyurethane by 20% to 30% with mineral spirits. The best fabric for wiping on the finish is mutton cloth, traditionally used to hang meat. However, this material is hard to find, and an acceptable alternative is a stretchy, open-weave, lint-free cotton polishing cloth sold in auto-supply stores.

Fold the cloth into a pad and dip it into the polyurethane, squeezing out the excess. Apply the polyurethane to the surface in long, even strokes with the grain, recharging the pad with finish as necessary. Don't be too sparing in the amount you apply. The object is to wipe the finish on, not off, so go heavy on the first coat, as it will sink into the wood. If you are working on a large table like this one, it pays to use sawhorses so that you can finish the base at a comfortable height. When the first coat has been applied, let the workpiece cure for four to eight hours.

Subsequent coats can be applied without any sanding as long as the time between coats is less than 24 hours. If you exceed this time, lightly scuff-sand the surface with

Photos: Mark Schofield

2. SAND WITH 320-GRIT PAPER

If you wait longer than 24 hours between wiped-on coats, sand with 320-grit paper. Also, sand before and after the last wiped-on coat.

Use 320-grit sandpaper wrapped around a cork block to level the finish. *Frequently remove dust from both the tabletop and the sandpaper with an old paintbrush to extend the life of the paper.*

Wipe on a last base coat. *Sanding may have revealed small voids and craters. Wipe on a final coat to help level the surface, and then sand again.*

320-grit paper. Each coat needs to cure before the next is applied, which means eight hours in warm, dry areas, and overnight if the table is in a damp, cool basement. I recommend applying a minimum of six coats to protect a kitchen tabletop, but if you want a higher build and sheen, apply eight or even 10. Most of the base needs only three coats, but areas liable to be used as footrests will need more.

Sand before and after the final wiped-on coat—Before applying the final coat, lightly sand the tabletop with 320-grit paper, then get rid of the dust. This step removes embedded dust nibs but might not remove small craters in the finish. The final coat will fill these craters, leaving a fairly smooth finish.

After a minimum of 24 hours' drying time, sand all of the surfaces with 320-grit paper wrapped around a cork block. I frequently brush off the dust from both the table and the sanding block with a paintbrush to maintain the cutting action of the sandpaper. If you still have shiny spots caused by slight depressions in the finish, use sandpaper without the block and apply localized light pressure with your fingers to remove irregularities. Don't go overboard and sand through to the bare wood. For the same reason, lighten up the pressure when block-sanding near edges. It is a good idea to wear a dust mask when

PAD ON THIN LAYERS FOR A SMOOTH FINISH

1. MAKE A RUBBER TO APPLY THE FINAL COATS

Apply a few very thin layers of polyurethane with a method traditionally used for padding on shellac. First, make a rubber out of cotton wadding and an old cotton bedsheet. Charge the pad with the finish and then use the rubber to wipe on thin layers of finish.

The core of a polishing rubber. *Cotton wadding, used by upholsterers, acts as the reservoir for the finish.*

Wrap the outer layer of the rubber. *Fold the cotton bedsheet over the rubber, and then twist the surplus sheet into a tail that is tucked in on top of the rubber.*

Recharge the rubber. *Unwrap the outer cloth and pour the finish into the cotton wadding. When it's rewrapped, the rubber will give a more even release of finish and trap any hard bits of finish or foreign matter.*

Flatten and dull the surface. *Use 600-grit wet-or-dry sandpaper lubricated with mineral spirits to smooth the tabletop and remove any shiny low spots.*

sanding because the polyurethane produces a very fine dust.

Pad on a few final coats

Now that you have built up a good base of polyurethane, the next step is to apply several very thin coats of finish to fill any voids and to leave the surface smooth and ready to be rubbed out. Borrowing a trick from French polishing, I employ a pad known as a rubber to lay down thin coats of polyurethane.

The core of the rubber is a piece of cotton wadding, also known as cotton batting, which you can find in upholstery and fabric shops. Cut off a section roughly 8 in. by 6 in., and fold it three times into a tight pad. Saturate this pad in the finish, squeeze it out, and then place it on a section of used cotton sheet roughly 8 in. to 10 in. square. Fold the edges of the sheet tightly over the pad, concentrating on leaving the bottom of the pad wrinkle-free. Last, take the ends of the sheet, twist them into a tail, and fold the tail over onto the top of the pad.

Using polyurethane reduced by 10% with mineral spirits, apply a coat with the rubber in straight strokes, with the grain. To recharge the rubber, unwrap the cotton sheet and pour the polyurethane directly into the wadding before re-forming the rubber. This will give a more even release of finish and will trap any hard bits of finish that may be floating in the can.

Let that coat dry for 30 minutes to an hour so that the surface is not fully cured but stable. Then repeat this process several times until the appearance is generally smooth and blemish-free, at which point the finish can be left to cure for 24 hours.

Create an even sheen

To achieve as smooth a surface as possible, sand the tabletop with 600-grit wet-or-dry paper wrapped around a block, using mineral spirits as a lubricant. There is no need to perform this step on the base of the table. After allowing the mineral spirits to dry for 15 to 30 minutes, wipe down all of the surfaces with a cotton rag or dusting brush, followed by a light sweep with a tack cloth.

To even the sheen, I rub all of the surfaces with 0000 steel wool. Apply a moderate amount of pressure, rubbing with the grain and going over the whole surface of the table. Remove the dust and fragments of steel wool, then apply a good furniture paste wax. This will produce a semigloss finish that is smooth and silky, that retains the clarity of the wood, and that will protect it from the assaults to come. □

2. RUB OUT FOR A FINAL POLISH

To achieve an even, low-luster sheen, the tabletop's finish must be flattened with wet-or-dry paper, rubbed with steel wool, and then polished with paste wax.

Steel wool is next. *Available in rolls and pads, 0000 steel wool should be refolded to form a loose pad slightly larger than your hand.*

Wax and buff the surface. *Apply a good paste wax to the surface. After the wax has dried, buff the surface with a clean cloth, leaving it silky smooth.*

Sean Clarke is a professional finisher in Columbus, Ohio.

Pennsylvania Tall Clock

PART ONE

The hood is one-third of this curly maple masterpiece, but it's half the work

BY LONNIE BIRD

With its decorated hood towering above the floor, a tall clock commands attention. Tall clocks, often referred to as grandfather clocks, are among the most elegant forms of 18th-century furniture. You can dress up a tall clock with embellishments, such as a gooseneck pediment complete with carved rosettes and finials, or you can choose to build a more subtle flat-top clock like the one shown here. This tall clock incorporates details found on several clocks fashioned in Pennsylvania during the late 1700s.

Despite its complex appearance, building a tall clock isn't difficult: It's really just three stacked boxes—the hood, waist, and base—and most of the joinery is not complicated. The waist and the base are the simplest to construct. In fact, the waist is just two sides joined to a face frame; it has no top or bottom. The base of the clock has a bottom that is dovetailed to the sides, but it has no top. (I'll talk more about the waist and the base in Part Two of this article, to be published in the next issue.)

Without a doubt, the hood is the most complicated part of the clock. It has an open frame at the bottom that allows the weights and the pendulum to hang into the waist below. The sides of the hood are joined to the bottom frame with through mortise-and-tenon joints, and the top of the hood is joined to the sides with dovetails. The rest of the hood—moldings, pediment board, and columns—are embellishments added on after assembling the hood.

It's always a good idea to start by putting together a cut list of all the parts you will need. The cut list doesn't have to note all of the final, exact lengths of components, but it helps the milling process go more smoothly if you've at least worked out thicknesses and widths. (For a copy of the cut list Bird used to construct this clock, go to www.finewoodworking.com.)

Build the hood around the movement

Before you finalize a design and start building the hood, it's important to pur-

ANATOMY OF AN 18TH-CENTURY TIMEPIECE

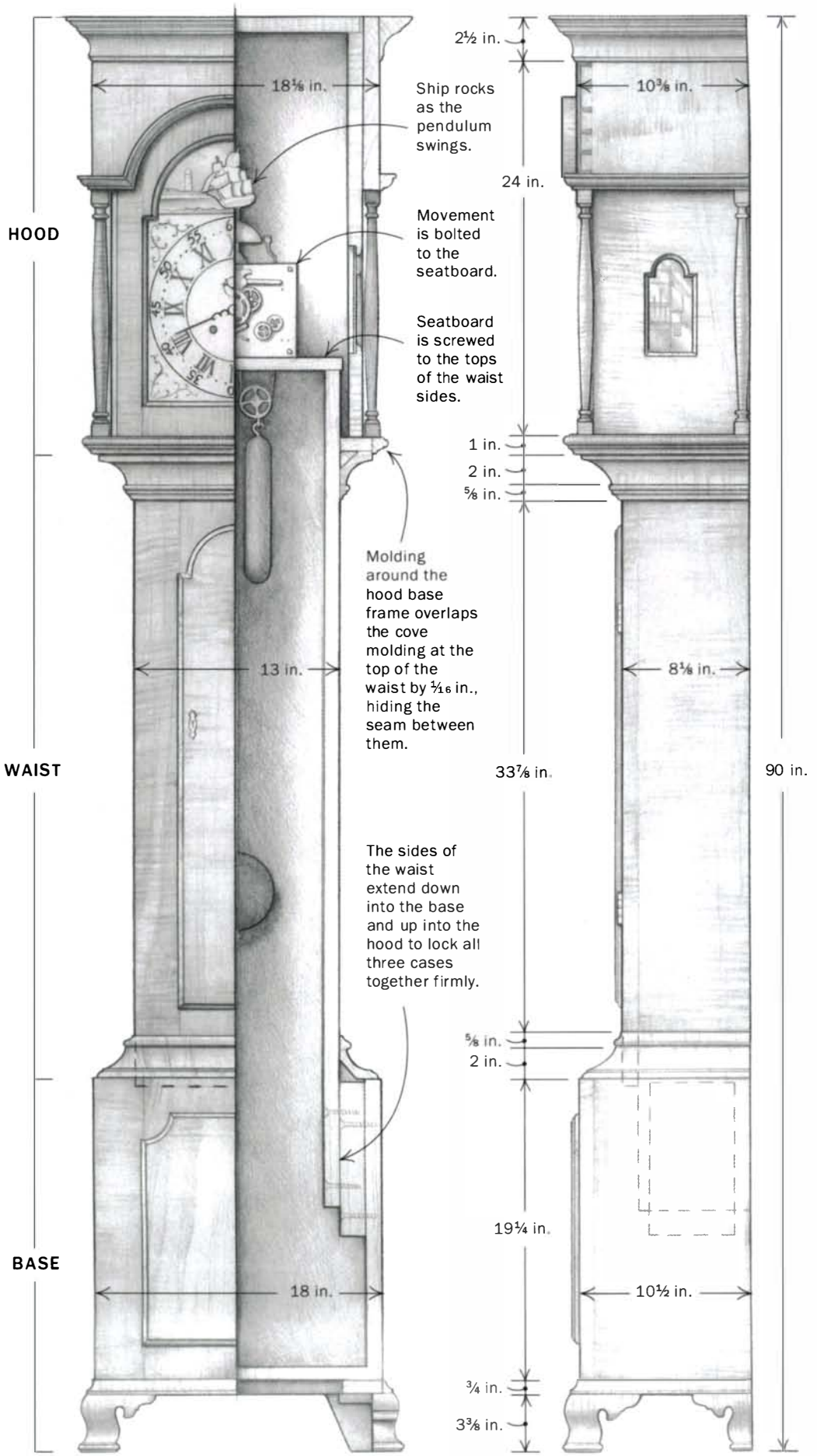
Any survey of antique clocks will reveal a wide variety of style details, but almost all of the tall clocks were made the same way: three simple boxes—base, waist, and hood—stacked together and dressed up with moldings and architectural add-ons. Except for the dovetails in the hood and the base, most of the joinery is not complicated.

Buy the movement first

Traditional clockworks, or movements, in tall clocks are weight-driven. The one I bought for this clock, from the Green Lake Clock Co. (see Sources of Supply on p. 67), cost about $700, which included the movement, the pendulum, the weights, an unpainted steel dial plate, and the hands. I sent the dial plate to an artist to paint the numbered face and a seascape for the rocking-ship movement at the top, which cost another $500.

Two cast-iron weights, one to power the timepiece and the other to power the hourly chimes, hang inside the waist and slowly drop throughout the week. The cast-iron weights drive the swing of the pendulum, which regulates how accurately the timepiece keeps time. The pendulum hangs on a rod, and you can adjust it up or down with a nut to speed up or slow down the clock. When you're buying a movement, look for one with an eight-day cycle. That way, you can get in the habit of winding the clock on the same day each week.

Watch it on the Web For more on tall clocks, go to www.finewoodworking.com.



Photos, except where noted: Rodney Diaz; this page: Mike Siemsen

FIRST, ASSEMBLE THE HOOD CASE

Dry-fit the hood parts before final assembly. *The hood sides anchor to the base frame with two through-mortises per side. Cut the mortises before assembling the three-sided base frame, and test the fit of all the hood pieces before gluing them together.*

chase the mechanical movement, or clockwork, and a dial plate. That way, you can build the hood to fit the dial and make certain that the waist will be large enough to accommodate the swing of the pendulum.

One vital but unseen part of this clock is the seatboard, which is a simple plank of wood to which the movement is secured with two machine screws and nuts. Some suppliers will send you the movement already attached to a seatboard; otherwise, you will have to mill your own. The position of the seatboard is critical because it aligns the movement with the face of the dial. The seatboard rests on the sides of the waist; when you add the large crown molding near the top of the waist, which in turn supports the weight of the hood, you must locate the seatboard position precisely. You can, of course, avoid all this fuss, save a lot of money, and simplify the clock's construction by using a modern quartz movement. But a tall clock fitted with a mechanical movement has a fascinating appeal that is lost when you use a battery-operated quartz movement.

Build the hood from the bottom up

The first component to construct is the hood base frame, which has three sides joined with mortise-and-tenons at the front corners (for a detailed drawing of the hood, go to p. 65). Before assembling the frame, cut the through-mortises in each of the two frame sides that will accept the tenons of the hood sides. After the base frame has been assembled, the molding can be applied to its edges. Note that the molding thickness is slightly greater than the base-frame thickness, creating a small lip, so the hood will overlap the cove molding slightly where it joins the top of the waist.

After milling the stock for the hood sides and top, cut the tenons on the side

Screw the pediment to the hood. *Because of the cross-grain construction, do not glue the pediment assembly to the hood. Instead, use screws through large pilot holes, which will allow some seasonal wood movement.*

Photos, this page: Karen Wales

pieces. Then cut the half-blind dovetails that join the sides to the top. However, don't glue together the hood just yet.

After the joinery has been completed, cut a groove in the hood sides to accept the dial frame. The groove is narrow, just big enough to allow the dial frame to slide in from the top. Next, cut a rabbet in the front edges of the hood sides. The shallow rabbet creates a stop for the hood door. Shape the thin edge that remains with a small thumbnail profile, and then cut a notch in the upper portion of each side. The notches will accept the backing board after the hood has been assembled and will align the backing board with the dial frame.

Finally, cut the arched windows in the hood sides. Rough-cut the windows first using a jigsaw, and then clean them up with a router fitted with a template collar and a jig to guide it. These little windows not only allow you to view the movement in the finished clock, but they also add some interesting visual detail to the hood. To hold the glass, rout out a rectangular rabbet on the inside surfaces of both window openings, which will be glazed to the hood later using colored glazing compound. With the joinery complete, you're ready to glue together the sides, top, and base frame to create a box that will become the hood.

Pediment adorns the hood

The pediment consists of six main components: the pediment board, the two side returns, the backing board, the crown molding, and the arched molding above the hood door.

Start by joining the pediment board to the two returns with half-blind dovetails. The position of the dovetails must be precise because, after assembly, the pediment pieces will be slipped into position around the hood. If the space between the returns is too tight, the pediment will not fit over the hood; too loose, and there will be distracting gaps between the returns and the hood sides.

When laying out the dovetails, remember that they will be covered by the moldings at the top and bottom of the pediment. Therefore, it's best to lay out the tails and pins so that the spacing will appear balanced after the moldings are applied.

After you've cut and fitted the dovetails and tested the fit of the backing board, glue it to the inside face of the front pediment board. Then lay out the arch and cut it on a bandsaw. The curve of the arch is determined by the steel dial plate; a 5-in. radius is fairly common for dial plates. Smooth the arch with a scraper and sandpaper, and then glue together the pediment board and the returns.

Once the glue has set, slip the pediment assembly over the hood and fasten it in place with screws from the inside. Don't use glue, because the cross-grain construction between the pediment assembly and the hood could cause the hood sides to split with seasonal changes in humidity.

SLIDE THE DIAL FRAME IN FROM THE TOP

Dial-frame joinery. *The stiles and rails of the dial frame fit together as glued half-lap joints. The dial frame, which is hidden from view most of the time by the arched door, slips into the hood from above in grooves that were cut into the sides of the hood.*

Dial frame slips in from the top

The next step is to build the dial frame. This simple frame is made from 5/16-in.-thick stock, with stiles and rails joined together with half-lap joints. Despite the cross-grain construction of the half-lap joints, on thin stock such as this you won't have any problems. Orient the joints so that the stiles overlap the rails when viewed from the

SHAPE THE HOOD'S ARCHED MOLDING

Shape the edge of the arched molding first. *After rough-cutting the inside curve of the molding around the arch, use a bearing-guided trim bit against a template to cut the final inside curve (left). Last, cut the outside curve on the bandsaw (center).*

This is not a 45° miter. *Where the curved molding meets its straight return, the bisected angle (53° on this clock) will vary, depending on the radius of the arch.*

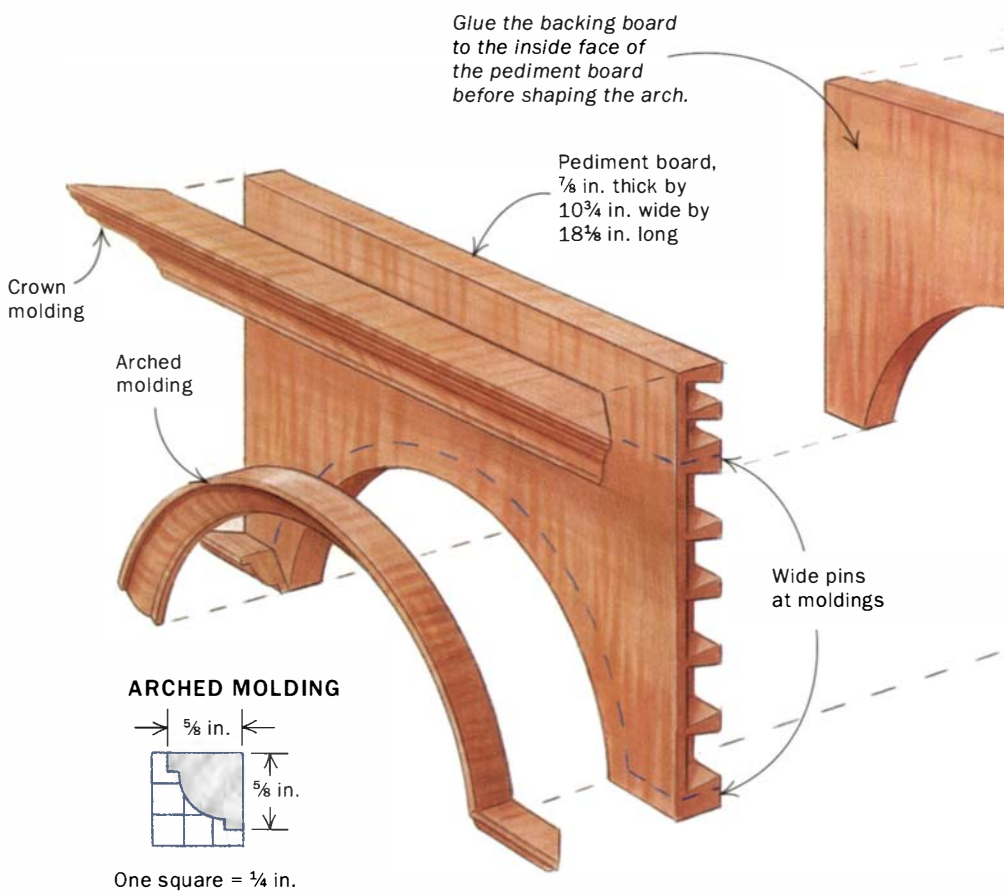
front. Remember, too, the dial frame should overlap the dial on all sides by about ¼ in. Before assembly, shape a small thumbnail profile along the inside edges of the dial-frame members and miter the molding where it intersects at each corner. Then glue together the dial frame, smooth the surfaces, and test-fit it by sliding the frame into position in the hood.

Shape the hood moldings

The next step is to shape the moldings and apply them to the pediment and hood. You can use a tablesaw to shape the cove cut on the crown molding (see *FWW* #168, pp. 68-73). Router bits with an inverted profile (available from CMT; 800-841-1133) set up in a router table work well for shaping the smaller profiles that flank the cove, as well as the stepped roundover molding around the arch, which returns to the bottom edges of the pediment.

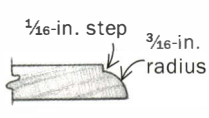
To shape the small roundover molding safely, first rough-cut the inside radius of the arch and trim it with a bearing-guided router bit and a template. Shape the profile and then cut the outer radius very carefully on the bandsaw. You can clean up the sawmarks with a spokeshave. Leaving most of the workpiece intact until after you shape the edge will help keep the weak short grain from breaking.

When you're ready to install the roundover molding, bisect the angle where the arch meets the small return pieces on the front. The miter on this clock worked out to 53°, but if you're building another clock with a different-size arch, the miter angle will vary. To blend the shapes

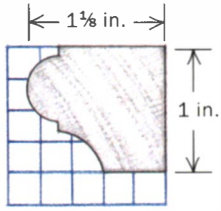


DETAILS OF THE CLOCK'S HOOD

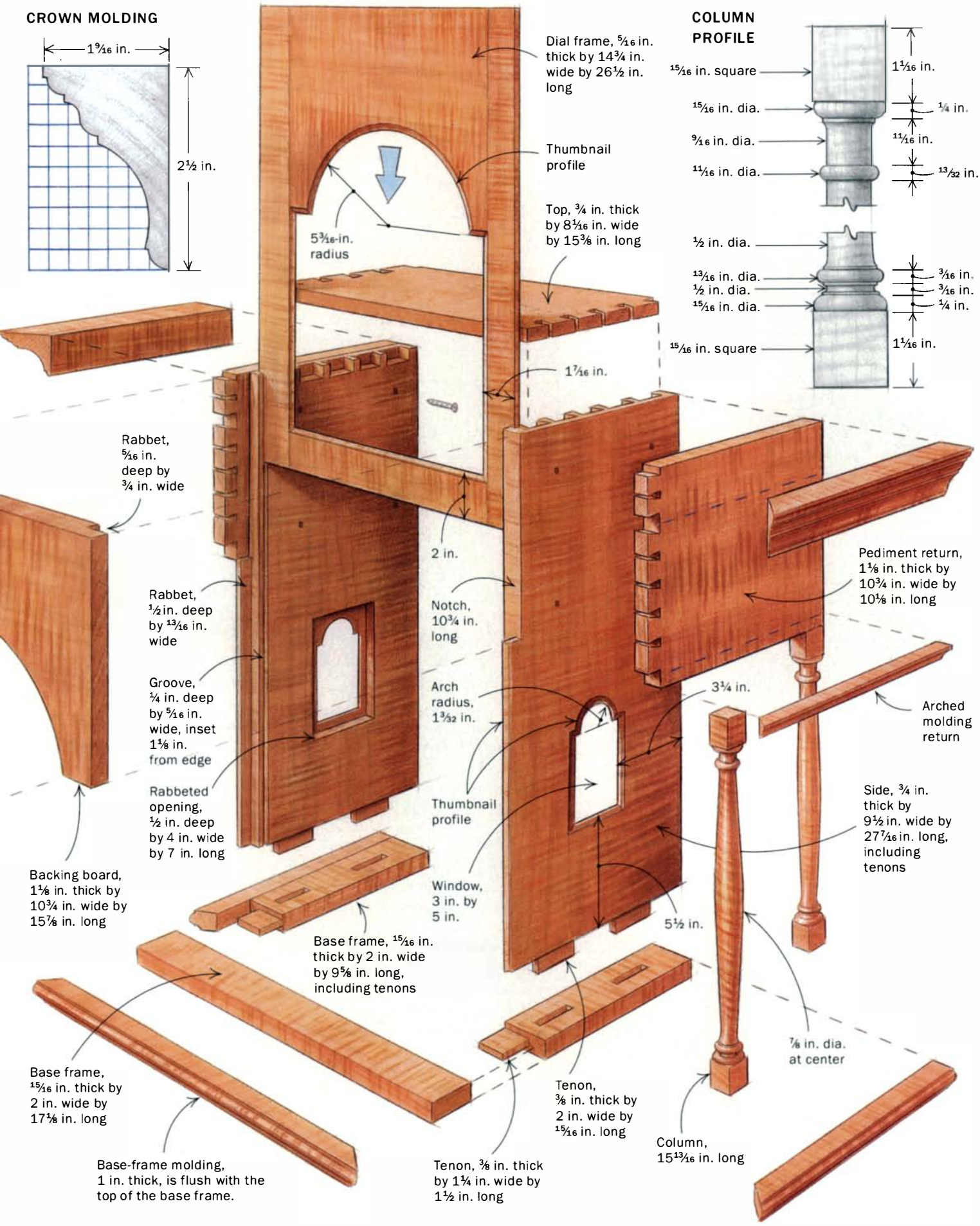
The hood is the most complex part of any tall clock, so it makes sense to build it first. After you have the movement in hand, verify the measurements that locate the center of the dial face and the swing of the pendulum. The molding around the bottom of the hood is thicker than the base frame, so when the hood is installed over the waist, the slight overlap hides the seam between the two cases.



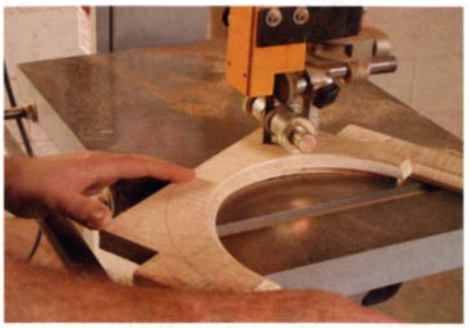
BASE-FRAME MOLDING



Drawings: Bob La Pointe

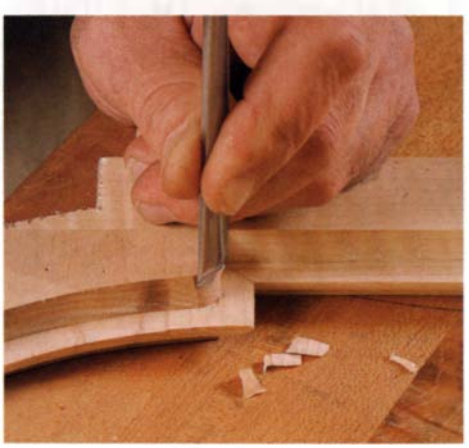

CROWN MOLDING
1 9/16 in.
2 1/2 in.
COLUMN PROFILE
15/16 in. square
15/16 in. dia.
9/16 in. dia.
11/16 in. dia.
1 1/16 in.
1/4 in.
11/16 in.
13/32 in.
1/2 in. dia.
13/16 in. dia.
1/2 in. dia.
15/16 in. dia.
15/16 in. square
3/16 in.
3/16 in.
1/4 in.
1 1/16 in.
Dial frame, 5/16 in. thick by 14 3/4 in. wide by 26 1/2 in. long
Thumbnail profile
5 3/16-in. radius
Top, 3/4 in. thick by 8 1/16 in. wide by 15 3/8 in. long
1 7/16 in.
Rabbet, 5/16 in. deep by 3/4 in. wide
2 in.
Rabbet, 1/2 in. deep by 13/16 in. wide
Notch, 10 3/4 in. long
Pediment return, 1 1/8 in. thick by 10 3/4 in. wide by 10 1/8 in. long
Groove, 1/4 in. deep by 5/16 in. wide, inset 1 1/8 in. from edge
Arch radius, 1 3/32 in.
3 1/4 in.
Arched molding return
Rabbeted opening, 1/2 in. deep by 4 in. wide by 7 in. long
Thumbnail profile
Side, 3/4 in. thick by 9 1/2 in. wide by 27 7/16 in. long, including tenons
Backing board, 1 1/8 in. thick by 10 3/4 in. wide by 15 7/8 in. long
Window, 3 in. by 5 in.
5 1/2 in.
Base frame, 15/16 in. thick by 2 in. wide by 9 5/8 in. long, including tenons
7/8 in. dia. at center
Base frame, 15/16 in. thick by 2 in. wide by 17 1/8 in. long
Tenon, 3/8 in. thick by 2 in. wide by 15/16 in. long
Column, 15 13/16 in. long
Base-frame molding, 1 in. thick, is flush with the top of the base frame.
Tenon, 3/8 in. thick by 1 1/4 in. wide by 1 1/2 in. long

FIT THE ARCHED DOOR TO THE PEDIMENT

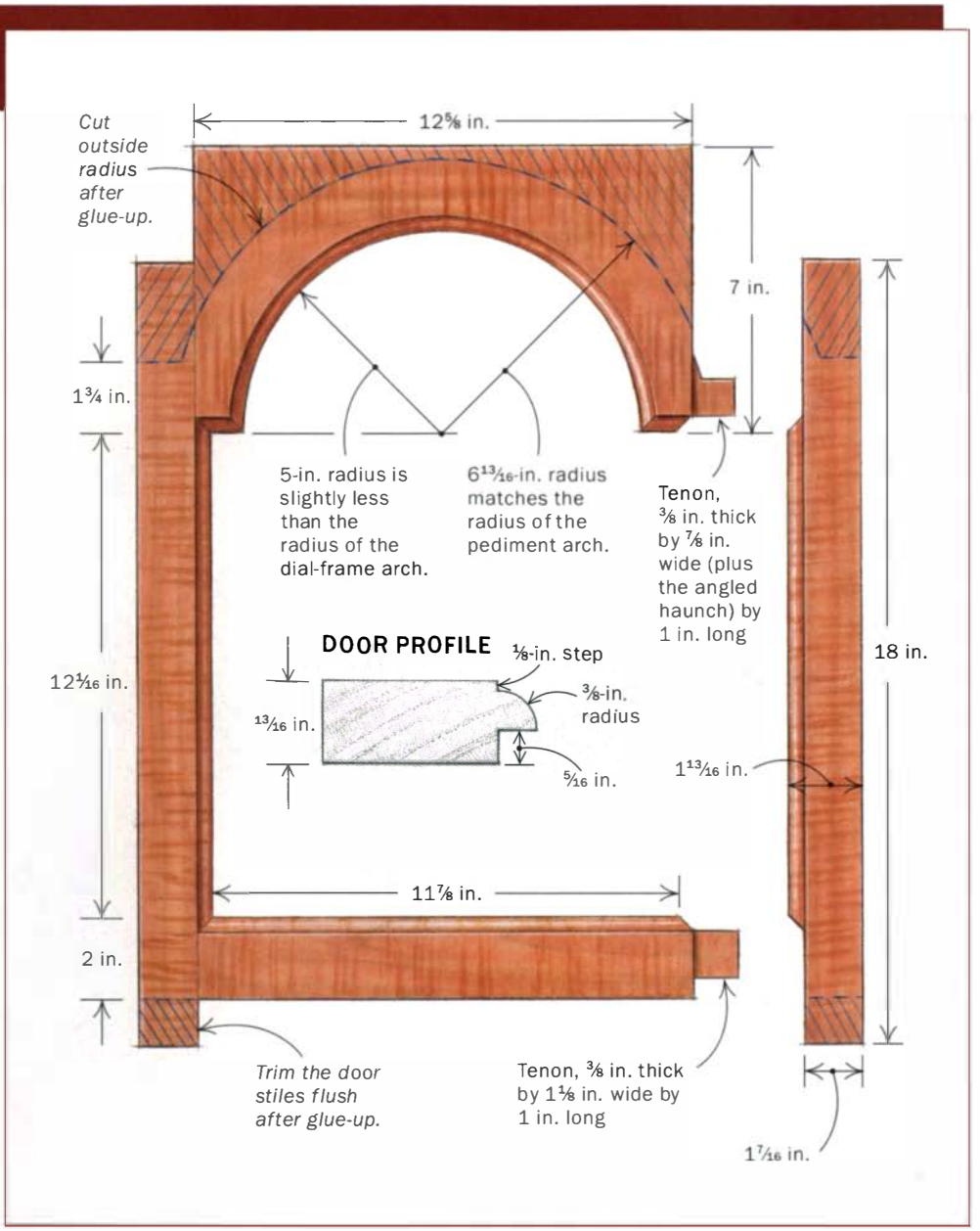


Assemble the door first. *After building the door and shaping the inside edges, use the bandsaw to cut the outside radius of the arched top.*

Fine-tune the fit. *Wedge the door against the pediment. Mark the high spots, which should be planed and scraped for an even fit. After that, lay the door in place horizontally, and then use a shim to mark the front face for a consistent gap around the arch.*



Use a gouge on the inside of the rabbeted corner. *Chisel this corner round to prevent a stress crack in the glass panel that will be cut to shape and installed later.*



of the moldings seamlessly where they meet at the miter may require a little tweaking with sharp chisels or sandpaper.

Assemble the hood's arched door

The hood is fitted with a glazed door that provides access to the clock dial for setting the time and cranking up the weights. The door fits flush inside the case sides and requires special hinges with an offset pivot point. The hinges allow the door to open and clear the corner column.

The arch in the top rail of the hood door is cut from a single board. This method creates short grain on each side of the arch, which seemingly would be somewhat weak. However, because the door is open briefly only once a week to wind the clock, it doesn't undergo a lot of stress.

Begin building the door by laying out the mortise-and-tenon joints at each corner. For a precise fit, build the door exactly the same size as the opening; afterward, plane the door to fit and provide ½₂-in. clearance on all sides. After layout, cut the mortises in the stiles, and then cut the tenons for a friction fit within the mortises. Then, with a bandsaw, cut the inside radius of the arch in the top rail. I've found that it's best to wait to saw the outside radius until after the door has been glued together; otherwise, the fragile arch may break during assembly.

The inside edges of the door framework

INSTALL THE COLUMNS AND THE DOOR

Install the columns last. *The turned columns are fastened in place with small trim screws after the finishing is completed, making it easier to apply the finish to the columns and to the hood case.*

Wide-throw pivot hinges for the glass door. *Because the door is set in from the face of the hood and the columns, special offset hinges are required to throw it clear of the columns in the open position. The hinge plates are screwed to the door at top and bottom. Brass escutcheon pins nailed to the underside of the pediment board and to the base frame provide the pivoting action.*

are embellished with a simple thumbnail profile. After shaping the thumbnail, cut a rabbet for the glass. Then miter the thumbnail sticking at each intersection.

Now you're ready to assemble the door. After the glue has dried, cut the outside of the arch using the bandsaw. Smooth away the bandsaw marks with a spokeshave and a chisel, and then carefully fit the door to the opening in the hood. For clearance, the top rail of the door must be beveled back approximately ⅛ in.; otherwise, the offset pivot could cause the back edge of the door to bind.

Install hood columns after finishing

The hood columns appear to support the pediment but actually are just ornaments screwed into the corners. After turning the columns, cut them to length, but don't put them in place until after you've applied a finish to all of the hood components. □

Lonnie Bird teaches woodworking at his shop in Dandridge, Tenn. (www.lonniebird.com).

PART TWO In the next issue, Bird will build the clock's waist and base, install the movement, and assemble the finished clock.

SOURCES OF SUPPLY

CLOCK MOVEMENTS AND PARTS

Green Lake Clock Co.
651-257-9166
www.greenlakeclock.com

Merritt's Clock and Watch Supplies
610-689-9541 www.merritts.com

CUSTOM PAINTING FOR CLOCK FACES

Angela Wendling Piacine
215-870-0791
a.wendling@juno.com

Kathi Edwards
770-943-5676 kedh2@aol.com

Laminate Trimmers

The best machines are stable, easy to use with one hand, and don't require extra tools to adjust

BY KIM CARLETON GRAVES

How many routers do you need? I thought four were enough, but when I needed to rout into a corner recently, none of the four could handle the operation. I had to add a laminate trimmer, a small router, to my collection. Now the laminate trimmer is what I reach for most often when I have to do any light-duty task, such as rout out a hinge mortise or plow a groove for an inlay. Most of the time, I keep a ⅛-in. roundover bit in the tool just to ease the edges of cauls headed for the vacuum bag or to take the sharp edge off a piece of lumber. Plus, the trimmer is small enough that I can use it one-handed.

Photos, except where noted: Kelly J. Dunton

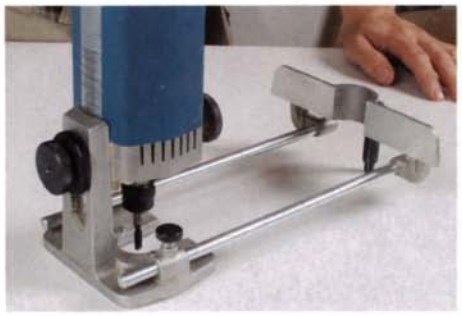
Single-base models

VIRUTEX FR92D

AUTHOR'S BEST OVERALL CHOICE

Advantages: This is a heavy-duty production tool. The fit and finish were excellent, and the tool was comfortable to use with either hand. The open base made it easy to see where the bit was cutting. A large knurled knob made vertical adjustments both easy and precise. The tool comes with useful accessories, including a fence that doubles as a circle-cutting jig (up to a 10-in. radius) and a jig for cutting hinge and lock mortises. The trim guide is the beefiest of the bunch, and it was the easiest to adjust.

Disadvantage: Virutex, a Spanish company, is well known in Europe. But because you have to order directly from the American distributor, you can't shop around for bargains.



A fence that becomes a circle cutter. *The fence on the Virutex, when inverted, uses a steel dowel as a pivot point to cut circles.*

MAKITA 3707FC

AUTHOR'S BEST VALUE CHOICE

Advantages: This lightweight tool was a pleasure to hold and easy to use. The base is clear plastic with two lights that illuminate the worksurface, so I could easily see where I was cutting. Although the switch is on top, the tool still could be used with one hand. An electronic speed control kept the speed constant even while the tool was under load. The trim guide was easy to install and remove and could be adjusted tightly. This unit ran smoothly and was relatively quiet.

Disadvantages: The vertical-adjustment control was inexact but adequate.

A better view. *A clear plastic base and subbase and lights built into the motor housing improve your view of the cutting action.*

PORTER-CABLE 310

AUTHOR'S BEST VALUE CHOICE

Advantages: Porter-Cable's production trimmer is heavy duty, and the design is very stable. The round body was comfortable to hold right-handed, and the switch is in a convenient location. This tool had the best vertical adjustment of all the trimmers tested. An adjustment ring screws up and down on the body, and then locks into the base, allowing for easy micro-adjustments. This tool accepts the standard Porter-Cable edge-guide kit, and the subbase accepts standard Porter-Cable templates.

Disadvantages: The subbase is black and has a small hole, which made it difficult to see what I was cutting. For left-handers, the clamp knob can get in the way.

Precise vertical adjustments. *The PC 310 trimmer has an adjustment ring that allows you to fine-tune the depth of cut.*

When I went shopping for a laminate trimmer, I found that there were two categories: Those that were packaged to be used mostly for plastic laminate work, and those that weren't. Trimmers for laminate work have multiple removable bases, so the bit can reach into corners, and the trimmer can be adjusted to cut at odd angles. Most of them also have a seaming base, which is used to make a nearly perfect joint between two pieces of laminate.

In the second category are basic single-base routers, and most of them hold the bit only perpendicular to the worksurface. These routers can be used for laminate work, but they don't perform all of the functions of the multiple-base machines. In my opinion, the simpler single-base units are preferable for furniture making.

Many of the tools have a trim guide, a nice feature. The guide is an adjustable L-shaped arm that hangs off the base, with a bearing at the lower end. Because you can align the bearing with the cutting edge of the bit, you don't need a bearing on the bit—any router bit will do. Manufacturers claim that the trim guide takes side pressure off the bit, yielding cleaner results. But using the trim guide also means that you can fine-tune the depth

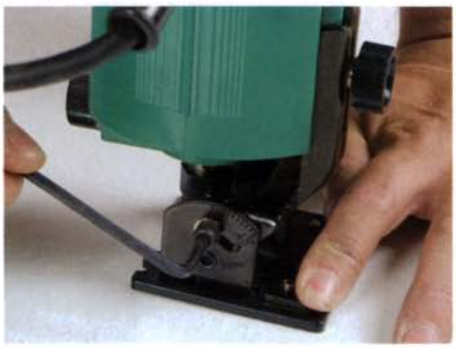
Photos, this page (bottom three): William Duckworth

Single-base models (continued)

HITACHI TR6

Advantages: The Hitachi is the second-least-expensive trimmer of those we tested.

Disadvantages: The tool was uncomfortable to use. It was too big to hold with one hand, and the two knobs that raise and lower the base and hold the trim guide in place dug into my palm. I also couldn't access the switch without using both hands. The small base and offset motor housing make the tool unstable. While the base allows for a tilt cut, there is no 90° stop, so I had to measure the angle each time. The base on the tool I tested was twisted and wouldn't sit flat, and the vertical-adjustment screw kept slipping in the threads. Also, the motor had a very loud whine.



Big motor with a small base. *On the Hitachi, the ratio of the footprint to its offset-shaped motor housing makes this tool tippy.*

PORTER-CABLE 309

Advantages: This bare-bones trimmer is well made and heavy duty, and it felt good in my hand. The switch is conveniently placed.

Disadvantages: Left-handers will be less enthusiastic about this tool because the adjustment knob will get in their way. The trimmer's round, squat body has a small subbase (or baseplate), making it a little unstable. Vertical adjustments, made by loosening a large knob and moving the motor housing within the base, were imprecise. It was hard to see where I was routing because the subbase is black and has a small hole. This could be a good tool for a production shop dedicated to a single function, but it's too limited for multiple tasks in a hobbyist setting.

Right-handed bias in the design. *The knob that secures the motor to the base makes the tool difficult to use for left-handers.*

RYOBI TR31

Advantages: The Ryobi is an inexpensive, lightweight, all-plastic unit. The unit was stable and comfortable to hold right-handed. An alternate two-handle base gave me more control when using this router, although it should be used for only light-duty tasks.

Disadvantages: If you hold the tool with your left hand, a wing nut will get in the way. This is the only trimmer that doesn't have a removable collet, so if it is ever damaged, the whole tool will need to be replaced. The motor is held in place with a wing nut that was difficult to tighten and loosen. Even when it was fully tightened, I was able to change the vertical setting by pushing down on the body.

Locking in the vertical adjustment. *The motor is secured to the base with a wing nut that can be difficult to tighten.*

of cut off an edge, adjusting the bearing position for the exact profile you want to shape.

A shop-tested comparison

I evaluated 10 of these trimmers, using them for several months in the cooperative shop where I work. I paid special attention to how the tools felt in my hand and how easy they were to use. Initially, I assumed that usability would be a highly subjective judgment, but I was proven wrong. During the time my four shopmates and I were using these trimmers for everything from kitchen cabinetry to fine furniture, there was keen competition for a select few of them, while others sat on the shelf gathering sawdust.

What made the favored tools user-friendly? I found that the trimmers in demand were popular because they were light enough to be used with one hand; had a switch that could be operated with the hand holding the tool; didn't have to be taken apart for bit changes; gave the user a clear view of the cutting action; didn't have lots of little parts that could get lost or damaged; and let the user keep the bit perpendicular to the router base while adjusting the depth of cut.

This last point requires a little explanation. When working

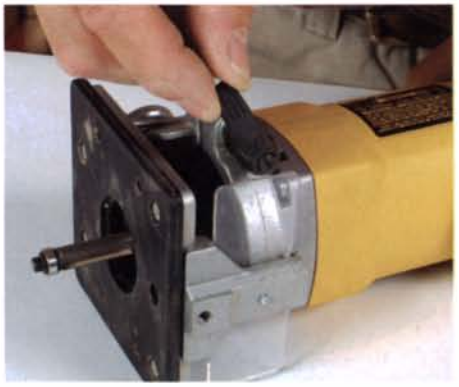
Photos, this page (bottom three): William Duckworth

Multiple-base models

DEWALT DW673K

Advantages: The DeWalt is nicely balanced and has a side switch that can be operated with one hand. Its bigger base makes it stable, and each base is held in place with a finger-locking arm, so there are no screws to lose. The trim guide was easy to install with captive screws that won't get lost, and the adjustment was tight and true.

Disadvantages: I couldn't change the bit without taking off the base. Because the spindle-lock button is spring loaded, considerable pressure is required to hold it in place, which made the operation awkward. When making vertical adjustments, tightening the base can change the bit's depth and position. While the plastic storage case is well made, the base has to be removed to store the tool.



User-friendly features. *On the DeWalt, the base is secured to the motor with a finger-locking arm, which is quick and easy to use.*

BOSCH 1609AKX

Advantages: The Bosch felt good in my hand—squat and well balanced with a good-size base. The case is all metal, with plenty of space for the components and a separate space to hold tools and screws while you're changing bases.

Disadvantages: In general, this unit was difficult to adjust and assemble. The four dedicated bases must be screwed to the motor housing. The vertical adjustment was sloppy: To raise or lower the unit, I had to loosen the knob that holds the vertical position; but tightening the knob again changed the position of the bit. The trim guide, held in place with two screws, was difficult to adjust. And I couldn't change bits with both the base and trim guide in place.

Adjustments require a screwdriver. *The Bosch kit comes with four bases, all of which must be secured to the motor with screws.*

FREUD FT1000ET

Advantages: The Freud fit comfortably in one hand and has a well-positioned switch. The three dedicated bases can be changed by loosening a screw without taking it out, so there is less chance of it getting lost.

Disadvantages: The unit's tall body and small base make it feel unstable. Control over the bit height on the 90° base was difficult: After loosening a knob and using an adjustment screw to raise and lower the base, it was difficult to tighten the knob by hand. The trim guide is held in place with two loose screws (not held captive with a nut), and it was difficult to adjust. The tilt base is marked in 5° increments, so anything more precise would need to be tweaked through trial and error. No laminate seaming base is included. This machine requires too many tools: Phillips-head and straight screwdrivers, four hex wrenches, and an Allen wrench.

Dial the speed to what you want. *The Freud is the only trimmer with a variable-speed motor.*

Photos, this page (bottom three): William Duckworth

Multiple-base models (continued)

PORTER-CABLE 97311

Advantages: This Porter-Cable model felt great in my hand, the switch is well placed, and the machine is stable. The four dedicated bases are held to the motor with one large knob, which also is used for vertical adjustments. The bases accept standard Porter-Cable templates, and the kit needs only one wrench. The storage case has a place for everything. The offset base was easy to put on. **Disadvantages:** The round vertical-adjustment knob, which was only slightly knurled, was difficult to tighten. Vertical adjustment for the 90° base was hit or miss: The bit fell and tilted as I adjusted the height, then rose and straightened as I retightened the knob. The trim guide had to be adjusted with an Allen wrench, which made the job difficult. The tilt base is marked in 5° increments, so anything more precise would need to be tweaked through trial and error.

Securing the bit. *To change bits on this Porter-Cable trimmer, you need only one wrench because you can lock the spindle by pushing a button on the side of the motor housing.*

MAKE/MODEL NO.	PRICE	AMPS
SINGLE-BASE MODELS		
HITACHI TR6 800-829-4752 www.hitachi.us	$110	4
BEST VALUE MAKITA 3707FC 800-462-5482 www.makita.com	$150	4.4
PORTER-CABLE 309 800-321-9443 www.portercable.com	$125	3.8
BEST VALUE PORTER-CABLE 310 800-321-9443 www.portercable.com	$159	4
RYOBI TR31 800-525-2579 www.ryobitools.com	$70	3.8
BEST OVERALL VIRUTEX FR92D 800-868-9663 www.virutex.com	$250	5.2
MULTIPLE-BASE MODELS		
BOSCH 1609AKX 877-267-2499 www.boschtools.com	$250	5.6
BEST OVERALL BEST VALUE DEWALT DW673K 800-433-9258 www.dewalt.com	$180	5.8
FREUD FT1000ET 978-264-9900 www.freud-tools.com	$140	7.5
PORTER-CABLE 97311 800-321-9443 www.portercable.com	$230	5.6

with laminate sheets, it's best to sand or file the edges after trimming them, which masks any unevenness. But in furniture making—for example, cutting inlay grooves or hinge mortises—you're shooting for a finished operation as the bit makes a cut. You want a hinge mortise at exactly the right depth; you don't want to have to shim it out or cut it deeper with another pass. A bit that stays perpendicular while its depth is adjusted is your best bet for getting the cut right the first time.

In general, I was disappointed with many of these laminate trimmers. Of the 10 tools my shopmates and I used, I'd characterize two of them as good

Photo, this page (bottom left): William Duckworth

SPEED (RPM)	EASE OF VERTICAL ADJUSTMENT	EASE OF BIT CHANGES	EDGE GUIDE INCLUDED	CASE INCLUDED	TEMPLATES INCLUDED	TILT BASE	CORNER BASE	SEAMING BASE
30,000	Poor	Good: two wrenches	Yes	No	No	Yes	No	No
26,000	Fair	Good: two wrenches	No (but available as accessory)	No	Yes	No	No	No
28,000	Fair	Good: two wrenches	No (but available as accessory)	No	Yes	No	No	No
27,500	Good	Good: two wrenches	No (but available as accessory)	No	Yes	No	No	No
23,000	Poor	Good: two wrenches	No	No	Yes	No	No	No
30,000	Good	Good: two wrenches	Yes	No	Yes	No	Yes	No
30,000	Fair	Fair: two wrenches	Yes	Yes	Yes	Yes	Yes	Yes
30,000	Fair	Fair: one wrench with spindle-lock button	Yes	Yes	Yes	Yes	Yes	Yes
20,000 to 30,000	Fair	Good: two wrenches	Yes	Yes	No	Yes	Yes	No
30,000	Fair	Good: one wrench with spindle-lock button	No	Yes	Yes	Yes	Yes	Yes

and two as adequate. The other six got a thumbs-down from all five of us who used them.

Recommendations

None of these laminate trimmers does everything. If you just need a tool for furniture work, I wouldn't recommend any of the multiple-base models. But if I were working with plastic laminate and needed to use all of a multiple-base tool's functions, the DeWalt would be my first choice because its attachment screws can be tightened by hand.

If you need a small router for making furniture and cabinets, I recommend the Virutex; the Makita and the Porter-Cable 310 tie for second place. Price differences aside, the Virutex is the best choice if you want the extra mortising and circle-cutting jigs that come with it. If you don't, the Makita is a wonderful tool to use because of its clear-plastic base and the two lights that illuminate the cutting action. If you just want a basic, heavy-duty trimmer, the Porter-Cable 310 is ergonomically very comfortable and has the best vertical-adjustment mechanism of all the tools I used. You could always make your own clear base for it. □

Kim Carleton Graves builds furniture and cabinetry at his shop in Brooklyn, N.Y. Masha Zager contributed to the preparation of this article.

Graceful Glass Doors

Delicate muntins require exacting machine work and handwork, but they create doors of elegant proportions

BY STEVE LATTA

A pair of properly executed glass doors adds sophistication to a bookcase, a breakfront or a case-on-chest. The doors on this walnut bookcase that I made for my wife are similar to ones I saw several years ago on an English antique. Most glass doors today are built using cope-and-stick knife sets to shape the muntins—not so with these doors. Cope-and-stick sets give rise to a heavier, bulky gridwork that is inappropriate for the lighter and more formal look I prefer in my work. My process involves precise machine work and handwork, but for the end result, the extra effort is well worth it.

Joinery details make a sturdy frame

The joinery for a glass-door frame is standard mortise-and-tenon fare, but there are a few important details to note. Choose straight-grained stock because of its strength and stability. Leave it oversize for several days, and then bring it down to final dimension after it has stabilized. The mortises cut into the stiles and the matching tenons on the ends of the rails are offset from the centerline of the stock thickness. The front cheeks align with the back edge of the small roundover bead that is shaped along the inside edges of the door frame. That bead holds the panes of glass in place. Also, with this design, one other detail stands out: Each of the delicate muntins is made from two separate pieces of wood—a face piece shaped with a small bead that fits over a lattice grid.

Mill and mold the door frame

I make doors slightly oversize and then fit them to their openings. With these doors, the stiles and rails are ⅞ in. thick by slightly more than 2⅛ in. wide. On the inside edge of each piece, cut a ⅛-in. radius bead (I use

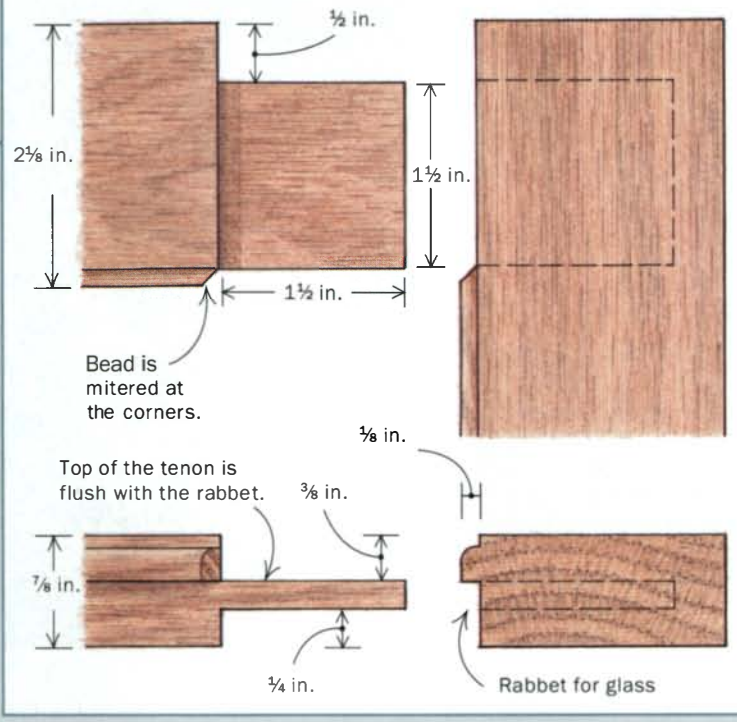
Photos: William Duckworth

DETAILS FOR ELEGANT GLASS DOORS

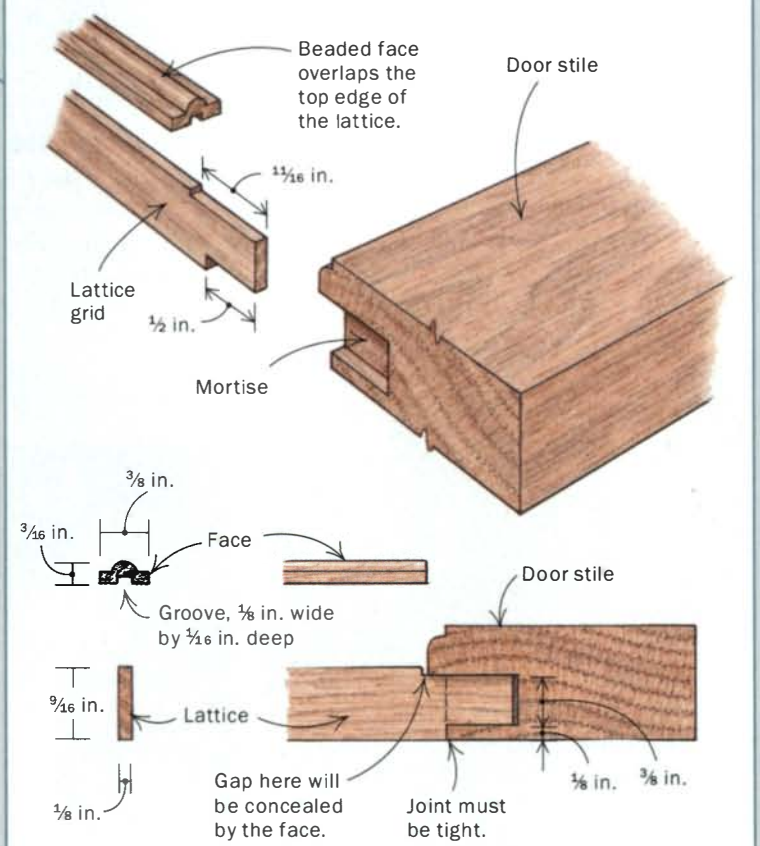
This design combines the delicate two-part muntins with strong, traditionally joined frames to make elegant, sturdy doors.

Align the horizontal muntins with the bookshelves behind the doors.

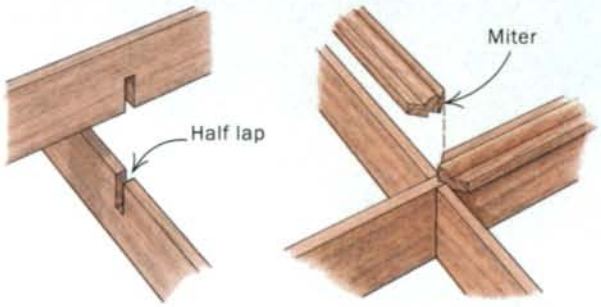
DOOR-FRAME JOINERY



WHERE MUNTINS MEET THE DOOR FRAME



WHERE MUNTINS INTERSECT



The lattice grid, joined with half laps, is glued together as the door is assembled.

Each beaded face is grooved on the underside, custom fitted and glued in place.

Drawings: Vince Babak

CUT SMALL MORTISES FOR LATTICE GRID

Small mortises require machine work and handwork. The ⅛-in. by ⅜-in. by ½-in. deep mortises for the lattice grids are drilled out with a brad-point bit in a drill press and cleaned out by hand with chisels.

an Amana #49496 roundover bit), leaving a heavy 1/16-in. step at the front edge. After routing the roundover, calculate the height of the back rabbet and cut it on a shaper or a router table with a fence. The rabbet should be the same depth as the roundover (mine is ⅛ in.). In height, it should leave enough of a bead and flat so that the entire muntin face dies into the flat area and does not have to be coped to the radiused section. To eliminate tearout when cutting the rabbet, make a light pass first and follow that with a full-depth pass.

After the roundover and rabbet have been machined, finish executing the door joinery—mortise-and-tenon with a mitered roundover where the stile and rail join, which some people call a jack miter—and then dry-fit the door.

Mold the bead on the muntin faces

After milling the stiles and rails for the door frame, mill the muntin face pieces to size and shape. At this stage, however, save the task of cutting the grooves in the backs of them until later. Mill the beaded faces in lengths longer than what you'll need, and always make extras. Start with a piece of stock about 5 in. wide and ⅜ in. thick. Joint an edge, then rout the beaded shape along that edge (I use an Amana #51540 bullnose bit with a 5/64-in. radius to shape the fully half-round bead on the edge faces). Make sure the bead is centered. After shaping the edge, rip it to thickness (mine were just shy of 3/16 in.), using a splitter and a good-size push stick to support the stock as you cut it. Repeat that process—joint, shape, rip—until all of the beaded face blanks are done. Store these muntin faces on a scrap of plywood and tack them down with a string or a rubber band to prevent them from twisting and cupping.

One thing I'd like to stress here is the need for accurately machined pieces. Use a narrow router table with a short fence to accommodate slight deviations in stock thickness or flatness.

Make the lattice grid delicate and strong

The stock thickness of the lattice grid is sized to fit a standard rip-blade kerf—one created by a sawtooth that is square in profile. Rip a shallow groove about ⅛ in. deep in a piece of scrap. This scrap will serve as a test sample for milling the lattice pieces to thickness.

Start with a piece of material about 6 in. wide that is a couple of inches longer than your longest frame member, and plane it down to ⅝ in. thick. This blank will be milled into strips that fit snugly into the groove on the scrap test sample. These strips can be generated a variety of ways. They can be ripped oversize and brought

MILL THE LATTICE GRID

Cutting tenons on the ends of the lattice-grid stock. *Use the tablesaw fence as a stop block and support the thin lattice with a scrap of wood screwed to the miter gauge. Make a first pass to define the shoulder and then drag the stock across the sawblade to cut the tenons.*

Half-lap joints for the lattice grid. *With ⅛-in.-thick stock, you can cut half-lap joints easily. Use a miter gauge to make one pass through each piece.*

ASSEMBLE THE DOOR IN STAGES

Glue-ups can be stressful, especially with so many delicate pieces of wood going together at the same time. Latta recommends breaking down the process into manageable stages.
***1.** Assemble the lattice grid with a spot of glue at each half-lap joint, and then glue the vertical lattice piece into the top and bottom door rails.*
***2.** Fit the rails and the horizontal lattice pieces into the first stile.*
***3.** Add the second stile and clamp the door assembly together.*

to thickness with a wide-belt sander, a drum sander or a thickness planer. Or you can just rip the lattice pieces to thickness on the tablesaw, using a zero-clearance insert, a splitter, and a push stick. Although the resulting sawmarks are not desirable, they won't be seen because the glazing compound that holds the glass in place will cover them. Once you've milled the lattice-grid pieces, bundle them up and set them aside. I keep mine wrapped in plastic to prevent them from twisting out of shape.

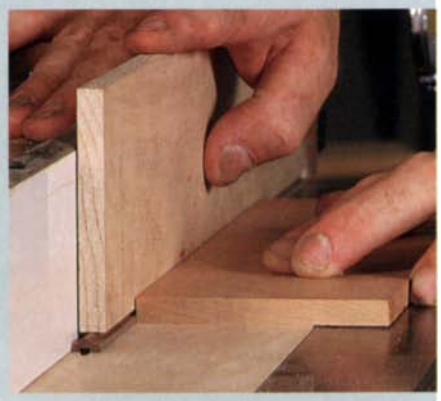
Cut mortises for the lattice grid—To lay out the mortises for the lattice grid in the dry-fitted door frame, measure the rabbet-to-rabbet dimension between stiles and rails to get the correct locations. I use a ⅛-in. brad-point bit mounted in the drill press to remove most of the waste, then I clean up the mortises with a chisel. Scoring a line with a knife down the center of the mortise layout helps the small brad-point bit stay on track better along the center of the mortise. Cut the mortises about ½ in. deep with one end flush against the back edge of the small roundover bead that is shaped along the inside edges of the door frames and the other end about ⅛ in. in from the back of the doors. When you've finished cutting all of the mortises for the lattice grid, you can cut the lattice pieces to length and shape the tenons on the ends.

Notch ends to make tenons—When calculating the exact length of the lattice-grid pieces, figure a 7/16-in.-long tenon on each end. This will leave a pocket at the bottom of the mortise for excess glue or debris. You need to cut rabbeted shoulders on both the top and bottom edges to form tenons. The bottom (or back) edge is the most important because it forms a visible seam where it joins the door frames. The

There's no room for slop when shaping and milling these small muntin faces. It's an exacting process.

MILL THE MUNTIN FACES

Joint, rout and rip. *Shape the muntin faces two at a time, working from both edges of a board. Joint each edge flat, rout the beaded shape, and then rip off each side on the tablesaw, using a large paddle-style push stick to keep the stock flat on the saw table.*



Small pieces require extra care. *To mill a 1/16-in.-deep groove into the delicate muntin, hold down each piece from above and push it tightly to the fence.*

upper (or front) rabbet does not have to fit tightly to the roundover bead because that seam will be covered by the muntin faces.

To cut the shoulders on the lattice-grid members, use a miter gauge with an auxiliary fence for support. You can use the main fence of the tablesaw as an indexed stop for the length of each tenon cut. Set a combination blade about 1/8 in. high, make a shoulder cut, and then drag the stock across the blade to cut the rest of the tenon shoulder. Once the proper tenon length has been established, cut all of the horizontal lattice pieces, and then repeat the process with the vertical pieces. Reset the fence to cut the upper rabbet on all of the lattice-grid pieces—horizontal and vertical—so that you end up with a tenon width that matches the width of the mortise.

Half laps stiffen the grid—The lattice-grid pieces must be joined with standard half-lap joints. This is best done on the tablesaw with a rip blade and an L-shaped auxiliary fence mounted to the miter gauge. The fence eliminates tearout and helps locate each notch. Cut a notch halfway through the horizontal frame members in the exact middle of each piece. Hold the vertical members against the stiles and transfer the locations of the mortises onto those pieces. Cut the notches to fit. The vertical and horizontal members should fit together at 90°. After all of the notching has been completed, dry-fit the door with the lattice grid in place to see whether it all fits.

Glue the door together before fitting the muntin faces

Glue up the door one section at a time. Havoc awaits fools who attempt to do it all at once. Start with the lattice grids, using yellow glue, and then glue the lattice-grid verticals into the top and bottom rails. After that, join each stile, one at a time. Make

Mark and cut each muntin face separately. *With a 2-in.-long layout scrap as a marker, Latta uses a plane iron to score each muntin face in place on the door. Then he removes each piece to custom-cut it to length.*

FIT THE MUNTIN FACES

Shopmade setup for trimming small miters. *A scrap of wood cut with 45° miters on both ends and screwed to a scrap of plywood serves as a guide for mitering the delicate muntin faces. A sharpened plane iron makes the cut.*

sure the door is flat and not twisted, using the same type of clamps throughout on a flat, level bench.

Fit the muntin faces one at a time— Using the rip blade again, cut a groove down the center of the back of each muntin face piece. Because these pieces are so small, use a large push block that will hold the whole piece tightly against the saw table and another scrap of wood that will keep it pushed against the fence. The groove should be a heavy ⅛ in. deep.

Where muntin faces join, I use a plane iron or a wide chisel as a sort of guillotine to chop the mitered ends cleanly. To make a guillotine, screw a block of wood with a 45°-angle cut on both ends to a small piece of plywood. This block will serve as the guide for the plane iron as you press it against the sides of the block. You'll need a layout piece to mark for all of the miter cuts. Cut a 2-in.-long scrap piece of muntin face stock. Leave one end square and make opposing 45° cuts on the other end.

To begin facing the lattice grid, cut a piece of muntin a little bit longer than the first point of intersection, with one end square. Fit it over the lattice grid, being sure to butt the square end tightly to the top or bottom rail. Coming in from both sides, slide the square end of the layout piece up to the muntin face and transfer a mark with the plane iron. These points indicate where the miters begin. Line up each mark to the edge of the guide block and, with a slicing motion, trim the miters to length with the iron. Check the fit by pressing the muntin face onto the frame and sliding the mitered face of the layout piece up to it. If the fit is good, cut and join each of the two side muntins that intersect that joint, and then continue with the next vertical piece. Work your way down the full grid of the door. As tedious as this process may sound, it actually goes quite quickly, providing your iron is sharp.

Once all of the muntin faces have been fitted, take them off one at a time. Using a small glue syringe, put a light bead on the inside edges of each groove and press them in place over the lattice grid. Do this to all of the muntins, adding a small drop of glue where the pieces butt together. Any excess glue must be removed because it will interfere with installing the glass and cause blotches in the final finish.

Once all of the muntin faces have been glued in place, and before installing the glass, fit the door to its opening and hang it on hinges. After that, sand and finish the doors before glazing them. Glass doors with this delicate gridwork are ageless and speak to a time when attention to detail meant a little more than it often does today. □

Steve Latta teaches cabinetmaking at Thaddeus Stevens School of Technology in Lancaster, Pa.

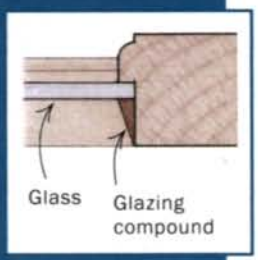
Eight miters for each intersection. *Four muntin faces join together over each half-lap joint of the lattice grid.*

Don't use too much glue. *A syringe is ideal for applying glue to the small muntin face pieces. (One source is Lee Valley, 800-871-8158.) Any excess glue should be removed before it dries.*

Match the color of the putty to the finished wood

Doing the glazing isn't difficult with a little patience and practice. A talented glazier named John Rush gave me more than a few pointers. Start by tacking each pane in place with a few dabs of clear silicone along each lip. This keeps the glass from rattling as the door is opened and closed, and it works much better than traditional glazing points that would tend to split the thin lattice-grid pieces.

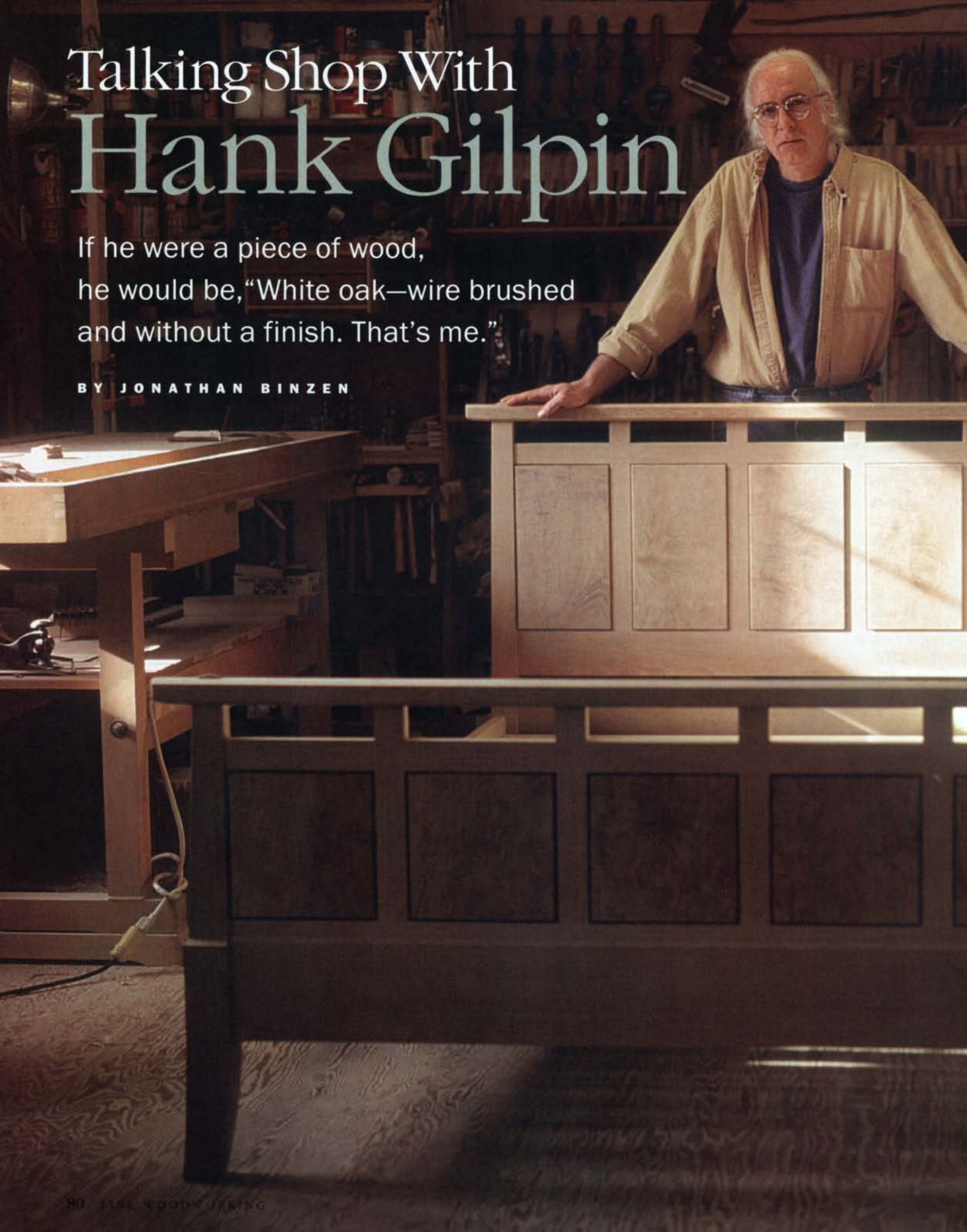
The glazing compound should be colored using universal tinting colors (UTCs) to match the finish on the wood. UTCs are used by painters and are available at most paint stores. Use a drill with a mixing paddle to blend the colors into a can of regular glazing putty. If the mixture becomes too thin, add a little whiting—also available at paint stores—to thicken it. Mix the glazing a few days ahead of time and set it aside. This allows it to thicken a bit, and as it dries you get a better idea of the final color. You don't need a dead match for the color; you just want it to be close and unobtrusive. To apply the putty, I use a shortened putty knife with one corner ground off, which helps me get neater results when trimming away the excess putty.



Talking Shop With Hank Gilpin

If he were a piece of wood, he would be, "White oak—wire brushed and without a finish. That's me."

BY JONATHAN BINZEN



Hank Gilpin has been making custom furniture in a converted church in Lincoln, R.I., for three decades. His work has been collected by museums and featured in many books and magazines, and it affords him a good living. After serving in Vietnam as an Army photographer, Gilpin studied woodworking under Tage Frid at Rhode Island School of Design. He works entirely in solid wood, using a wide range of domestic species, and his furniture relies on traditional joinery and extensive hand-tool work. Gilpin's love of wood and trees has led to a parallel career in horticulture. These days he designs gardens and landscapes as well as furniture. I spoke with him recently in his back garden.

JB: Your mentor, Tage Frid, taught the whole gamut of woodworking techniques, yet you focus strictly on solid wood. How did you develop that approach?

HG: When I was in graduate school in the early '70s, everyone was doing Art Nouveau-inspired work. All kinds of flowing lines, awfully difficult things—laminating, steam-bending, and veneering—all that stuff that's so outrageously time-consuming. When I opened my shop, economic forces dictated simplicity. If I could sell a piece of furniture for $200, I was really pushing it. So I became Mr. Mortise-and-Tenon and Solid Wood.

At one point in the early days, I had a one-curve rule. I realized that if a piece had more than one curve in it, I wasn't going to make any money. Then I took it a step further and said, okay, there can't be *any* curves. This has to be straight-line design. I have to design pieces that are out of the planer and the tablesaw, and still have some kind of interest. They could have a million tenons and mortises because I could whip through those. Obviously, I abandoned the no-curves rule, but it was good discipline.

JB: How do you see yourself in relation to your contemporaries who make more sculptural, self-expressive furniture?

HG: Early on I realized that I'm either not interested enough or not talented enough to do a certain type of expressive work, but I'm really good at another type: the simple, practical pieces that have a little bit of zing to them. Compared to what other people were making, these were somewhat lesser-priced, functional pieces.

JB: What is on your mind when you design?

HG: I listen very carefully to what a client says to me. Then I look around and get a feel for what they are all about, and I try to make something suitable in my own way. I never ignore the client's needs. That's the practical aspect, and it's a big, powerful force. They've got to be able to sit at this table. They don't want it talking to them when they're sitting at it.

JB: You are contacted frequently by aspiring woodworkers. What do you say to someone who tells you they want to do what you do?

HG: I'm brutally honest. I tell them it's impossible. Then I work

Gilpin pairs domestic timber with inspired design. *For this 8-ft.-long gallery bench commissioned by the Smith College Museum of Art, Gilpin chose an exceptional batch of curly white oak.*

backwards from there. If you want to make a living making wooden objects, there are some absolutes to consider:

- You're not going to make a lot of money for 10 years, if ever.
- You have to be totally dedicated to your work; your life is secondary.
- You have to live and work in the same place.
- You have to work more than anybody else.

I work 60 to 70 hours a week. I don't mind. I don't watch television, so I have plenty of time to draw, sketch, and think. Every night I'm doing my little business.

> "I don't think you can understand machines until you understand [the hand tools] they replaced."

JB: Do you work alone?

HG: I usually have a couple of people in the shop with me. I need the interaction. And to make a profit, you need other people working with you. There's not enough time in the day to run a business and also be at the bench long enough to make money. You can't do it. Fifty percent of my time I'm not doing anything related to making things.

JB: You use hand tools and machines extensively in your work. What's the best way to teach these two components of woodworking?

HG: I don't think you can understand machines until you understand what they replaced. People in my shop don't go near a machine for two years. By then they have absolute, complete control of handwork and the furniture-making process from post-machining to the end. Once they've got the hand skills down, the sequence goes: drill press, bandsaw, mortiser, tablesaw, jointer, and planer.

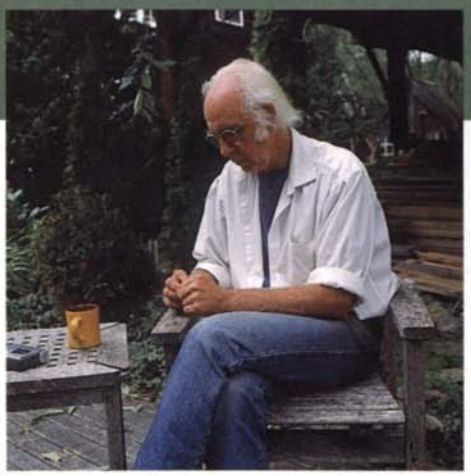
If you throw someone on a milling machine in the beginning of a job, they have no idea what's at the end of all that effort. If you work backwards, then, by the time they get back to the milling, which is the most important part of a job, they see the whole picture; they know where they're headed.

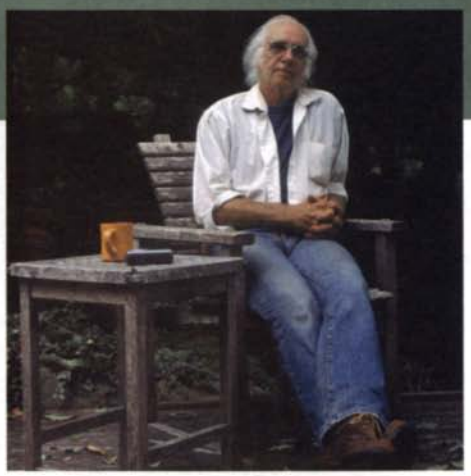
JB: Why is milling so important?

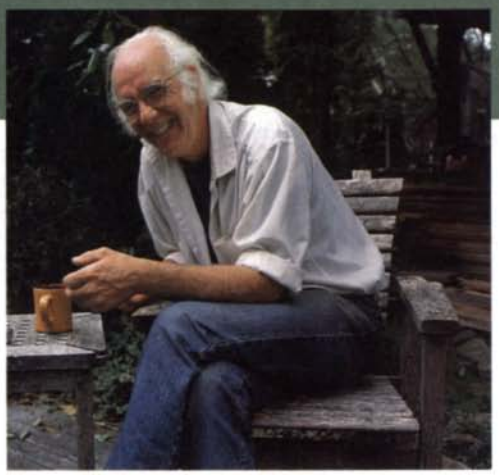
HG: Two things. First, I generally work with wood that is carefully selected for each piece—and there isn't any extra stock. So milling mistakes can be problematic. Second, and more impor-

Photos: Jonathan Binzen

"At one point in the early days, I had a one-curve rule. ... If a piece had more than one curve in it, I wasn't going to make any money."







tant, is that I change the design at the milling stage on virtually every piece I do.

At the beginning of a job I've got a pile of wood and a rough sketch. As I'm pulling the wood, I start my working drawing. I walk back and forth from the pile to the drawing, making sure the wood can match it, because there are always limitations. Maybe I have 5/4 stock, but it was cut a little lean at the mill, maybe there's a twist in the board, or maybe the face grain is exceptional.

When I cut the parts to size, the working drawing is still very casual. Then, when I start milling, I might say, whoa, this piece is a little more interesting than I thought, or I see that I'm going to get more thickness out of the board than I expected. I know from experience how close I can cut things and still have lots of options.

JB: Did you continue studying furniture after graduate school?

HG: Nonstop. I read everything I could get my hands on. I wanted to know every style, every technique. And in 1976 I went to Europe for six weeks. I wrote ahead to a bunch of museums and got letters back giving me basically carte blanche access to their collections. That was amazing. When I got there, I gravitated instantly to England, 1903, the time of the original Arts and Crafts guys.

A couple of years later, I did the same thing in California. I wrote to Randall Mackinson, whose books on the Greene brothers had just come out, and asked if I could visit the Gamble House. Grad students lived in it at that point, and I got to stay in the house and study it for a week. Wow, that place was unbelievable.

JB: You work in Rhode Island, with its deep furniture tradition. Has being there affected your furniture design?

HG: One thing I quickly realized is that if you are a New England woodworker and you want to make a living here, you have to appeal to the New England aesthetic. I'm surrounded by antiques, surrounded by history. So, as I studied the furniture and did a lot of repair work on antiques, I started to think about how I could use these forms as inspiration to create pieces of my own. I wanted to make furniture familiar, comfortable, and practical enough to be embraced by New Englanders.

I like highboys, so I might design a piece that had a highboyesque quality about it. I wouldn't make any explicit historical reference; I'd just look at the stance, the format, the way that it functioned, and use those as guides while I drew my own pieces. And fortunately, once in a while, somebody would ask for one. □

Jonathan Binzen, a former editor of Fine Woodworking, *is a freelance writer.*

Table explores extremes of domestic wood. *Gilpin built this end table with tropical sea grape. He has acquired a wide range of exotic-seeming American woods on trips to Florida.*

Current Work

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Mark Slowik Derby, Conn.

Slowik built this Connecticut flat-top highboy (18¼ in. deep by 38 in. wide by 72 in. tall) after seeing one featured in Jeffrey P. Greene's *American Furniture of the 18th Century* (The Taunton Press, 1996). Slowik, a Connecticut native and self-taught woodworker, said that building this piece was a challenge he could not resist. The piece is constructed out of cherry—some from recycled wooden pallets—and white pine and took 18 months to complete. The highboy is finished with two layers of dye stain and a hand-rubbed gel-varnish topcoat.

Curt Hart Edmonds, Wash.

"I am inspired a lot by pure shapes and forms," Hart said, adding that he likes to play with shapes to make furniture that is both visually pleasing and functional. He gave this cherry and maple dining chair (18 in. deep by 18 in. wide by 32 in. tall) a leather-padded seat and finished it with hand-rubbed clear lacquer.

Klaus Kloepper Watsonville, Calif.

In making this lidded vessel, Kloepper said his intent was "to combine the natural-looking elements of a poplar leaf and ebony cherries with a functional redwood burl vessel." The 6-in.-dia. piece stands 8 in. tall and is finished with oil and wax.

William Anderson Billings, Mont.

This hall table (18 in. deep by 49 in. wide by 33½ in. tall) is made of maple and lacewood with brass accents. "I was initially intrigued by the technical challenge of making the top—solving that problem with veneer in a vacuum press—then by the wide range of aesthetic choices the basic design offered," Anderson said. The table is finished with oil, polyurethane, and wax. Photo by Tony Smith

Seth Barrett Milan, N.Y.

Barrett chose the dimensions and style of this coffee table (34 in. deep by 54 in. wide by 18 in. tall) to suit a client's home. The design reflects the client's interest in architecture and in open furniture structures that support functional areas. The table is made of walnut and Gonçalo alves and finished with lacquer.

Andrew J. Ritchie Toronto, Ont., Canada ▲

Ritchie was browsing in a store a couple of years ago when a Windsor chair caught his eye. He was so intrigued by it that he signed up for a local chair-making class taught by John Robinson, proprietor of John Robinson Windsor Chairs. This left-handed writing-arm Windsor (30 in. deep by 35 in. wide by 42½ in. tall) is one of four different designs he's built since taking the course. The chair is made of oak, basswood, cherry, and pine and finished with two coats of red, blue, and yellow milk paint, linseed oil, and wax.

Allen Bixby Ukarumpa, Papua New Guinea ▲

Bixby built this table (44½ in. dia. by 30 in. tall) because he wanted to experiment with a veneering technique he read about in *Fine Woodworking* (#111, pp. 40-44). The tabletop is veneered with 18 leaves of rosewood with solid rosewood banding over a ¾-in.-thick plywood substrate. The legs are 15 laminations, mostly of rosewood, and the center support for the legs is taun. The table has a lacquer finish.

Chris Gillott Auckland, New Zealand ▶

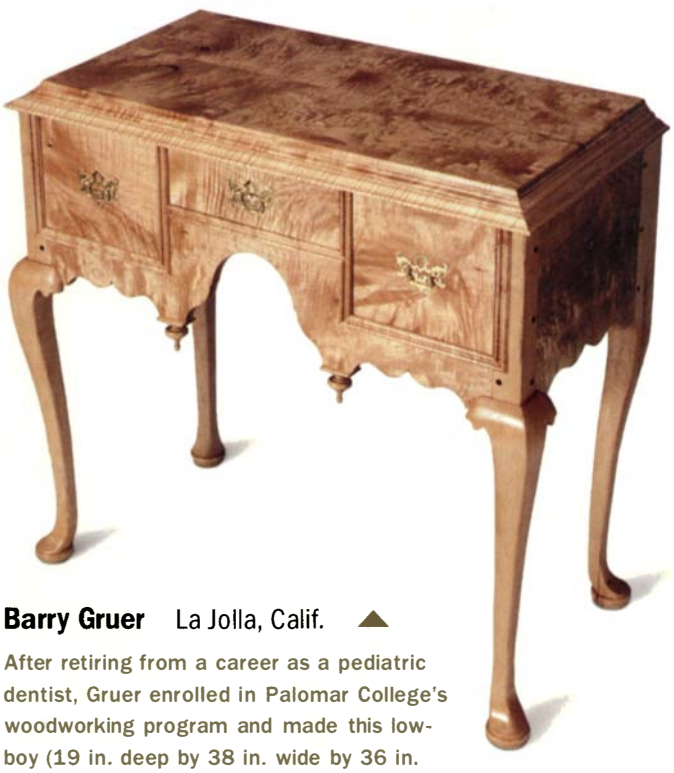
In designing this Scotch chest (21 in. deep by 57½ in. wide by 55 in. tall), Gillott began with a rough sketch done by the client, who also requested that the piece be heavily proportioned and made of native lumber. The primary wood in the chest, part of a bedroom ensemble, is New Zealand rimu. The top is waxed leather over a core of medium-density fiberboard (MDF). The drawer fronts are weathered New Zealand matai with kwila detail, and the drawer boxes are made of macrocarpa. The piece has a shellac, Danish oil, and wax finish.

Keith S. Cornell and Paul N. Smith II ▶
Whitman, Mass.

Cornell and Smith built this china cabinet (22 in. deep by 80 in. wide by 84 in. tall) as part of a two-piece dining set for a client. The design originated from a piece made by Morris & Company that appears in *Good Citizen's Furniture: The Arts and Crafts Collections at Cheltenham* (Ashgate Publishing Co., 1999). Built of Honduras mahogany, the piece features a maple upper cabinet interior with true divided-light doors, meaning the mullions completely divide the curved panes of glass. It has an oil finish.

Paul Petrie Jr. Gloversville, N.Y. ▲

Petrie turned this pedestal box (5¼ in. dia. by 10½ in. tall) as an entry in the 2003 Northeast Woodworkers annual show. Made of mahogany and spalted maple, its form was inspired by a world globe. It is finished with a hand-rubbed mixture of varnish, tung oil, and gum turpentine. Photo by John Paul Viscosi



Barry Gruer La Jolla, Calif. ▲

After retiring from a career as a pediatric dentist, Gruer enrolled in Palomar College's woodworking program and made this lowboy (19 in. deep by 38 in. wide by 36 in. tall) as his first project. The design was inspired by a highboy in Norman Vandal's *Queen Anne Furniture* (The Taunton Press, 1990). The piece is made of curly maple with ebony plugs and is finished with tung oil. Photo by Archie Breeden

Rules of Thumb

Why use nails in fine furniture

BY MIKE DUNBAR

Visitors to my workshop appreciate that I make chairs without nails. They think that making furniture with nails is a sign of poor workmanship. While you wouldn't want to join chairs with nails, they are the best fasteners to use for many other applications.

Nails have been around for thousands of years. Ancient Egyptians and Romans used them, as did every furniture-making culture since the dawn of woodworking. Despite this long and honorable history, nails have acquired a bad reputation.

Perhaps our association of nails with poor-quality construction dates back to a time when utilitarian furniture was often nailed together to avoid the high cost of making hand-cut joinery, which, of course, was more time-consuming. Nevertheless, large quantities of utilitarian furniture have survived years of hard use and abuse, proof that nailing does not necessarily equate with poor-quality construction.

Before the time of the Industrial Revolution, specialist blacksmiths, called naylors, hand-forged nails out of iron and produced specialized nails for furniture making. While some of these specialized nails have been superseded by other types of fasteners, many still exist and are used today.

These hand-forged nails, however, were expensive. By the end of the 18th century, inventors developed ways to mass-produce nails by shearing them from sheets of iron. These nails, known as cut nails, were still costly to produce. With the development of inexpensive soft steel in the late 19th century, wire nails rapidly took the place of iron nails. These wire nails commonly are found in today's hardware stores and, like their earlier counterparts, have their place in fine furniture making.

Nails hold moldings in place while glue dries. *Using only nails on the side moldings allows the case sides to shrink and expand.*

Nails are effective fasteners

Nails give a little when stressed. This characteristic usually makes them the best choice for securing cleats or runners that are applied across grain, situations where wood would split or glue eventually would fail because of the wood's seasonal movement.

Nails generally do jobs that are difficult to accomplish with joinery. They fasten back boards to chests and cupboards and keep drawer bottoms in place.

Nailing still is the most common method of attaching moldings and other thin strips to a piece of furniture. Nails also are used to apply small ornamentation, such as brackets, where end grain or too little surface area prevents a good glue bond.

Furniture makers generally don't use common nails—the ones with flat, round heads. Instead, they use finish nails, which have heads that are less obtrusive

CUT NAILS VS. WIRE NAILS

The coarse four-sided shanks and blunt points of cut nails cause less splitting than the round shanks of wire nails. When driving a cut nail, always align the wider face of the nail with the grain.

Photos, except where noted: Marcia Ryan; this page (top): Asa Christiana

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WORKING WITH NAILS

When fastening with nails, all you need are small hammers and a square awl.

A square awl for pilot holes. *When twisted into wood, the awl bores a small hole. It's used where wood is more likely to split, such as near the ends of boards.*

The right way to pull a nail. *Use a block of wood to protect the project and pull out the nail in the direction it entered the wood to avoid enlarging the hole.*

and easier to hide. They also use brads, or tiny finish nails, which are available in various sizes.

Cut nails are effective and attractive

In period pieces, and in restoration work, furniture makers often use cut nails. These nails have a unique holding power that comes from the shape of their shanks, which are square in cross section. The square shank causes minimal splitting of the wood and allows the wood fibers to spring back onto the coarse shanks, which creates a strong hold onto the nail.

Cut nails have heads that are narrow and rectangular. When set and filled, the hole is unobtrusive. Curiously, the square holes left by some small nails used in nail guns are very similar to the impressions left by cut nails. In some furniture pieces, the nailing done with cut nails actually can enhance the appearance. Because the nails in this case are decorative, you do not want to set them. When you leave nails visible, be attentive to your nailing pattern and make it uniform on both sides and throughout the piece.

Another effective nail application dates back to the 18th century, when hinges, cleats, and battens often were secured with special, spear-pointed clinch nails. Strictly speaking, these were hand-forged nails, not cut nails. Today, however, some cut nails are manufactured as clinch nails. The metal is malleable enough and the point thin enough for the nail to curve back onto itself. This technique permanently secures hardware to the furniture.

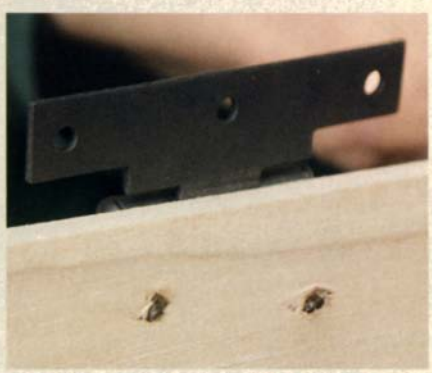
Owing to their authentic looks and their advantages over wire nails, I prefer to use cut nails whenever a nail is needed for furniture projects. The best-known cut-nail maker is Tremont Nail of Wareham, Mass. (www.tremontnail.com).

How to use nails properly

Hammering nails isn't rocket science. However, missing a nail or bending one can scar your work. Just as it is wise to practice cutting dovetails before building a Queen Anne highboy, a little practice with the hammer is a good idea.

When nailing thin parts or near the ends of boards, bore a pilot

CLINCHED NAILS WON'T PULL OUT



The anvil forces the malleable nail to bend back onto itself like a fishhook, which increases withdrawal resistance. The visible part of the nail all but disappears under a coat of paint.

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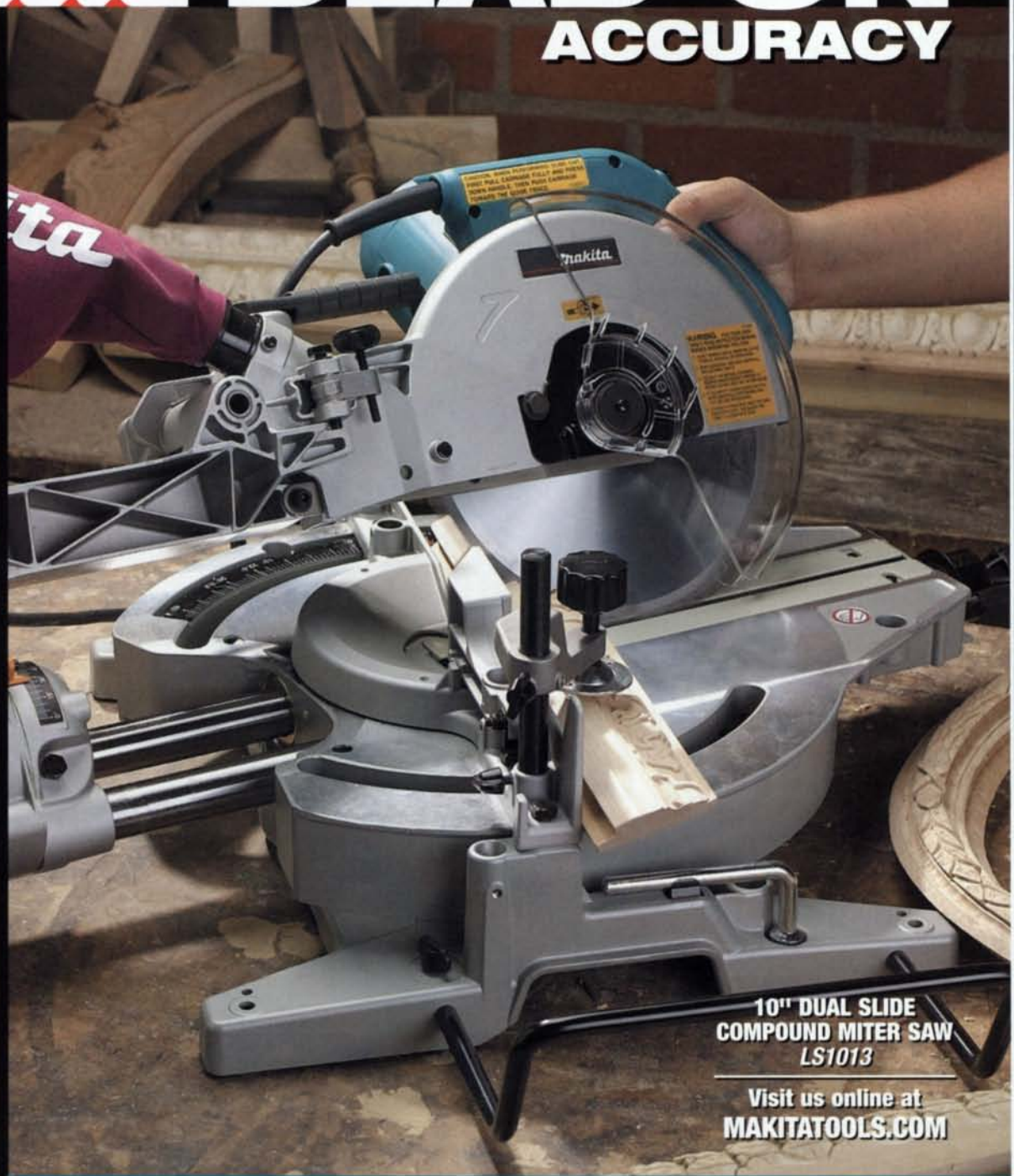

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Small nails driven with a nail gun leave holes similar in shape to those left by cut nails driven with a hammer.

hole to help avoid splitting. In the past, cabinetmakers used either a spear-pointed or square awl that was twisted into wood to bore a small hole. This type of awl is still available from Lee Valley (www.leevalley.com). But you can use a twist drill just as well.

Cabinetmakers use small, light hammers. An 8-oz. hammer can do most jobs, but a tack hammer is designed for smaller nails such as brads; the narrow bell of the hammer (the end of the hammer, adjacent to the face) gives better visibility of the head of the nail than a hammer with a wider face and bell. For some jobs, I find a 7-oz. hammer a good, intermediate choice.

When first assembling a piece of furniture, leave nail heads projecting about ½ in. This way, if you need to make a correction, you can pull the nail without damaging the wood. If you need to pull a nail, use a block of wood as a fulcrum under the hammerhead so that the direction of pull is directly up and not to the side, which would enlarge the hole and damage surrounding wood. The block also protects your worksurface. Drive all of the nails flush after you have tested everything satisfactorily.

If a nail is driven into a visible surface, its head may need to be hidden, depending on the aesthetic you're after. Use a nailset to drive the head below the wood. Fill the space above the head with wood filler, and when it has hardened, sand it smooth. If you are using a clear finish, hide the nailing by selecting a tinted filler whose color matches that of the wood and the final finish. Remember that over time, wood will darken. Therefore, slightly darker filler will look better in the long term. □

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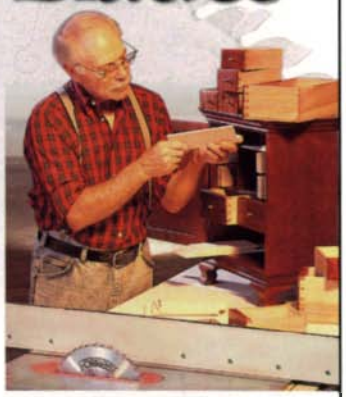

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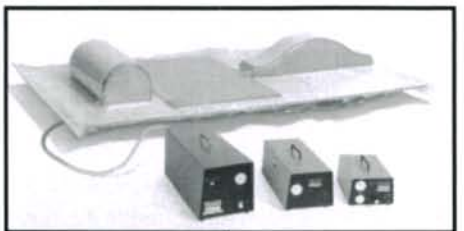

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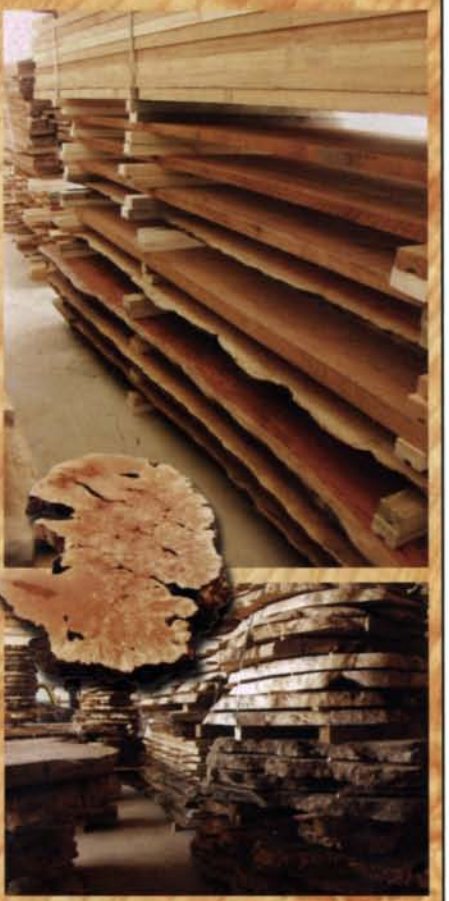

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Q&A

Shellac shelf life can vary. *If dry shellac gets old or is packed poorly, it will polymerize, leaving an undissolved glob in the bottom of the jar.*

Why won't my shellac flakes dissolve?

Q *I have some shellac flakes that I have tried to dissolve in denatured alcohol. After three days, the flakes are only partially dissolved, even with frequent agitation. What could be the problem?*

—Dennis Walter, West Chester, Pa.

A **Chris A. Minick replies:** As with liquid shellac, dry shellac flakes have a limited shelf life. Once dissolved, shellac molecules begin to react with the alcohol solvent, producing an ethyl ester of shellac. Over time, the concentration of ester increases so much that the shellac will no longer dry to a usable finish film. So, shop-mixed shellac one year old or older should be discarded.

Dry shellac undergoes a chemical reaction, too, but at a significantly slower rate than the liquid version. The shelf life of the shellac flakes usually is measured in years, whereas shellac dissolved in alcohol is measured in months. However, under the right conditions, the dry shellac molecules come together, forming chemical bonds between each molecule and releasing water vapor in the process. The result is one mega-molecule—a shellac polymer. The actual shelf life of shellac flakes greatly depends on how they were processed and stored by the manufacturer. An oversight in packing can accelerate the polymerization process significantly. Fortunately, this problem is rare.

I suspect your shellac flakes were too old when you bought them or were not packed properly. You'll have to throw them out, buy fresh flakes, and start over.

[Chris A. Minick is consulting editor to *Fine Woodworking*.]

Scraper vs. spokeshave

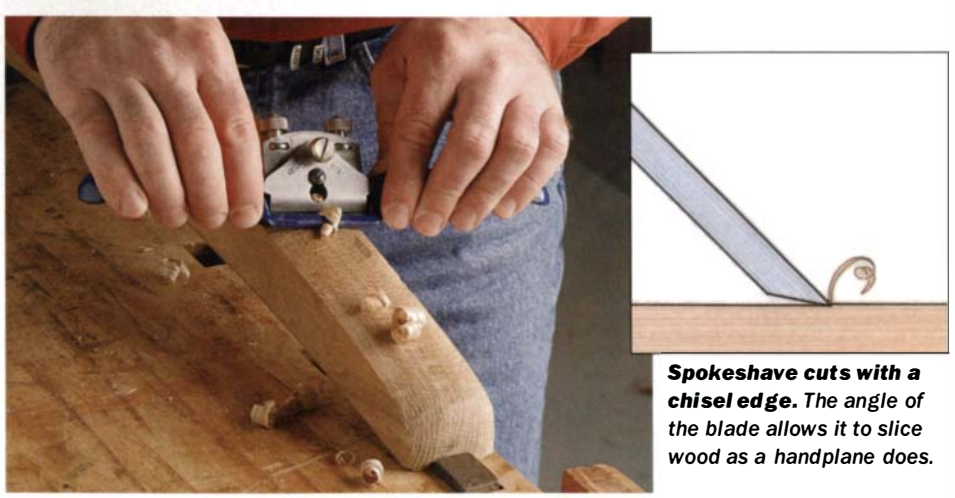
Q *What is the difference between a scraper plane and a flat-based spokeshave? They look the same to me.*

—Pete Peterson, Loves Park, Ill.

A **Garrett Hack replies:** Some scraper planes may resemble spokeshaves, but they differ in the orientation of the blade to the cut. Scraper planes have the unique cutting characteristics of a blade tilted forward into the cut, so the tool cuts lightly with a hook or burr along the cutting edge of the blade. Scraper planes are used for smoothing large, flat surfaces. Spokeshaves are configured more like typical planes, with chisel-edge blades angled back from the cut surface, and a sharpened edge does the cutting. Spokeshaves are used for shaping curved surfaces.

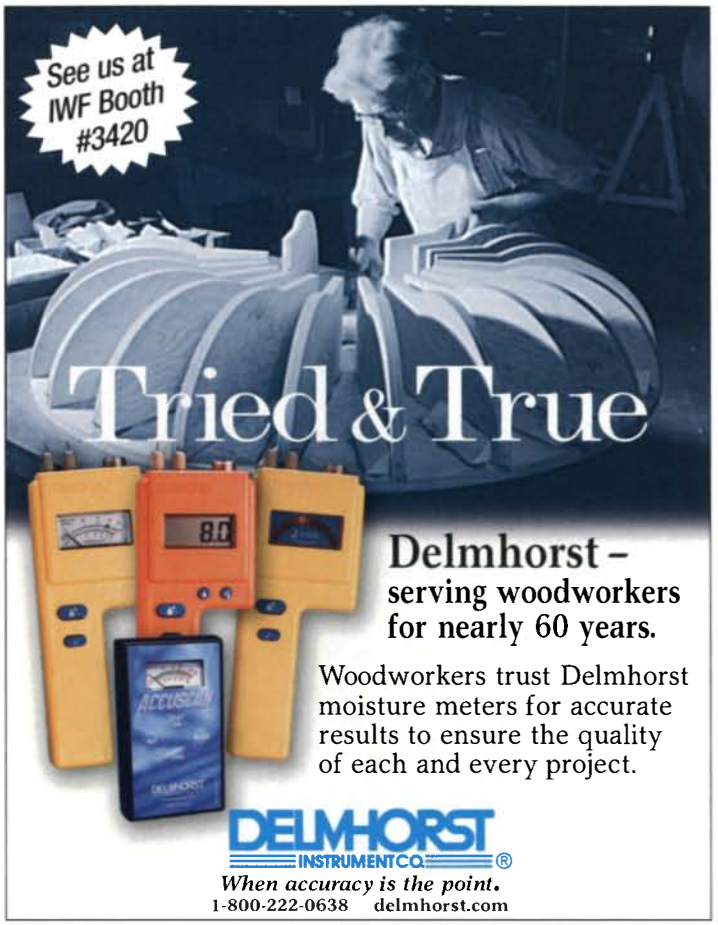
[Garrett Hack is a contributing editor.]

Scraper cuts with a burr. *A scraper plane holds a blade at an angle that causes a scraping action from the burr of the blade.*



Spokeshave cuts with a chisel edge. *The angle of the blade allows it to slice wood as a handplane does.*

Photos, except where noted: Kelly J. Dunton; this page (top and bottom right): Marcia Ryan; drawings: Vince Babak



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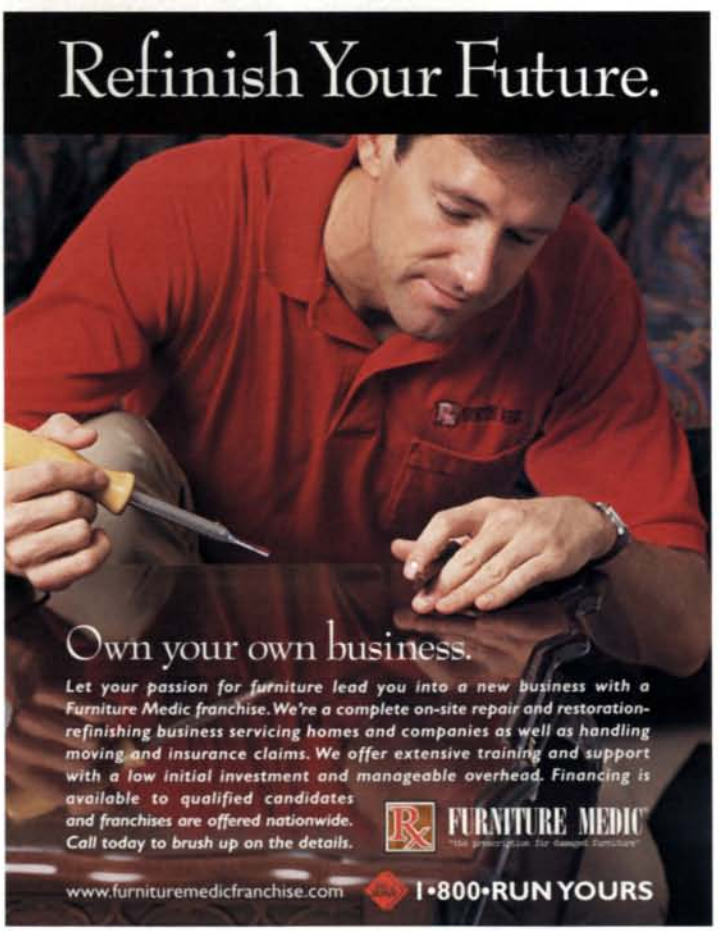


READER SERVICE NO. 80

American furniture inscriptions

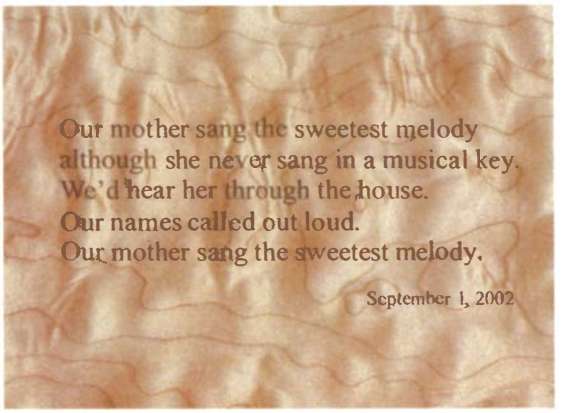
Q *My husband and I recently contracted to have a bed made for us by a local craftsman. I want to personalize the bed frame with a small, discreet inscription of some type. Are you aware of any tradition in American furniture making of personalizing homemade beds with quotes, poems, or sayings?*

—Meredith Nicholson, Durham, N.C.

A **Christian Becksvoort replies:** I've offered this service to my clients for years. When I started woodworking, I ran across an old headboard with a carved arrow in the center. I asked the owner of the antique store about it, and he said that it was from an early inn or guest house where guests slept two to a bed. If one of them felt the other was using more than his allotted share of the bed, he could reach up to the middle of the headboard to find the carving. If the other guest was beyond his borders, the first could feel justified in shoving the offender back to his side. So, in certain cases, a headboard carving served as a means of ending territorial disputes. Most often, though, the reasons for having a headboard carved were as personal and sentimental as yours.

I have carved diamonds, stars, the moon and sun, a compass rose, dates, initials, and monograms into headboards. Because I charge by the letter for hand-carving, customers tend to keep things short. When I'm asked to execute a stanza of poetry, I print it out in the size and font that will best fit the style and send it to the client for approval. Then I take the headboard to a local trophy or awards shop and have it laser-engraved. A laser will copy almost anything, from text to logos to complex, high-contrast photos. Keep in mind that a laser burns an image, so the sides of the letters will be dark brown and look machine-made. Hand-carving, which I prefer, is much more artistic but very time-consuming.

[Christian Becksvoort is a contributing editor.]



Inscriptions can be hand-carved or laser-engraved. *Whether elegant initials or an ambitious stanza of poetry, inscriptions make any piece of furniture unique.*

Turning willow

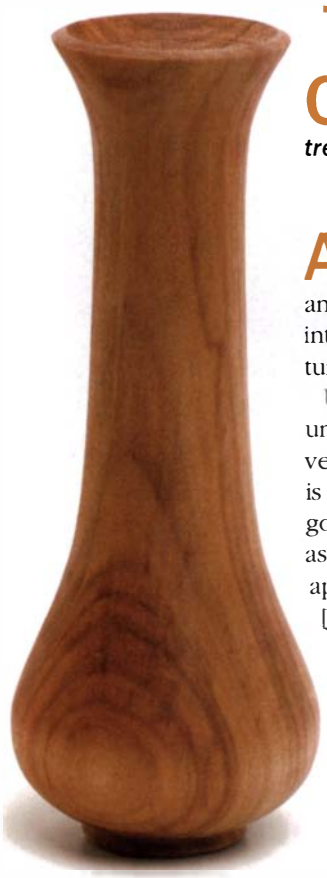
Q *Last summer I cut down a weeping willow in my backyard. Does that tree make good turning wood?*

—Dan Miller, Sheboygan, Wis.

A **Jon Arno replies:** Weeping willow does turn very well. It spalts easily and, if selectively chosen, can offer some interesting opportunities for decorative turnings.

Unfortunately, willows are notoriously unstable; they grow quickly and have very poor resistance to decay. Because it is so soft and lacks stability, willow isn't a good choice for turnings that will be used as structural members in furniture applications.

[Jon Arno is a frequent contributor to *Fine Woodworking*.]



Willow turns easily. *Willow is a forgiving and beautiful-looking wood to turn but should not be used for structural components.*

How many blade stabilizers should I use?

Q *I've been told that I should use one blade stabilizer in place of the wide washer on a tablesaw. However, catalogs show that packs of two stabilizers also are available. Should I use one or two?*

—Steve Eckers, East Northport, N.Y.

A **Gary Rogowski replies:** My advice is to go with stabilizers sold singly. These are ground flat and designed to work on the outside of the blade. Stabilizers sold in pairs are hollowed out and designed to work on each side of the blade. If you go with those sold in pairs, the position of the blade will move over to one side, and you'll need to make a new zero-clearance throat plate and widen the kerfs in all of your crosscut sleds.

By the way, a stabilizer does not take the place of the washer. Always use the blade washer on the outside of the stabilizer to balance out the arbor-shaft flange.

[Gary Rogowski is a contributing editor.]

Photos, this page (top left, top right): Christian Becksvoort; p. 98: Marcia Ryan

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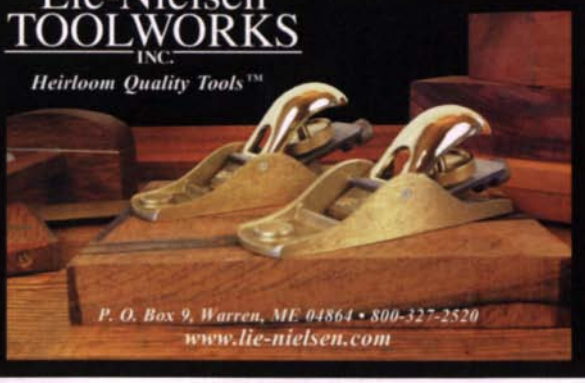

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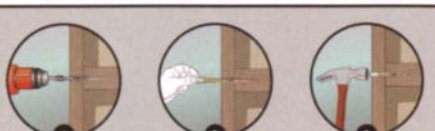

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READER SERVICE NO. 14

Are bandsaws left-handed?

Q *My jointer and tablesaw are configured for right-handed people. And my bandsaw appears to have an opposite configuration to those tools. Are bandsaws built left-handed?*

—Gus Ramirez, San Antonio, Texas

A **Mike Dunbar replies:** Actually, bandsaws are ordinarily built for right-handed people. When using a bandsaw, your left hand holds the work on the table, and your right hand guides it. The same concept applies to a jointer and tablesaw, in that your left hand steadies the work while your right hand provides the forward motion.

The important configuration that may affect how you handle your work is the side on which a large piece can extend beyond the table. So, for right-handed people, a large piece would overhang the table on the right of it, and the right hand would control the part that extends beyond the table.

[Mike Dunbar is a contributing editor.]

Bandsaws generally are not designed for left-handers. *The opening on the right side of the bandsaw affords right-handed people maximum control when sawing wood.*

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BY DAN FAIA

Hammer veneering

When it comes to applying veneer, modern woodworkers tend to lean toward more mechanical procedures, such as veneer presses, vacuum bags, and clamps and cauls.

Veneer presses work well on large, flat surfaces, but they take up an enormous amount of floor space. And while vacuum bags are excellent for all veneering applications, flat or curved, a quality bag system is a big investment ($500 and up). Clamps and cauls are labor-intensive to set up, especially for curved surfaces. Hammer veneering, on the other hand, requires only two items: a glue pot to keep the hide glue at the proper temperature and a veneer hammer to apply it.

The glue pot ($100) and veneer hammer ($32) can be purchased from a number of sources, including Highland Hardware (800-241-6748; www.highlandhardware.com). For the very frugal, a stove-top double boiler can be assembled easily from household items, and the veneer hammer can be shopmade.

Hammer veneering involves applying heated hide glue to the substrate, the underside of the veneer, and its top side (to lubricate the hammer). Then the veneer is pressed, not pounded, into place with the straight edge of the veneer hammer. The job is complete within a few minutes after the glue has cooled.

Hide glue has many qualities that make it suitable for hammering. For one, with hide glue you may loosen the glue bond using heat and reposition or readhere problem areas. Also, glue applied to the top side of the veneer acts as a grain filler and sealer coat and can be scraped, sanded, and finished more easily.

The hammering technique works on both flat and curved surfaces. On curved substrates, I usually glue the veneer seams

A simple but effective veneering kit. *With a relatively small investment in a glue pot and veneer hammer, you can veneer both flat and curved surfaces.*

HEATED HIDE GLUE IS THE KEY

Hide glue must be mixed with water—the ratio varies for different glue types—and then heated and kept at 140°F in a glue pot or double-boiler setup.

Scuff the surface and apply glue size. *Rough up the substrate with coarse sandpaper. Then brush on a size, a watered-down coat of hide glue, and let it dry.*

Now paint hide glue onto all surfaces. *Apply full-strength glue to the substrate and the underside of the veneer.*

Veneering goes quickly. *Position the veneer and apply glue to the top side to lubricate the hammer. Start from the center and work toward the edges, pushing out air bubbles and excess glue. Work the surface continuously until the glue cools.*

Photos: Asa Christiana

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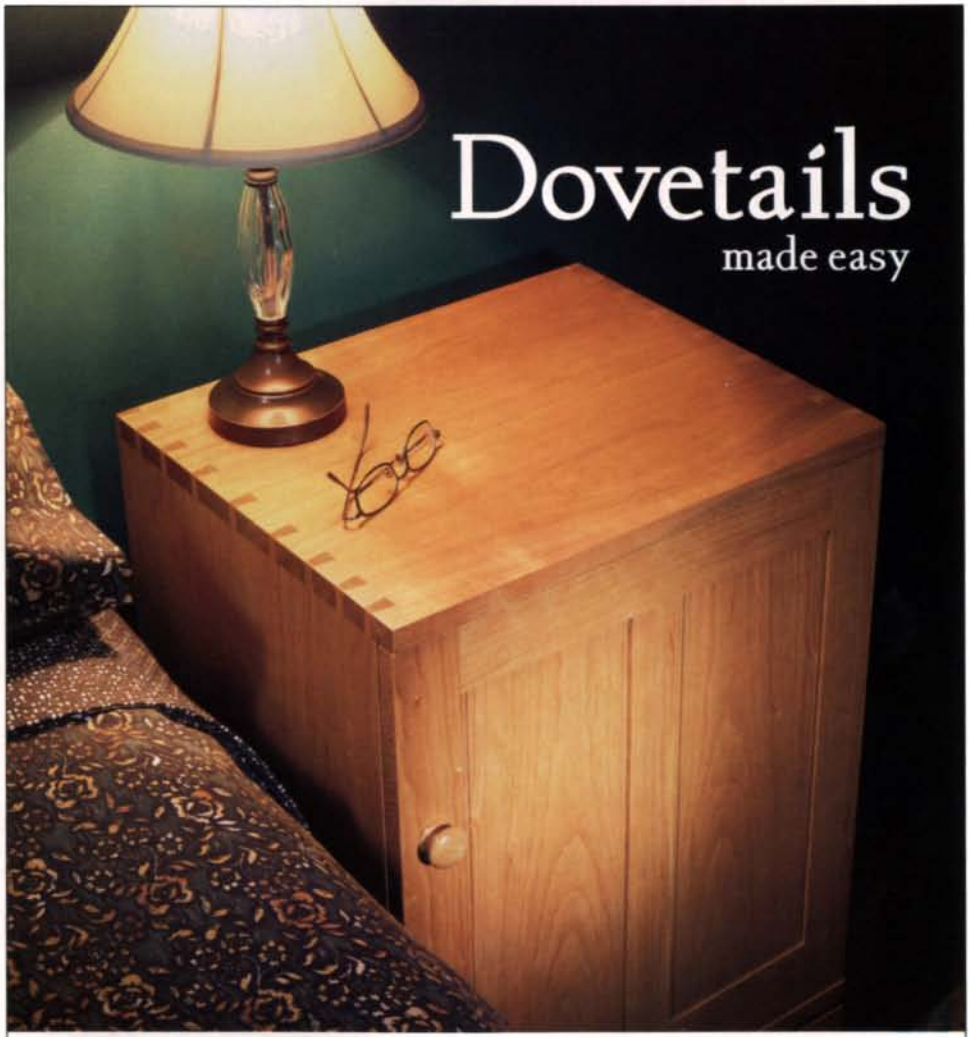

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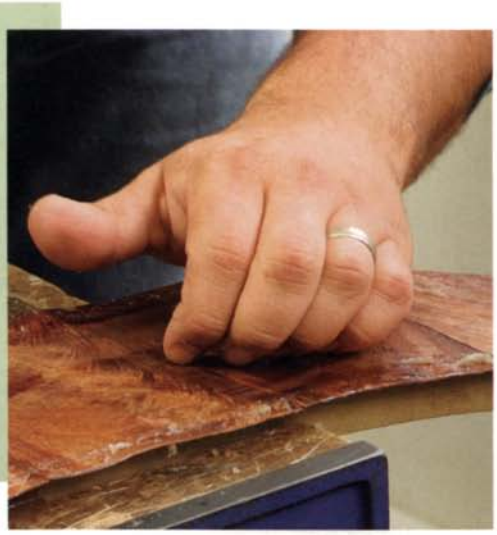
CHECK FOR BUBBLES

Tap the surface with your fingernails to search for any air pockets, which sound hollow, or glue pockets, which feel soft. Both are easy to fix. Large pockets will need to be sliced open; small ones won't.



Removing glue pockets. *Slice open the pocket (above), and then apply heat to the area with an iron (right). The heat will soften the glue, allowing the excess to seep out while the iron presses down the raised veneer.*

with yellow glue and remove any veneer tape or masking tape before hammer veneering. The veneer should overlap the substrate by roughly ⅛ in. all around to allow for minor shifting during application.

Cook up some glue

I buy hide glue from Bjorn Industries (704-364-1186), where an expert will recommend a particular strength based on the substrate, the veneer type, and the desired open time. But standard, good-quality hide glue is widely available. Buy it in ground form, as opposed to pearls. In my experience, ground glue melts more quickly in the pot and produces a smoother consistency.

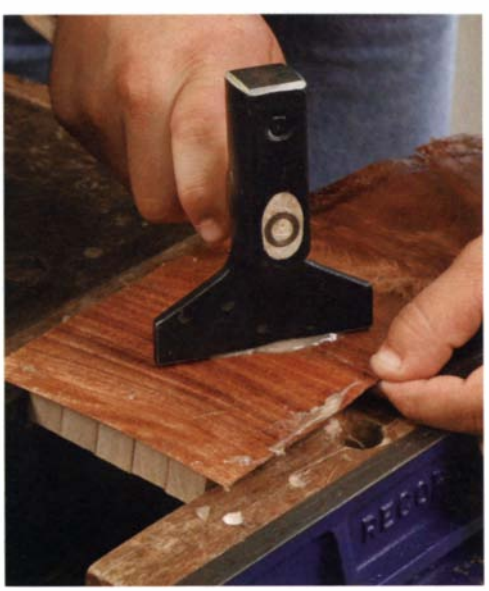
Mixing and heating the hide glue is the only tricky aspect of hammer veneering. Glue that is too thin won't have enough adhesion strength, and glue that is too thick is difficult to hammer out, leaving glue bubbles under the veneer. The final consistency of the glue should be between that of heavy cream and pancake syrup.

Mix the hide glue with cold water (one part glue to two parts water). Let the mixture stand for approximately a half-hour—until it has absorbed all of the water. Then cook the hide glue for at least 20 to 30 minutes in a double boiler or glue pot. A glue pot creates the proper temperature automatically. However, a makeshift double boiler—simply a lower pot creating a water bath, with a second pot containing glue suspended inside—needs to be monitored to keep an approximate 140°F temperature and avoid burning the glue. As hours go by, heated glue may thicken and need to be thinned by adding some water.

I put water in the glue pot and place the glue in a separate jar in the water bath. It's not necessary, but it makes cleanup easier. Hide glue is best used when the ambient temperature is around 68°F to prevent the glue from tacking up too early. If the shop is cooler, heat up the veneer and substrate with a hair dryer prior to glue-up.

Prepare the substrate and apply the veneer

It's a good idea to rough up the substrate with coarse sandpaper to help adhesion. Because of the nature of hide glue, it doesn't bond



Fixing air pockets. *Again, slice open the pocket (left), if necessary, work glue into the cavity (center), and then hammer down the problem area (right) for an invisible repair.*

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quite as well on a perfectly smooth surface. Also, I apply a watery hide-glue mixture—called glue size—to the substrate before veneering. This prevents the substrate from drawing too much moisture out of the glue. To make the glue size, mix five parts water and one part glue, and heat it in the glue pot.

Apply the glue size with a brush and allow it to dry before veneering. Then brush the full-strength hide glue (be sure it is heated fully) onto both the veneer and the substrate. Lay on the sheet of veneer and press it into position by hand. Paint a thin coat of hide glue on the top face of the veneer. This lubricates the surface for hammering. Hide glue cools quickly, so work briskly.

Start pushing down the veneer with the veneer hammer, using a firm squeegee-like motion and working from the center out. The veneer hammer can be pushed or pulled. Work the surface diagonally and push out the excess glue. Avoid going directly cross-grain, which will tend to split the surface veneer. Keep working the entire surface until the glue starts to gel and tack, which should take two to three minutes.

Look for problem areas

Once the veneer has been hammered into place, set aside the piece for 30 to 45 minutes, until the veneer is dry to the touch. Then tap the surface with your fingernails. Two problems that occur occasionally are air and glue pockets. Air pockets will sound hollow and make a ticking sound. Glue pockets will be silent, soft, and rubbery. Small air and glue pockets (smaller than a dime) can be fixed with a clothes iron. Heating the pockets enough to warm the glue allows them to be hammered down.

Larger glue and air pockets will need to be sliced with a razor blade so you can either add glue or remove air (see the photos on p. 102). Then these areas are reheated with the iron and hammered again.

Once you've fixed any problem areas, trim the excess veneer with a sharp chisel. Scrape the hide glue from the surface of the veneer in the direction of the grain, lightly sand, and you're finished. It's that simple. □

A low-tech method for high-style results. *The curved aprons on the author's Federal-style table are perfect candidates for hammer veneering.*

TRIM EXCESS VENEER

When the glue is completely dry, use a wide, sharp chisel to shave away the excess veneer (above), working toward the substrate to avoid chipping the edges of the veneer. After joints have been cut, scrape and sand the veneer (left) before applying a finish.

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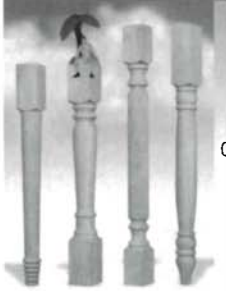

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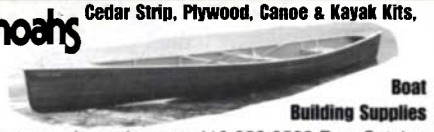

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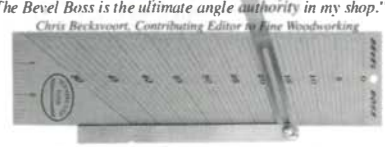

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BY PETER GEDRYS

Altering the colors of dyes and stains

Always make a sample board. *When mixing colors, it is important to test them on scrap wood before applying them to the workpiece.*

All colors are not created equal. How many times have you bought a stain or a dye and been surprised or unhappy with the results? Each manufacturer presents us with its version of a particular color, such as cherry, and the versions can be as different as night and day.

However, with a little knowledge of color theory and how to "read" colors in different ways, you'll soon be controlling the color and not the other way around.

Learn to read a color

Before you can adjust the color of a dye or stain, you need to discover what its true color is by applying it on a white background. Oil-based colors can be tested on paper, but because water- or alcohol-based dyes are absorbed quickly by paper, they are best tested on plastic plates. Dab on a small amount of color, then drag some of it out into a thin line. Do the same with a color you think will blend well, and then with the two colors mixed together. When using any pigmented color, be sure to stir the can until all of the pigment is in suspension; otherwise, you will get an incorrect reading.

Test the color on sample boards

Once you have created a blend that looks good on a plate, it is time to test it on a sample board. Use a piece at least 4 in. wide and 6 in. long for each sample, and be sure to keep notes on what went into each color mix and how many coats you applied.

Alcohol- or water-based colors dry so quickly that you won't have the wet finished look you get with an oil-based color. So add a couple coats of clear finish to develop the final look of the piece.

Adjusting dyes and stains

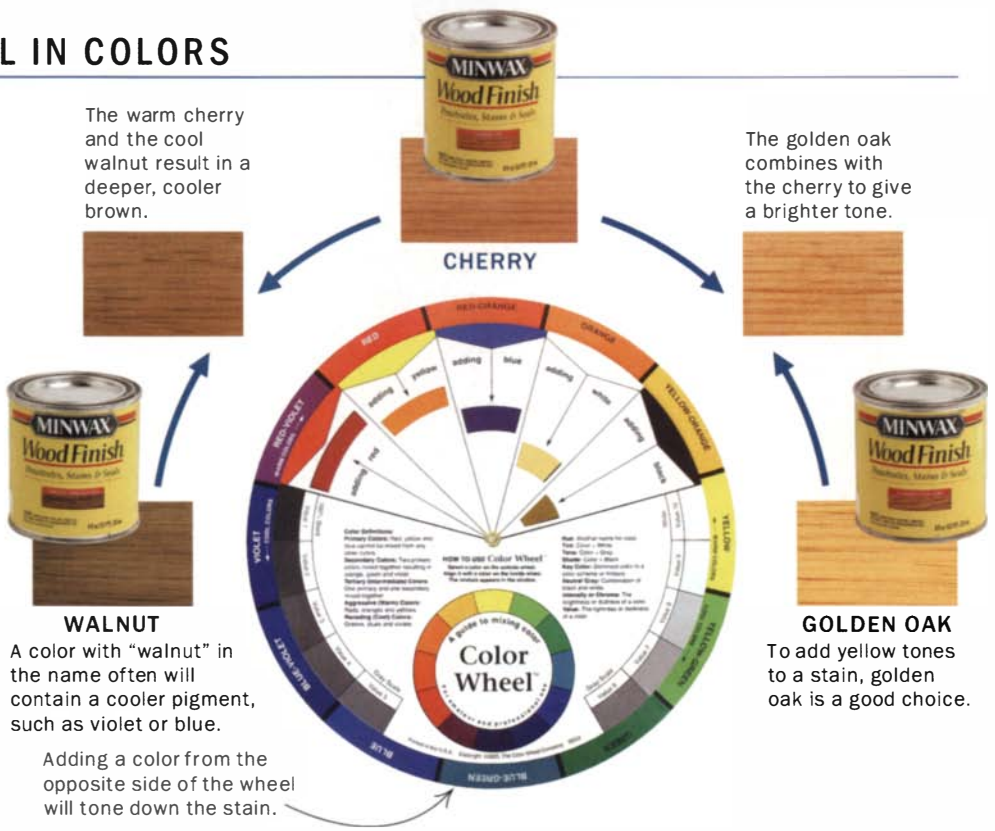
To help explain the process of adjusting color, I made a few sample boards, using a variety of cherry stains and dyes. The goal was not to produce four identical shades of cherry but to show how each original color can be changed.

Oil-based stain—Many penetrating oil stains are a blend of dyes and pigments,

A COLOR WHEEL HELPS DIAL IN COLORS

The colors on a color wheel are divided into categories: primary, secondary, and tertiary. Primary colors—red, yellow, and blue—combine to create secondary colors—green, violet, and orange. Tertiary colors combine one primary and one secondary color. Colors opposite each other on the wheel are complementary colors. Mixing a color with its complement neutralizes (reduces the intensity of) the color. For example, if a stain is too red, add small amounts of green and watch the red change to a cooler brown.

Using a color wheel, first identify the main color of a stain. Then select stains containing colors adjacent to or opposite the main color on the wheel. Use these additional stains to mix the exact color you want. For a quick preview, you can pick a color on the rim of the wheel and rotate the inner circle to see the results of adding different colors.



Photos, except where noted: Kelly J. Dunton; this page (top left): Mark Schofield

MORE RECIPES FOR CHERRY

Bartley, Lockwood, and Solar-Lux each has a different idea of what the color cherry should look like. Using the techniques described, read the color to get a better idea of where it falls on the color wheel. Then, using the wheel, add complementary or adjacent colors to manipulate the original color until you are satisfied with the shade. It is safest to use stains or dyes from the same manufacturer in your recipe.

BARTLEY GEL STAIN

The Pennsylvania cherry stain (left) has a strong purple hue. Mixing it with Bartley's greenish fruitwood stain in a 50:50 ratio produces a warm brown (center). Substitute Bartley's orange-brown country maple for the fruitwood, and you get a medium brown (right).

LOCKWOOD WATER-BASED DYE

The early American cherry (left) is an orange-brown color. To neutralize the orange, add a small amount of its complementary color, violet, for a deeper brown (center). To create a more golden color (right), add about 20% of Lockwood's light golden oak to the cherry dye.

SOLAR-LUX NON-GRAIN-RAISING STAIN

The original cherry (left) is reddish-brown. Adding 25% of medium-red mahogany deepens the tone (center). If you don't have the complementary color to neutralize red or orange, add black to produce a dark brown (right).

SOURCES OF SUPPLY

WATER-BASED DYES
866-293-8913
www.wdlockwood.com

BARTLEY'S GEL STAINS AND SOLAR-LUX NGR STAINS
800-645-9292
www.woodworker.com

MINWAX STAINS
Available at most home centers and hardware stores

but Minwax cherry stain is almost all dye with a very small amount of pigment. The Minwax product had a weak, almost neutral tan color, with very little reddish tone, or warmth, to it. For a deeper, warmer shade, I added to the cherry stain 25% of Minwax's special walnut stain. If you want a brighter shade, add 25% of Minwax's golden oak to the cherry stain.

Gel stain—In general, because of the density of their pigment-based color, gel stains are best used over wood that has been sealed already. However, in this case I wanted to emphasize the color, so I applied Bartley cherry stain to bare wood.

The stain had a pronounced purplish hue that I wanted to tone down. Bartley's fruitwood gel stain is a greenish brown that resembles raw umber. I combined the cherry and fruitwood stains in a 50:50 mixture, which produced a pleasing, warm brown color. For a neutral, medium-brown color, I blended Bartley's country maple stain, which resembles burnt sienna (orange-brown), with the cherry stain in a 50:50 mixture.

Water-based dye—For clarity of color, powdered dyes are the most versatile because you can mix them yourself, which allows you to control the concentration. When handling dye powders, make sure you wear a dust mask.

I selected the Lockwood early American cherry, which produced an orange-brown color. To create a deeper brown, I added a few drops of violet, the complementary color to orange.

Non-grain-raising stain—Non-grain-raising (NGR) stains, such as Solar-Lux, are a mixture of water-soluble dyes and solvents that don't include water. They work well as a background color. Some start out unrealistically bright and in strong light fade faster than a campaign promise.

The Solar-Lux cherry is a warm, reddish brown. To bring out the red tones, I added about 25% of medium-red mahogany. If you want to neutralize a color but don't have its complementary color, try adding black in very small quantities, say 2% or 3%.

Color, like food, is a subjective taste. The examples I have shown are a starting point. Don't be afraid to experiment, and don't get stuck using a color you don't like. □

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Acoustic Armoire

Most armoires built today are used as entertainment centers, hiding a TV screen and numerous components. This Craftsman-style case is an entertainment center of a different sort: Paul Downs designed the cabinet, made of red and white oak, stained to match, for a client who wanted a storage center for her husband's collection of guitars, sheet music, and CDs. The piece is huge: 28 in. deep by 54 in. wide by 96 in. tall. For ease of transport, the crown and base detach from the main carcase. Downs, whose business is based in Bridgeport, Pa., has nine cabinetmakers working for him. This piece was built by Nathan Rossman and finished by Kathleen Quinn. The hardware on the doors and drawers is from Horton Brasses. You can see more of Downs' furniture at www.pauldowns.com.

Photos: Paul Downs