April 1998
No. 129

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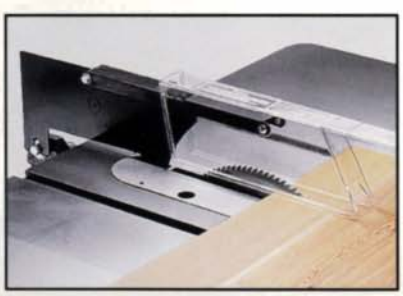

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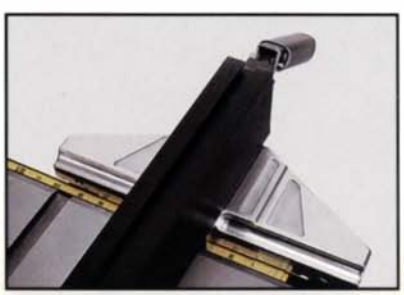

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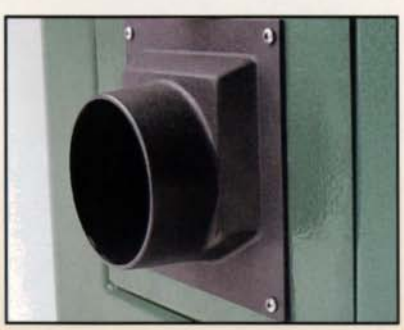

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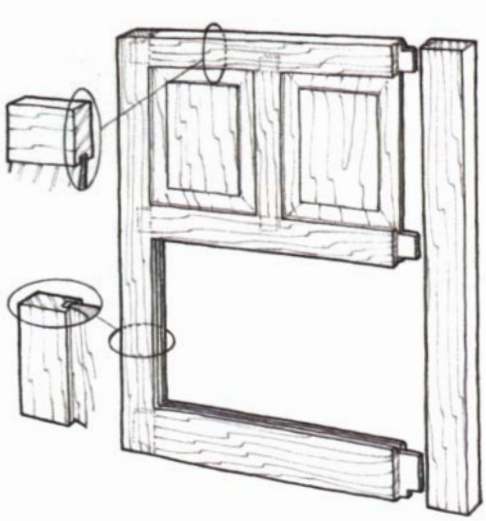

Frame-and-panel doors, p. 73

On the Cover:
Simple frame-and-panel construction transformed this blanket chest from a basic box into something with depth, dimension and visual power. John McAlevey explains how it's done on p. 38. Photo: Dennis Griggs

Fine Woodworking (ISSN 0361-3453) is published bimonthly, January, March, May, July, September and November, by The Taunton Press, Inc., Newtown, CT 06470-5506. Telephone (203) 426-8171. Periodicals postage paid at Newtown, CT 06470-5506, and additional mailing offices. United States newsstand distribution by Curtis Circulation Co., 730 River Road, New Milford, NJ 07646-3048 and Eastern News Distributors, Inc., One Media Way, 12406 Route 250, Milan, OH 44846-9705. GST #123210981.

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Postmaster: Send address changes to *Fine Woodworking*, The Taunton Press, Inc., 63 S. Main St., P.O. Box 5506, Newtown, CT 06470-5506

Printed in the USA

Contributors

John McAlevey ("Blanket Chest with Legs") has been designing and making furniture since 1964. He lives and works out of his home and shop in Tenants Harbor on the mid-coast of Maine. He builds furniture on commission for clients throughout the Northeast.

Nick Engler ("Sticking with Hide Glue") got his start as a luthier, making dulcimers and guitars. Nowadays, he spends much of his spare time restoring his Victorian house in West Milton, Ohio, and building Arts-and-Crafts style furniture. He also trains dogs for people who are hearing-impaired.

John West ("Large Moldings from Small Parts") migrated to cabinetmaking from an earlier career in an architectural office. He builds interiors and provides millwork for the rich and famous in southwestern Connecticut.

Steve Latta: To help pay for college, Steve Latta ("Corner Joints") ran a bicycle repair shop out of his dorm. One of his customers owned a cabinet shop and gave him his first woodworking job. Latta now specializes in marquetry and inlay work and building Federal-period furniture. He works for Kinloch Woodworking in Unionville, Pa. For recreation, he collects rare books.

Peter Turner ("Wall-Hung Shelf") worked for Greenpeace in Boston before changing careers to become a furnituremaker about 10 years ago. He learned woodworking in the trenches, doing repairs, finishing and otherwise learning the trade in several shops in the Boston area. He then moved to Maine, where he now runs his own furnituremaking business in South Portland.

Pat Warner ("Router Safety") is a self-taught designer, craftsman and author who has been woodworking for the last 25 years. He has published articles and two books, *Getting the Very Best from Your Router* and *The Router Handbook of Joinery* (Betterway Books). In his spare time, he is a 2,500-mile-a-year bicyclist and a jazz fan.

Graham Blackburn ("Frame-and-Panel Doors") is a writer, illustrator and book designer who lives in Woodstock, N.Y. He is a former chief editor of California-based *Woodwork* magazine and is a former contributing editor to *Fine Woodworking*. He is the author and illustrator of more than a dozen books on woodworking and home repair.

Joe Tracy: When Joe Tracy ("The Shop As Tool") finished high school, his parents gave him a one-way ticket to Australia. He spent a year and a half doing odd jobs and sightseeing before returning to the States and getting a real job at the Naval Weapons Laboratory as a model maker. He also started making furniture for himself, which led him to the Rochester Institute of Technology where he studied furnituremaking. Since 1976, he has had his own furniture shop in Maine.

Robert M. Vaughan ("Boring Big Holes") made furniture for his family long before beginning a professional career in a cabinet shop. From there he went on to run his own shop in Roanoke, Va. He developed a knack for tuning up and fixing his own tools. Soon he discovered that there was more demand for, and more money to be made from, repairing woodworking machines. He still enjoys spending hours working on his lathe.

Lon Schleining: The restoration of a Stickley style rocker, found dismantled at a friend's house in 1972, aroused in Lon Schleining ("Joint-Quality Edges Cut on a Tablesaw") a love of woodworking that hasn't abated. He works as a custom stairbuilder and also teaches woodworking at Cerritos College in Norwalk, Calif.

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Letters

Respirators breathe even when not on—I enjoyed the brief article on protecting your lungs (*FWW* #127, pp. 64-67). However, you do everyone a disservice by not informing your readers that the expensive respirator cartridges will continue to absorb airborne contaminants long after removing them from your face and placing them on the shelf. This absorption fully uses them up before they are needed again.

I would recommend that woodworkers store all respirators in a heavy-duty Ziploc freezer bag when they are not in use. This method has served me well for over 30 years, allowing a cartridge to last efficiently for three years or more. Even dust masks should be stored in such a manner so that they do not become contaminated on the facial side. Keep up the good work.

—John Adams, Manchester, Tenn.

We're listening and improving

***Fine Woodworking* has always been close to its readers. Much of that closeness comes from the fact that the magazine is written by its readers, who are woodworkers like you. We also get telephone calls and mail (electronic and postal) from hundreds of you every week. In addition, we survey a random sampling of subscribers after every edition is published to find out what you like and dislike about each issue and the magazine in general.**

We have been studying your responses for some time now, and they have led us to make some improvements in the magazine that you will be seeing over the next few issues. For example, we have learned that you use your woodworking skills and tools to improve your homes. So beginning with this issue, we will include a story on how to use your shop and tools to personalize your house.

We know you don't necessarily like to make exact copies of our projects, so we're making an effort to focus project articles on design ideas and techniques that are more widely applicable. You have told us that you are hungry for more information about tools and materials, especially as they become available on the market. So we have expanded our old "Tool Forum" department to find and test new tools as well as materials such as finishes, jigs, gauges and woodworking supplies. We have redesigned the department to include more information and have renamed it "Tools and Materials." To aid in that effort, we built a great new woodshop, which will help us not only test tools but also try out the projects and strategies that our authors recommend.

Curly Maple & Cherry Blanket Chest

It is also clear to us that all of you are serious woodworkers. Some of you are masters of the craft, and some of you hunger for the knowledge that will take you to the next woodworking level. With this in mind, we will soon begin two new departments: one on the fundamentals of our craft and another as a master class on more advanced skills. To satisfy your desire for more information about wood finishing, we will soon inaugurate a department dedicated to that subject. We have also taken a close look at the popular features of the magazine with an eye toward ensuring that they are useful to you.

The improvements I have outlined result from much input from you. But please don't wait for our survey computer to randomly pick you. Let us know what you think about the magazine. The easiest way is to jot down your thoughts and send them to us at 63 S. Main St., P.O. Box 5506, Newtown, CT 06470-5506 or through e-mail (fw@taunton.com). We look forward to hearing from you and to serving your needs even better.

—Tim Schreiner, editor

Smoking is as hazardous as dust—It took a second, close read of your December issue (*FWW* #127) to discover why I was so angry. Don't you find it hypocritical to feature an article on building your own humidor alongside an article that talks about the dangers of hazardous fumes and dust? My father died as a result of smoking cigarettes and cigars, and I am appalled at this blindness. Your article about volatile carcinogens showed micro-photographs of these dangerous particles. My father told me that the X-rays of his lungs looked like eggplants. Decades of misuse had taken their toll. Where was the micro-photograph of the damage smoking does? Where was the warning about lung, lip and tongue cancers as a result of cigar smoking?

You put in warnings about safety in woodworking, and yet this activity—smoking—seems to be getting a push from people I have trusted to warn me of the dangers involved.

I would cancel my subscription but I enjoy your magazine too much. I am very much a novice woodworker but have learned an enormous amount from your articles. *—Dan Peyton, New York, N.Y.*

Moser deserves accolades—I loved the article about Thomas Moser (*FWW* #128, pp. 70-73). One of the first guidelines I give my students is that furniture is art by coincidence only. Try to make it art on purpose and you end up with something ridiculous. Furniture must be useful. Pretty, graceful, well-proportioned, but useful above all.

Moser's company makes high-quality furniture that is useful, nice to look at and well-made. It puts that low-end junk from North Carolina to shame. Why is it an issue that he produces it using efficient methods? Conscientious woodworkers should applaud him.

This is why it is an issue: There are lots

Writing an article

Fine Woodworking is a reader-written magazine. We welcome proposals, manuscripts, photographs and ideas from our readers, amateur or professional. We'll acknowledge all submissions and return those we can't publish. Send your contributions to *Fine Woodworking*, PO Box 5506, Newtown, CT 06470-5506.

of precious object makers out there spending too much time making things that aren't overly useful, that are too fragile to let your kids near or to set a glass on. Pieces that gather dust. You'll hear, "Oh, it's an unsophisticated market and populace that doesn't want our stuff." Phony saints and martyrs.

Moser found a way to make the market work for him, and the stuff is good. He's deservedly making a fortune.

—Anthony Guidice, St. Louis, Mo.

The sled article had flaws—The tablesaw sled article by Lon Schleining (*FWW* #128, pp. 66-69) was of great interest to me since I have, over the years, built two sleds similar to the design he describes. From my experience, I feel that changes in his design would improve its utility as well as the safety of the user.

The sled's basic purpose is to provide maximum support of the workpiece for accurate crosscutting. The rear fence, against which the work will be held, should be as long as possible and extend from one edge of the sled to the other.

For safety reasons, the rear fence should be 3 in. forward of the back edge of the plywood to leave some plywood uncut at the back. Additionally, after the rear fence has been finally located and fastened, a block of wood, about an inch and a half thick, should be glued to the back face of the rear fence in line with the saw to keep the blade from emerging exposed after it passes through the fence. This can happen when the blade is fully raised. As a final safety measure, a stop must be provided to prevent the sled from advancing so far that the sawblade is exposed after a cut even though the above-mentioned block is in place. On my sleds, I use a 4-ft.-wide piece of plywood that extends slightly beyond the saw fence. I bolt a stop to the saw-table edge and glue one on the underside of the sled.

I align my saw fence by fastening it with a single screw to the plywood at one end, clamping the other and then cutting a good sized piece of ¼-in. plywood, first from one side of the blade and then the other. I adjust each time until I have a perfect 90° cut. Of course, the fence should be square to the plywood vertically.

Obviously, the corner between the fence and the plywood must be free of significant sawdust for accurate cutting. An incidental improvement in convenience will result if a ⅛-in. by ⅛-in. rabbet is cut in the rear fence on the side that is fastened to the plywood. This gives a place for some sawdust to collect so it doesn't have to be cleared away quite so often. *—M. Charles Keck, Anacortes, Wash.*

LON SCHLEINING REPLIES: Mr. Keck's letter illustrates the saying that 10 woodworkers put in the same room will have 10 different ways of doing the same thing—all of which will be correct. He cites three regarding my sled: a dust-catching slot, a longer rear fence and an exit block for the blade. I'll address them in reverse order.

If the rear fence is not built high enough, it is possible, as he says, for the exposed exiting blade to catch the operator's thumb. This is why I suggest building it at least 5 in. high. That way, my natural hand position on the fence keeps my thumbs well clear of the blade (even with the blade as high as it will go).

He also suggests gluing on a block to cover the blade as it exits the rear fence. The block, as he recognizes, cannot do its job without a positive stop for the sled. I see no problem in building it this way, but with a high enough rear fence, I don't think it's necessary.

The sled I built in the article was designed for cutting small parts. To crosscut longer pieces, a different sled would probably work better. Personally, however, I don't think the tablesaw is the tool I would choose for crosscutting a long board no matter how wide the sled.

Many woodworkers cut a dust-collection slot where he suggests: at the base of the rear fence. I prefer not to. I sometimes use the sled to cut very thin pieces or mitered pieces where the knife edge has to go down on the table and against the fence. If there is a slot, the piece will slide down into it, blocking my ability to see whether the edge is in good contact with the fence.

Mr. Keck's observations on my sled are what make woodworkers such an interesting group. If there was but one right and safe way to do woodworking, it wouldn't be quite so fascinating.

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.

—Timothy D. Schreiner, editor

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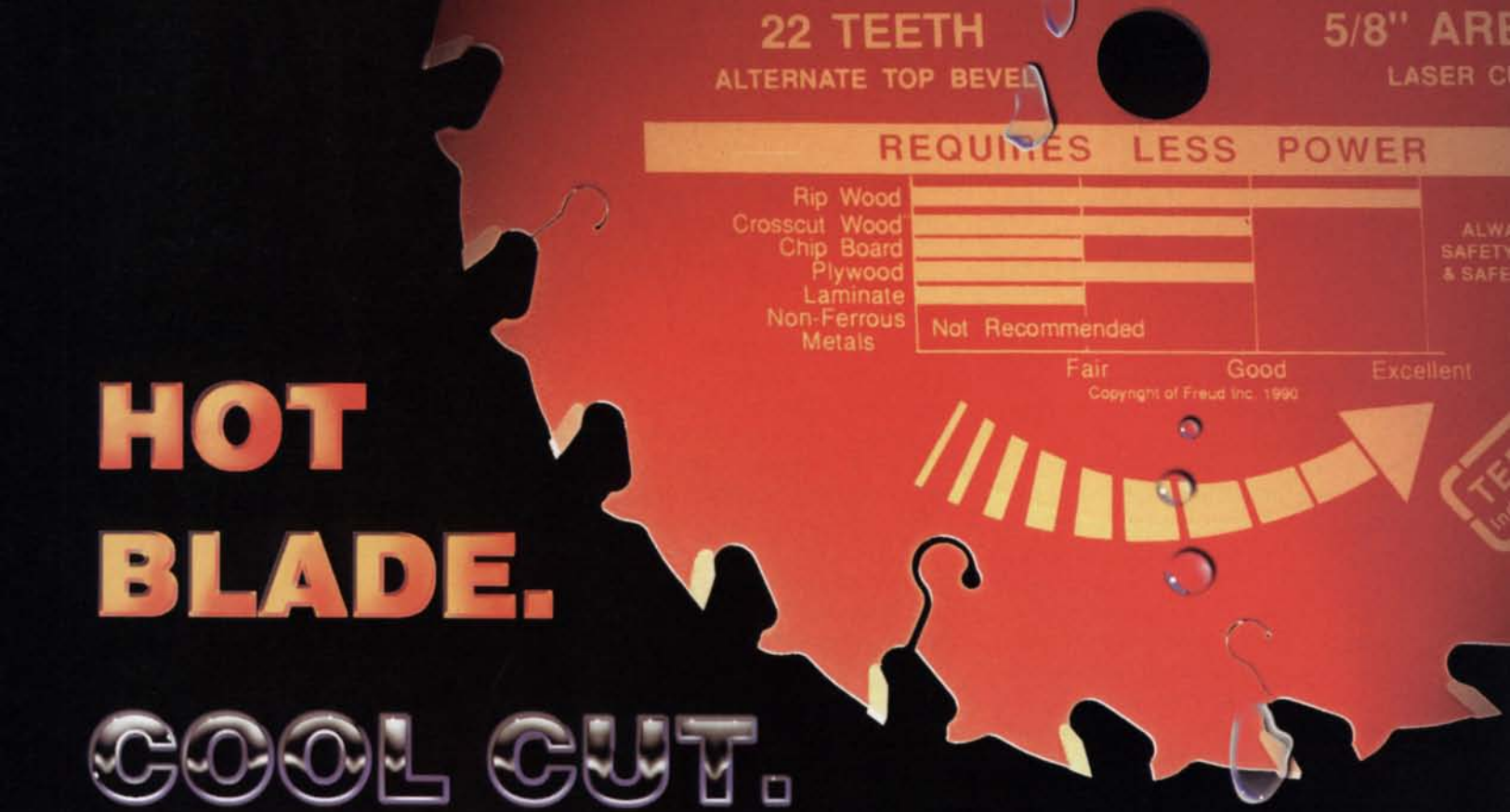

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Q&A

Placing tripod pedestal legs

Can you explain the correct way to install two tripod pedestal bases on a dining table? One leg pointed to each corner of the table or one leg toward each end?

—Adam Florkowski, Pittsburgh, Pa.

Philip Lowe replies: Pedestals on a dining table are most often arranged so one leg points to the end of the table (see the drawing below). As age slowly creeps upon us, one often relies on the support of a firm fixed object to assist in getting to one's feet from a seated position. The leg pointing to the end of the table, if firmly attached, will take that exertion of weight in a more central location. The remaining legs that point to the sides of the table will distribute the weight to both columns.

One other concern is the way chairs will store when pushed under the table. Consider the style of chair, as well as the stretcher arrangement, and whether the table legs will interfere with this storage.

Another consideration is purely aesthetic—the bases just look more attractive with the legs pointing in this direction. And I must admit that in my 25 years of studying furniture, I have on only two occasions come across tables with the pedestals positioned so the legs point inward.

[Philip Lowe builds furniture and teaches woodworking in Beverly, Mass.]

Sanding sequence for waterborne dyes

In Chris Minick's article on aniline wood dyes (FWW #114, pp. 72-76), he wets the surface with water to raise the grain, then sands it smooth. Can you describe the order of sanding and wetting?

—Stephan Vitas, Washington, D.C.

Chris Minick replies: Pre-wetting wood to raise the grain and then de-fuzzing before staining will improve the appearance of the finished piece. However, this step is entirely optional.

The decision to pre-wet your project is dictated by the wood. I've found dense, small-pored woods like hard maple benefit little from this treatment. But pre-wetting is a necessity for soft or large-pored woods (red oak, for example). To help make the decision, sand a piece of scrap to get it smooth, wet it and let it dry overnight. If the wood feels rough or fuzzy after it dries, include pre-wetting in your sanding schedule. If the wood surface feels flat and smooth, don't.

Pre-wetting the wood comes after the wood surface has been sanded smooth but before the final grit in your sanding schedule. My sanding and pre-wetting procedure for red oak is a good example:

1. Start with a random-orbit sander and 80-grit aluminum-oxide discs to level the wood surface.
2. Smooth the surface with 120-grit or 150-grit aluminum-oxide discs.
3. Hand-sand with 180-grit garnet abrasive sheets to remove stray scratches.
4. Wet with tap water to raise the grain.
5. Dry overnight, then lightly hand-sand with 220-grit garnet to remove fuzz.
6. Finally, stain with water-soluble dye.

Keep in mind that sanding with 220-grit is to remove the fuzz only; sanding too much will negate the whole process. When the surface feels smooth, stop sanding, and stain your project.

[Chris Minick is a finish chemist and amateur woodworker in Stillwater, Minn.]

PEDESTAL LEGS POINT TOWARD THE END

Dining tables with two tripod pedestals, especially popular in the early 19th century, usually have one leg that points toward the end of the table, rather than to the corners.

Refitting a tablesaw with a magnetic switch

Recently, while cutting on my contractor's tablesaw, I lost power. When the power came on, so did the saw. Luckily, I had removed my workpiece; otherwise, who knows what might have happened. As a result, I would like to replace the on/off switch with a magnetic switch. Can you give me directions for the change?

—Gabriel Pons, El Paso, Texas

Robert Vaughan replies: The automatic restarting of a machine after a power interruption is a constant problem, and OSHA (Occupational Safety and Health Administration) doesn't allow it in the workplace. Magnetic starters are one solution. On these devices, the start/stop button controls the power to an electromagnetic relay, which does the actual work of connecting the power and motor (line and load) terminals. When the power is interrupted, the electromagnet is deactivated and the power contacts disconnect. When power is restored, the start button must be pressed again to energize the electromagnet so the contact will reconnect and the motor will start.

Another advantage of a magnetic starter is it usually includes an in-line overload motor protection circuit. This system uses

Drawings: Vince Babak

thermal units (heaters) that one buys extra to suit the motor's amp load.

Magnetic starters range from $150 to $250 and are available from electrical supply houses. Don't expect the installation to be as simple as a household light switch, though. There are too many variables in starter components. Usually, the actual starter is in a box mounted in an unobtrusive and safe place on the machine, with a small light-switch size box conveniently mounted elsewhere that encloses the on/off button controls.

If all you want is protection from restart after a power interruption, you can use a product called a Saf-Start-Plug. Delta (800-223-7278) sells them as stock no. 49-350 (other electrical and industrial suppliers also sell them). At about half the cost of a good magnetic starter, these gadgets replace your existing power line and plug with a power line that has a small yellow box with a black button. Any time power is interrupted, the button must be pushed to reset the circuit. However, you still have to remember to turn off the machine's switch before resetting the circuit.

If you are uncertain how to install a magnetic starter or Saf-Start-Plug, consult a licensed electrician to be sure it is compatible with the amperage requirements of your motor and that it complies with local codes.
[Robert Vaughan tunes, repairs and restores woodworking machinery in Roanoke, Va.]

Repairing a cracked headboard

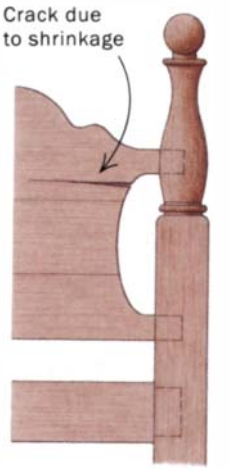
Several summers ago, I built my daughter a cannonball bed using white pine. I don't usually build furniture in the summer because of the high humidity, but this time, I had no choice. During the first winter, a ½-in. crack developed. In the summer, the crack disappears. How should I repair it?

—John MacKay, Bridgewater, Nova Scotia, Canada

Christian Becksvoort replies: Your problem is a classic illustration of the agonies of wood movement. As the moisture content of the headboard decreases, the headboard shrinks across the grain, causing the two tenons to come closer together. However, if the tenons are tightly held by the mortises, they can't move and a crack results.

If the headboard assembly is not glued up and it can be taken apart, repairing this problem will be a breeze. Pull the headboard out of the post, and force glue into the crack with a sliver of wood. Or place a glob of glue on one side, and hold a vacuum cleaner hose on the opposite side to pull the glue through the crack.

CRACKED HEADBOARD NEEDS ROOM TO MOVE

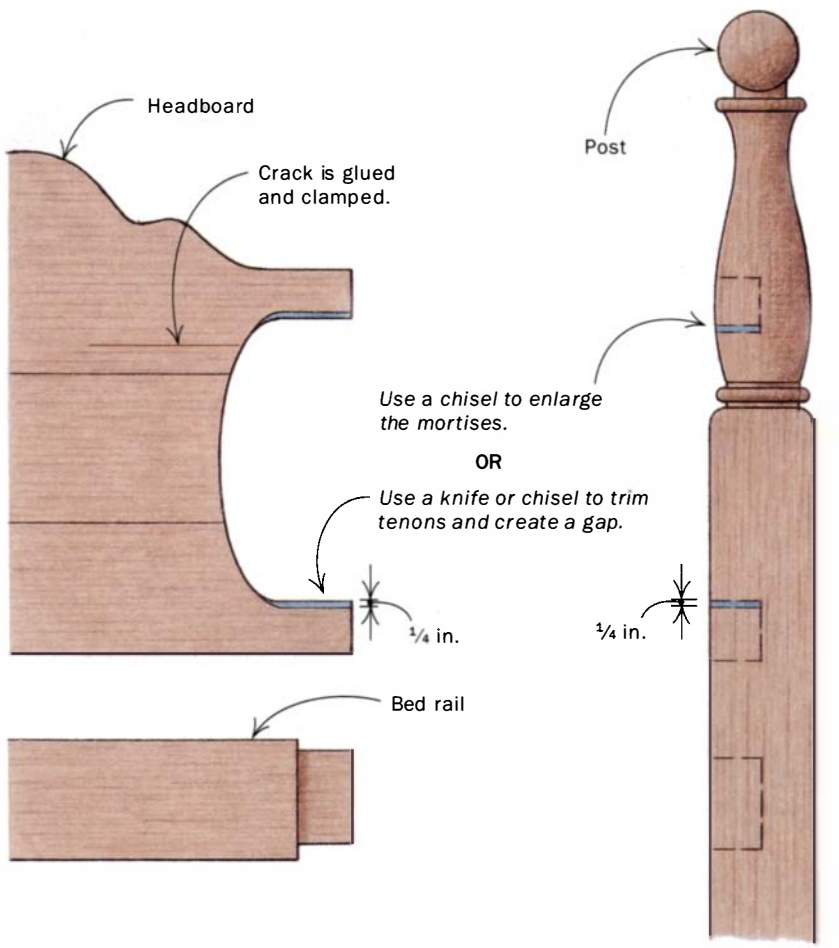


The tenons on this headboard were locked in place, so when the wood lost moisture during the winter, it shrunk and a ½-in. crack developed. To fix the crack, either the mortises need to be enlarged or the tenons need to be trimmed.

Clamp the upper and lower tenon to close the crack, and wipe off the excess glue.

If the crack is indeed ½ in. wide, that tells you how much your board has shrunk. To prevent the problem from recurring, make the mortises ¼ in. longer on both posts (elongate the bottom of the top mortise and the top of the bottom mortise). Alternatively, you can trim the bottom of the top tenon and the top of the bottom tenon to achieve the same result. As the headboard shrinks, it will have room to move.

If your headboard is glued up as a unit and can't be taken apart, the problem becomes trickier. You can either trim the tenon or enlarge the mortise, both difficult operations with the joint assembled. You will have to chisel out (carefully) the bottom of the top mortise and the top of the bottom mortise. If the joints are pinned but not glued, you can pare down the tenons instead (see the drawing below). Once you hit parallel grain, you should be able to break out the sliver with a knife or chisel and pull it out of the mortise. Then repair the crack



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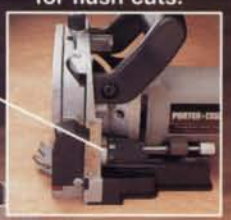

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READER SERVICE NO. 142

as described above. Good luck. [Christian Becksvoort builds furniture in New Gloucester, Maine.]

What's the point?

A co-worker brought a handsaw to work one day to see if anyone on the crew knew the purpose of the odd point on the top edge of the tip. I might be in for a free lunch if you can help me answer this nagging conundrum.

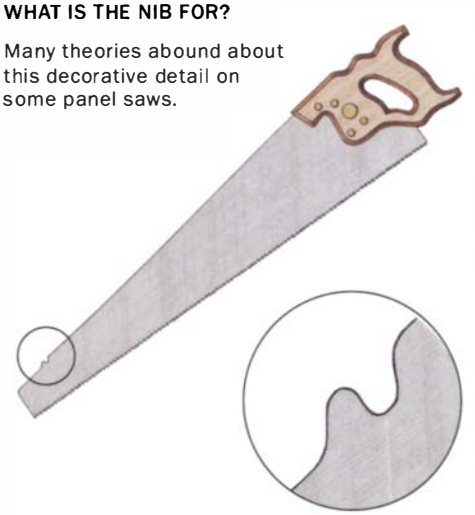
—Matt Jackson, Rapid City, S.D.

Zachary Gaulkin replies: Bad news, Matt. If you think there's a point to the point, there doesn't appear to be one. We posed the question to Fred Wilder, a woodworker and expert saw sharpener. He turned up a 1902 Henry Disston catalog (Henry Disston and Sons was a Philadelphia saw manufacturer), which says the "nib" has "no practical use whatever, it merely serves to break the straight line of the back of the blade and is an ornamentation only."

Theories of practical (and not so practical) uses abound. Some say it's a scribing device or gauge for determining set (I'm not sure how either would work). Others have heard it's for sighting down the spine of the blade as if it were the barrel of a rifle, but I don't know anyone who cuts a board the same way he would shoot at a target or line up a golf putt.

WHAT IS THE NIB FOR?

Many theories abound about this decorative detail on some panel saws.



Carpenters often say the nib was used in the old days to create a notch for starting low-angle cuts (on rafters, for example). The notch would prevent the saw from skittering down the board. Wil Neptune, a former carpenter and now a cabinetmaking instructor at the North Bennet Street School in Boston, says he has seen saws in which the nib has been filed. Maybe carpenters found a use for what was intended to be a decorative feature.

Neptune has heard all sorts of other theories, none of which seem to make sense. "The worst one I ever heard was that you could use it to hang your saw from the edge of a roof so it wouldn't slide off," he says. "I think the old-timers tell that one just to see who's dumb enough to believe it."

[Zachary Gaulkin is an associate editor of *Fine Woodworking* magazine.]

Do you have a question you'd like us to consider for the column? Send it to Questions & Answers, Fine Woodworking, P.O. Box 5506, Newtown, CT 06470-5506.

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Dennis Preston, FINE WOODWORKING

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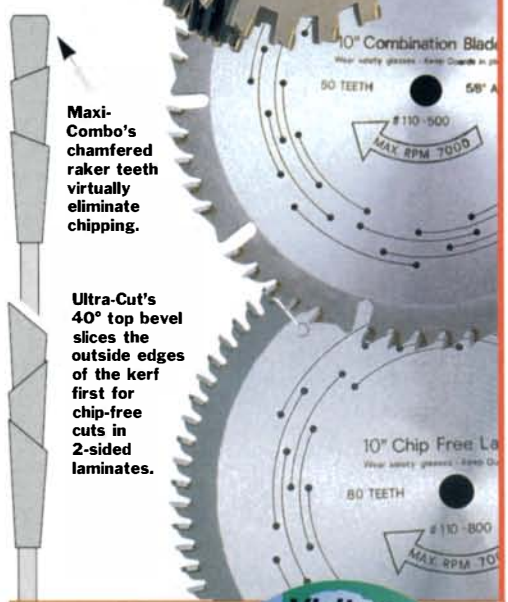
210-240 Thin-Kerf Ripping	24	.097"	20º	$69.00	$58.65
210-500 Maxi-Combo Lite	50	.097"	12º	$79.00	$64.90
210-222 Both Thin-Kerf Blades				$148.00	$99.90
SBS-005 5" diam. blade stabilizers (set of 2)				$25.20	$19.90



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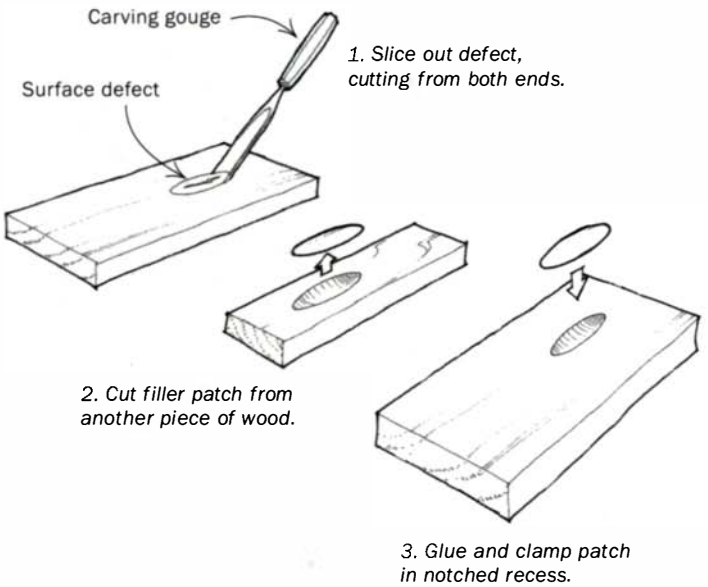
Methods of Work

EDITED AND DRAWN BY JIM RICHEY

Using a carving gouge for surface repairs

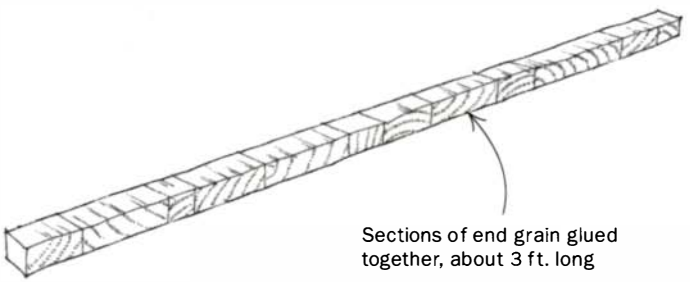


Here's how to repair voids, scratches, chips or small dents in wood that are parallel to the grain. Pick a carving gouge that will take a cut bigger than the void being filled. Start from both ends of the defect, and slice into the wood toward the middle of the defect. Remove the gouged waste piece.

On another piece of wood with matching grain, slice out a filler strip of wood slightly deeper than the gouged void. Cut the filler strip from both ends, just as you did the defect. Glue and clamp the filler strip in the void and sand flush. It makes a nearly perfect repair without obvious gluelines, especially if you use a gouge with a deep, rather than a shallow curve.

—Gary Rosquist, Salt Lake City, Utah

Humidity stick

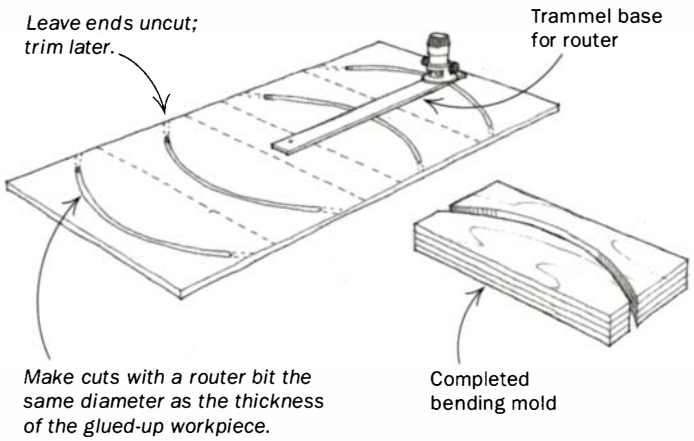


To judge the humidity in my workshop and to determine the approximate gaps necessary for drawer clearance and panel movement, I keep a device I call a humidity stick hanging on the wall. It is simply a number of scraps of end grain, about 1 in. wide by 1 in. thick, glued together to form a stick 3 ft. long. Every few weeks, I measure the length of the stick and write the measurement on the front side, along with the date.

This historical data helps me to estimate the amount of cross-grain wood movement I should experience from season to season. A bit of quick math will scale the movement in the stick to the dimension of a furniture part. The stick also gives me a physical gauge that helps to estimate where the wood in my shop stands in the yearly expansion and contraction cycle.

—Garrett K. Spitzer, Jamestown, N.Y.

Making bending molds from router-cut plywood

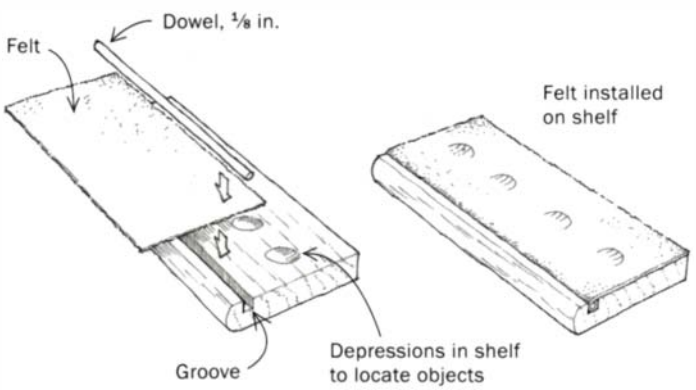


When I made some plywood forms to laminate a curved headboard, I discovered this trick. If you cut the forms with a router bit the same diameter as the thickness of the laminated workpiece, you will automatically have the slightly different curves needed for the inside and the outside molds. They will fit perfectly when clamped up.

To make a matched pair of bending forms, screw a wooden bar to your router base to act as a trammel. Mark a centerline on a sheet of plywood, and lay out the locations of the slots. Rout the arcs, leaving a small piece uncut at the end of each radius to hold the sheet together. When done, cut the pieces to size. Stack the cut parts for inside and outside molds, and screw them together.

—Ken Shaw, San Diego, Calif.

Lining shelves with felt



When I accepted a request to build a display case for 100 golf balls, I had no idea how to line the shelves with felt. I did know, though, that I did not want to glue the felt to the shelf with a raw edge

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8"x60Tx5/8" 3/32"K	$150	$109
8-1/4"x60Tx5/8" 3/32"K	$150	$109
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Fine Woodworking Magazine test, Oct. 96, page 43

After installing your blade and 5 in. stiffener the vibration in my saw went down another 20%. I ran several pieces of hard wood through the saw, both crosscut and ripping, and was amazed at the smoothness. It was like cutting butter, maybe smoother. I have never had a saw blade that cut this smooth.

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WOOD® Magazine test, Sept. '93, pg. 45

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8" x 80T x 1/8" & 3/32"K	$202	$169	12"x100T x 1-1/8"	$253	$215
220mm x 80T x1/8" x 30mm	- - -	$159	14" x 80T x 1"	$232	$197
9" x 80T x 1/8" & 3/32"K	$207	$179	14" x 80T x 1"	$266	$226
10" x 80T x 1/8" & 3/32"K	$207	$159	16" x 80T x 1"	$262	$223
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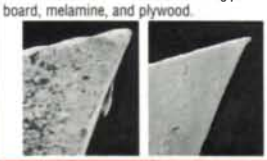
Standard C-2 Carbide (below, left) and FORREST **still sharp** Oxidation and Corrosion Resistant Sub-Micron C-4 Carbide (below, right). Each shown after cutting 3,500 feet of MDF. Similar results obtained cutting particle board, melamine, and plywood.



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showing at the front. I came up with a method that works well.

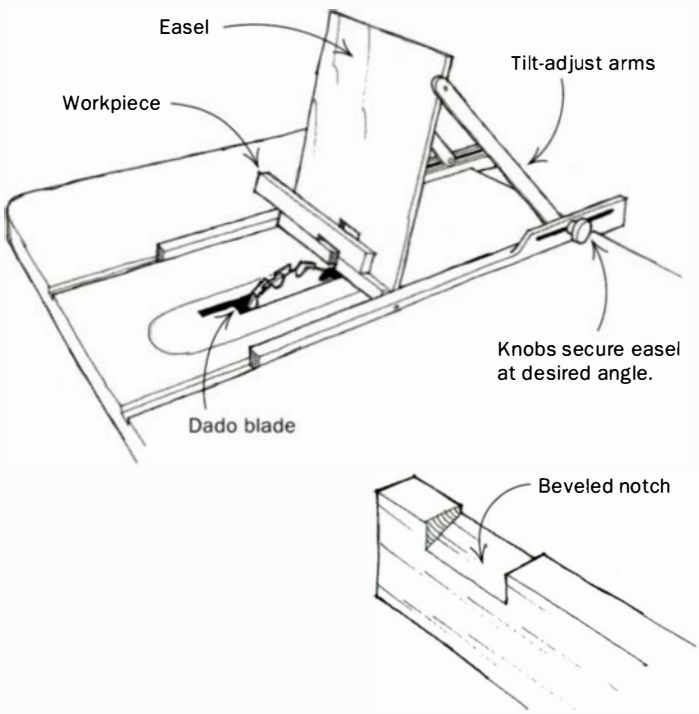
I cut the shelving pieces, bullnosed the front, drilled shallow indentations for the golf balls (with a modified spade bit ground to shape), and stained and finished all exposed surfaces. Then I cut a groove about ½ in. back from the top edge of each shelf to accept a ⅛-in. dowel and two thicknesses of felt. After spreading a light coat of white glue in the groove, I folded the edge of the felt around the dowel and pressed it into the groove. I used a wooden wedge to seat the dowel where needed. Later, I glued the flap of felt to the shelf and trimmed the sides and back.

—Carl Reiser Sr., Ada, Mich.

Quick tip: To make a flush-cutting saw for plugs and dowels, I ground the set off the teeth on one side of a hacksaw blade. To use, I hold the sawblade with my fingers and place the blade's teeth against the dowel with the smooth side down on the workpiece.

—R.B. Himes, Vienna, Ohio

Jig for making beveled notches



For a recent production run of toys, I had to cut several beveled notches on each toy. My first thought was to use a simple beveled block attached to my miter gauge that would tilt the workpiece at the appropriate angle for a dado-blade cut. But then I realized I'd have to try several different angles when building the prototype, requiring many trial-and-error setups. So to save time, I designed the variable-angle, notch-cutting jig shown in the drawing.

The jig consists of a sliding frame that runs along the miter-gauge slots in the tables. The frame includes a work-support easel mounted on a tilt-adjust mechanism. When the easel is set at the desired angle, the tilt-adjust mechanism clamps it in place.

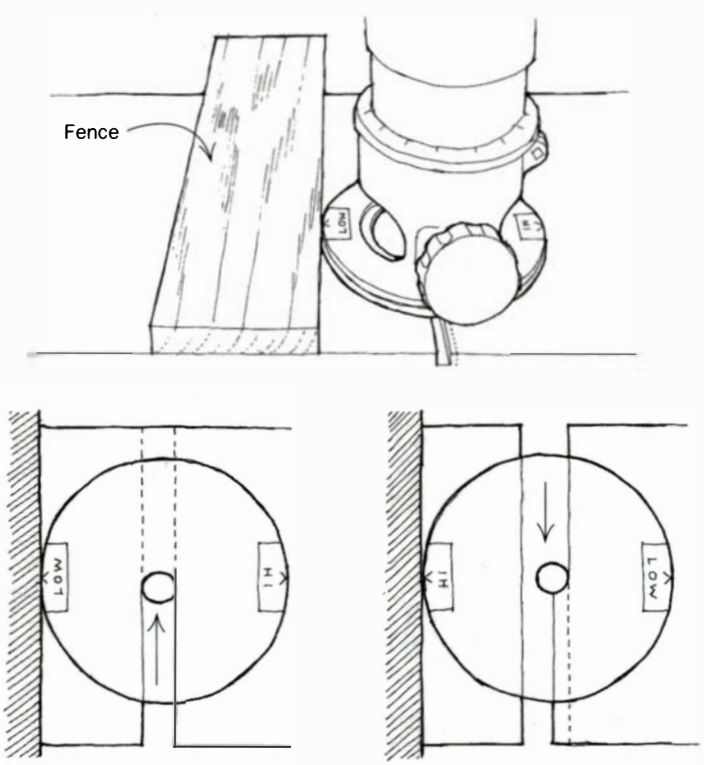
I adjust the dado blades to the proper height for the desired depth of cut, and push the whole frame forward to make the cut. I slide the workpiece to the left or right and make another pass to widen the cut of the beveled notch.

—Jack Hall, Newport Beach, Calif.

Quick tip: There is no better tool to use for setting the fence on a tablesaw than a good machinist's stainless-steel rule that has a satin finish. My favorite is a Starrett 18-in. rule. It has four sets of gradations: 32nds, 64ths, 10ths and 100ths. I keep it clean with a dish-washing abrasive, so it's always bright and readable.

—Donald R. Lewis, Owasso, Okla.

Enlarging routed dadoes



Find low spot and high spot on router base. Make first rout with low side against fence.

To enlarge dado, rout second pass with high side against fence.

I recently had to rout a series of dadoes slightly wider than the router bit into some large panels. To accomplish this, I took advantage of my slightly eccentric router base. In relation to the collet, most router bases are less than perfectly centered.

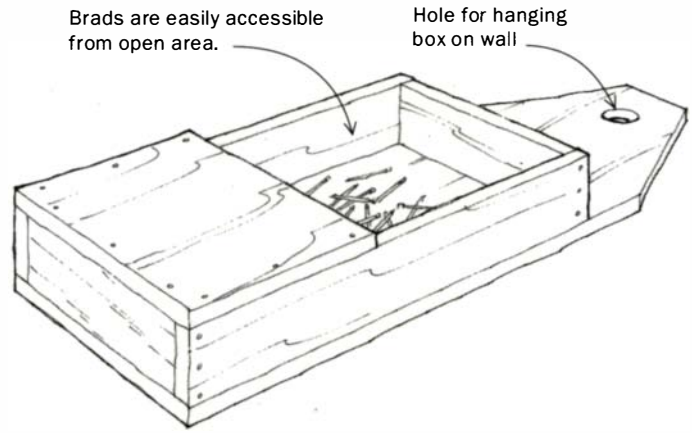
Through trial and error, using pieces of scrap, I determined the high spot (the one farthest from the collet) and the low spot (the one nearest to the collet) on the base. I marked these locations with masking tape. I also marked several intermediate locations between high and low.

With a fence clamped in place, I made a single pass, keeping the low spot against the fence. Then I rotated the router base, placing the high spot against the fence, and made a second pass to enlarge the original dado slightly. The second pass added about 1/32 in. of width to the dado—just the right amount for my application. If

your router base is one of the few that happens to be concentric, you can accomplish the same effect by adding layers of tape as shims on the outside edge of your router base.

—Scott Bowen, Salt Lake City, Utah

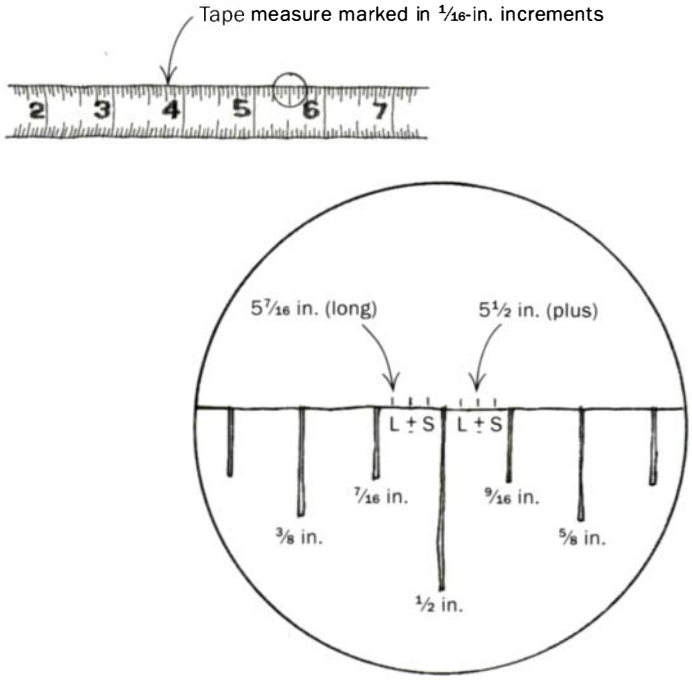
Brad box



Here's an idea I got out of a patternmaking handbook published in 1907. Make up brad storage boxes from thin scrapwood in sizes to suit, as shown. When laid horizontally on the bench, the brads are accessible in the open area. When hung on the wall, the brads will fall into the lower portion of the box.

—Anthony Guidice, St. Louis, Mo.

Approximating 64ths on a tape measure



I usually carry a tape measure graduated in 1/16-in. increments. A fellow named Drummond Reed taught me a system to see and to communicate measurements down to 1/64 in. If the measurement falls between two marks, call it plus or minus. If it falls a quarter of the way between two marks, call it long or short. With a little practice, you can see the measurements at a glance.

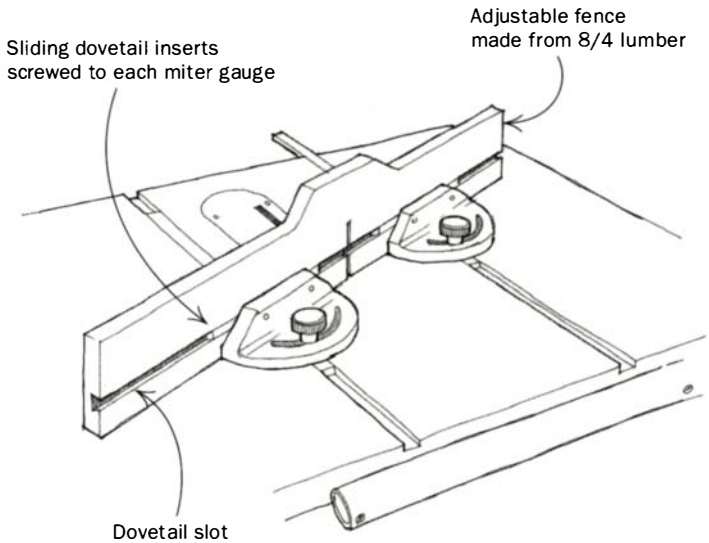
This system is accurate, and it eliminates the need for hard-to-see tiny lines and complicated measurements expressed in 32nds or 64ths.

—Gary Allan May, Seattle, Wash.

Quick tip: To quickly identify lathe tools on a shaving-covered lathe bed, paint the ends different colors to designate different functions: for example, green for skew chisels and yellow for parting tools.

—Robert M. Vaughan, Roanoke, Va.

Double miter-gauge jig for cutting angles



Frustrated by the inaccuracies and trial-and-error test cuts that seem to go with using a regular miter gauge on the tablesaw, I had set the gauge aside and relied on dozens of auxiliary fences preset to specific angles. But now, after years of not using that one miter gauge, I discovered all I really needed was two miter gauges connected by a hefty fence.

To make the jig, I set one miter gauge in each slot and screwed a 2-in.-thick oak fence, 2 in. wider than the maximum height of the blade, to both of the gauges. To allow the fence to move slightly when the angle is changed, I cut a dovetailed slot, centered where the screw holes for the miter gauge go into the fence. Then I made some mating dovetail pieces, slid them in the dovetail slot and added screws through the miter gauges into the mating pieces.

With the jig, I can measure the cut angle directly between the fence and the blade and hold angles more accurately. When I need to cut a complementary angle, I simply slide the workpiece along the fence and make a cut on the other side of the blade.

—Joseph M. Santapau, Yardley, Pa.

Methods of Work buys readers' tips, jigs and tricks. Send details, sketches (we'll redraw them) and photos to Methods of Work, Fine Woodworking, *P.O. Box 5506, Newtown, CT 06470-5506. We will return only those contributions that include an SASE.*

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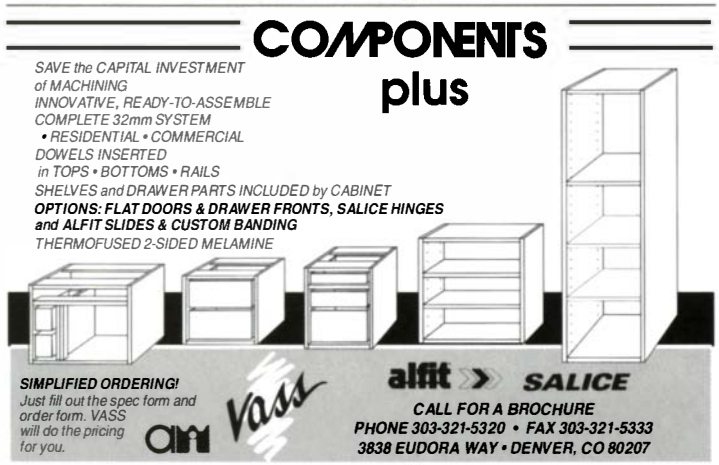

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9068	1/2" Impact Wrench with case	457	269
5455	7"/9" Polisher 1750 rpm	280	164
6078	7"/9" 13 amp grinder	295	169
0230-1	3/8" Drill 3.5 amp	231	132
5936	Belt Sander 4 x 24 w/bag 10 amp	495	269
6747-1	Drywall Gun 0-2500 rpm 5 amp	205	115
6016	1/4 sheet Palm Grip Sander	99	56
6017	6016 Sander with dust bag	101	62
6008	1/3 sheet 12,000 orb/min 5 amp	230	132
8975	Heat Gun 570° & 1000°	102	59
8977	Variable temp. Heat Gun	137	82
8980	8975 Heat Gun w/ case, & acc.	155	94
3102-1	Plumbers right angle Drill Kit	401	229
5660	Router 1-1/2 HP 10 amp	357	209
6256	Variable speed Jig Saw 3.8 amp	278	149
6266-6	Top Handle Jig Saw	315	159
6527	Super Sawzall with case	343	169
6528	above Sawzall with wired cord	339	189
6537-22	6527 w/ quick lok blade change	224	175
6516-21	NEW cordless Sawzall	550	299
0406-1	9.6V Drill Kit with 2 batteries	315	172
0407-22	12V Drill w/keyless chuck & 2 batt	380	175
0502-21	12V Drill Kit w/ 2 batteries	436	235
0231-1	3/8" Drill 0-1700 rpm	170	88
0224-1	3/8" Drill 4.5 amp magnum	236	132
0225-1	Same as 0224-1 w/kylss chuck	236	132
0234-1	1/2" Drill 5.4 amp mag 0-850 rpm	255	129
0236-1	0234-1 drill with steel case	288	158
0235-1	Same as 0234-1 w/kylss chuck	255	142
0244-1	1/2" Drill 5.4 amp mag 0-600 rpm	255	129
0222-1	3/8" Drill 3.5 amp 0-1000 rpm	213	119
0228-1	3/8" Drill 3.5 amp 0-1000 rpm	207	109
0375-1	3/8" close quarter Drill	255	148
0379-1	1/2" close quarter Drill	288	165
6539-1	cordless Screwdriver 190 rpm	139	78
6540-1	6539-1 with bits & case	175	99
6546-1	cdlss Screwdriver 200 & 400 rpm	150	89
6547-1	6546-1 w/ bits 1/4" chuck, & case	185	108
5399	1/2" D-handle Hammer Drill Kit	356	219
1676-1	Hole Hawg with case	541	299
6507	Original SawZall with case	278	155
6517	6.5 amp Sawzall with case	296	159
6175	14" Chop Saw 15 amp	415	279
6010	Orbital Sander 1/2 sheet	235	135
5397-1	3.8" var. speed Hammer Drill Kit	275	145
5371-1	1/2" var. speed Hammer Drill Kit	360	194
5377-1	5371-1 with keyless chuck	360	209
3107-1	1/2" var. speed right angle Drill	411	234
3300-1	1/2" var. speed right angle Drill	378	219
5682	Router 2 HP -w/ 1/4" & 1/2" collets	367	225
6145	4-1/2" Grinder 10,000 rpm	179	99
6142	6145 with case & accessories	224	129
6749-1	Drywall Gun 0-2500 rpm 5.4 amp	235	135
6755-1	Drywall Gun 0-4000 rpm 5 amp	183	105
6767-1	Screw Shooter Kit	252	142
5353	Eagle 1-1/2" Rot. Hammer w/ cs	1046	575
6365	7-1/4" Circular Saw 13 amp	229	132
6367	above Saw - double insulated	224	138
6366	6365 with fence & carbide blade	237	136
6368	6365 w/fence,carbide blade,& cs	259	148
6377	7-1/4" Worm Drive Saw	345	198
6369	7-1/4" Circular Saw with brake	280	162
6490	10" Mitre Saw	496	265
6494	10" Compound Mitre Saw	585	315
0422-1	12V Hammer Drill w/ 2 batt	441	269
0431-1	12V Drill w/ 2 batteries	441	269
6496	10" Slide Compound Saw	1050	569

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Model	Description	List	Sale
EY6100FQKW	12 volt Drill kit with 2 Ironman batteries, 15 min. charger & case	379	179
EY6230FQKW	NEW 15.6V Drill Kit with 2 Ironman batteries, 30 minute charger & case	425	215

Batteries for above are New 2.0 amp-hr

EY6181CRKW	9.6V Drill Kit with 2 batteries, 1 hour charger, & case	307	169
EY6101EQKW	Same as above but has two Ironman batteries	Sale	249
EY3503FQWKW	NEW 5-3/8" 12V Wood Cutting Saw Kit	500	259

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Cordless Specials

Model	Description	List	Sale
5090DW	3-3/8" Saw Kit 9.6 volt.	280	155
DA391D	3/8" angle Drill 9.6 volt	166	114
DA391DW	3/8" angle Drill Kit 9.6 volt	341	189
ML900	9.6 volt flashlight	Sale	14.95
6095DWE	9.6 volt Drill Kit w/2 batteries.	Sale	125
6095DWLE2	6095DWE w/ flashlight	Sale	139
6095D	6095DW Drill only & case	Special	65
6011DWE	12 volt Drill Kit w/ 2 batteries.	365	168
632007-4	9.6 volt Battery	47	30
632002-4	7.2 volt Battery	39	28
6203DWAE	9.6V 3/8" Drill Kit w/ 2 batt.	351	159
6211DWHE	12V 3/8" Drill Kit w/ 2 batt.	368	175

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6213DWAE	12V 3/8" Drill Kit w/ 2 batt	325	169
6233DWAE	14.4V 3/8" Drill Kit w/ 2 batt.	358	199

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9900B	3" x 21" Belt Sander with bag	347	179
9924DB	3" x 24" Belt Sander with bag	360	189
JR3000V	Var. speed Recip Saw w/ case.	264	135
9820-2	Blade Sharpener	433	225
N1900B	3-1/4" Planer with case	263	142
1912B	4-3/8" Planer	352	199
BO4552	1/4 sheet Pad Sander w/ bag	101	55
DA3000R	3/8" Angle Drill var. speed	355	185
2708W	8-1/4" Table Saw	637	295
1806B	NEW 6-3/4" Hand Planer	959	499
6405	3/8" Drill 0-2100 rpm 2 amp	115	65
6821	NEW Drywall Gun 0 - 4000	190	95
6013BR	1/2" Drill Rev. 6 amp	270	154
5402A	16" Circular Saw 12 amp	1073	659
9401	4" x 24" Belt Sander with bag	458	235
LS1030	10" Mitre Saw	428	209
5007NBK	7-1/4" Circular Saw w/ case	250	125
5037NB	7-1/4" Circular Saw	288	155
LS1011	10" Slide Compound Saw	995	429
GV5000	5" Disc Sander	148	88
N9514B	4" Grinder 4.6 amp	118	65
N9501B	4" Grinder 4.0 amp with case	174	99
9217SPC	7" Sander/polisher var. speed	378	179
6302	1/2" Drill 0-550 rpm 5.2 amp	250	118
BO5001	5" Random Orbit Sander	125	69
BO5010	NEW 5" Random Orbit Sander with dust pickup	142	72
LS1211	12" Slide Compound Saw	1620	779
3901	Plate Joiner Kit	376	209
3612C	NEW 3 HP Plunge Router	492	269
9031	1-3/16" x 21" v/spd belt sander.	346	209
LS1040	10" Compound Miter Saw	460	259
HP1500	1/2" Hammer Drill 5 amp	145	95
LS1013	10" Dual Compound Slide Miter Saw	1088	599
LS1220	NEW 12" Compound Miter Saw	Sale	379

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Model	Description	List	Sale
N80S-1	Stick Nailer	Super Sale	339
N80C-1	Coil Nailer	Sale	339
RN45	Coil Roof Nailer 3/4 - 1-3/4	845	369
N60FN-2K	Finishing Nailer 1-1/4" - 2-1/2" w/ case, oil, & nails	618	275
T50S4-1	Decking Sheathing Stapler	618	365
MIIIFS	Flooring Stapler 15 gauge	902	529
S32SX-1K	Finish Stapler-1/2" - 1-3/8" with case and oil	269	145
BT35-2K	Brad Tacker 5/8" - 1-3/8" with case, oil, and brads	279	125
BT50-2K	Brad Tacker 1-3/16" - 2" w/ case, oil, and brads	335	175
PC5000-1	Power Crown Stapler	242	155
CWC100	1 HP Pancake Compressor	440	305

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Model	Description	Teeth	List	Sale
LU82M010	Cut-off 10"	60	93	44
LU84M011	Combo 10"	50	78	45
LU85M010	Super Cut-off 10"	80	115	59
LM72M010	Ripping 10"	24	69	38
LU73M010	Cut off 10"	60	84	49
LU87M010	Thin Kerf 10"	24	72	45
LU88M010	Thin Kerf 10"	60	88	49
LU85M015	Mitre Saw blade 15"	108	175	105
LU91M010	Compound Mitre Blade	60	88	54
LU98M010	Ultimate 10"	80	128	68
LU89M010	Ferrous metal 10"	72	104	58
F410	Quiet Blade - 10"	40	95	49
F810	Quiet Blade - 10"	80	135	74
TK303	7-1/4" Finishing - 40 tooth		38	25
TK906	10" Combo - 50 tooth		53	32
SD306	6" Dado - Carbide		215	115
SD308	8" Dado - Carbide		230	119
SD506	6" Super Dado-carb. w/cs&shims		292	149
SD508	8" Super Dado-carb. w/cs&shims		344	168
FB107	7 piece Forstner bit set 1/4" - 1"		92	59
94-100	5 pc Router bit door system w/cs		320	169
BF3	Router Table w/ fence & legs		495	289

NEW Teflon Coated Red Blades

Model	Description	Teeth	List	Sale
LU98R010	Ultimate 10"	80	128	69
LM72R010	Ripping 10"	24	78	44
LU84R011	Combo 10"	50	89	55
LU85R010	Super cut-off 10"	80	114	74
LU85R015	Miter saw blade 15"	108	179	119
LU87R010	Thin kert 10"	24	72	54
LU88R010	Thin kerf 10"	60	88	55
LU91R008	Compound miter 8-1/2"	48	79	49

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FT2000E	Plunge Router - $30 rebate	Sale	205
FJ85	Top Hndle Jig Saw	Sale	99
JS102	Biscuit jointer	Sale	125
TR215	8-1/4" Mitre Saw	Sale	249
FE82	3-1/4" Planer	Sale	99

Freud Carbide Dado Blades

SD608	8" dial-a-width dado	389	199
SD606	6" dial-a-width dado	369	189
SD208	8" economy dado	155	85

ACCU-MITER

18-34	Professional Mitre Gauge	Sale	145

JDS AIRTECH AIR CLEANERS

Model	Description	Sale
350	12"x24"x28" 1/5 HP - 350 CFM	249
8-12	20"x24"x44" 1/3 HP - 800,1200 CFM	479
10-16	20"x24"x44" 1/3 HP - 1000,1600CFM	679

PORTA NAILER

Model	Description	List	Sale
401	Porta Nailer complete	295	209
501	Face Nailer complete	295	209
1,000	Genuine Porta Nails - 1000 qty		16.50
5,000	Genuine Porta Nails - 5000 qty		74.95
10,000	Genuine Porta Nails - 10000 qty.		129.95

BIESEMEYER FENCES

Model	Description	List	Sale
B-50	50" Commer. Saw Fence	443	325

Above fence has $30.00 rebate !

T-SQUARE 52	52" Homeshop Fence	360	275

Above fence has $20.00 rebate !

T-SQUARE 40	40" Homeshop Fence	335	255

Above fence has $20.00 rebate !

T SQUARE 28	28" Homeshop Fence	325	245

Above fence has $20.00 rebate !
REBATES EXPIRE 03/31/98

BOSCH

Model	Description	List	Sale
1587VS	Top Handle "CLIC" Jig Saw	292	139
1587AVSC	1587VS 50th Anniversary Saw with case	Sale	149
1587DVS	above saw w/ dust collection	317	185
1584VS	"CLIC" Barrell Grip Jig Saw	288	139
1584DVS	above saw w/ dust collection	306	185
Bosch Metal Case for above Jig Saws		34	24
Bosch 30 blade assortment for Jig Saws			28.99

Super Special
1584VS or 1587VS with steel case and 30 Bosch blades ..... **Sale** 175

1942	Heat Gun 600°-900° temp	132	78
1289D	1/4 sheet Sander	113	69
1003VSR	3/8" Drill 0-1100 rpm	167	78
1194VSR	1/2" var. speed Hammer Drill	272	155
1194VSRK	above Hammer Drill w/ case	303	169
1295DH	5" Random Orbit Palm Sander	145	89
1608T	5.6 amp tilt base Trimmer	189	110
1608U	Underscribe Laminate Trimmer	239	139
1609K	Laminate Installers Kit w/ 1609 Trimmer	355	199
1609KX	Deluxe Installers kit	425	229
1604A	1-3/4 HP 2 Handle Router	269	142
1604AK	Same as above w/case & acc.	337	185
1606A	1-3/4 HP D-handle Router	300	179
1274DVS	3"x21" v/spd Belt Sander w/bag	301	175
1613EVS	2 HP v/spd Plunge Router	369	199
1615EVS	3 HP v/spd Plunge Router	536	305
1614EVS	1-1/4 HP v/sp Plunge Router	295	169
3054VSRK	12 volt cordless drill kit	323	185
1370DEVS	6" Random Orbit Sander	446	248
3294EVS	In Line Jig Saw	206	119
3272K	3-1/4" Planer with case 4.2 amp	205	119
1347AK	4-1/2" Grinder w/ case & acc.	172	89
1348AE	5" Grinder 8.5 amp	237	135
11304	"The Brute" Breaker Hammer	1249	
11314EVS	Demolition Hammer	921	539
11232EVS	1-1/2" Spline Hammer Drill	890	525
11224VSR	7/8" SDS Rotary Hammer Drill	404	229
1634VSK	Recipro Saw 10.5 amp	335	189
1278VSK	NEW 1-1/2"x12" Belt Sander	218	129
1276D	4" x 24" Belt Sander	379	219
1275DVS	3" x 24" v/spd Belt Sander	379	214
1276DVS	4" x 24" v/spd Belt Sander	408	229
3107DVS	5" Random Orbit Sander	165	98
3107DVSK	3107DVS with case	195	115
3725DVS	5" Random Orbit Sander	256	149
3727DVS	6" Random Orbit Sander	266	154
B3915	10" Slide Compnd Saw	1050	559
11230EVS	SDS-max 1-1/2" Rotary Hammer	910	529
11231EVS	SDS-max 1-3/4" Rotary Hammer	1363	815
11223EVS	SDS-max 2" Rotary Hammer	1595	945
11311EVS	Demolition Hammer variable speed	1328	785

BOSCH CORDLESS DRILLS

3300K	12V Drill Kit with 2 batteries	285	169
3315K	12V T-Handle Drill Kit with 2 batteries	345	159
3110K	9.6V T-Handle Drill Kit with 2 batteries	318	185
3615K	14.4 volt Drill Kit	354	174

SKIL TOOLS

Model	Description	List	Sale
HD5825	6-1/2" Worm Drive Saw	313	189
5510	5-1/2" Circular Saw	196	125
5860	8-1/4" 60° Worm Saw	350	205
5660	8-1/4" 60° Circular Saw	292	179
5657	7-1/4" Circ Saw - pivot foot	220	129
5525	6-1/2" Circ Saw - big capacity	189	115
3400	10" Table Saw - Bench Top	360	189
77	Famous 7-1/4" Worm Drive Saw	Sale	158
77M	77 Mag Worm Saw -	Sale	168

RYOBI SPECIALS

Model	Description	List	Sale
JP-155	6-1/8" Jointer/Planer	700	319

Above jointer comes with extra blades

RE600	3 HP Plunge Router var. speed	500	235
BE321	3" x 21" var. speed Belt Sander	310	139

Above sander comes with sanding frame

BT3000	10" Table Saw with stand	1125	529

Above saw comes with router kit

AP12	12" Bench Planer	884	379

Above planer comes w/ extra blades & dust hood

JS45	Top Hdle Jig Saw var. spd	98	49
OSS450	Oscillating Spindle Sander	340	155

Above sander comes with spindles

WDS1600	16" x 32" Drum Sander	980	569

Above sander comes with stand

JM80K	Plate Jointer with case	218	99
DBJ50	Detail Biscuit Jointer	114	69

PORTER CABLE

Model	Description	List	Sale
690	1-1/2 HP Router 8 amp	278	149
6931	Plunge Router Base	139	82
693PK	690 and 6931 plus case	Sale	199
691	1-1/2 HP Router D-handle	303	164
697	1-1/2 HP Router/Shaper	418	235
698	Heavy Duty Shaper Table	238	135
351	3" x 21" Belt Sander without bag	302	168
352	3" x 21" Belt Sander with bag	312	175
352VS	3 x 21 Belt Sander v/spd	321	175
360	3" x 24" Belt Sander with bag	397	214
360VS	360 Sander with variable speed	429	229
361	3" x 24" Belt Sander without bag	377	204
362	4" x 24" Belt Sander with bag	412	224
362VS	362 Sander with variable speed	446	239
314	4-1/2" Trim Saw	274	154
9314	4-1/2" Trim Saw 4.5 amp w/cs	299	169
97751	1/2" v/ spd Hammer Drill w/cs	274	155
9125	3-1/4" Planer Kit w/ case	250	145
9118	Porta Plane Kit 7 amp	400	235
505	1/2 sheet Pad Sander	249	139
6614	1/2" var. speed Drill 0-750 rpm	210	122
330	Speed Block Sander 1/4 sheet	120	68
556	Plate joiner with 5556 tilt lence	Sale	135
557	NEW Plate jointer with tilt fence. Includes 2" and 4" blades for use with standard and face frame plates	400	215
345	6" Saw Boss 9 amp	207	118
9345	345 comp. w/cs & carbide blade	237	138
332	Palmgrip Random Orb Sander	133	59
333	above Sander with dust bag	144	68
333VS	NEW Random Orbit Sander - variable speed	150	79
334	333 sander with PSA pad	148	65
335	NEW Palmgrip Random Orbit Sander with dual flip pad	Sale	85
7519	3-1/4 HP Router 2 Handle	469	258
7518	3-1/4 HP 5 speed Router	534	289
7536	2-1/2 HP 2 Handle Router	389	215
7537	2-1/2 HP D-Handle Router	409	228
7538	3-1/4 HP Plunge Router	469	259
7539	3-1/4 HP var. spd Plunge Router	534	289
7310	5.6 amp Laminate Trimmer	176	102
7312	5.6 amp Offset Base Lam Trim	241	135
97310	Laminate Trimmer Kit complete	336	189
7335	5" w spd Ran Orbit Sander	254	139
97355	7335 Sander w/cs & dust collect.	274	149
7336	6" w/ spd Ran Orbit Sander	259	145
97366	7336 Sander w/cs & dust collect	284	159
693	1-1/2 HP Plunge Router	338	184
97549	Top Handle Jigsaw w/ case & blades	275	144
9444	Profile Sander Kit	220	99
9444VS	NEW var/spd Profile Sander Kit	207	115
7499	Ultimate Cut-out tool	119	69
97499	7499 w/ case & bits	150	89
340	1/4 Sheet dustless sander	91	55
310	Production Laminate Trimmer	270	154
347K	7-1/4" "Framers" Circular Saw with plastic case	250	129
743K	7-1/4" "Framers" Circular Saw with plastic case - left hand version	250	129
447K	7-1/4" "Framers" Circular Saw with brake & plastic case	259	139
843K	447 Saw - left hand version & cse	259	139
7800	Drywall Sander	589	349
7810	Wet/Dry Vac for above sander	452	269
9737	Tiger Recipro Saw	307	158

New Porter Cable Cordless Nailers !

CDA250	Angle Finish Nailer 1-1/4" - 2-1/2"	500	279
CFN250	Finish Nailer 1" - 2-1/2"	500	279
CMS200	Medium Crown Stapler 1" - 2"	500	279

Porter Cable Pneumatic Nailers

BN125	Brad Nailer - 18 ga. 5/8" - 1-1/4"	144	89
BN200	Brad Nailer - 18 ga. 3/4" - 2"	238	139
FN250A	Finish Nailer - 16 ga. 1" - 2-1/2"	362	189
DA250A	Angle Nailer - 15 ga. 1-1/4" - 2-1/2"	412	235
NS100	Stapler - 1/4" crown 1/2" - 1"	154	95
FC350	Framing Nailer - clipped head	558	289
FR350	Framing Nailer - round head	558	289
RN175	NEW Roofing Coil Nailer	504	289

Porter Cable Compressors

CF1400	1 HP, 4 gallon Pancake	Sale	195
CF1540	1-1/2 HP, 4 gallon Side Stack	Sale	295
CF2400	2 HP, 4 gallon Side Stack	Sale	319

Porter Cable Cordless Drills

9862	12V Drill Kit w/ 2 batteries	382	169
9862F	9862 Drill Kit with flashlight	Sale	189
9863	12V Drill Kit - pistol grip	319	179
9872	14.4V Drill Kit w/ 2 batteries	424	205

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A Blanket Chest with Legs

Simple frame-and-panel construction lets you break out of the boring box

BY JOHN MCALEVEY

I have always liked designing and making sideboards, chests of drawers and blanket chests. It is very satisfying to make a basic box that will contain and store the things that we use in our everyday lives. And when it works, the result can be as beautiful as it is useful. It's even more satisfying when you can transform a basic box into something with depth, dimension and visual power.

The blanket chest I designed and made for a family in New Hampshire is a piece of furniture that could have been just another unremarkable dovetailed box, but it is redeemed by frame-and-panel construction that allows for greater play with forms and materials. It pleases me to think that many years from now, someone will open this chest on a snowy December night, pull out a down comforter as proof against the cold, and think, "What a beautiful chest."

Legs double as stiles

A chest made of four solid slabs dovetailed together looks too heavy and traditional for my taste, and I can assemble frames and panels much more quickly than I can cut

Photos except where noted: Dennis Griggs

long rows of dovetails. Frame-and-panel construction has more going for it than lightness and economy of labor: It adds depth and shadow lines to the look of a piece, and it allows the use of contrasting wood—something you can't do with mitered or dovetailed chests made only from flat panels.

My client wanted a fresh design that incorporated elements of two of my previous frame-and-panel chests. In a departure from one of the older designs, I decided to eliminate the stiles of the frame-and-panel sides and join the top and bottom rails directly to the legs so that the legs themselves serve as stiles (see the drawing at right). This legs-as-stiles approach, which I had first tried nine years ago on a cabinet, allows for simplified construction and a lighter look than full frame-and-panel sides attached to separate legs. (Squinting at the blanket chest, you can almost imagine away the light-colored panels, leaving behind an open frame of thin, table-like legs and rails.) A gentle curve in the bottom rail helps the legs visually lift the chest off the floor.

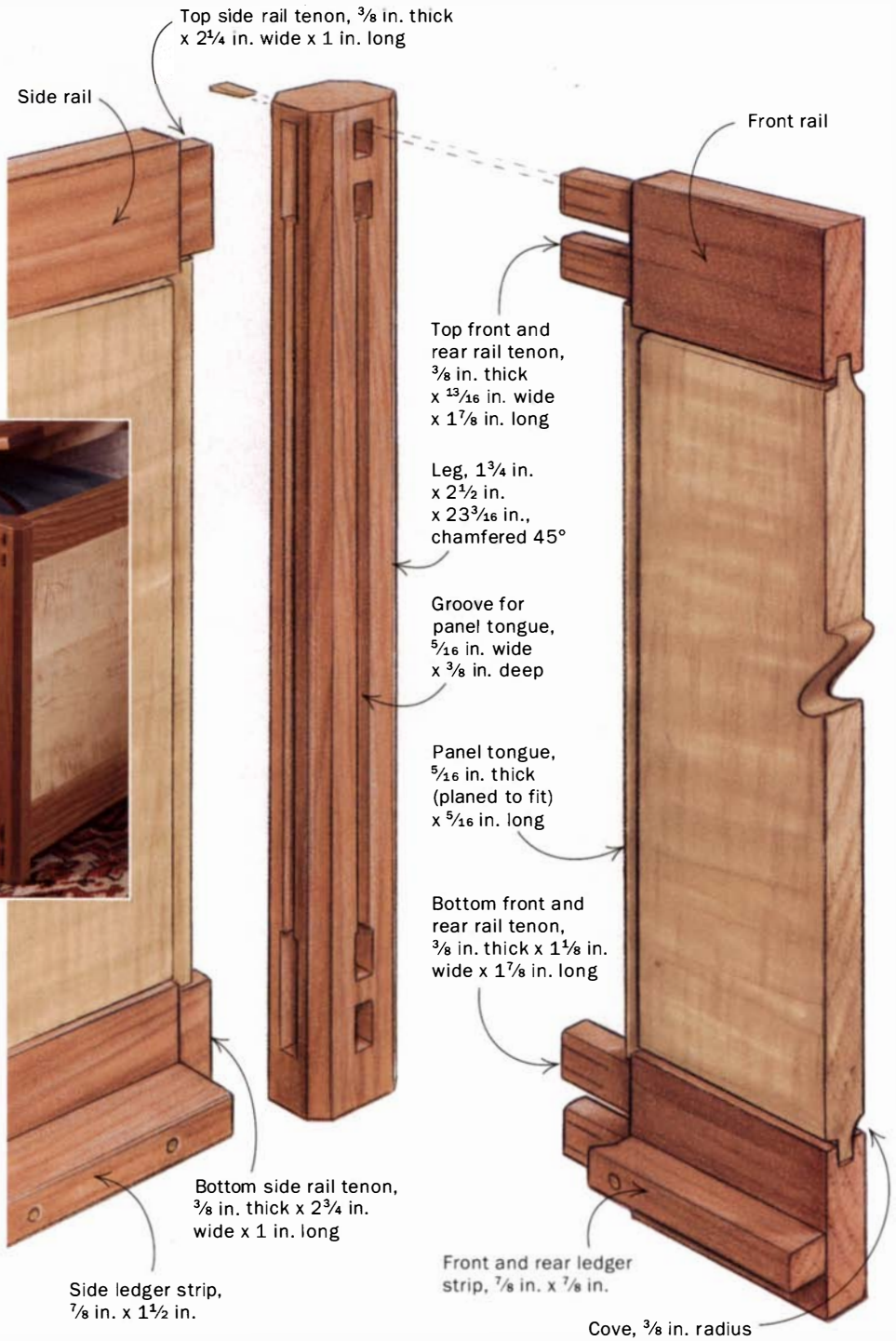
The frames are made of cherry and the panels are of curly maple. The legs are made from 8/4 lumber, lightened and made more interesting by chamfering on all four sides. To add even more visual character and a form of decorative detail, I brought the double tenons of the front and rear rails through and let them stand ⅛ in. proud of the legs. And to transform the top from a typical rectangular shape into a more pleasing and interesting form, I decided to curve the ends of the lid, carrying through the motif of the curved bottom rails.

Mortise-and-tenon joints hold the panels together

Mortise-and-tenon joints, in one form or another, are the basis for all good furniture construction, and this blanket chest is no exception. As in a post-and-beam house or a post-and-rail fence, mortise-and-tenon joints draw horizontal and vertical pieces

THE ACTION IS IN THE CORNERS

Because the legs serve as the stiles of the frame-and-panel sides, they are mortised for the rail tenons as well as grooved for the panel tongues. Both the mortises and grooves are centered on the inside faces of the leg, so layout is straightforward.



Drawings: Bob La Pointe

of furniture together simply and rigidly. Used with frame-and-panel construction, these joints make furniture that accommodates seasonal changes in the wood better than any other method.

The architect Louis Kahn said that the joint was the beginning of all ornament, and this holds true for the wedged, double through-tenons on my blanket chest. I worried that through-tenons would detract from the lines of the legs, but now that I've done them, I'd do them again. Details like these through-tenons add mystery because people at first wonder why they're there, and yet they take away mystery because they ultimately reveal the nature of the construction. I've noticed at shows that people make a beeline to just such details.

Careful preparation pays dividends during mortising

I always sticker more wood to acclimate in my shop than I think I'll need for a project, and I take a few shavings from each board with a block plane to give me a clearer view of its grain and color. For the legs, I wanted straight grain—nothing wild—so that no one leg would detract from the others. I also wanted consistency in the grain of the rails so that the figured curly maple would stand out. To match the grain on the top and bottom rails of a given side, I chose boards wider than 8 in., wide enough that I could rip them into a 3-in. top rail and a 3½-in. bottom rail. Because my design called for relatively narrow rails, I felt I could use flatsawn cherry instead of more expensive quartersawn cherry. Flatsawn lumber will expand and contract more than quartersawn lumber. But with a narrow rail, the difference will be negligible.

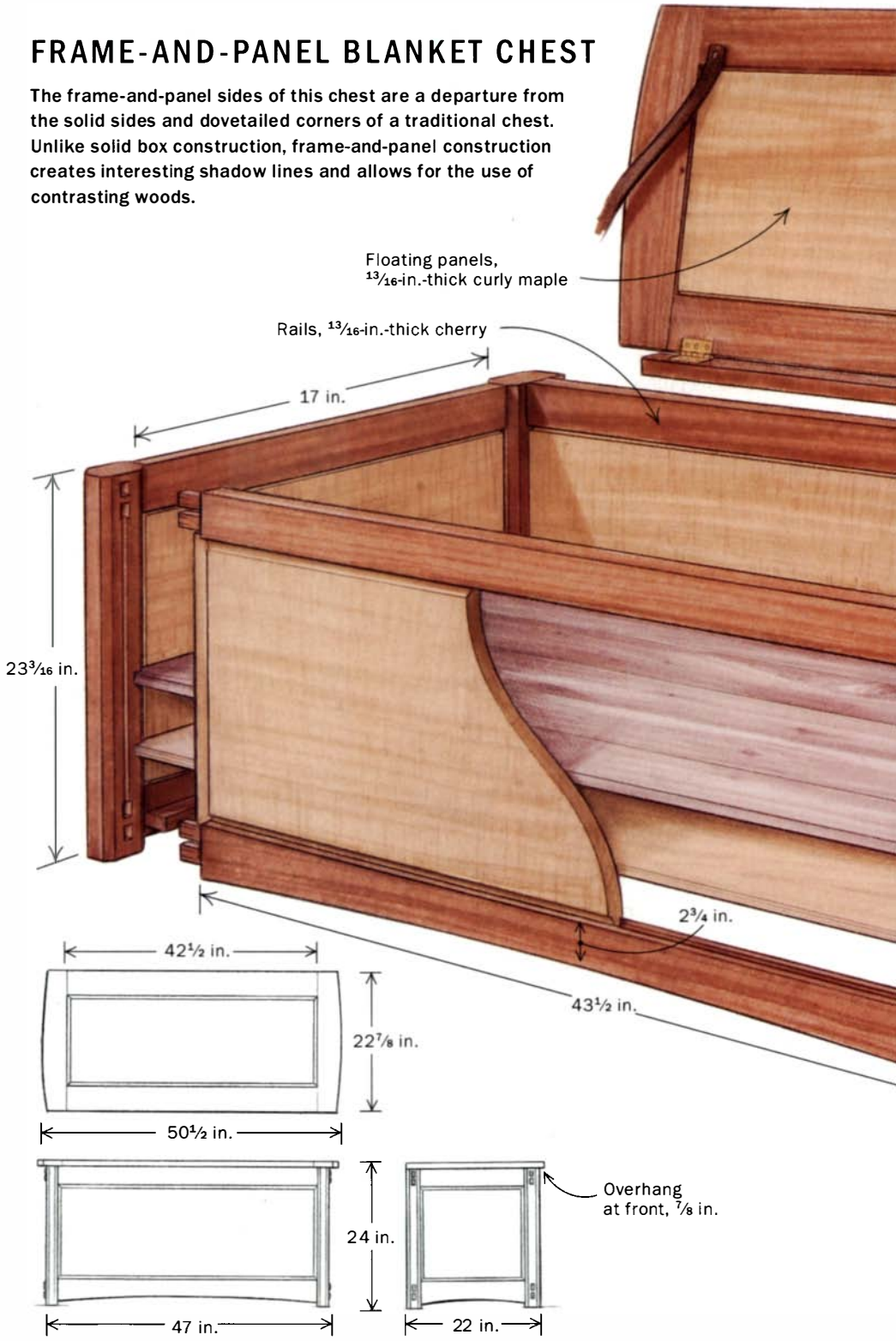
I began by roughing out the four legs. I always cut pieces to length oversized by a few inches. I keep an eye out for end-checking and surface defects and plan my cuts around them. If, when I am laying out the pieces, it looks as though one might have a streak of sapwood showing, then I'll rough out five legs. And I always mill a few test pieces. Using test pieces to set up joinery cuts helps ensure my good pieces will be right on. In making any piece of furniture, my time and labor far outweigh the cost of using a few extra inches of wood here and there. This is not a place to be stingy.

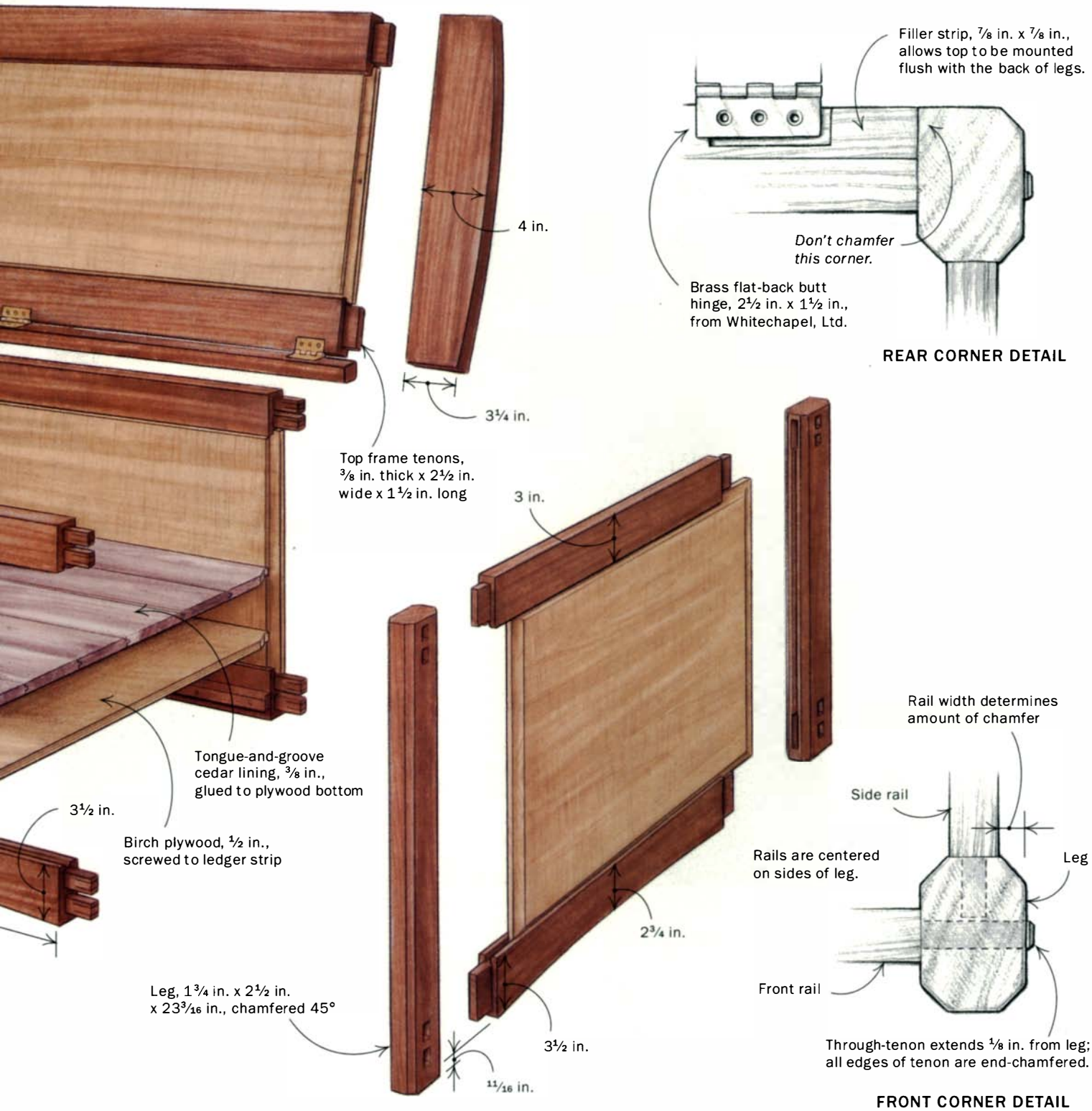
I chose to make all the mortises and tenons ⅜ in. thick, with the tenons on the bottom rail a little wider than those on the top rail. The side rails and the frame for the top are put together with blind, not through-tenons. After I determined their locations, I laid out the mortises and tenons on the legs and rails with a marking gauge and a very sharp pencil.

There are many ways to cut mortises, ranging from using hollow-chisel machines and plunge routers with spiral end mills to chopping them out by hand the old-fashioned way. I use an Italian-made slot-mortising machine to cut mortises in my shop. The machine can use either a Clico slot-mortise miller bit (available from Garrett Wade; 800-221-2942) or a spiral end mill (available from Woodcraft Supply; 800-225-1153). A slot-mortising machine is expensive, but it's extremely accurate once

FRAME-AND-PANEL BLANKET CHEST

The frame-and-panel sides of this chest are a departure from the solid sides and dovetailed corners of a traditional chest. Unlike solid box construction, frame-and-panel construction creates interesting shadow lines and allows for the use of contrasting woods.





you've set it up, and it's a pleasure to use. I've never understood why the Taiwanese haven't made a less expensive one.

A slot mortiser leaves a mortise with rounded ends. I prefer the look of a squared tenon in an exposed through-mortise joint, so on the blanket chest legs, I squared up the mortises by hand with a bench chisel. Working on the outside face of the leg, I made starter cuts on the sides of the rounded mortise and then cut out the waste at the end. The English would have cut a tapered mortise to accept the flared shape of a wedged tenon. I didn't make a big deal of it, but I did cut a little heavy on the end line and chiseled a slight taper.

When I cut the mortises, I also used my slot mortiser to cut the grooves that receive the maple panels. Because both the mortises and grooves are centered on the legs, I had only to change the bit. You could also use a router or a dado blade on the tablesaw to cut the grooves.

For cutting tenons, I prefer a tablesaw. I made the shoulder cuts first, using a tenon jig that safely secured the rails perpendicular to the table. As always when cutting

ONE SIDE AT A TIME

To avoid gluing up too much at once, assemble the front and rear panels first. **1.** *Glue the double through-tenons of the top and bottom rails into a mortised leg.* **2.** *Fit the panel into the grooves in the rails and leg without glue.* **3.** *Glue up the other leg, and wedge the through-tenons.* **4.** *Join the completed front and rear with the side rails and panels to form a carcase.*

tenons, I used a test piece to check the settings of the tablesaw. I removed the waste between the double tenons with a bandsaw, and cut slots for the wedges two-thirds through the tenons with a backsaw.

Once all the mortise-and-tenon joinery was cut, I dry-fit each tenon to its own designated mortise. I strive for an exact fit right off the machine. If I'm going to use machines, I insist on obtaining a high degree of accuracy. I've put a lot of time into adjusting and keeping my saws, jointer and planer tuned up. Those machines and my trifocals ensure the precision I've grown to expect.

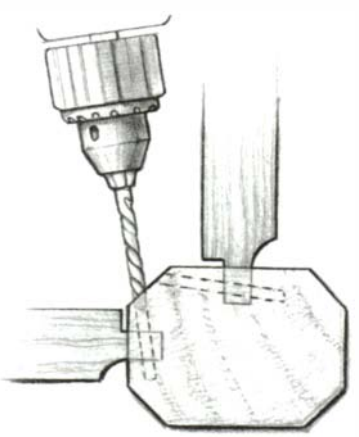
A cove bit shapes the panels

I feel as though we've become anesthetized to frame-and-panel construction because of kitchen cabinetry, much of which has been derivative of traditional furniture. I try not to make furniture that looks like a kitchen cabinet. So I milled the five curly maple panels that make up the sides and the top of the blanket chest from solid stock glued together with butt joints at the seams. I raised the panels by cutting a cove around the perimeter on the outside surface, allowing for a very narrow reveal between the frame pieces and the cove.

For the cove cut, I used a router table with a standard high-speed-steel, ⅜-in. cove bit. To increase the height of the cove, I stood the panels on end, against the fence, and ran them vertically through the router. This way, I could make use of the ¾-in. height of the cove bit rather than its smaller radius.

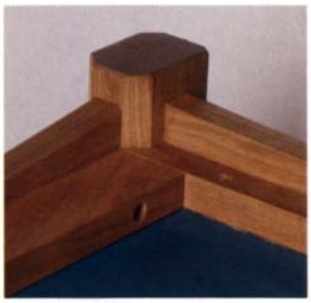
I took slight incremental cuts, about 1/16 in. at a pass, to avoid burning the maple. This

PIN THE PANELS FROM THE INSIDE



Pin the center of each vertical tongue to the legs with a ⅛-in. dowel, so the panels will expand and contract evenly at the top and bottom rails. Angle the hole for the pin to prevent the drill from damaging the sides of the panels.

Photos this page: William Duckworth



***Ledger strips support a plywood bottom panel** painted with odorless milk paint (above). A liner of tongue-and-groove aromatic cedar (right) is glued on top of the plywood and is notched to fit around the legs.*

improves consistency and saves time and frustration. And I ran each panel through consecutively before raising the bit. Experience has taught me to be careful not to bull through this process. Only a newly sharpened bit will do; if the bit is borderline dull, it will burn. And I find that high speed steel is less likely than carbide to burn a workpiece. For most woodworking projects, I think carbide has been over-hyped.

After I finished cutting the coves on all five panels, I used a dado blade in my tablesaw to remove enough material to make a tongue that fits into the grooves previously cut in the legs and rails. The grooves were ⅜ in. deep, so I made the tongues 5/16 in. long, allowing 1/16 in. for expansion. In sizing panels, it's important to allow enough room for seasonal expansion and contraction. Often I have to fine-tune the width of a panel tongue by using a rabbet plane to shave the shoulder.

I pre-finished all the curly maple panels before assembly, because it's easier to get a finish on the cove edges this way. On the inside surfaces, I brushed on three coats of shellac. Shellac will not impart any unpleasant odor to blankets or sweaters stored inside the chest. On the outside of the panels, I used a linseed oil and turpentine mixture, wiping off any excess oil (as it began to tack up) with cotton rags. I took great care to dispose of the rags by putting them in a bucket of water.

Assembly is easy

With all the parts prepared, I assembled the chest in sections (see the photos on the facing page). The front and rear sections each consist of two legs, top and bottom rails and a floating panel. I glued and clamped the front and rear sections separately. (I prefer Titebond Extend glue, which I buy from Woodcraft Supply, because it provides a little more working time for putting together many parts at once.) At this time, I wedged the exposed through-tenons with precut maple wedges, wetted with a dab of glue. I also pinned the vertical centers of the panel tongues to the legs so that the panels will expand and contract evenly in the top and bottom rails (see the drawing on the facing page). When the glue on the front and rear frames had set, I then glued and clamped the whole chest together, joining the front and rear sections with the top and bottom rails of the sides. I was careful not to forget to put in the maple side panels.

After the four sides were together, I attached bottom ledger strips with screws and glue, and screwed a ½-in. birch plywood bottom panel to the ledger. I painted the plywood panel with milk paint (which, like the shellac, won't impart an odor). With a few lengthwise beads, I glued a tongue-and-groove aromatic cedar lining on top of the plywood to make the floor of the chest smell good (see the photos at left). A little play in the tongue-and-groove joints and glue on only a few boards allow the cedar lining to expand and contract without busting up the chest. I also glued up the frame-and-panel top, which is essentially a door mounted on brass butt hinges.

Once the top was glued up, I laid out the curves on the ends, using spline weights and a plastic spline (see *FWW* #71, p. 45). I cut the curves with a sabersaw and then cleaned up the edges with a block plane and sandpaper. Before setting the hinges, I glued a filler strip to the rear top rail, between the two rear legs (see the photos below). To keep the lid from swinging too far back, I installed a leather strap. The leather adds a warm touch to the chest without sacrificing strength. □

John McAlevey teaches at the Center for Furniture Craftsmanship in Rockport, Maine, and builds one-of-a-kind furniture in a shop next to his home in Tenants Harbor, Maine.

***A filler strip holds the hinges.** The strip is glued to the rear top rail and butts against the rear legs, whose inside back corners remain unchamfered.*

Boring Big Holes

When to use Forstners, Multispurs, spades, hole saws and wing cutters

BY ROBERT M. VAUGHAN

Many years back, I had a commission to build lockset displays. The job called for 18,000 holes with smooth bores and crisp edges in blocks of 1¾-in.-thick oak. At a flat rate of 9 cents a hole, I couldn't afford to let the wrong drill bits slow me down.

Before beginning, I experimented with a variety of methods. I settled on Multispur bits chucked in a drill press. They produced precise, tearout-free holes and allowed me to work fast enough that I finished the job in a little over a week. Depending on the project, other large-hole boring tools might be worth considering. The most common tools include Forstner bits, spur bits, spade bits, hole saws and wing cutters.

Furniture, craft projects, architectural work and home repairs often call for boring large holes. Large in my book is anything more than ⅝ in. dia., bigger than most commonly available twist drill bits. Big holes demand special bits, and the variety on the market includes everything from inexpensive high-carbon-steel spade bits to costly Forstners.

Before spending a wad of cash on a set of bits, consider how often you need to drill large holes, the precision of cut required and how quickly you need to get the job done.

For precision holes, pick a Forstner or Multispur bit

Like life forms, tools evolve over time, only much faster. Forstners were developed more than 100 years ago for use in hand braces. They were an improvement over the other bits of the time, such as brace bits, because Forstners could drill overlapping and flat-bottomed holes. Forstners cut on two fronts: A sharp outer rim continuously scores the wood, and a pair of horizontal cutting wedges removes most of the

Photo this page: Michael Pekovich

waste inside the hole and shaves the bottom flat.

If brace bits were life forms, they'd be the fish of boring tools. Forstners are the amphibians. The 20th century saw yet another major evolution: Forstners emerged from the swamp with teeth along their rims. Although it would seem that this would give the bit a bigger bite, something more significant happened. Like mammals, these sawtooth Forstners were more efficient at heat regulation. Getting rid of the solid rim meant less metal-to-wood contact, which creates heat-producing friction. With the advent of power tools, a cooler-running bit was needed. Smooth-rimmed Forstners, especially those 1 in. and greater in diameter, tend to scorch wood when used in an electric drill.

Today, we can choose among traditional Forstners, sawtooth Forstners, Multispurs and spur bits. All do the same thing: They drill flat-bottomed holes with clean rims and smooth sides. (Although a traditional Multispur has only one cutting wedge, the term *multispur* has become synonymous with the sawtooth Forstner, which has a pair of cutting wedges.) These bits are good for boring holes for dowels or hardware, architectural detailing or craft projects, such as clock making, where you need a precise hole.

True Forstners have a stubby center point that just barely protrudes beyond the edge of the rim. When centering the point on a mark, you have to peek under the bit to see if it's in the right place. Sawtooth Forstners and Multispurs have slightly longer center points, which make them easier to align. These bits range from ¼ in. to as big as 4 in. dia., and prices vary widely (see the box on p. 46). Spur bits have a pair of cutting wedges and two small spurs. They're made for boring at 90° to the surface. Many 35mm bits for installing cup hinges are of this style (see the top right photo).

Because the outer rim of a Forstner is smooth, it won't catch when drilling overlapping holes (see the bottom right photo) or when boring at an angle. Sawtooth Forstners and Multispurs can also be used to drill overlapping holes, but be aware that the teeth on these bits can catch and hurl a workpiece that isn't clamped down. When drilling overlapping holes with these bits, use a drill press and firmly clamp the workpiece.

FORSTNERS AND MULTISPURS

TRADITIONAL FORSTNER

The smooth rim of a Forstner bit cuts a clean-walled hole but tends to overheat, especially in larger sizes (more than 1 in. dia.).

MULTISPUR

The sharp spurs reduce friction while cutting a clean hole. A true Multispur has one cutting wedge and a longer center point than a Forstner bit.

SAWTOOTH FORSTNER

A hybrid of the traditional Forstner and Multispur, the sawtooth has two wedges, which speed up cutting, and a toothed rim that resists overheating.

Specialty spur bits. *Spur bits have a pair of small spurs on their rim, and they're made for boring at 90° to the surface. This one is made for installing 35mm cup hinges.*

Boring overlapping holes. *Forstner bits are good for roughing out mortises.*

For fast drilling, use a spade bit

A spade bit is one of the simplest drill bits. It's nothing more than a rod of steel with one end forged flat. The flat section is ground away, leaving a sharp point and a pair of cutting wings. Spade bits are mostly used in construction with portable drills. These bits bore holes quickly but tend to wobble and vibrate, causing a raggedy rim on the entry side and tearout and splintering on the exit side. But when you're drilling holes for wire or pipe in studs and joists, speed matters more than looks. For deep holes, withdraw the bit frequently to clear the chips, so the bit won't bog down.

When sharp and used at slow speeds in a drill press, a spade bit can cut a fairly clean hole. Spades are inexpensive and

Photos except where noted: Anatole Burkin

What's the difference between cheap bits and pricey bits?

The prices of Forstners, sawtooth Forstners and Multispur bits vary widely depending on where you buy them, where they're made and how long and thick their shanks are. I tried four 2-in. bits from three continents, priced from $15 to $58, and drilled a bunch of holes in hardwood (see the top photo on the facing page). Used in a drill press, all were capable of boring holes with acceptably clean rims and fairly smooth walls, although the cheapest bit cut the slowest.

So why the big price difference? The size of a bit's shank plays some part: more steel means greater cost. Lower-cost bits have 5/16-in. or 3/8-in. shanks about 2½ in. long. Higher-priced bits have ½-in. or 5/8-in. shanks about 5 in. long. A hefty shank provides additional stiffness, and the extra length lets you bore deeper holes.

I ordered a $15 sawtooth Forstner bit, made in China, from Woodcraft (800-225-1153), a retail chain and mail-order company. This economy bit was slow-cutting. The rim of the hole had some minor tearout, but overall, it was acceptable. The spurs and cutting wedge weren't ground as sharp as the other bits. For occasional use, this bit would be a good value.

A $35 Forstner bit from Austria, ordered through Woodcraft, came with a sharply ground outer rim. This Forstner cuts faster than the Chinese bit, leaving a clean hole. A $46 Multispur from Forest City Tool, made in Hickory, N.C., cut faster than the other bits. The Multispur produced some minor tearout at the edge of the hole and on the wall. The most expensive bit, a $58 sawtooth Forstner from Austria ordered from Woodcraft, cut as fast as the U.S.-made bit but left a tearout-free rim and a clean wall.

***—Anatole Burkin,* associate editor**

For speed, choose a spade bit. *Holes for threading pipe or conduit in framing lumber don't have to be pretty.*

Spades are easy to customize. *Just file away equal amounts on each side of the blade to create a narrower or tapered bit.*

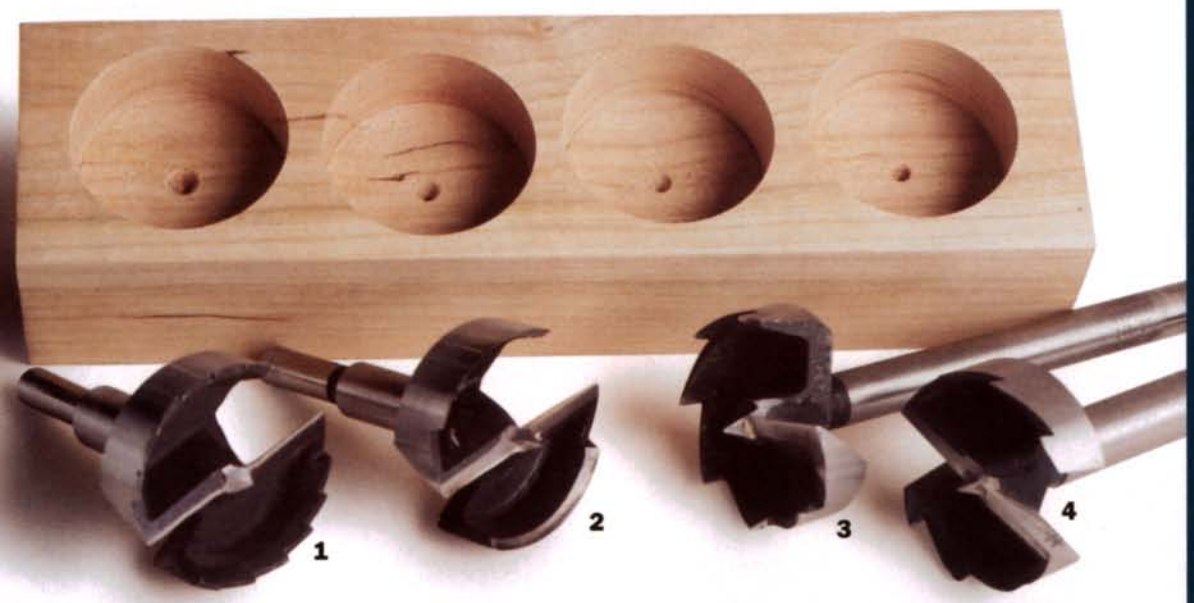
simply designed, which makes them a good choice if you need to reshape one for a special job. If you need to drill a hole to accept a 1-in. dowel that's sized a hair under 1 in., just file away an equal amount on both outside wings of a 1-in. spade bit to match the dowel's diameter (see the bottom left photo). Or, if you want a slightly tapered hole, you can file a taper onto the outside wings. Spade bits range from ¼ in. to 1½ in. dia. and cost about $2 apiece.

Hole saws are good for installing locksets

A hole saw, like a spade bit, has limited use in furnituremaking, but it can be handy around the house. Hole saws come in different styles, but they generally have an arbor that holds both a pilot twist drill (usually ¼ in.) and a larger cutting cylinder, 5/8 in. or larger (see the photo at right). More expensive hole saws come in kits with an arbor that accepts hardened steel cylinders of various sizes. Costs are based on the size of cylinders; for a good arbor and a 2-in. bit, expect to pay about $20. The cutting cylinder has fine teeth, like those found on a hacksaw. Inexpensive hole saws have thin-walled cylinders that flex like a hacksaw blade, and these sometimes pop off the arbor. They cost about $10.

Hole saws are commonly used in portable drills by plumbers and electricians for boring pipe and conduit holes. They're good for drilling holes for locksets in doors. When using a hole saw,

Hole saws have self-centering pilot bits. *They make quick work of drilling out doors for locksets. You can use them in a portable drill or drill press.*



Bits for every budget ***1.*** *Chinese-made, short-shank Forstner ($15) cuts slowly but produces an acceptable hole with only minor tearout at the rim.* ***2.*** *Austrian-made, short-shank Forstner ($35) drills a cleaner hole.* ***3.*** *U.S.-made, long-shank Multispur ($46) bores faster but leaves minor tearout.* ***4.*** *Austrian-made, long-shank sawtooth Forstner ($58) cuts as quickly as the U.S.-made bit but leaves a cleaner hole.*

A wing cutter gives you infinite adjustablllity. *The single cutting wing can be positioned anywhere along the bar and is held in place with a setscrew. Properly sharpened, a wing cutter can make a clean entry hole, but the walls will have some tearout. Use a drill press running at slow speeds with this tool.*

the pilot bit enters first, followed by the cutting cylinder. For a relatively clean entrance hole on two sides, the drill is stopped as soon as the pilot punches through the door. The hole saw is withdrawn, and the hole is completed by drilling from the other side. A hole saw doesn't leave a big pile of shavings like a Forstner; rather, most of the waste is in the form of a cylinder stuck to the pilot bit. Only through-holes can be bored with a hole saw. The surface left by a hole saw is fairly rough, so it's not a good choice when the cutout will be exposed or if you need a precise fit.

Wing cutters and circle cutters are adjustable

Wing cutters, like hole saws, have a center pilot bit. But instead of a cutting cylinder, a wing cutter has a single vertical cutting blade attached to an adjustable bar (see the photo above). The adjustability has some appeal. If you only need to drill a few large holes, a wing cutter, which can be purchased for about $20, is cheaper than a large Forstner or Multispur bit. Some wing cutters can cut holes up to 6 in. dia. That makes them useful for drilling out holes for large fixtures such as light canisters. You can also use a wing cutter for cutting out wheel blanks used in toys.

A wing cutter works slower than most hole-boring bits. Its shape makes it prone to vibration, and the rotating cutter arm can give you good cause for anxiety. A wing cutter bores by cutting a groove in the workpiece, leaving a disc or cylinder. You can adjust the cutter to bevel either the waste disc or the hole. Wing cutters must be used at very slow speeds (250 rpm) in a drill press, and the work must be clamped. There are a variety of wing cutters on the market. The ones marketed as wheel cutters leave a more desirable profile on the disc. □

Robert M. Vaughan is a contributing editor to Fine Woodworking, *and he repairs and restores woodworking machinery in Roanoke, Va.*

A new curve in drill bits

The 3D-Bit was designed in Europe with electricians, plumbers, carpenters and locksmiths in mind. The narrow shank makes it possible to slightly alter direction when drilling, which is useful when cutting curved holes to rout pipe or cable (see the photo below). The bits have a stubby center point and a pair of scoring wings, like a brad point, and a pair of cutting wedges sharpened on their horizontal and vertical edges. All these cutting edges, plus a narrow shank that lets the sawdust escape, make these bits fast-cutting. The cutting wings of a 3D-Bit

score the wood, much like a brad point, leaving a clean entry hole. Used with a drill press, the 3D-Bit bores a hole nearly as well as a Forstner bit. 3D-Bits are being marketed by RotoZip Tool Corp. (800-521-1817). Currently, they are only available in metric sizes. They cost about $75 for a set of four. —A.B.

Sticking with Hide Glue

This stuff does some things modern adhesives can't

BY NICK ENGLER

Cook it in a pot—any pot will do. *The author brushes glue from a pot made just for hide glue onto the apron of a table. This pot sells for about $90. You could also use a doubler boiler on a hot plate, and monitor the temperature with a candy thermometer for about one-third the cost.*

Photos: William Duckworth

Let's start with what most woodworkers know about hide glue: It's yucky. It smells bad. It's not as strong or as stable as other glues. And it's old stuff, which can't compare with the new stuff. Well, some of that is true. I'll give you the yuck and most of the stink. But hide glue is every bit as strong as other glues and very durable. And because of a few unique properties, hide glue has some advantages over other adhesives. Once cured, it's more heat-resistant than other common woodworking glues, and it's far less likely to creep or move with seasonal changes.

Researchers at the Franklin glue company (the Titebond people) glued blocks of hard maple together using different adhesives, then broke them apart using a machine to test the shear strength of the glue joint. Hide glue, they found, fails at about 3,600 lbs. per square inch (psi)—a respectable showing. By contrast, their newest (and more expensive) polyurethane glue let go at 3,500 psi. And as far as durability is concerned, Egyptian furniture from 2,700 B.C. was discovered with still-stuck hide-glue joints. "Protein-based glues, such as hide glue, are incredibly stable," says Dale Zimmerman, a Franklin scientist. "We have hundreds of years of history to back that up."

About the only thing that can undo a hide-glue joint (besides 3,600 psi) is water, making hide glue the only easily reversible adhesive on the market. Hide glue is hygroscopic, meaning it sucks up any available moisture. As it does so, it dissolves itself. This isn't a problem in most climates. A good coat of finish is more than enough to protect hide-glue joints from a few humid days.

Because hide glue is reversible, it's still the only glue used for restoring valuable antiques and for making musical instruments. And for veneering, you can't beat it—especially if you don't own a veneer press or you've suffered the indignities of using contact cement. Two other hide-glue advantages: It's less likely to interfere with finishes, and any delamination is easy to repair.

Hot or cold, hide glue has its strong points

- Its shear strength is equal to or greater than white or yellow PVA glues and the newer polyurethane glues.
- It's the only easily reversible glue on the market.
- Its color matches wood tones better than many other adhesives, making gluelines less visible.
- It's highly resistant to heat.

Premixed or glue pot—you have a choice

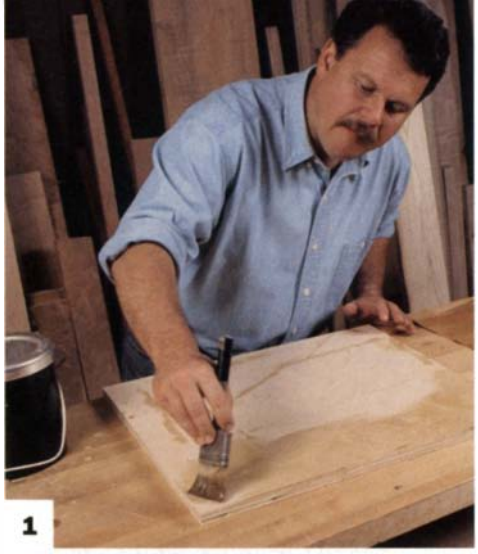
Hide glue is made from animal gelatin, the visceral protein that binds skin, muscles and bones. Manufacturers scrape it from the inside of hides, boil it from bones, dry the gelatin and then break it into granules. These granules must be softened in water and cooked, but not boiled (see the photos at left). Cold or premixed liquid hide glue, now sold in bottles, is made the same way at the factory. But manufacturers add more water and chemicals to keep it from coagulating as it cools.

Liquid hide glue can be stored and applied at room temperature, like other common glues. It has a longer working time, or open assembly time, of 15 to 30 minutes. This property makes it useful for biscuit joinery and mortise-and-tenon assembly. The bad news is that liquid hide glue has a limited shelf life of about a year, and it's even more sensitive to water than the hot variety you can mix yourself.

To cook up a pot of hide glue, you should start the evening before you need to use it. Put as

VENEERING WITH HIDE GLUE

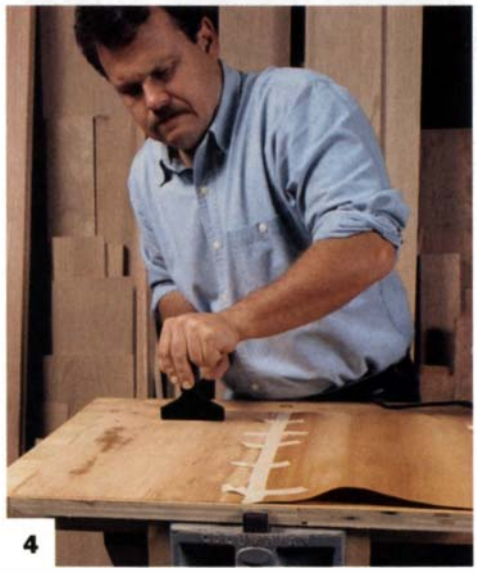
More like maple syrup than tap water. *Hide glue should be heated to between 140° and 150°F, and the consistency should be thick but smooth. Test the viscosity by dipping a disposable brush or a small scrap of wood into the hot glue. You want the glue to drip off the brush slowly.*



1. Coat both surfaces well. *The author starts a veneering job with a liberal layer of glue on both the veneer and the core material.*

2. Place the veneer in position, and dampen it with a clean cloth. *Aligning the veneer just right is not critical at this stage. With hide glue, you can move it around after making contact.*

3. A laundry iron makes the job easier. *Heat from the iron and steam from the dampened veneer reactivate glue that has cooled. Keep the iron moving to prevent it from scorching the veneer.*



4. Pressure from the veneer hammer secures the bond. *Pressing small sections at a time is better than trying to adhere a large sheet of veneer all at once, because portions of it may cool before you can bond it properly. Work from the middle, parallel to the grain. Cross-grain strokes may split the veneer.*

many granules into the pot as you think you'll use the next day, and cover them with water. By the next morning, the granules will be soft and jiggly. Pour off the excess water, and heat the pot to between 140° and 150°F, stirring occasionally. Add water a little at a time until the glue is thick but smooth in consistency. Test the viscosity by dipping a small scrap of wood in the hot glue. You want the glue to drip off the wood slowly, not run off.

Hot hide glue has a pot life of a single day according to most manufacturers. However, when I was making musical instruments, I could use a batch for two or three days with no problems. Once applied, hot hide glue cools quickly and develops a good deal of tack. But because it takes longer to set up, hide glue gives you extra time to assemble parts and fuss with the clamps.

Apply veneer without a press

For occasional woodworkers, probably the best use for hide glue is in an age-old process known as hammer veneering (see the photos above). Hide glue is stronger than contact cement, which grabs on initial contact and won't let go. If you haven't positioned the pieces precisely, you're in big trouble. Hide-glue veneering allows you to position and adjust the veneer before the adhesion process begins.

I begin by brushing an even coat of hide glue onto the back side of the veneer and the core material. After the glue cures—when it's almost dry but just a little tacky, 20 to 30 minutes—you can position the veneer over the core. Unlike contact cement, the two surfaces won't bond immediately. If necessary, once it's in place, tack the veneer to the core with a few veneer pins to prevent it from shifting.

Wipe the veneer with a damp rag—this closes the pores of the wood and prevents the veneer from scorching. With a laundry iron on a medium setting, heat the veneer surface evenly. Immediately, press the veneer onto the core with a roller or veneer hammer, starting at the center of the veneer. Work your way toward the edges, rubbing parallel to the wood grain. (If you draw the hammer perpendicular to the wood grain, you may stretch and split the veneer.) Go over the surface a second and third time, applying more pressure as the veneer cools.

Test the glue bond by tapping the veneer surface with a dowel. It should have a solid sound wherever you tap. If you find an area that sounds hollow, the veneer has not completely bonded. Wipe the area with water, reheat it with the iron and press the veneer once again with your roller or veneer hammer. In some cases, you may have to make a small cut parallel to the grain to let air escape from under the veneer. If you find there are a lot of areas that haven't bonded, set the iron a little hotter. □

Nick Engler works wood and writes books in West Milton, Ohio.

Build a Wall Shelf

A simple piece with sliding dovetails is a good excuse to make a versatile router jig

BY PETER TURNER

Shake up your wall with a shelf. *This simple wall-hung shelf, perfect for a spice rack or sea shells, was adapted from a traditional Shaker design. The shelves are joined to the sides with sliding dovetails.*

My wife, Colleen, occasionally asks me to build a piece of furniture for our home. I would love nothing more than to honor these requests, but there never seems to be time. But a hanging shelf is one project that I figured I could finish quickly.

I got the inspiration from a drawing of a peg-hung Shaker shelf in Ejner Handberg's book, *Shop Drawings of Shaker Furniture and Woodenware, Vol II* (Berkshire Traveller Press, 1975). The shelf sides in Handberg's drawing are curved on top, but the bottom is straight. I added another curve at the bottom, experimenting with

different curves until one satisfied my eye. Handberg's Shaker shelves also hung from a wall-mounted peg rail. I don't have a peg rail at home, so the first time I made this piece, I used brass keyhole hangers. In later versions, including the one shown on p. 51, I used simpler brass hangers mortised into the second shelf from the top. These are less expensive, easier to install and make hanging the shelf a snap. We use one hanging shelf as a spice rack. The varying heights and sizes of our spice jars helped establish the shelf spacing and overall width.

Consistency is the key to this piece. If you start with flat stock of uniform thickness and length, the joinery follows smoothly. To ensure consistency, do all your milling at once (all the stock is ½ in. thick), and use a plywood pattern and flush-trimming router bit for making identical curved and tapered sides.

The trickiest parts of this piece are the sliding dovetails. Routing the grooves is easy, but the long tails on the ends of each shelf take some patience and finesse. I use a router setup in which the router is mounted horizontally; it seems to make it easier to get a straight, even cut (see the drawing).

By holding the pieces flat on the router table, I have more control as I slide the piece past the bit. I make test pieces out of scrap, which I milled at the same time as the final pieces.

The Shakers housed the shelves in dadoes, rather than sliding dovetails, and you can do the same. It won't be as strong, but if you're worried about the shelves, you can toenail them from the bottom with finish nails or brads. □

Peter Turner is a woodworker and furnituremaker who lives in Portland, Maine.

WALL SHELF STEP-BY-STEP

STEP 1

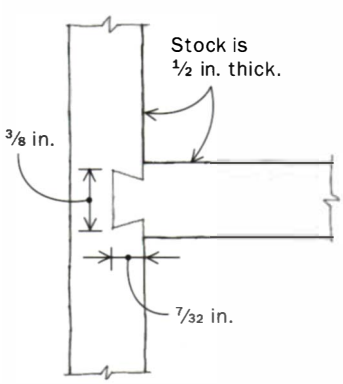
Routing dovetail grooves in the sides: **After milling all the material to a thickness of ½ in., cut the sides to length, but leave them at least ¼ in. wider than the widest dimension (4⅜ in.). Then mark the centerlines for each shelf on both pieces. Using a slotted piece of plywood to guide a ½-in. router template insert, cut the dovetail slots. First rough the slots with a ¼-in. straight bit, and finish them off with a ⅜-in. dovetail bit.**

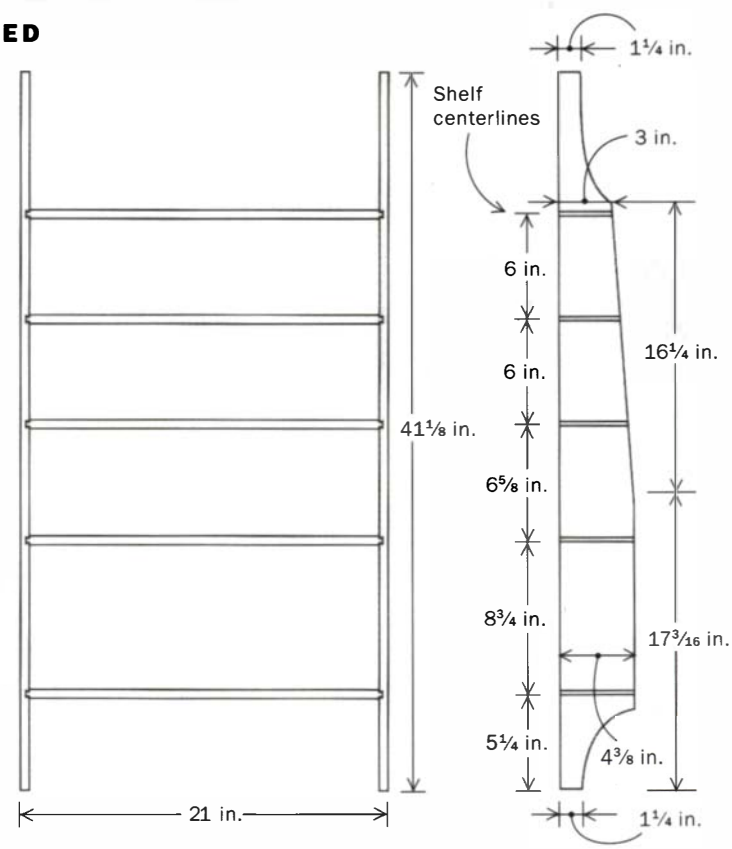
STEP 2

Trace the pattern, and bandsaw the sides: **With the grooves routed, cut the curved and tapered sides. First make a plywood pattern matching the shape of the sides of the shelf, trace the pattern onto the back of each side and bandsaw the shape close to the line.**

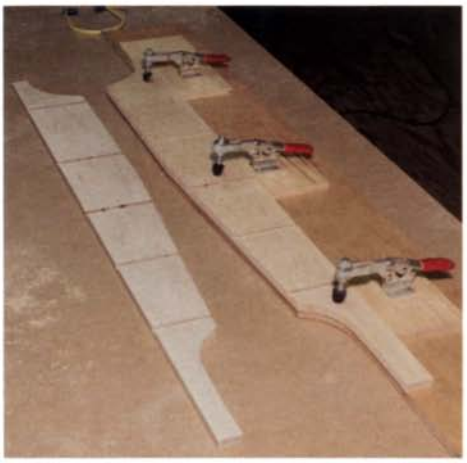
SHAKER SHELF UPDATED

Traditional, peg-hung Shaker wall shelves often have a slight curve at the top and taper from top to bottom. This shelf has a curve at the bottom also, and only the top half is tapered. The piece can be modified by changing the width or the shelf arrangement.



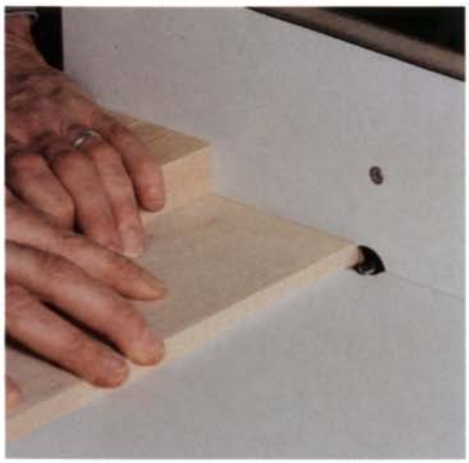


Photos: Zachary Gaulkin



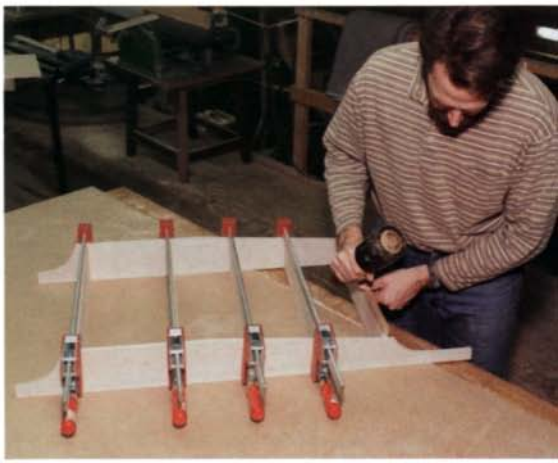
STEP 3

Flush-trimming bit makes both sides identical: **After roughing out the sides on the bandsaw or jigsaw, clamp each side into the plywood pattern using hold-down clamps fastened to the plywood. Then rout the edge with a ½-in. flush-trimming bit, either using a router table (see the drawing below) or a hand-held router setup. This step will remove any tearout created when you routed the dovetail grooves, and it makes each side identical.**



STEP 4

Routing the dovetails on the shelves: **To cut the dovetails, mount your router horizontally on the router table (see the drawing below). This makes it easier to adjust the height of the cut. It also lets you hold the workpiece flat on the table rather than against a fence. Adjust the depth and height of the router bit to match the depth of the slots. I cut the tails to fit by trial and error, testing on scrap stock milled at the same time as the shelf parts.**

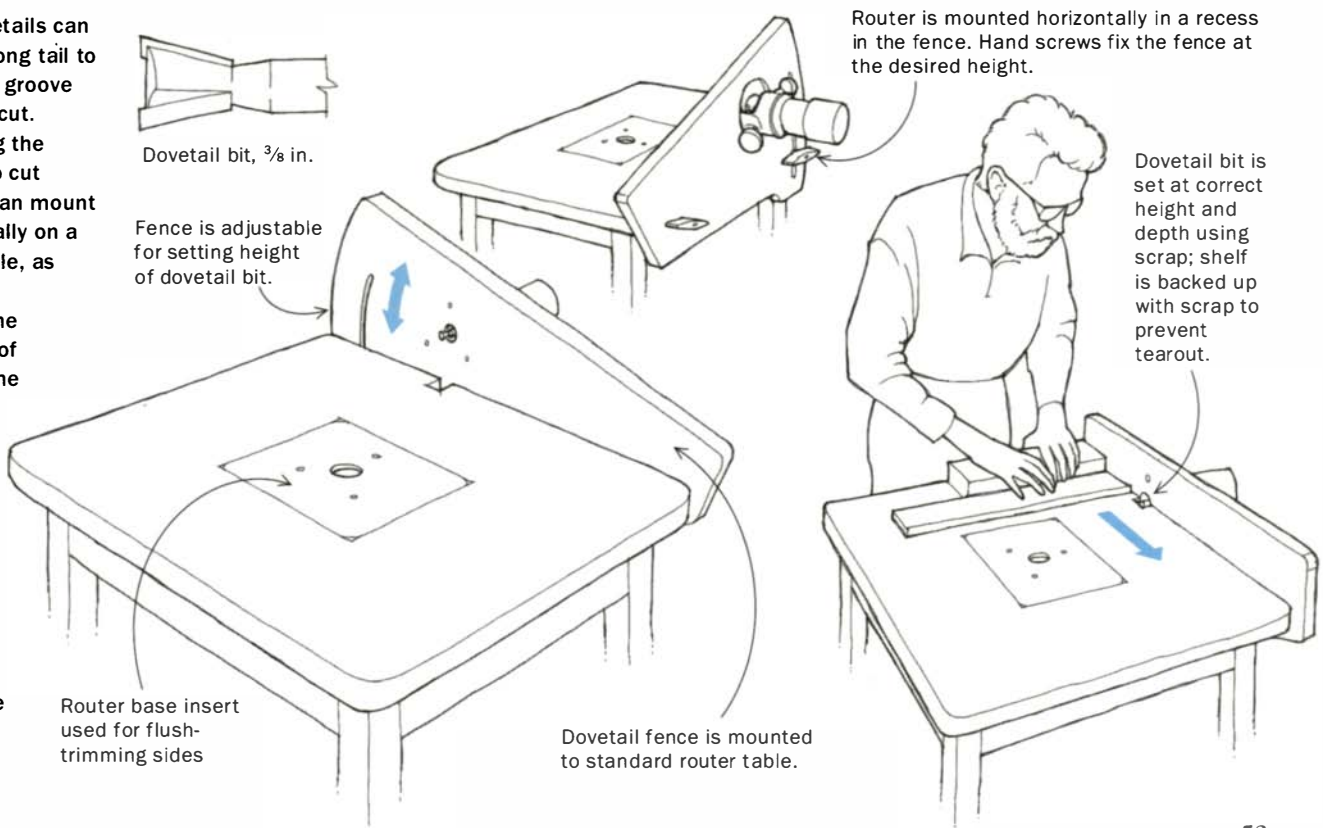


STEP 5

Cut shelves to width and assemble: **Don't cut the shelves to width until after you cut the dovetails on the ends, so you can remove any tearout caused by the router. The front edge of the top three shelves is angled to match the tapered sides, which you can do by transferring the angle to the jointer fence. After sanding all the pieces, slide each shelf into the sides, starting at the bottom and clamping each shelf as you go.**

HORIZONTAL DOVETAILING FIXTURE MAKES A DIFFICULT JOINT EASY

Cutting sliding dovetails can be tricky. To get a long tail to slide snugly into its groove requires a uniform cut. Rather than holding the shelves vertically to cut the dovetails, you can mount the router horizontally on a standard router table, as shown. Holding the workpiece flat on the table, cut one side of the tail; then turn the piece over, and cut the other side. Use scrap of the same thickness to establish the exact height and depth of the dovetail bit, and then fit them in a test groove to prevent marring the final pieces.



Drawings: Jim Richey

The Backsaw Makes a Comeback

A sharp backsaw won't just make you a better woodworker; it will turn you into a surgeon

BY ZACHARY GAULKIN

There is an old truth buried under mountains of machine-made sawdust—the best way to sever wood is with a thin, sharp blade. This is the beauty of the backsaw. With its swaged metal spine, a backsaw can carry the thinnest of blades, allowing it to slice wood with minimum waste and maximum control. No one can deny the aggressive speed of a tablesaw or a sliding chopsaw, but for joinery (and quiet pleasure) it's hard to beat the backsaw's surgical precision.

Another great thing about this most critical hand tool is that it is a whole lot cheaper than a screaming armada of cutting machines. A backsaw is one of the cheapest tools you can buy, especially if you plan to do lots of joinery by hand. Best of all, it doesn't take much to master. True, it involves some practice, but success with a backsaw is not so much about skill as it is about choosing the right saw and keeping it sharp.

Rips and crosscuts seldom come in one package

All wood saws do two things and two things only: they rip along the grain and crosscut across it. Follow the direction of the grain and you're ripping. Cut a board perpendicular to the grain and you're crosscutting. You might think a simple saw can do both with equal ease, and sometimes it can. But the ripsaw that seemed like a scalpel cutting dovetail pins might leave a crosscut, such as a tenon shoulder, looking a little chewed up.

A saw's ability to rip or to crosscut lies in the geometry of its teeth—the size, shape and set, or the amount they are bent away from the blade. Rip teeth usually are bigger than crosscut teeth, their cutting faces are nearly straight up and down and flat across, and they have a small amount of set. The big teeth shave away material fast, and the deep gullets (the valleys between the teeth) give the shavings a place to go so the saw won't bind. The small set on a rip tooth creates a narrow kerf, making it less likely to wander.

Crosscut teeth have more set, giving the body of the blade (sometimes called the plate) a wider path. The teeth are raked back (they don't have the steep leading edge of a rip tooth), and they are beveled to a point like an incisor, rather than filed straight across. These points enable a crosscut saw to score and sever the grain cleanly, without tearout.

A THIN BLADE NEEDS A STRONG BACK

The secret of the backsaw lies in its metal spine, which allows it to carry a thin blade. Whether you choose a European backsaw (left) or a Japanese *dozuki* (right), the backsaw is an essential hand tool for any woodworking shop.

Because backsaws are made for joinery and not for carpentry, the teeth tend to be small. The teeth still are filed for ripping or crosscutting, but the differences are not as noticeable as they are on big panel saws. So depending on your wallet and the level of perfection you hope to achieve, backsaws can be somewhat interchangeable. (In fact, most catalogs don't make a distinction between rip and crosscut backsaws; you have to ask.) It's certainly possible to rip with a crosscut backsaw (everybody does it), but it

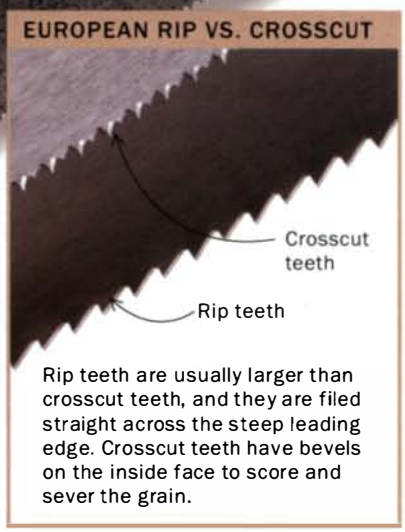
Photos except where noted: author

A good backsaw handles smoothly. *The handle should be comfortable, whether it's a handmade pistol-grip (left) or a rattan-wrapped handle that provides a good grip for the dozuki's pull stroke (right).*

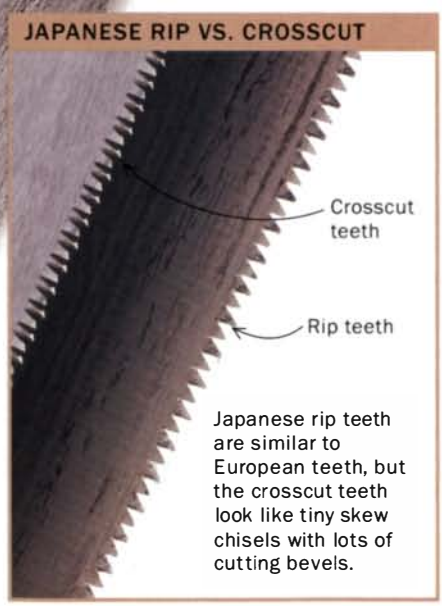
Push vs. pull technology. *European saws cut on the push stroke, so they must be thick enough not to buckle or bend. Japanese saws can be thinner because they cut on the pull stroke, when the blade is in tension.*

Some blades you sharpen; others you just throw out. *Japanese backsaw blades can be removed from their handles for sharpening. Most cheaper saws come with replaceable blades, so you don't have the hassle of sharpening.*

A backsaw has life until there's no metal left. *As long as the blade isn't bent or broken and rust hasn't invaded the steel, an old backsaw can be sharpened or retoothed to its original condition.*



Rip teeth are usually larger than crosscut teeth, and they are filed straight across the steep leading edge. Crosscut teeth have bevels on the inside face to score and sever the grain.



Japanese rip teeth are similar to European teeth, but the crosscut teeth look like tiny skew chisels with lots of cutting bevels.

Subtlety can be pricey. *Handcrafted dozukis can be filed, set and tensioned for different wood species and for specific applications. But they can be expensive and must be sent back to the maker for sharpening.*

Photos this page: Scott Phillips

GET A GRIP

Backsaws come in many shapes and forms. Although the handles may differ, their defining characteristic is the metal back that supports and stiffens the thin blade. Unlike carpentry saws, backsaws have finer teeth and are used mainly for joinery.

TURNED HANDLE
A backsaw with a turned handle is often called a gent's saw. It can be used for dovetailing or cutting short tenons because the blades are usually narrow.

PISTOL GRIP
The wider, pistol-style handle (open or closed) provides more stability and a wider blade. These saws can be small, for dovetailing, or large, for mitering, crosscutting and deep tenons.

REVERSIBLE HANDLE
The offset handle and spine on this reversible backsaw allows it to double as a flush-cutting saw. The teeth are filed on both sides to cut in either direction.

JAPANESE HANDLE
The rattan-wrapped handles provide a secure grip for the pull-cutting action and can be used with replaceable blades that lock into a recess inside the handle.

will take you longer, the teeth will probably get clogged with sawdust and the kerf might be a little ragged. You can miter or cut a tenon shoulder with a backsaw ground for ripping, but you'll probably have to clean up a shaggy edge with a plane or a chisel.

The most common backsaws you will find are European or Western in style. They cut on the push stroke, and they come in many styles: rip and crosscut, pistol grips and turned handles, long and short, brass-backed, and even reversible (see the photos at left). They can have more or less set, and the teeth can be big, aggressive ones or small, fine ones. More teeth per inch (tpi) generally mean that you will get a finer, slower cut. (Backsaws range from 12 tpi to more than 20 tpi.)

Wil Neptune, an instructor at the North Bennet Street School in Boston, suggests that if you only want one European-style backsaw, it makes sense to get one that can rip well. That's because most joinery cuts—tenon cheeks and dovetails—are made along the grain, not across it. With a steady hand and sharp teeth, you can slice your dovetails without having to clean up the ripcuts with a chisel. (You'll still have to chisel the shoulder, of course.) For crosscuts, such as tenon shoulders, you can get away with using the same saw by cutting to the waste side of the line and cleaning up the edge with a chisel. As Neptune points out, you rarely try to get a finished crosscut surface off the saw anyway.

Japanese saws give new meaning to severance pay

The variety of European backsaws is nothing compared with the Japanese equivalent, called a *dozuki*. What's the difference? There are many, but chief among them is that Japanese saws cut on the pull stroke, when the blade is in tension and won't buckle or bend. This means a Japanese saw can carry a thinner blade than its European counterpart (although the difference, again, is less apparent on backsaws than on saws made for carpentry).

There is also a dental difference: Rip teeth on a Japanese saw closely resemble a Western rip tooth. The cutting edge is nearly perpendicular to the blade, and the tooth comes to a point. But Japanese crosscut teeth are quite different from their Western counterparts. They have an angled top (the profile sort of resembles a skew chisel), and each facet is beveled. "They've got bevels

It's no crime to leave the sharpening to a professional

Using a backsaw is a pleasure. Sharpening one is another story. Some people try, but few can do it well. Most woodworkers don't even think about it until the thing just refuses to cut anymore. Sharpening your own saws is a valuable skill (see *FWW* #125, pp. 44-47), but for most of us, it makes more sense to seek out professional help. A good sharpening service, though sometimes hard to find, can turn a rusty antique into a precision instrument or customize a new saw right out of the package.

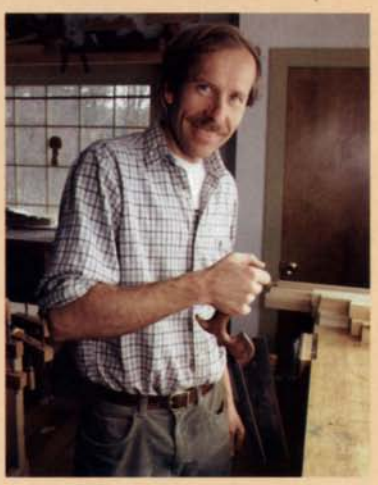
If you're not sure whether your saw needs sharpening, it probably does. Even new saws need to be touched up. New backsaws generally come with punched teeth (one side of the saw is rolled over, and the other side has a slight burr) and, therefore, cut more aggressively on one side. Filing, either by hand or machine, cleans up the edges and solves the problem.

A professional sharpener can also reduce or increase the set, depending on what kind of use you have in mind. (Many woodworkers say new backsaws come with far too much set.)

Sharpeners can file the teeth on old backsaws, or they can do much more, as long as the steel is solid and the blade isn't bent or warped. They can change the angle and set of the teeth or even retooth the saw entirely. —Z.G.

Sharpening a backsaw is a skill. *A single pass will sharpen the teeth on this dovetail saw. Each stroke has to be even to keep the teeth uniform.*

Top photos: Scott Phillips



My favorite backsaw:
If you could have just one, which would it be?

WIL NEPTUNE'S ORANGE-HANDLED BEAUTY IS A BARGAIN

What saw does cabinetmaker and teacher Wil Neptune reach for to cut a dovetail or tenon by hand? "That's easy," he says. "It's the cheesy one with the blue blade and the painted orange handle." It costs $9.95 and has become a staple in the student toolboxes at the North Bennet Street School in Boston, where Neptune teaches woodworking. The saw comes from the factory a little rough. So he shows his students how to file the teeth and press out some of the set by sandwiching the blade between two old jointer knives and clamping it in a machinist's vise. "If you totally screw it up, throw it in a drywall bucket for site work, and buy a new one." The Eberle saw and file is available from J.I. Joseph Co. (617-723-2323).

A HANDMADE *DOZUKI* CAN TRACK A LINE LIKE A BLOODHOUND

John Reed Fox, a furnituremaker in Acton, Mass., has a simple philosophy about tools. If you are at all serious, buy the best you can afford. That's one of the reasons his favorite backsaw is a handmade *dozuki* crafted to his specifications. His *dozukis*, which he sends back to Japan every year or so for sharpening, are a dream to use. With a little camellia oil (a traditional Japanese saw lubricant), it can follow a line like bloodhound tracking a scent. Fox recently let a class of novice woodworking students use one of his *dozukis* to cut dovetails. "People were nailing the cuts right on the line, and they were rank beginners," he says. "Everybody was astonished." A similar handmade saw is available for about $100 from Misugi Design (510-549-0805).

THE ANTIQUE MITER SAW REVIVED FOR RIPPING

Allan Breed doesn't even know where his favorite backsaw came from. It's an old Henry Taylor, one of about a dozen backsaws he owns. After Breed reground the teeth for ripping, it has become his favorite dovetail saw, perfect for his unusual tail-cutting technique: With the workpiece flat on a bench, he dangles the saw from his pinkie with the teeth pointing away from his body. This plumbs the saw, guaranteeing a square cut across the end grain. He plunges through each cut in two or three swipes (still hanging on by his pinkie finger) and moves onto the next one. "I can see what I'm doing, and it's more comfortable," he says. "I also wax my saws a lot, especially if there isn't a ton of set in them. It makes it a lot easier." For a good used saw, look around at yard sales and used-tool suppliers. —Z.G.

all over the place," says John Reed Fox, a cabinetmaker in Acton, Mass., who uses Japanese handsaws almost exclusively.

You can go crazy choosing a *dozuki,* especially if you have an unlimited budget. A good Japanese saw smith can take into account things like wood density and moisture content, and can even tailor a saw to match the idiosyncrasies of a single woodworker's stroke. Subtlety comes at a price, though. Fox spends more than $100 for his handmade *dozukis,* which he sends back to Japan for sharpening. If you can't justify investing in a handmade saw, you can buy factory-made Japanese backsaws with replaceable blades for $50 or less. When the blade gets dull or breaks, just by a new one. According to those who swear by them, even cheap *dozukis* outperform good European-style saws.

A saw's true worth is measured in decibels

When is a whispering backsaw better than a power saw? It depends on whom you ask. Wil Neptune can cut a perfect tenon with a backsaw and chisel in minutes, leaving a thimbleful of sawdust. But he does so only on occasion. Machines are just too efficient if you have to make more than one, he says, "and when do you ever make something with one tenon?" But if he needs to miter something quickly or if an unusual joint requires lots of set-up time on a machine, a backsaw can be quite handy.

Dovetails are another story. Allan Breed, a Maine cabinetmaker, does all his dovetails by hand, racing through the cuts with an old miter saw reground for ripping. "I'll cut dovetails with anything as long as it's sharp," he says. Breed doesn't use handsaws for some romantic thrill. He does it for ergonomics and efficiency. Power saws and routers are loud, and you have to haul around a lot of metal. And on the kind of high-style reproductions that Breed makes, tooling up with machines hardly ever makes sense. For Fox, handsaws are a critical part of the work itself. With a handsaw, he can cut perfect dovetails less than an eighth of an inch apart, something no machine has yet been able to accomplish. □

Zachary Gaulkin is an associate editor of Fine Woodworking.

The Shop

Smart design and imaginative uses of common materials make an efficient shop that's a pleasure to work in

1. FINISHING ROOM *I hung an interior wall on four heavy-duty door hinges. The wall closes, making space for assembly, storage or anything else. But when it's open, it forms an efficient little spray booth. An exhaust fan keeps finish odors away from other areas of the shop.*

2. VACUUM PRESS *On one side of the finishing room's movable wall is my vacuum veneer press table, a hinged table on a hinged wall. When the table is needed, it drops down, but most of the time, it folds against the wall and out of the way.*

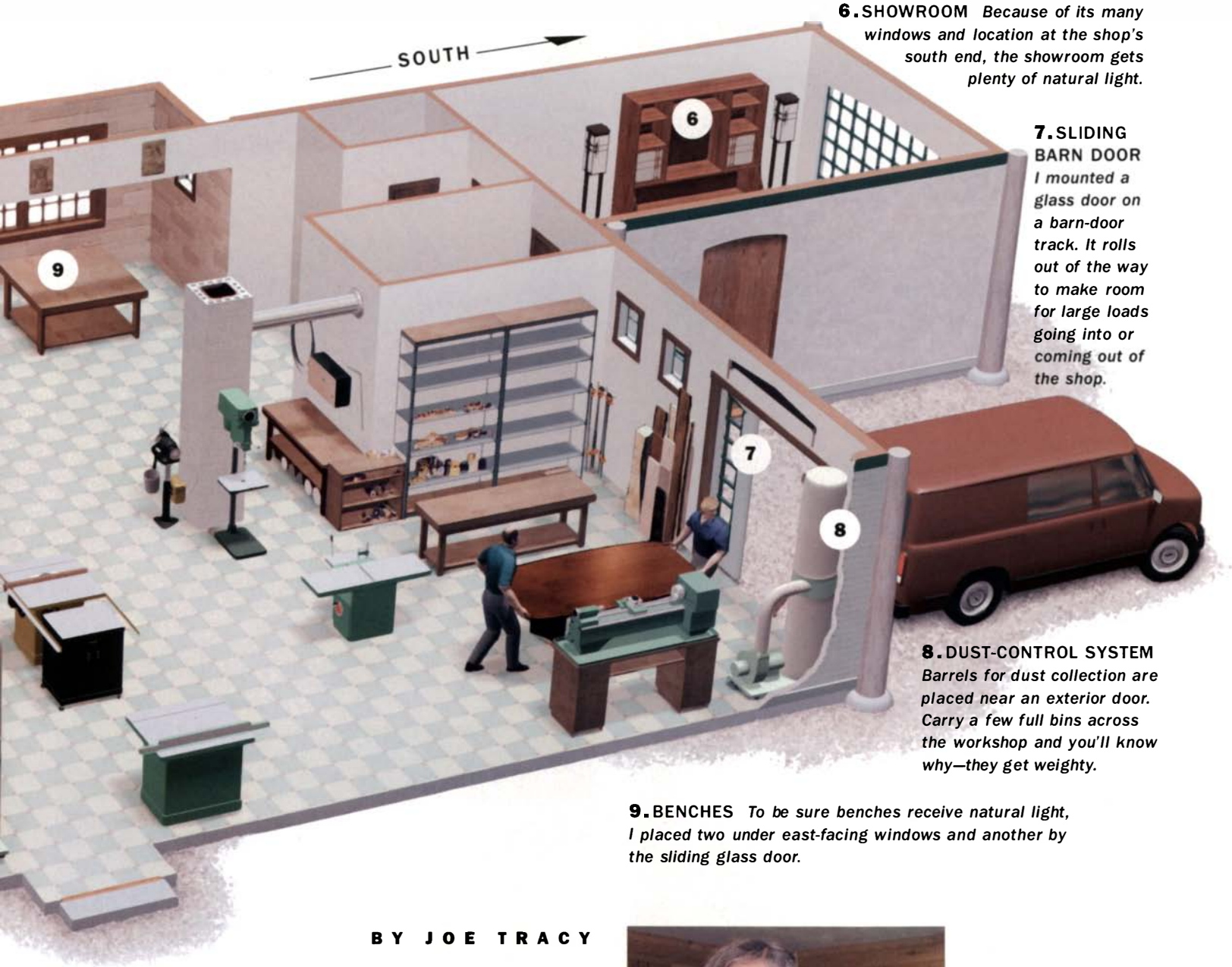
3. LUMBER STORAGE *The driveway runs up to the lumber storage area, which comes in handy when unloading wood.*

4. GARAGE DOOR *Inside, I store long boards vertically, so I can get to them without unstacking a pile. I modified a garage door so it opens almost straight up—this leaves high wall space for storing boards.*

5. FLOORING *Stenciling and spray painting the high-density particleboard floor into 1-sq.-ft. modules makes easy work of judging lumber length.*

Drawings: Design Core

as Tool



6. SHOWROOM *Because of its many windows and location at the shop's south end, the showroom gets plenty of natural light.*

7. SLIDING BARN DOOR *I mounted a glass door on a barn-door track. It rolls out of the way to make room for large loads going into or coming out of the shop.*

8. DUST-CONTROL SYSTEM *Barrels for dust collection are placed near an exterior door. Carry a few full bins across the workshop and you'll know why—they get weighty.*

9. BENCHES *To be sure benches receive natural light, I placed two under east-facing windows and another by the sliding glass door.*

BY JOE TRACY

A well-designed, well-built shop can do more for your woodworking than any new tablesaw or handplane. A good shop is a place you want to be, a safe, comfortable, well-lit space where work flows efficiently from machine to bench to finishing area. Of course, building a shop is a good deal more expensive proposition than buying a new tablesaw. Whatever your situation—even if you just want to retrofit a basement or garage—you won't go wrong if you think of your shop as a complex functioning tool that calls for continual sharpening and adjustment.

The first step in creating a new workshop is determining a floor

The intentional shop. *The author's second shop incorporates all he learned from his first effort. A scale model (above) helped him work out proportions and details.*

plan that will make it an efficient and enjoyable place to work. You don't want your tools simply lining the walls of the shop. Instead, consider not only the area that the tool will take up, but also what I call a tool's shadow—the amount of space around the tool that will make it accessible for ripping and crosscutting. Because my two tablesaws see more work than any of my other machines, I wanted them in central locations, but within proximity to the lumber room. I also wanted them in relatively permanent locations, but in places where I could reposition them to accommodate large or awkward boards.

No matter how big a shop is, sooner or later, materials and projects will have it straining at its seams. Flexible use of space is very important to me. Unless something is being used, I want it out of the way. The best solution to a problem is often just at the edge of our conceptual reach—disarmingly simple sometimes, but requiring a creative leap. The drawings and photos show just a few of the ways I've managed to capitalize on shop space.

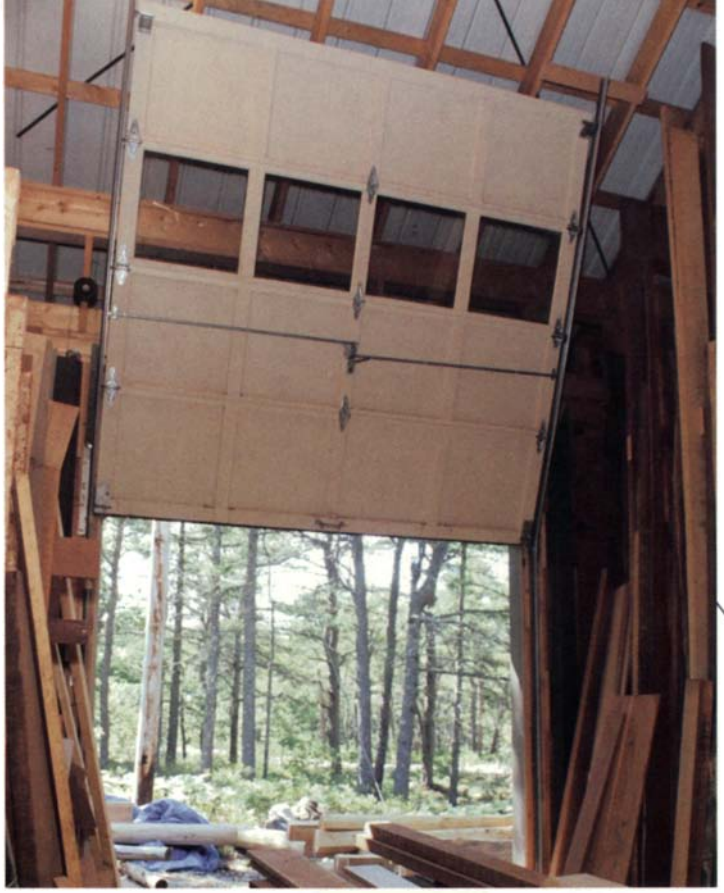
When I set out to build my shop six years ago, I had a number of ideas I wanted to incorporate into the structure. I decided early on to use metal agricultural roofing, a relatively inexpensive roofing material that's extremely durable and sheds snow well, which is not an insignificant consideration here in Maine.

A good shop is a place you want to be, a safe, comfortable, well-lit space where work flows efficiently from machine to bench to finishing area.

I framed the roof to provide deep eaves to keep as much snow, rain and sun away from the sides and base of the building as possible. Not only does this help protect siding, all but eliminating the need for maintenance, but also it provides storage space beneath the eaves, next to the walls of the shop.

Almost all of my windows are shop-built. When I made them, I sized them to fit precisely between the wall studs for easy installation. I also placed the windows high up on the wall, near the eaves, so I have plenty of wall space inside for shelving and hanging tools—not to mention that the natural light they provide is a welcome boon to any shop.

Once inside the shop, milling of stock takes place in one section of the shop, bench work elsewhere, sanding and finishing in still other locations. Dust can be a nuisance, as well as a health hazard, and handling it is a chore. I placed all my sanding machines—a stroke sander, disc sander, inflatable drum sander and reciprocat-



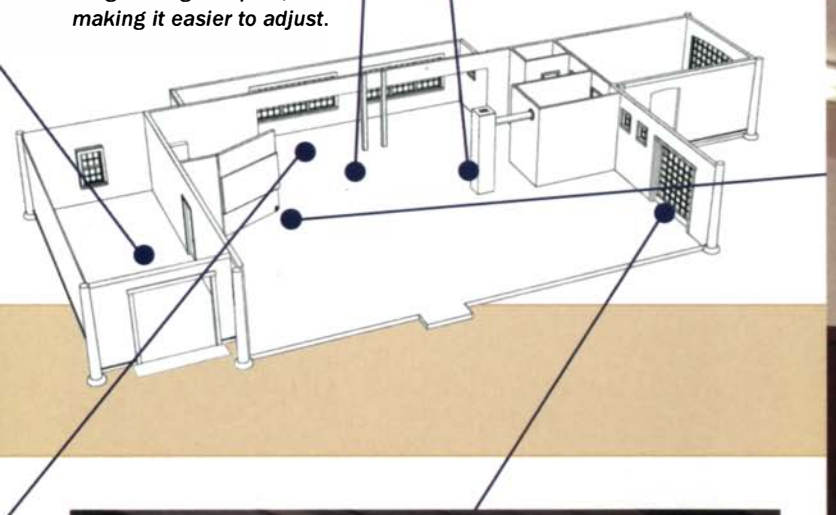
Door stays out of the way. *The author modified a regular garage door; otherwise, it would have made moving and sorting boards in the vertical storage area difficult. He hacksawed a kerf in the tracks the door rides in, then straightened them and oriented them almost vertically. Counterweighting the door makes it easy to open.*

A disappearing router table. *Built for convenience, the author's router table can be clamped in a bench vise and ready to use in seconds. It stores out of the way just as quickly.*

Photos: Vincent Laurence

Saving a tool. *The author's bandsaw was bought from an old warehouse for $40 and then reworked. The author made a plywood case for the bottom and used old sash weights to counterweight the guide post, making it easier to adjust.*

Mister keeps tools cool. *Powered by compressed air, this mister blasts coolant from the reservoir onto the grinder pedestal and leading edge of the tool being ground, preventing the tool from being burned.*



A door to ease the load. *A large door on a barn-door track slides open to make awkward loads more manageable. The author opted for a glass door to keep the shop well-lit.*

ing spindle sander—in one corner, and use a simple exhaust fan to keep dust away from other machines. I also outfitted all my major machines—the shaper, jointer, planer and my two tablesaws—with ducts for dust collection. The stroke sander has its own collection system, and all the dust barrels are kept near doorways so they're easy to carry out and dump.

Once you get a rough idea of how you want your shop to look and function, the lay of the land begins to fill in some of the details. I sell my furniture from my shop, so the southeast corner—with its abundance of sunlight and attractive position as you approach the building—was the obvious choice for the showroom.

The location of the lumber room seemed just as logical. It's in the rear of the shop where it's easily accessible from the driveway. Boards move smoothly—on good days—from one end of the shop to the other. Overall, it's a great shop, but there's always room to improve. My next one will be even better. □

Joe Tracy works wood on Mount Desert Island, Maine. With nearly 30 years of woodworking experience, he has built everything from production furniture to timber-frame houses.

Small touches add comfort to a shop. *With the author's vacuum press folded away in the movable wall, you see that a quick paint job on a simple particleboard floor breaks up the monotony of a shop. Beneath the particleboard are 2x4 sleepers and radiant-heat tubing that comes out at his feet, where it does the most good.*

Strong, No Clamp-Up Corner Joints

Tablesawn miters for case work are assembled using clear packing tape

BY STEVE LATTA

A good part of my early woodworking career was spent making cheap, lacquered medium-density fiberboard (MDF) furniture. My co-workers and I called it curb furniture because of its inevitable resting place. Despite the lack of inspiration or style, working in that shop taught me a valuable skill: how to make foolproof mitered corner joints. All case work was done this way because we had to hide the ugly edges of MDF, which telegraph through paint.

Eleven years and three shops later, I now spend my days building reproduction 18th-century American furniture. Although this job calls for a lot of traditional joinery—dovetail and

Photos: Anatole Burkin

mortise and tenon—the mitering technique used to join slabs of MDF has a place here, too. It works on solid stock and is handsome and durable.

When mitering large stock on a tablesaw, most woodworkers use a traditional rip-cut method: One edge of the workpiece rides along the rip fence, and the other edge is mitered by the tilted blade.

There are problems with this method. Many tablesaws have a limited capacity between the fence and blade. Also, tilting your blade throws off the reading on the rip-fence scale. Safety is a concern, too. When mitering a wide piece, it's nerve-wracking to try to keep your eyes on the fence and sawblade at the same time. At the very least, stock cut this way is prone to minor imperfections unless you own a sliding-table attachment.

With my method, you first rip and crosscut all stock to finished dimensions, with square edges. Next cut any internal grooves or slots your project may require. Miters are cut with the blade buried in scrap stock clamped onto the rip fence. I should stress that although I've found this method to be perfectly safe, it's unconventional. My auxiliary fence and hold-down *minimize* the chance of the offcut kicking back. But you should always stand to the left of the blade, just in case. Most of the time, the offcut just rattles around harmlessly between the blade and fence until the next piece of stock pushes it through. Alternatively, shut off the saw, and between cuts, move the offcut out of the way after the blade stops spinning. Also, buy or make a zero-clearance throat-plate insert for your tablesaw (*FWW* #126, p. 77) for added safety.

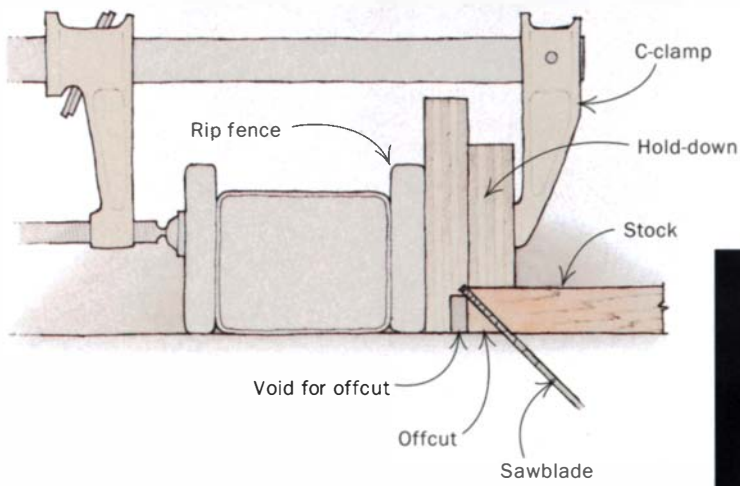
Make the auxiliary fence, and adjust the blade

There are two parts to my auxiliary fence setup, and both can be made of ¾-in. stock, solid wood or sheet goods. First cut a piece of scrap about 3 in. wide and roughly the length of your rip fence. Then cut a rabbet, about ¼ in. deep, into this piece. Start with a rabbet about 1/16 in. narrower than the thickness of the stock being mitered, and make sure that's enough room for the offcut. The offcut must be able to float freely in this space until the next cut pushes it through or until the saw coasts to a stop.

Cut another piece of scrap, about 1½ in. to 2 in. wide by 12 in. to 16 in. long for the hold-down. Clamp both pieces to the rip fence. Place a workpiece under the hold-down when making adjustments. Stock should

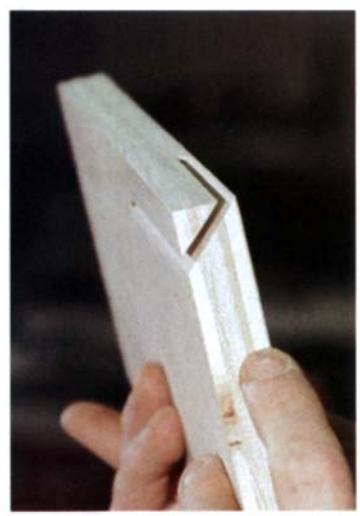
Miter all sides of the stock. *The miter cuts are made by pushing dimensioned stock along an auxiliary fence fitted with a hold-down covering the blade and a recess for the offcut. The blade is partly buried in the auxiliary fence.*

TABLESAW JIG FOR CUTTING MITERS



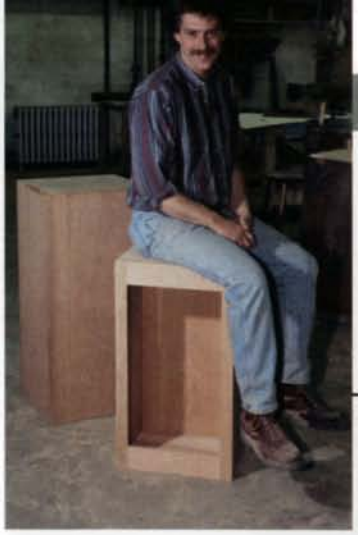
A safety warning:

This method of cutting miters leaves room for the offcut to drift away from the blade, but it doesn't guarantee against potentially dangerous kickback. Never try to pull the offcut through when the saw is running. Do not stand directly behind the blade when working. Have a way to turn off the tablesaw without putting yourself in the kickback zone. And wait for the blade to come to a complete stop before removing the offcut. —S.L.



How much to cut. *The miter should not reduce the width of the workpiece, which is cut to finished dimensions first.*

Drawing: Jim Richey



Uses for mitered case work

These mitered corner joints are surprisingly strong, and they have many applications. They are appropriate for everything from basic boxes and bookshelves to fine furniture. You can use hardwoods or sheet goods or a combination as long as you avoid large areas of cross-grain with solid stock.

slide through with only the slightest trace of resistance.

The relationship between the fence and blade is critical for precise, safe cuts. Adjust the blade (tilted at 45°) and rip fence until the blade's teeth are aimed directly at, but not touching, the outside corner of the rabbet. Then turn on the saw, and slowly raise the blade into the auxiliary fence, only about ⅛ in. The outside face of the blade, where it enters the auxiliary fence, should be as high as the stock being cut is thick. That way, when cutting the miter, the outside dimensions of the stock remain constant. Cut a piece of scrap from the same batch of stock to check your settings (see the bottom photo on p. 63).

Be sure all your stock is the same thickness

Because the auxiliary fence is rabbeted, your stock is riding on only a small portion of the fence. Be sure all the stock is the same thickness. Remember: Sheets of plywood may vary in thickness, so measure all your stock before beginning.

When you're ready to miter, keep your body to the left of the blade, out of the path of potential harm (see the top photo on p. 63). It's also a good idea to

Tape the outside seams of the case. *Position the panels of the case flush with each other, and pull them tight with strips of clear packing tape. Then spread tape along each joint.*

- ***Matching grain:*** **You can match grain between a case side and the face frame if the stock is cut from the same board.**
- ***Speaker cabinets:*** **Leave one face open, and cover the exposed edges with strips of hardwood or iron-on edge-banding.**
- ***Plant stands:*** **Miter all six sides for a strong box, and finish it with something durable such as lacquer or urethane.**
- ***Bookcases:*** **Before joining the cases, drill holes for shelf pins. Or cut dadoes or biscuit slots to hold fixed shelves. —*S.L.***

have an on/off switch you can reach without having to step into the kickback zone. Most of the time, cutoffs will just rattle and float back. Offcuts can be pushed through the blade with successive passes of stock. Or turn off the saw between cuts, and when the blade stops spinning, remove the offcut.

With this method, I've mitered components as large as 36 in. by 84 in. and as small as 12 in. Don't put anything against your rip fence that's less than a foot long.

After flipping the case over, *spread glue on the exposed miters. Then fold the case into a box, and tape the fourth corner.*

Forget about splines; miters go together with glue

I was taught that miters require slots for reinforcing splines, and that's how I built them for many years. Inserting a long spline into a long groove that is tacky with rapidly drying glue can give you fits. Sometimes the spline just jams up. Several years ago, while employed at the curb-furniture shop, I realized a strong, spline-free miter would make my job easier.

The idea of abandoning splines was heresy. Nonetheless, I found a few willing heretics, and we conspired to build and test a spline-free cube about 18 in. sq. After gluing it up and letting it cure, we proceeded to abuse it. We repeatedly pitched it off a plywood rack to the concrete floor below, a distance of about 12 ft. We beat it with hammers. We stood on it. The cube remained intact; its corners were blunted, but the joints held fast.

For a strong mitered corner, you need perfectly flat mating surfaces, a tight clamp-up and a lot of yellow glue. Glue-up will be messy, but you don't want to starve the joint, especially with glue-hungry plywood. Solid stock requires less glue.

After mitering the stock, lay it down on a large workbench. A sheet of MDF or plywood makes a good work surface. Arrange the four sides in sequence, outside face up, and tape the panels together along the seams, using clear packing tape (see the bottom photo on the facing page). The tape acts as a hinge when you fold the four sides into a box. Then flip the case over, and mask off the inside corners. Make sure you don't tape the miter. The tape keeps the glue squeeze-out off the wood. If you're building a plant stand or something where the insides won't be seen, skip this step.

Make sure the corners are flush. *Last, tape the top and bottom pieces in place.*

Run a generous bead of glue along all the mitered surfaces, and spread it out with a brush. When I'm using plywood, I add a second coating of glue. Then fold the box into shape, and tape the last corner (see the photo above). Finish up by gluing and taping the top and bottom pieces. If your miters are all 45°, the box will align itself perfectly square. Let the glue set for about an hour or so, then rip off the tape, and scrape off any remaining squeeze-out using a cabinet scraper. When the glue has cured, burnish the sharp corners of the box using the wooden handle of a chisel, then sand lightly. □

Steve Latta works for Kinloch Woodworking in Unionville, Pa.

Which Finishes Are
Food Safe?

Exploring the menu of finishes for woodwork in the kitchen

BY JONATHAN BINZEN

I was hoping to compile a list of foolproof products and strategies for food-safe finishing. But I soon discovered that it wasn't going to be that easy. What I found, after scores of conversations with chemists and regulatory agencies, finish manufacturers, finishing experts and woodworkers, is that although there are a few finishes that everyone agrees are food safe (see the box on p. 69), those finishes tend to be the least protective. I also found that the great majority of finishes are in a kind of limbo, with many experts saying most are fine for use with food but with others saying they should be avoided because there are some lingering questions about their safety.

Coatings you can cut on

For cutting boards and the like, you can cut the confusion in half. Wood finishes can be divided into two broad categories: film-forming finishes, which harden in a thin layer on top of the wood, and penetrating finishes, which harden (if they do harden) in the wood rather than on it. When choosing a finish for a cutting or chopping surface, you can start by ruling out the film finishes. Although film finishes like polyurethane, nitrocellulose lacquer, varnishes and epoxy form a hard surface and are considered by many to be nontoxic when cured, they aren't impervious to knives. By cutting on boards with these finishes, you'll eventually slice through the film, inviting water underneath and compromising the finish.

That leaves you with the penetrating finishes to choose from. From the standpoint of food safety, this group can be chopped in two as well. On one side are what I'll call unmixed oils—pure tung oil, raw linseed oil, mineral oil and cooking oils such as walnut oil. These unmixed oils are all naturally occurring substances, are all sold in their pure form and are all perfectly edible (although not all delectable). On the other side are what I'll call mixed oils—boiled linseed oil and the range of oil-and-varnish mixtures often sold as teak oil, tung oil finish and Danish oil. The mixed oils are synthesized blends of oil, resins, driers and other ingredients whose identity often won't be revealed on the can.

Finishes you invite to dinner. *For protecting cutting boards and other abused and oft-washed items, penetrating oils are best.*

Mixed oils—As a class, the mixed oils offer considerably more protection from moisture and staining than the unmixed oils because of the resins and other additives most mixed oils contain. (Boiled linseed oil is an exception. It does not contain resins and is not as water-resistant as the other mixed oils.) Mixed oils are made easier to use by the addition of driers. The metallic driers in a tung-oil based varnish, for example, make it easier to work and quicker to cure than pure tung oil. But the safety of mixed oils as a finish for cutting boards and other items in contact with food is the subject of debate. It is the heavy-metal driers, primarily, that cause some people to consider mixed oils unsafe for food surfaces. The metals used no longer include lead or mercury, but one chemist told me that the currently used driers aren't above suspicion and that he wouldn't use a finish with heavy-metal driers on a cutting board. "Twenty years ago, nobody was worried about lead. Look what happened," he said.

By far the majority of people I spoke with, however, consider that mixed oils, once fully cured (a process that can take up to a month for some finishes), are probably fine for contact with food. Watco Danish oil, for example, has been used for years as a finish for cutting boards and bowls. According to one chemist I spoke with at Flecto Coatings, which now manufactures Watco, the company has never had any complaints. He said he thinks the question of food safety is "substantially a nonissue." But Watco isn't pitched as a food-safe finish, and the company won't recommend it for such use because, as I was told, "We haven't done the testing." The testing he was referring to is a lengthy and expensive process of assessment conducted by the Food and Drug Administration (FDA). Watco oil hasn't been found unsafe, of course, but unless it is tested and found to comply with

FDA regulations, the company won't accept the legal liability of proclaiming it a food-safe finish.

One company that has done the testing is Behlen's, makers of Salad Bowl Finish. They have been touting this mixed oil (probably tung-oil based, but they won't tell) for years as food safe, but only recently had it tested by the FDA (it passed). The process was costly as well as protracted, and Behlen's had to pull the finish from distribution during the testing. According to several finishing experts, passing the FDA tests doesn't necessarily make a particular finish different from others in its class; it has been tested, and the others haven't. All of which means that the consumer is left without a definitive answer on whether most mixed oils are food safe.

Food fight: wood vs. plastic cutting boards

Cutting controversy. *Among researchers, plastic cutting boards were once clearly favored as more sanitary, but wooden boards are gaining proponents.*

The debate over whether plastic or wood is the better material for cutting boards rages on. There is research on both sides of the issue. One prominent study shows that wooden cutting boards are less likely than plastic ones to harbor bacteria after being used to cut raw meat. Other studies show just the opposite. The Food and Drug Administration (FDA) and other agencies that oversee the food-service industry have backed off their previous stand that only plastic should be used. The FDA now recommends that boards be made of plastic or of "hard maple or equivalently hard, close-grained wood." The FDA stresses that to make cutting boards easy to clean, it is important to use materials "free of cracks and crevices," and to "avoid cutting boards made of soft, porous materials."

With any cutting board, the primary danger (assuming you wield your knives carefully) is from food poisoning. This can occur when a food that will be eaten uncooked is chopped on a board that has previously been used to cut raw meat or raw fish. To prevent such cross-contamination, the FDA recommends that after cutting raw meat or fish, you should wash the cutting board with hot water, soap and a scrub brush. Periodically, sanitize the board with a solution of chlorine bleach (1 tsp. bleach to 1 qt. water). Flood the surface with bleach, let it sit a minute, then rinse it off. You can protect yourself further by using one cutting board exclusively for foods that will be cooked and another one for foods that are ready to eat. —*J.B.*

Slicing to the heart of the matter. *With either wood or plastic cutting boards, segregating raw meats from ready-to-eat foods is the way to avoid contamination.*

Unmixed oils—With unmixed oils, there is no such dilemma. We know that pure tung oil and raw linseed oil are edible. And you can lean back and drink walnut oil or mineral oil right out of the bottle, if you want to.

Pure tung oil will provide a much better moisture barrier than any of the other unmixed oils (and some of the mixed oils), but it does present difficulties in application, requiring multiple coats with a day or so to dry between coats and at least a week of final curing time. Pure tung oil is an ingredient in a slew of other finishes, many of which use tung oil in their name. If you want the unmixed version, look for "pure tung oil" or "100% tung oil" on the label.

Applying raw linseed oil is also a long-term project. Without the driers that are added to make it boiled linseed oil, raw linseed oil can take several weeks to cure. Even then, it doesn't provide good water-resistance and will have to be reapplied fairly often.

Walnut oil is probably the best of the cooking oils for use as a finish, because, unlike olive or peanut oil, walnut is a drying oil—it polymerizes within a few days of application, its molecules linking together so it becomes inert and cannot go rancid. There's no trick to applying walnut oil—just soak the surface, triple-soak the end grain, let it sink in and wipe off the excess. It won't provide much water-resistance and will need to be reapplied frequently.

If you ask professional makers of cutting boards what finish they use, whether in one-man shops or at major manufacturers, it's almost certain you'll find they use old-fashioned mineral oil. Although it's a derivative of petroleum, mineral oil is odorless, tasteless and colorless, completely inert and approved as a food additive by the FDA. It is the same stuff you see in the drug store sold as a laxative. Some makers I spoke with use it straight, others blend it with beeswax or paraffin, and everyone had a twist on how it ought to be applied. (For information on making and applying a mineral oil and beeswax finish, see the box on the facing page.)

Many makers use mineral oil because of the convenience and low cost. It certainly isn't a miracle finish. It never dries, and to maintain even a modest amount of protection for the wood, you need to reapply it often. But it is extremely inexpensive, and because the stuff is completely inert, it will last indefinitely in the bottle. And it ranks with the least fussy of all finishes. As with walnut oil, you simply drench the cutting board, let it soak and wipe it dry. Various companies sell mineral oil explicitly as a wood finish, but such products are typically twice the price of mineral oil sold as a laxative in the drug store. The drug store variety may be slightly more viscous, but it is the same substance. If you want it a little runnier to make it penetrate the wood more deeply, you can heat it gently on the stove.

Which finish for woodenware?

The considerations for finishing wooden bowls, serving and cooking implements, plates and trays are the same as those for finishing cutting surfaces, with a few exceptions. For stirring spoons, pasta forks, spatulas and other implements that will see duty in bubbling liquids or sizzling solids, some kind of penetrating finish would be preferable to a film finish. Although you won't be cutting on these finishes, the combination of heat and water will eventually undermine even a rock-hard finish like epoxy. And cer-

Photos except where noted: Scott Phillips

EDIBLE FINISHES

In the welter of contrary opinions about which finishes are food safe and which are not, a few naturally derived, unblended, no-hidden-ingredients, certainly nontoxic finishes stand out.

Pure tung oil. **Extracted from the nut of the china wood tree. Used as a base in many blended finishes. Available from catalogs and hardware stores. Difficult to apply, requires many coats, good water-resistance.**

Raw linseed oil. **Pressed from flax seeds. Not to be confused with boiled linseed, which contains metallic driers. Listed as a food additive by the Food and Drug Administration (FDA). Very long curing time, good looks, low water-resistance, frequent reapplication.**

Mineral oil. **Although derived from petroleum, it is colorless, odorless, tasteless and entirely inert. Sold as a laxative in drug stores and as a wood finish in hardware and kitchen-supply stores. Simple to apply, low water-resistance, frequent reapplication.**

Walnut oil. **Pressed from the nuts of the walnut tree. Sold as a salad oil in health food stores and in large grocery stores. Walnut oil dries and won't go rancid. Easy to apply, frequent reapplication.**

Beeswax. **The work of the honey bee. Can be mixed with an oil to create a better-smelling, slightly more water-repellent finish. Sold in woodworking and turning catalogs.**

Carnauba wax. **Derived from the Brazilian palm tree. Harder than beeswax and more water-resistant. Can be used straight on woodenware as a light protective coating or a topcoat polish. Sold in woodworking and turning catalogs.**

Shellac. **A secretion from the lac bug. Harvested in India. Super blond shellac in flake form is the most water-resistant variety. A film-forming finish. Sold in woodworking catalogs and hardware and art supply stores.**

Nothing. **Available everywhere. Makes a reasonable finish for woodenware. No application time. Free.**

tainly any duty in the dishwasher (not a great idea for wood with any finish) will eventually whiten and crack a film finish.

One place where a film-forming finish would be appropriate is on items like trays that won't be subjected to high heat or constant washing but would benefit from a water-repellent finish. Chris Minick, a chemist and contributing editor to *Fine Woodworking*, suggests that if you are uncomfortable using a synthetic film-former, you might try shellac. If the shellac is selected and applied with care, it will provide a hard finish that can be sponged off and ingested with impunity. Minick recommends using only super blond shellac and buying it in dry flake form. Super blond, also known as dewaxed shellac, is ordinary shellac that has been refined to remove the wax that makes other grades of shellac less water-resistant. Buy it in flakes rather than premixed, and use it immediately, because once it is in liquid form, shellac gradually begins to lose its water-repellent properties. But remember, even a drop of vodka from a martini or a dribble of wine will dissolve shellac and mar the finish.

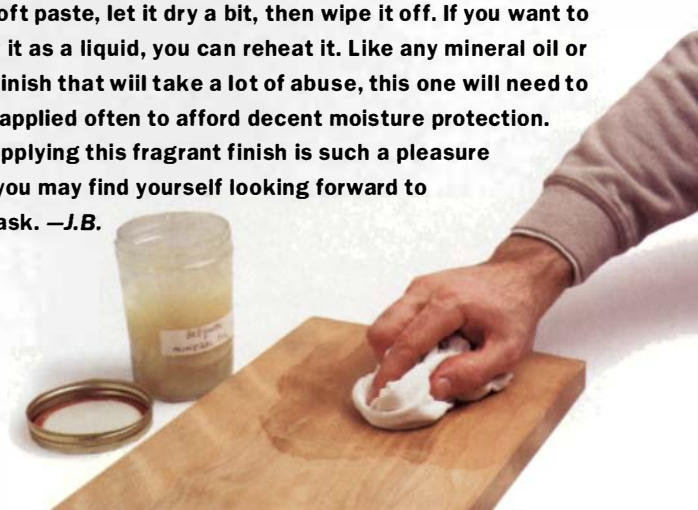
A final option for finishing woodenware—an option that neatly skirts all these difficult issues—is to use no finish at all. If you don't mind chancing some stains and are willing to forego the luster an oil finish can add, it is a viable solution. With the right wood, something hard and tight-grained and ring-diffuse like maple, beech or cherry, there shouldn't be any major problems with going buck naked. □

Jonathan Binzen is an associate editor of Fine Woodworking *magazine.*

Photos this page: author

A recipe for one sweet finish

The food-safe finish that appeals most to me is one recommended by Jim and Jean Lakiotes, West Virginia makers of spoons and other kitchen items, as weli as furniture. Their finish is a mixture of mineral oil and beeswax. To make it, warm the mineral oil in a saucepan over low heat, and melt a chunk of beeswax in it equal to about one-fifth or one-sixth the volume of the oil. (At high heat, there's a potential for fire. Be sure to keep the heat low, and consider using a double boiler.) As the wax begins to flake apart and dissolve, stir frequently. When the mixture is blended, pour it into a jar to cool and solidify. To apply, wipe on an excess of the soft paste, let it dry a bit, then wipe it off. If you want to apply it as a liquid, you can reheat it. Like any mineral oil or wax finish that wiil take a lot of abuse, this one will need to be reapplied often to afford decent moisture protection. But applying this fragrant finish is such a pleasure that you may find yourself looking forward to the task. —*J.B.



Routing Safe and Sound

7 tips to keep your hand-held router under control, your workpiece intact and your first-aid kit closed

BY PAT WARNER

When you lose control of a router, whether totally or just a little, it's the workpiece that most often gets messed up. Now and again, you'll chip or break a bit. And if you're really unlucky, you will get hurt. Keep this in mind: Most router bits rotate at a speed in excess of 20,000 rpm. When something goes wrong—a grab, a dig, a jolt to the machine, bad things happen fast. I have had my fingernails trimmed mighty close by a dovetail bit before I knew what happened.

Router safety is essentially a matter of controlling the router and securing the workpiece (and vice versa on the router table). Safety considerations are therefore intimately related to the quality of the cut. The safest routing technique will by and large yield the best finished surface.

Here are some tips to help you produce the quickest, smoothest and safest cuts with a router. □

Pat Warner is a woodworker and college instructor who lives in Escondido, Calif.

1 SOME BITS BITE BACK

Not all router bits are created equal. Some are far less capable of handling the stresses of cutting wood and will break easily. Some are prone to other problems, such as burning or catching in the cut. Recognizing bits that need particular care will help you keep them from biting you and your work.

Long, thin bits are fragile: Thin bits with cutting-edge lengths that are more than three times longer than their diameters are easily stressed and broken. Some of the thinnest bits are milled into their shank, making them even more fragile. The ⅜-in.-dia. bit at left has less than 1/16 in. of steel between the flutes. Cut in ⅛-in. increments or less with these bits.

Trapped bits need precise guidance: Some bit designs, such as dovetail bits and T-slot cutters, trap the bit in the work. The slightest wavering in the cut will mess up the workpiece. These bits should be used only with jigs and fences to guide them.

***Trapped!** Cutting a sliding dovetail buries the bit in the work. If the router can't be pulled up and away, the bit is trapped and needs careful guidance.*

Dovetail and T-slot bits also break easily. They are designed to cut while fully engaged in the workpiece, which is the most stressful kind of cut for any router bit. Most of the cutting is done at the ends of the flutes where their diameter is at a maximum. However, most of the stress is concentrated where the shank and the flutes meet, which is the thinnest part of the bit. To make matters worse, some of these cutters are ground into the shank. Just take things easy, and don't force the cut. For long T-slots and sliding dovetails, I pre-plow with a straight bit.

Many other kinds of bits cut in such a way that you can't lift the router straight up and off the workpiece freely. These bits include cope-and-stick cutters, glue- and finger-joint bits, bull-nose bits and some profile bits. To be used successfully, they should be treated as trapped bits.

***A twist to the left and a twist to the right.** The up-shear bit (left) spins like a drill bit, with the flutes spiraling up. The down-shear bit's flutes (right) spiral down.*

Spiral bits can be unpredictable: Spiral up-shear and down-shear bits can produce impeccable surfaces. The cutting edges travel in a spiral motion and are always engaged in the work, unlike ordinary straight bits. Up-shear bits send the chips into your face, and down shears send the chips into your socks (see the photo at left).

Large spiral-ground down-shear bits have one nasty feature: If the bit catches in the work, it will pick the router up and out of the cut. I almost

Top photos: Scott Phillips; bottom photo: Strother Purdy

lost my grip on a router with a down-shear bit that suddenly climbed up the work. Down shears are too unpredictable for this woodworker, especially on end grain. If you use them, cut very lightly, or use them in a router table with a power feed.

2 LISTEN TO YOUR ROUTER WHINE

Routers always seem to whine, but you should listen to them. The sound a router makes while idling should not change appreciably in the cut. If it does, you may be stressing the bit and the motor.

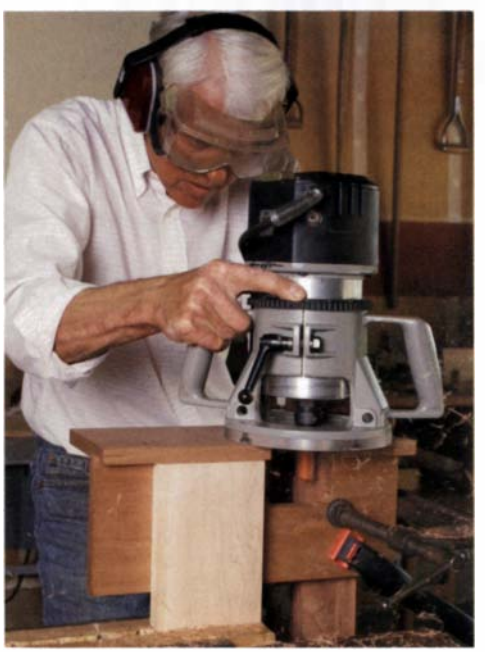
It's all too easy to overwork a bit because it's difficult to estimate how much stress a particular cut will put on a bit. The volume of material you remove increases exponentially when you double the dimensions. This means that you remove 25 times more wood from a given length of a ⅝-in.-sq. rabbet than from a ⅛-in.-sq. rabbet. However, the stresses on the bit are not 25 times as great. Your best estimate will come from how it sounds in the cut. If your bit chatters, screeches or just sounds unhappy, then slow down the cut.

3 JIGS ARE SAFETY DEVICES IN DISGUISE

Jigs secure the work and control the path of the cut, reducing the chances of error. Consequently, they are essential to the most accurate—and the safest—router cuts.

The best jigs have a few things in common. They secure the workpiece without interfering with the path of the router. They offer a large surface for the router to run on, giving it stability. And jigs guide the router positively and completely through the cut. Avoid designing jigs that trap the workpiece between a fence and the cutter. When using an edge-guide on a router, position the bit in the fence.

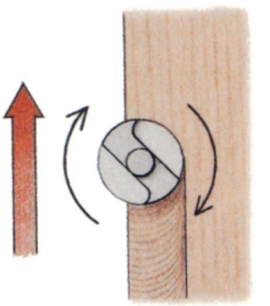
It's often the simplest jigs that help the most. On a standard outside edge cut, less than half the base casting rides on the workpiece. If you rout around a corner, as little as 25% of the base rides on the workpiece, and the chances of tipping are great. I make an offset subbase that increases stability by giving the router a larger platform to ride on.



A good jig keeps the router in line. *By controlling the line of cut, jigs make mistakes less likely.*

4 GETTING AWAY WITH THE CLIMB CUT

The direction of cut has great bearing on the quality of the cut. If you look at a router upside down, you'll see that the bit spins counterclockwise, and when the router is on top of the workpiece, it's spinning clockwise. When the router is pushed through the cut with the bit spinning into the edge of the workpiece, it's called a climb cut (shown in the drawing at right). The bit can self-feed or climb along the cut, wrenching the router forward. Running a router in the opposite direction, with the bit spinning out of the edge of the workpiece, is anti-climb cutting. Though riskier, climb

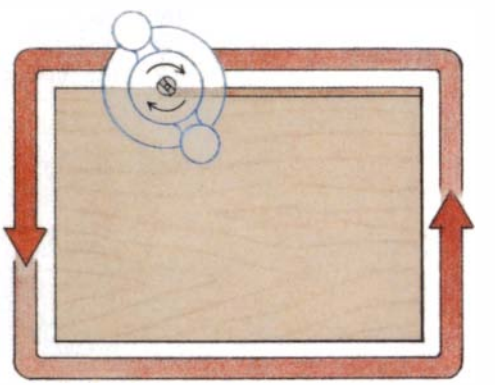


The drawing above shows a climb cut. Though risky, routing in this direction produces a smooth surface.

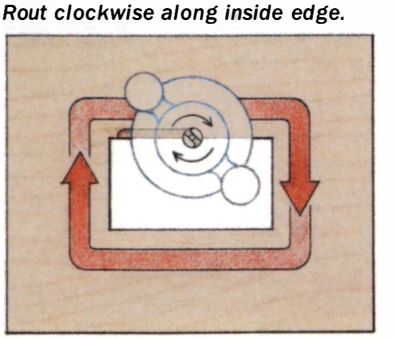
DIRECTIONS FOR ANTI-CLIMB CUTTING

For the safest cuts, run the router counterclockwise around the workpiece and clockwise inside of a workpiece. Reverse this for the router table, because the router is upside down.

Rout counterclockwise along outside edge.



Rout clockwise along inside edge.



Drawings: Vince Babak

cutting produces a superior edge, without the kind of tearout anti-climb cuts produce.

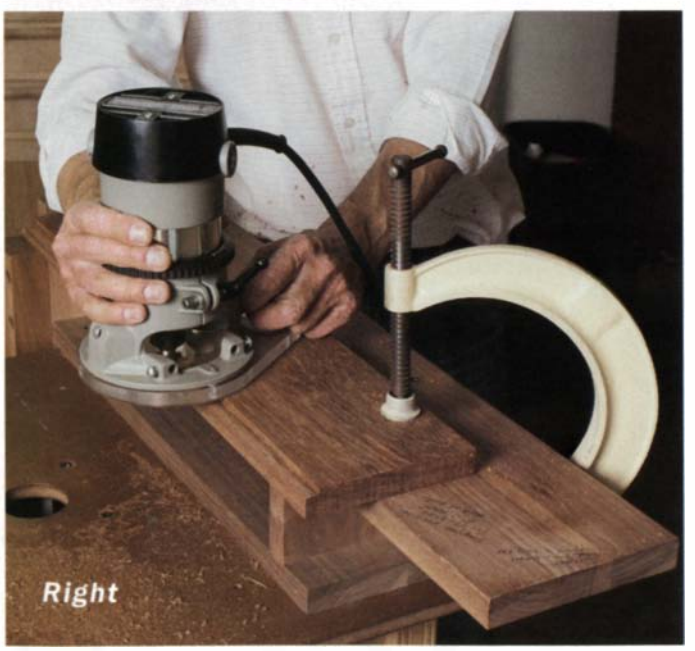
Use the anti-climb cut for most work, but when you need a perfect edge, use a climb cut, taking light passes. Learn to feel the speed and depth of cut when the router starts to grab and self-feed, so you don't lose control.

5 KEEP GRAVITY ON YOUR SIDE

Bad accidents with routers do happen. I heard of a carpenter who tried to rout some molding under a countertop. He didn't secure the motor in the casting. Halfway through the cut, the motor spun out of its casting and onto his leg. The lesson should be obvious: Keep gravity on your side. Hand-held routers should always be used horizontally with the bit facing down. It can be tempting to run a router sideways down a board, especially if the bit is oriented to cut that way, but don't do it. Find a different bit, or make a jig that supports the piece in such a way that you rout horizontally (see the photos below).

Rabbeting the wrong way. *Routing sideways can be tempting but is always treacherous. If you lose your grip, the router will fall.*

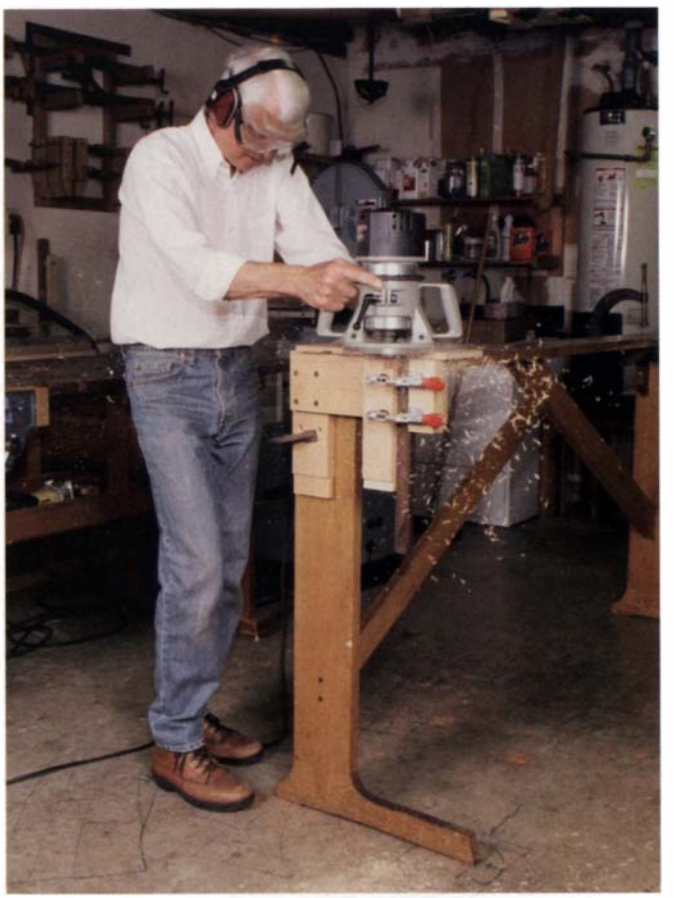
Rabbeting the right way. *The router is easier to control when flat on the workpiece. Your hands are above the bit if you lose your grip.*



6 START THE ROUTER WITHOUT WOBBLE

I start a router with its base casting flat on the edge of the workpiece. I find it troublesome and risky to set down an already running router on the workpiece. However, starting the router on an edge isn't completely risk-free. Some machines will jerk from the torque of the motor and possibly push the bit into the workpiece. Worse, starting a cut before the bit reaches full speed can break the bit. I prefer soft-start machines because they don't twist on start up.

7 ROUT COMFORTABLY



A special router bench for comfortable work. *The author made this bench 40 in. high, so he doesn't have to lean over to see what he's doing.*

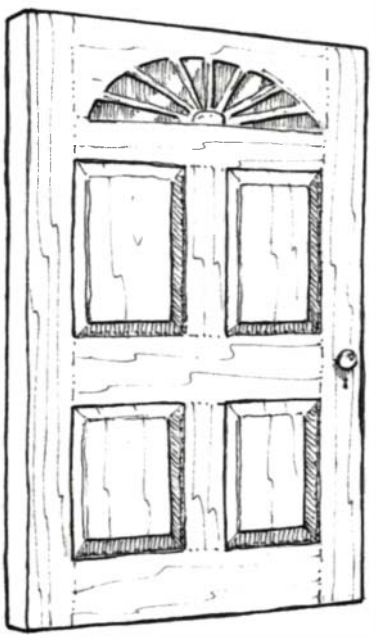
Routing at a standard bench height is difficult and tiring for me. I can't see what's going on easily, so I end up hunched over trying to see where the bit is. Being able to see the bit is crucial to keeping the router under control. To solve the problem, I made a special routing bench 40 in. high. It allows me to stand tall and see what I'm doing. I also make router jigs for my bench vise that stand at about the same height. I'm 6 ft. 1 in. tall, so 40 in. off the ground may not be the best height for you. Experiment to find your most comfortable routing height.

Photos except where noted: Strother Purdy

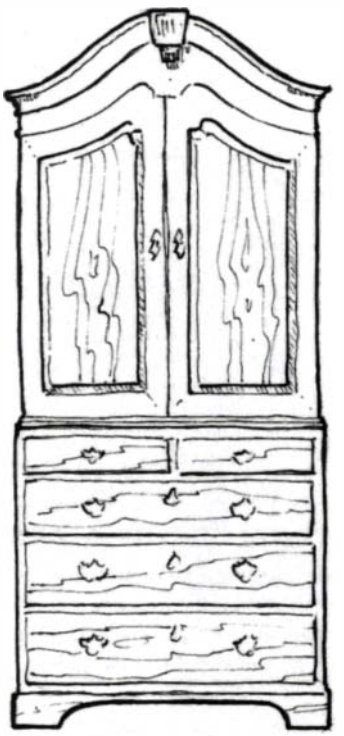
Frame-and-Panel Doors: An Illustrated Guide

The best way to build doors for a sideboard or an entryway is also the most beautiful

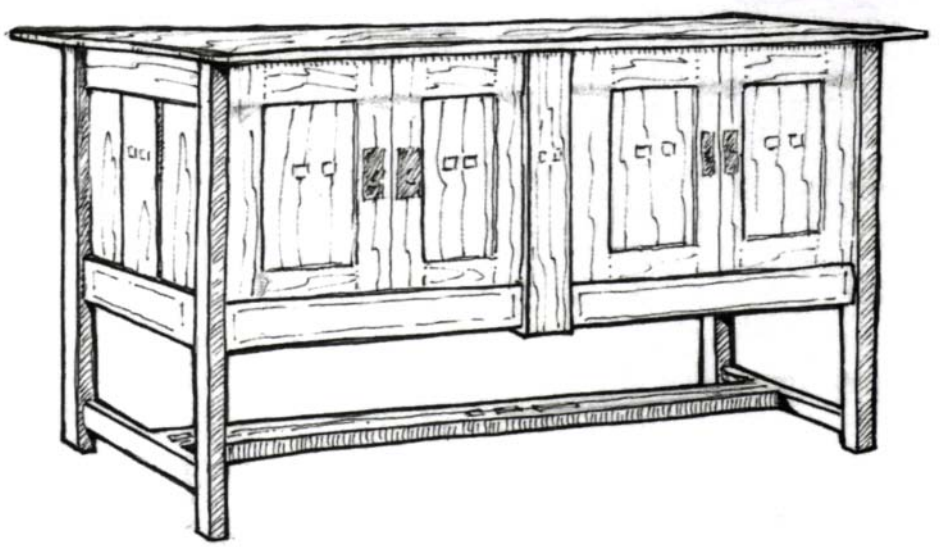
BY GRAHAM BLACKBURN



ENTRY DOOR



QUEEN ANNE CUPBOARD



ARTS-AND-CRAFTS SIDEBOARD

Before the advent of frame-and-panel construction, doors (and their owners) were at the mercy of wood movement. Solid plank doors were unruly—likely to split, warp and twist. Subject to expansion and contraction across their entire width, they'd gape open when the weather was dry and swell shut when it was wet. Frame and panel changed all that. Instead of ignoring or resisting wood movement, frame and panel was designed to accommodate it.

Frame and panel soon became one of the indispensible building blocks of work in solid wood, used not just in doors but in all sorts of case construction and paneling. Over the centuries, the range of its applications has been equalled only by the diversity of stylistic treatments it has received.

Given all this variety, where does a woodworker start when designing frame-and-panel doors? With the structure. It is my feeling that before you can make something look good, you have to be able to make it work well. Once you understand why and how frame and panel works, you are halfway to a successful design. In the drawings on the following pages, I've laid out

Drawings: author

the underpinnings of frame-and-panel construction and followed them with a selection of considerations that inform the design process.

The structural nitty-gritty

The simple genius of the frame-and-panel system is in making a dimensionally stable frame of narrow members and allowing a large solid panel to expand and contract freely inside it. The panel may be large or small, plain or simple, but as long as it is made of solid wood it must be free to move (so that it will not split or buckle with changes in humidity) and at the same time be securely held (so that it cannot warp). Panels are typically held by their edges in grooves formed in the surrounding frame, and they are pinned or glued only at the center. Occasionally, the grooves are formed by adding a strip of molding to a rabbet, but most often the groove is integral.

The frame members are most commonly mortised and tenoned together, although other methods such as plate joinery or doweling can be used. Because most panels are oriented with their grain running vertically, the rails have the most work to do in preventing the panel from warping. Therefore, the rails are usually the widest parts of the frame. So the frame does not appear top-heavy, the top rail is often made a little narrower than the bottom rail. The stiles are generally made narrower still, giving a pleasing appearance and minimizing the seasonal change in the width of the door.

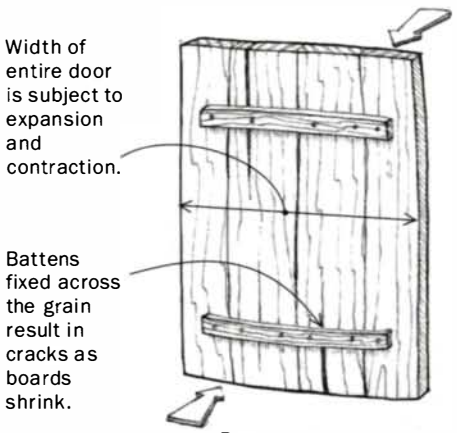
The proportions of the frame joints may vary depending on the size and function of the piece: More substantial doors should be joined with tenons approximating one-third of the thickness of the members;

CONSTRUCTION: FRAME-AND-PANEL DOORS

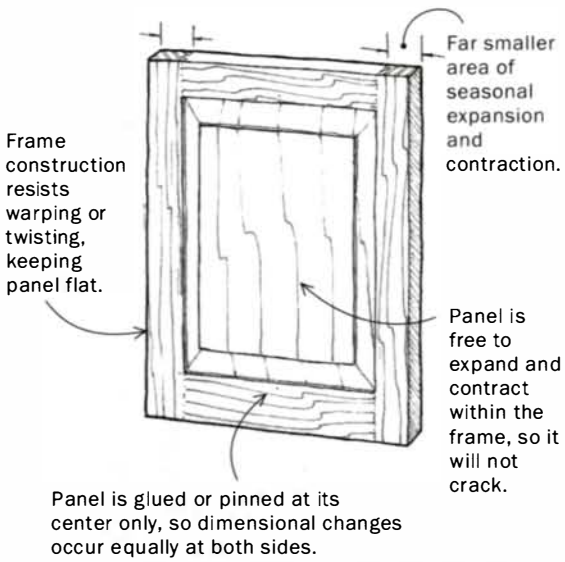
WHAT'S THE POINT OF FRAME AND PANEL?

Solid plank doors are at the mercy of seasonal changes in humidity. Hence, they are unlikely to fit their openings in both summer and winter. Frame and panel solved the problem, making a stable frame and allowing a solid panel to expand and contract inside it.

PLANK-AND-BATTEN DOOR IGNORES WOOD MOVEMENT

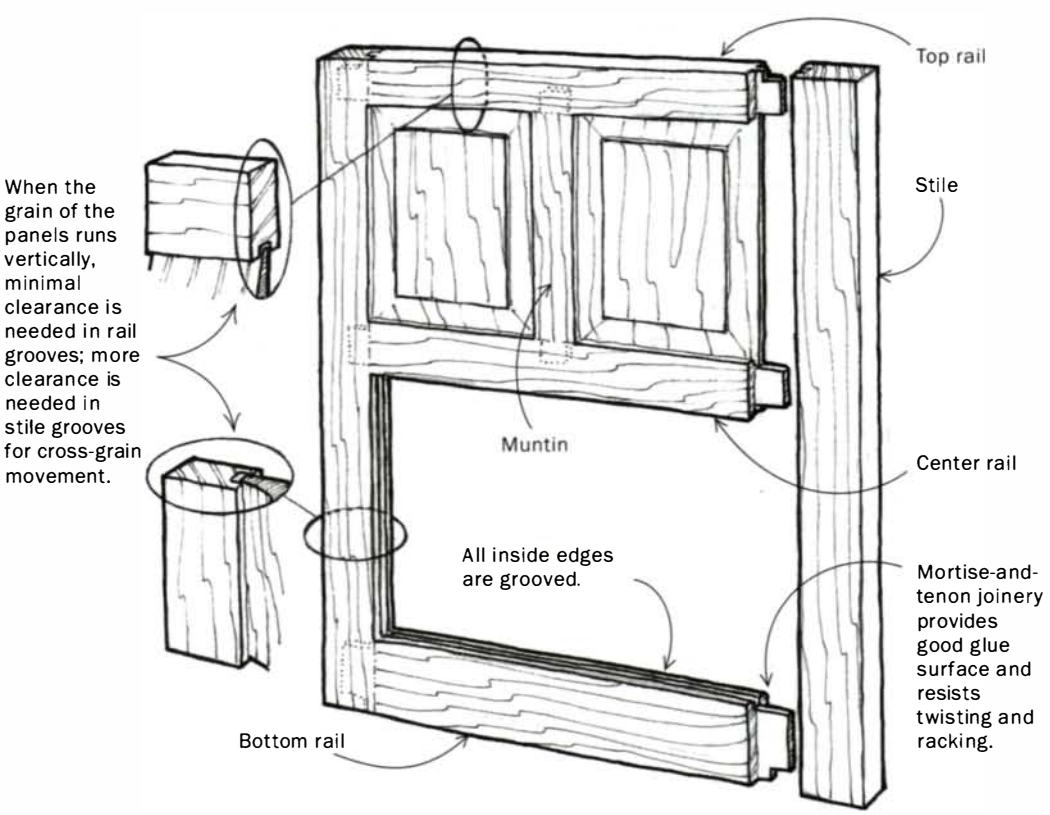


FRAME-AND-PANEL DOOR ACCOMMODATES WOOD MOVEMENT



BASIC STRUCTURE OF A FRAME-AND-PANEL DOOR

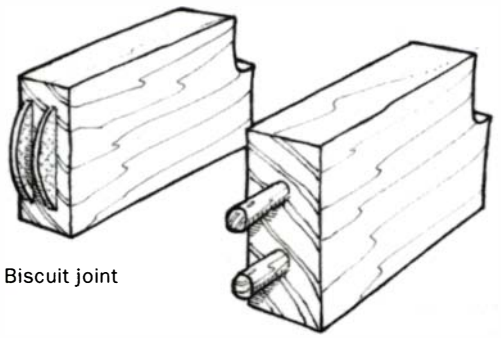
In a typical frame-and-panel door, the stiles run through from top to bottom, and the grain in the panels is vertical. The rails are generally wider than the stiles, providing wider tenons and better resistance to warping of the panels. One rough rule of thumb suggests that if the bottom rail is one unit wide, the top rail should be two-thirds of a unit wide and the stiles one-half of a unit wide.



JOINERY OPTIONS

THREE WAYS TO JOIN THE FRAME

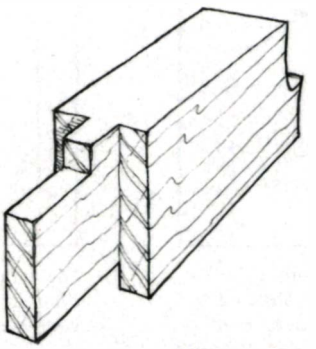
Lighter cabinet doors, especially those with glued-in plywood panels, may be joined with biscuits or dowels.



Biscuit joint

Dowel joint

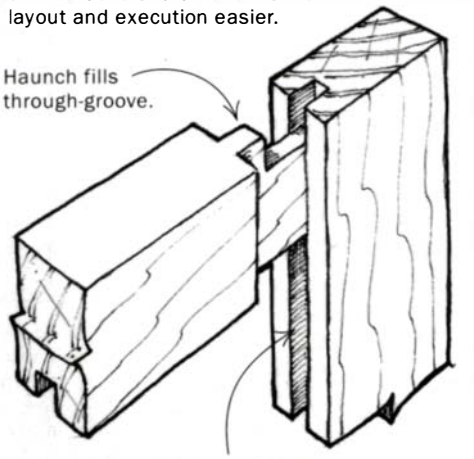
Mortise and tenon is strongest. The haunch of the tenon increases the joint's resistance to twist.



Mortise and haunched tenon

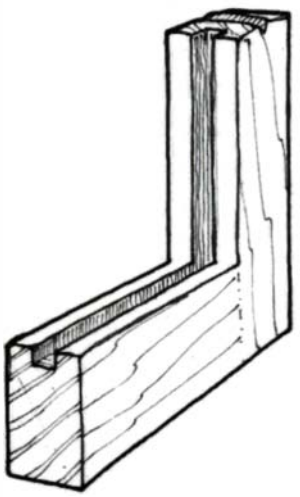
JOINERY LAYOUT

Cutting the panel grooves in line with the mortises and tenons makes layout and execution easier.

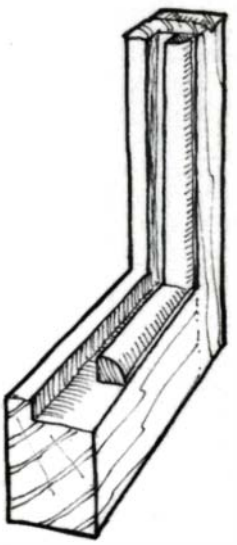


Panel groove runs through

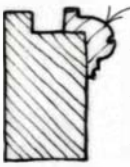
PANEL-HOLDING OPTIONS



Integral groove

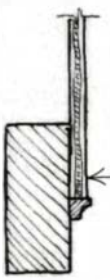


Rabbet with applied molding



Applied bolection molding supplies strength without using much space in the rabbet.

Applied bolection molding



Face-mounting panels is useful when frame members are too narrow to groove or rabbet.

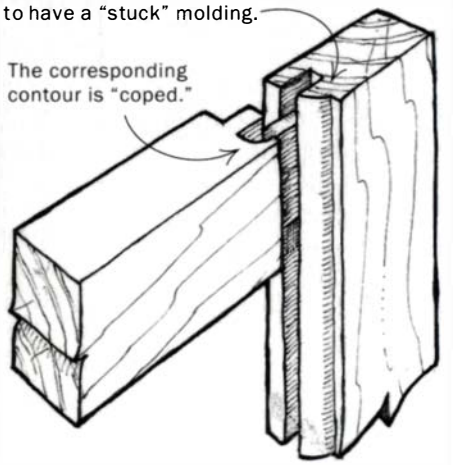
Plywood panel

Face-mounted panel

COPE AND STICK

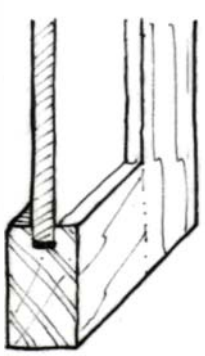
An edge that is profiled is said to have a "stuck" molding.

The corresponding contour is "coped."

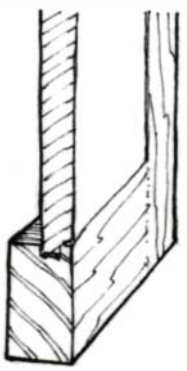


Note: On small cabinet doors, a tongue on the rail instead of a full tenon suffices for joinery.

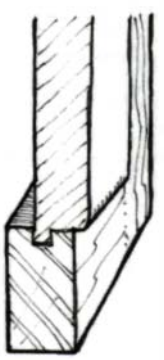
PANEL VARIATIONS



Flat panel

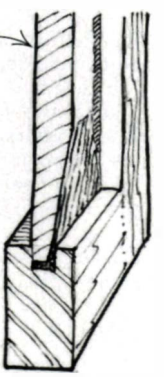


Flush panel



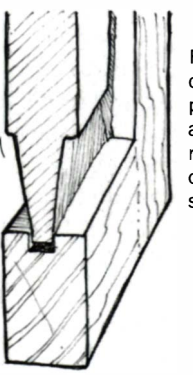
Proud front panel

A fielded panel is one with a defined center section: the field. For cabinet work, panels are generally flat on the inside face.



Fielded panel

Although the term is often used more broadly, a raised panel is one in which the center, or field, is defined by a shoulder.



For entry doors, panels are often raised on both sides.

Fielded and raised panel

joints for lighter doors may be a quarter of the thickness.

Purposeful design

Working up the proportions of a door's parts from a structural standpoint will go a long way to producing a pleasing design. But without compromising structural integrity, there remains much you can do to control the final appearance.

You can change the apparent shape of any door by altering the size, shape and number of framing members and reinforce the message with compatible grain patterns. To make an extremely vertical door appear less tall and narrow, for example, try using multiple rails and orienting the grain of the panels horizontally, or make a square door stretch vertically by giving it a number of tall, narrow panels. If you are designing a long, low piece and are concerned it will appear squat and heavy, you can give the piece more lift by dividing the doors so the top panels are smaller than the lower ones.

Control of the focus is another useful design tool. To avoid visual confusion, pick out certain elements of the design for emphasis. For example, you might use plain panels in an unusual frame or surround a strikingly grained panel with a straight-grained frame.

Whatever else is required, design in a style that is in harmony with other woodwork in the room. Even if you don't design in the exact style of the surroundings, try to include elements that will relate, such as elegantly raised panels in a piece destined for a roomful of Colonial furniture or flat panels for a piece that will live with Arts-and-Crafts furniture. □

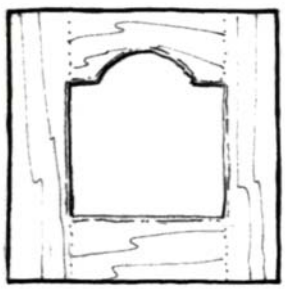
Graham Blackburn is a furniture-maker, illustrator and author who lives in Woodstock, N.Y.

DESIGN: FRAME-AND-PANEL DOORS

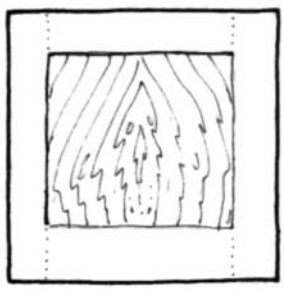
WORKING WITHIN A GIVEN SPACE

DESIGNS FOR A SQUARE OPENING

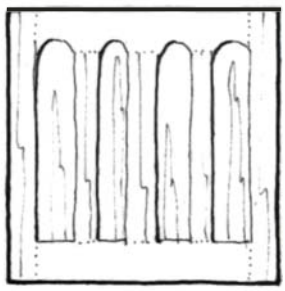
Different effects can be achieved for similar spaces by changing the visual focus.



Focus on the framing: Concentrate the shaping on the frame members, and keep the panel neutral in color and pattern.

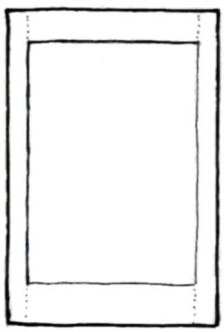


Focus on the panel: Use dramatic grain matching or veneer within a plain frame.

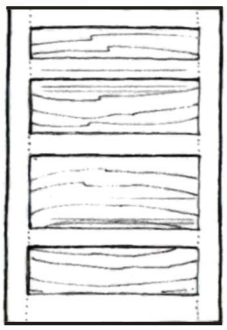


Stretch the square: Downplay the squareness of the opening by designing a door with strong vertical elements.

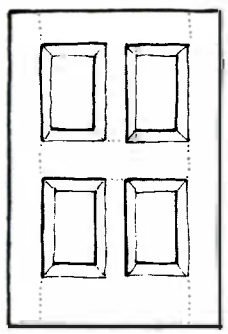
DESIGNS FOR A VERTICAL OPENING



Restate the shape: Keeping the design as simple as possible preserves the essential shape of the opening.



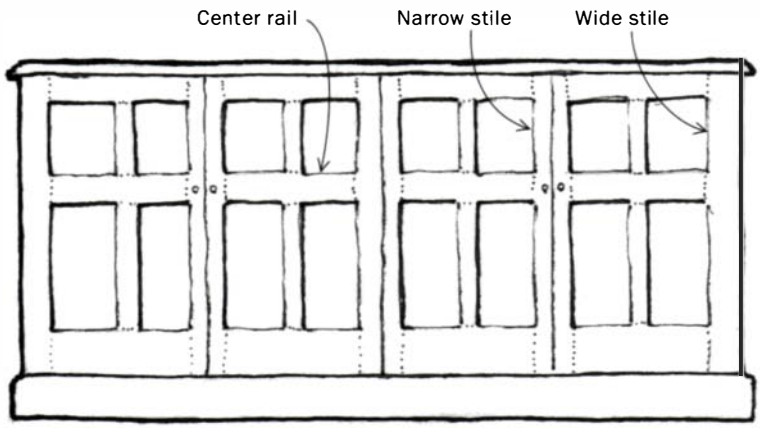
Accentuate the lateral: Introducing strong horizontal elements—three center rails, wide panels with strong grain running side to side—offsets the door's verticality.



Beefing up the rectangle: Raised panels make a door look stronger and heavier; a traditional four-square approach with slightly taller bottom panels provides good balance in a rectangular opening.

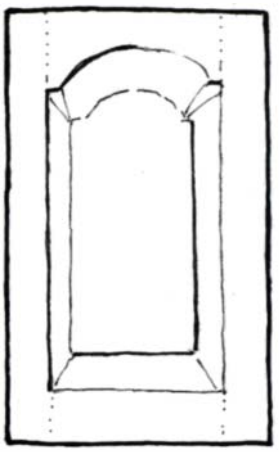
MULTIPLE DOORS FOR A HORIZONTAL SPACE

Stiles at either end of cabinet are made double-wide to balance the paired stiles between. Placing the center rail above the mid-point creates tall lower panels, which give the long, low cabinet a vertical emphasis. For visual balance, the top rail plus the cabinet top equal the width of the bottom rail.

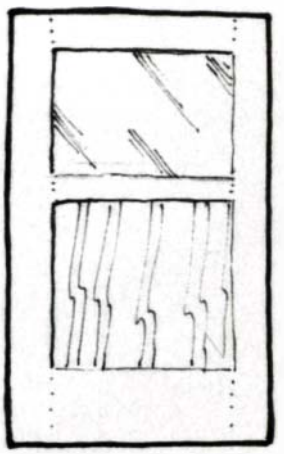


DESIGNING WITH PERIOD STYLES

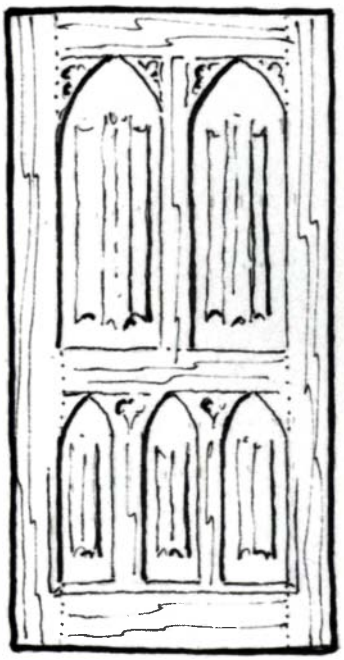
Use the characteristics of a period style to design a door in harmony with its surroundings.



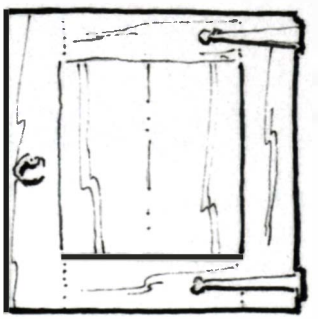
18th century: Classic proportions, raised panels; made of mahogany.



Contemporary: Geometric proportions, unadorned forms; contrasting materials.



Victorian Gothic: Emphasis on verticality, pointed arch panels, linen-fold carving; polychrome finish or walnut or fumed oak.



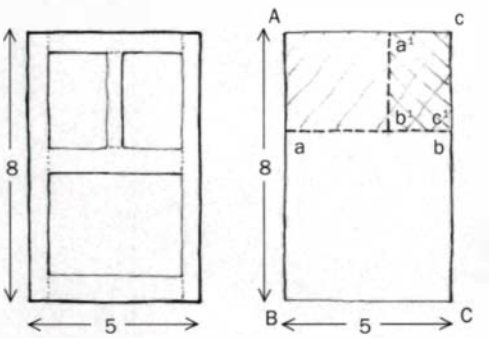
Arts and Crafts: Bold, simple forms, minimal molding, wrought-iron hardware; made of oak.

PROPORTIONING BY THE BOOK

Although the designer's eye should always be the final judge of what looks good, there are a number of traditional systems you can use to establish pleasing proportions.

USING THE GOLDEN MEAN

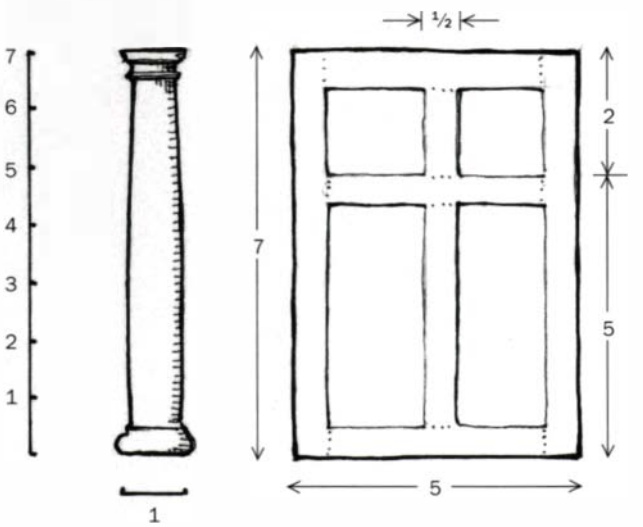
The golden mean may be expressed as a ratio, BC:AB as AB:AC. This is approximately 5:8.



ABCc is a golden rectangle. Squaring a golden rectangle leaves another golden rectangle (shaded area Aabc); squaring this rectangle produces yet another golden rectangle (double-shaded area $a^1b^1c^1c$). This smallest rectangle produced the shape of the door's upper panels.

USING THE CLASSICAL ORDERS OF ARCHITECTURE

The Tuscan column (the first of the five classical orders of architecture) is built on a ratio of 1:7. The column width = 1, the column height = 7. All other dimensions are multiples or fractions of this ratio; for example, the base and the capital are each one-half the column width.



Use the ratio of the Tuscan order (or any other order) to proportion a door. Divide the height of the door by seven, then use multiples or fractions of the resulting unit to size the panels and frame members. (For an 84-in. door, the unit would be 12 in.)

PERSONALIZE YOUR HOUSE

Making Large Moldings

BY JOHN WEST

Nothing dresses up a drab room quite so dramatically as a fancy cornice molding where wall meets ceiling. In rooms with high ceilings or in rooms full of tall cabinets, adding a big cornice molding can change the visual dimension of the space.

But there are some problems with large, one-piece moldings. Because so much material is removed from one side, they have a tendency to cup, and cupped moldings are difficult to hold tight to the wall and ceiling. It is also impossible to make good outside corner miters when molding isn't flat. And mitering inside corners of large moldings can drive you nuts because beaded profiles can't be coped.

There is an answer to large molding problems, and it begins at your local lumberyard. If you break down the cornice into several smaller parts—even stock pieces off the shelf of a nearby store—you can avoid all these problems.

Smaller pieces yield better results

When you're perched on a ladder, installing several small pieces at the ceiling can often be a lot easier than dealing with one huge molding. With careful planning, you can establish many desirable conditions using smaller moldings: a good nailing surface behind the moldings, hiding places for fasteners, good square corners at ceiling and walls, and a way to locate and lock moldings together.

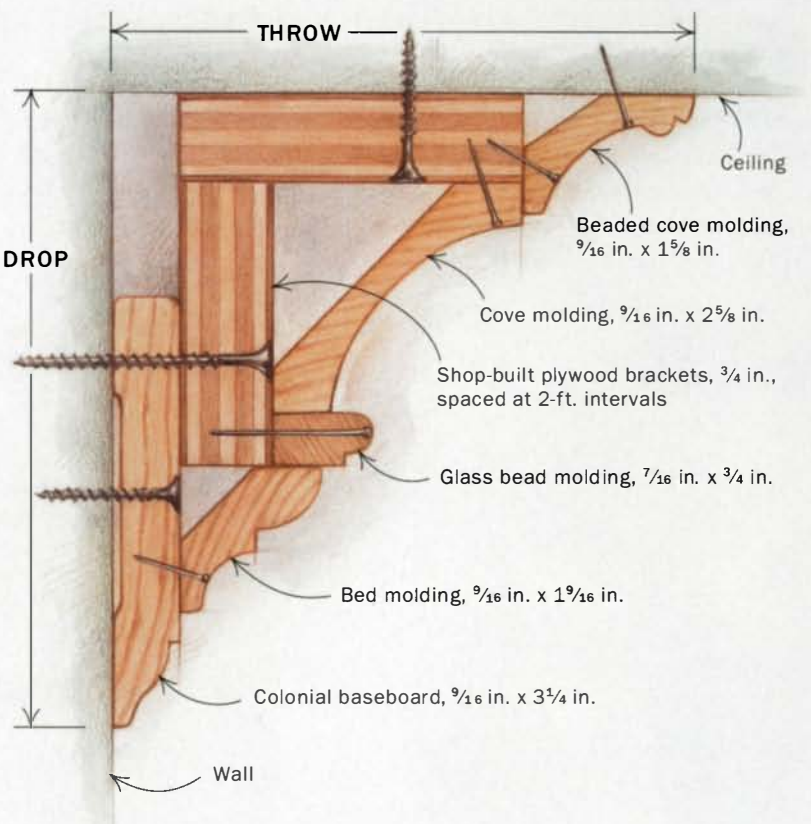
Prepare a sturdy nailing surface—When you are laying out the design for a large

Photos: William Duckworth

Cornices built up from lumberyard stock render a custom look without the custom cost

Smaller shapes linked together add a more formal look to a room. *Five different store-bought moldings shaped the cornice for this dining room at a cost far less than custom-milled moldings.*

THE SUM OF THE PARTS



This large cornice molding was built up from five separate pieces of smaller moldings and installed in a dining room with 9-ft.-high ceilings. The shop-built plywood brackets serve to make square corners, provide a solid nailing surface and help locate the moldings where they belong in sequence to one another.

Drawing: Tim Langenderfer

Shop-built brackets are easy to make square. *The author mass-produces plywood brackets in the shop, using the tablesaw, an air nailer and a screw gun. Pieces are butt-joined at the corners with glue, nails and screws.*

cornice, start with a piece of inverted baseboard molding on the wall (see the drawing on p. 79). This piece of molding answers two important needs: a solid nailing surface for building up the cornice from the bottom and plenty of room to hide large fasteners. It doesn't matter whether you use nails or screws to secure the baseboard to the wall. All but the bottom edge will be hidden from view. You can put as many fasteners as you need to anchor the baseboard solidly in place.

With the inverted baseboard we installed in the dining room shown on the previous pages, we started by nailing the pieces in place and followed with screws. If you're going through drywall, you want to secure these pieces to studs whenever possible. If you're going through plaster, as we did on this job, all but an occasional screw will grab hold of lathing behind the plaster, which is plenty strong to do the job.

Plywood brackets make the corners square—Few houses, old or new, have walls that are perfectly square to each other or to the ceiling. By building up a cornice from several small pieces and by using a bunch of plywood brackets behind the built-up moldings, you can accommo-

Coping the profile

Handsawing the straight run

Coping a joint

As with the inverted baseboard piece shown in this sequence of photos (see the photos above and below), coping a joint to look like an inside miter is easy. Start by making a mitered sawcut on the end of the molding to be coped. Trace the inside edge of the miter with a lead pencil to make it easier to see where you need to make the cope.

Start the cut from one end of the miter using a coping saw, and follow the pencil line. As you follow the shape of the cut, tilt the blade back at a slight angle so that you remove more of the stock from the back of the cut. For straight cuts, like those along most of the width of the baseboard pieces, use a regular handsaw to remove the material, again, tilting back the sawblade slightly. For a good fit, use a small, round rat-tail file to refine the shape of the curved cuts. —*J.W.*

Undercutting with a rasp

Installed and shimmed

date walls and ceilings that are not square. These brackets also serve to establish the drop and throw dimensions for the cornice, as shown in the drawing on p. 79. (*Drop* refers to the overall vertical height of the cornice; *throw* indicates how far the cornice projects off the wall at the ceiling line.) By making the brackets just the right size, you can use them to locate the separate pieces of molding where they belong in relation to one another.

All the plywood brackets can be assembled in the shop, where it's easy to make them square (see the top left photo on the facing page). Make separate brackets for all the corners, in addition to a slew of smaller ones for the wall-to-ceiling joints. When installing the plywood brackets, space them at intervals of about 2 ft. or less to allow ample nailing surfaces for the moldings to follow. Add shims behind the backs or tops of brackets, as necessary, to square up the corners (see the top left photo on this page).

Shims help create square corners. *During installation, pine shims fill gaps in out-of-square corners at walls and ceilings. Once the brackets are screwed into place, trim off the excess by scoring the shim with a utility knife.*

Coped joints are cleaner. *The first two layers of this cornice, an inverted baseboard and a bed molding, were installed with coped joints at the inside corners.*

Install one layer at a time—After the inverted baseboard pieces and all the plywood brackets on top of those are squared up and installed, layering a large cornice molding is simply a matter of adding one layer at a time, starting with the one at the bottom. At inside corners, coped joints (see the top right photo on this page and the box on the facing page) look better than miters, which don't always meet perfectly at the joint. Also, coped joints hold up better through seasonal changes in humidity levels. However, with moldings that contain a full beaded profile (see the drawing on p. 79), as did two of the five we used on this job, you have no choice but to miter them at inside corners.

With all the layers of molding in a built-up cornice like this one, don't bother using glue on most of them. Use glue on the top edge of the top piece of molding where it joins the ceiling, just to help it stay put. Also use glue on outside miters at protruding sections of walls or the top faces of cabinets.

The installation will go easier and look better in the long run if you can minimize the number of joints along any given span. With this job, we had only one scarf joint in one layer of molding (see the box below). If you must have joints in several pieces, it's best to stagger them. And keep in mind that not all runs of the same profile of molding are the same size. □

John West operates Cope and Mould Millwork in Danbury, Conn.

Scarf joints should be invisible

If you can't buy molding long enough for the spans you need, you'll have to join two pieces with a scarf joint, which requires cutting matching miters on the ends of each piece. Be aware that pieces of molding from the same millwork shop will sometimes vary in width and thickness. Mismatched pieces will create a sloppy scarf joint.

Every trim carpenter I know has his own preference for what angle to use for scarf-joint miters. For me, a 60° angle on the molding works best. At that angle, the molding has less of a tendency to spring back at the outside of the miter than it does on a sharper angle, such as 45° or less. I always use glue at the joints, and I'm careful to place scarf joints over one of the plywood brackets to get a solid nailing surface at the joint. Any slight discrepancies in the profiles can easily be sanded smooth. —*J.W.*

Joint-Quality Edges Cut on a

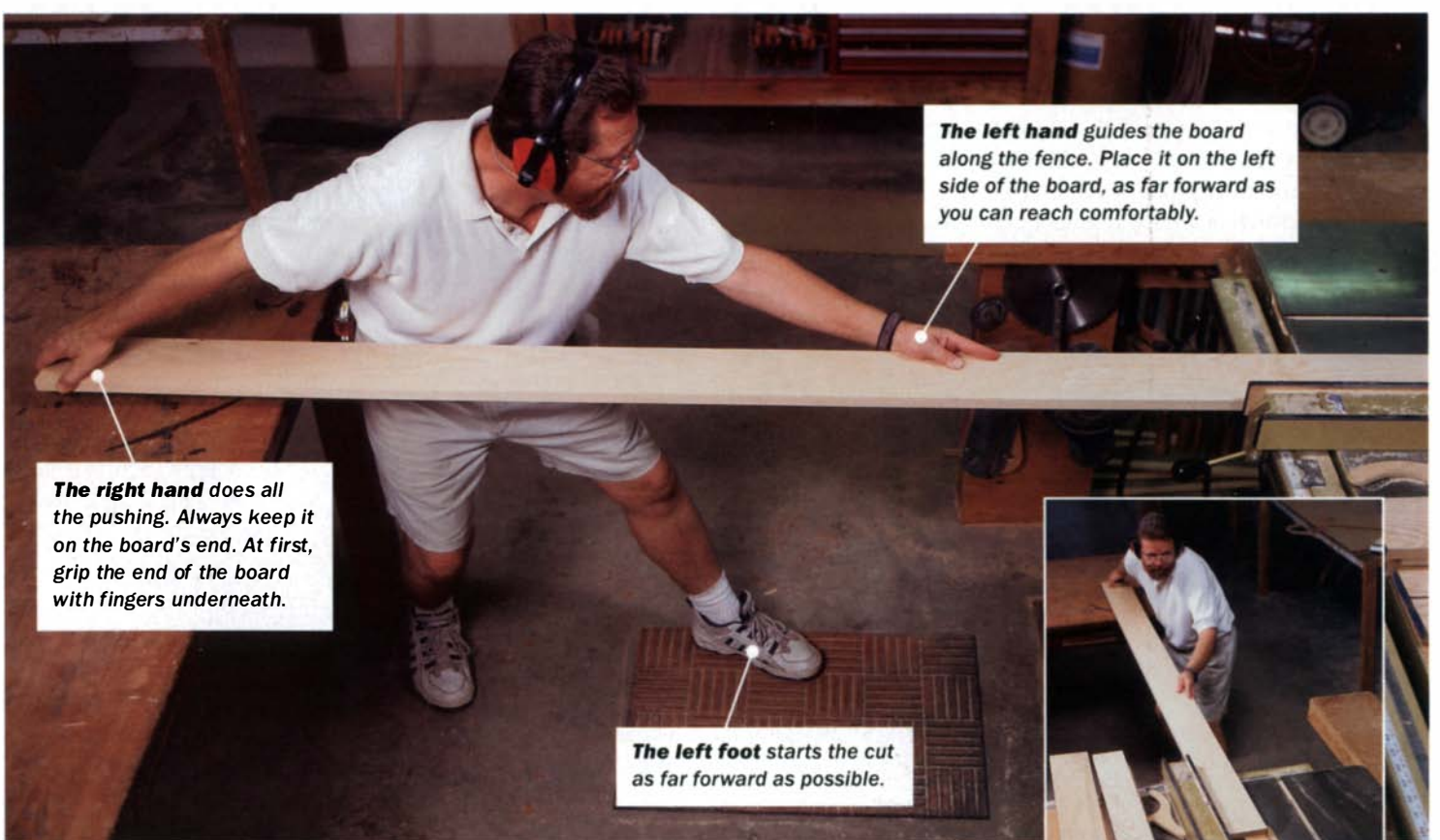
When I tell my students that a lot of professional woodworkers use a tablesaw to get glue-ready edges, I sometimes hear gasps of disbelief. Most woodworkers think the tablesaw cuts crude, uneven edges, which must be cleaned up on a jointer. The assumption is that the smoother surface a jointer gives is better for glue, but this isn't always true. Glue must penetrate below the surface of the wood to do its job, so it needs open pores to seep in and grab hold. Jointer knives can compress the wood as they cut, glazing the surface and preventing maximum glue penetration—especially if the knives are dull or if the board is run over the jointer too slowly. However, running an edge over a jointer too fast cuts a pronounced wave pattern. If severe enough, only the tips will touch when two boards are put together, creating a wider glueline than is desirable.

The right technique on a tablesaw creates a straight, square and slightly abraded surface, which is ideal for glue joints. And a properly sawn edge, if it's to be left exposed, needs only light sanding to be finished. The trick is mostly in the way in which you feed the board through the cut. It has to move through the blade at a constant speed without wavering. All you need is a tablesaw with a powerful motor (3 hp or more), a good quality triple-chip blade and an outfeed table. The rewards are great—less milling time for stronger glue joints and finished edges.

Two-step at the tablesaw

To cut a clean edge on a tablesaw, you'll need to rethink how you move the board over the saw, as well as how *you* move. The commonly accepted technique of standing next to the saw and feeding boards hand over hand ensures an uneven edge and, frankly, is a dangerous habit. There is a total reliance on friction between the hands and the top face of the board to feed it forward, hold it down on the table and press it

DANCE STEPS FOR A SMOOTH RIPPING TECHNIQUE



Start the cut by holding the end of the board...

Tablesaw The trick is learning the steps in the dance

BY LON SCHLEINING

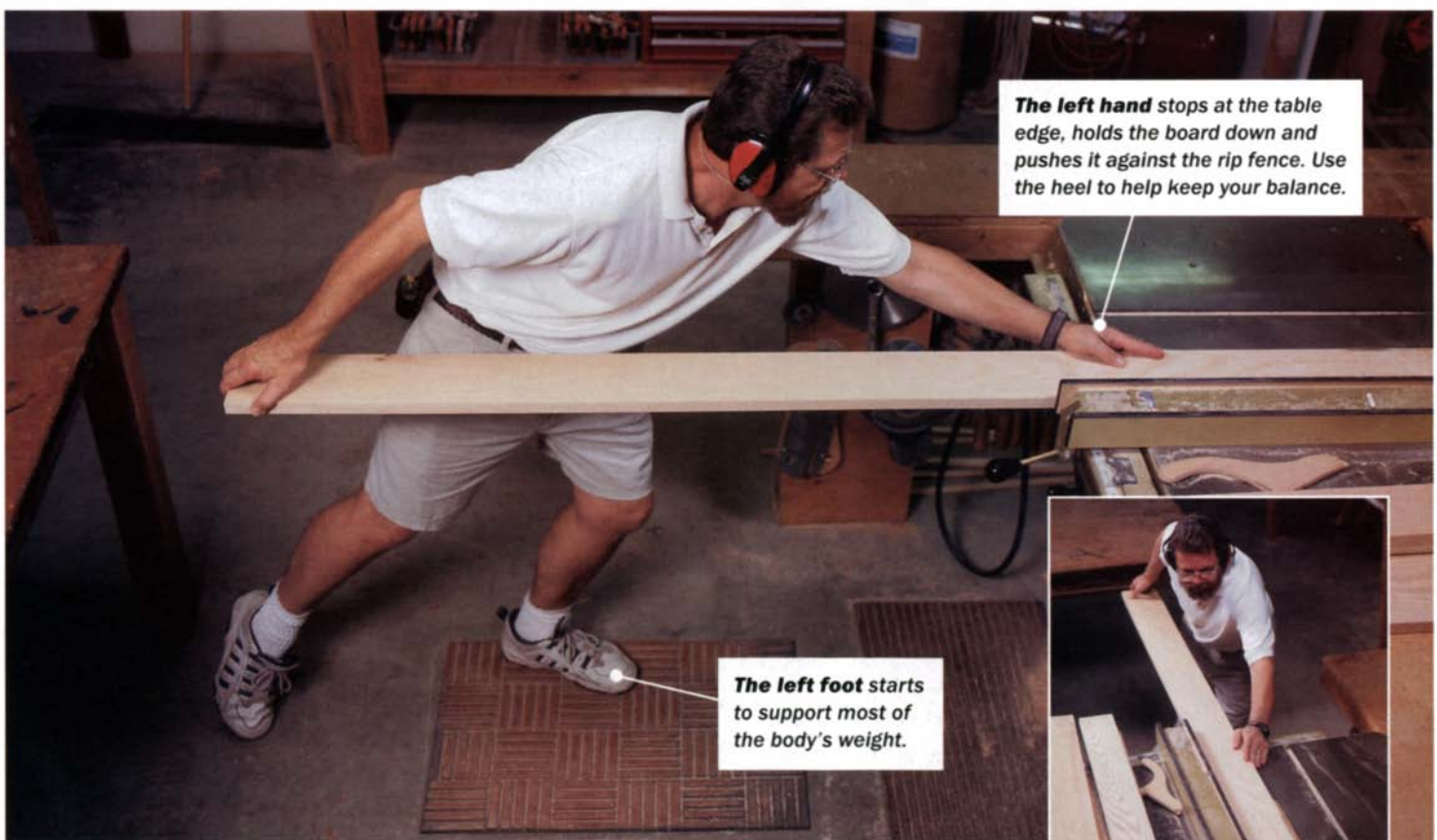
against the rip fence. The body is out of balance, and the hands (especially the left) move very close to the blade. One slip and the unthinkable might happen.

The following technique is a lot safer, but somewhat more complicated. It's very much like a bowling step. You need to coordinate your feet, hands and body into one fluid movement to ensure that the board goes over the saw steadily. I'll walk you through the technique presuming that you have one edge of the board straight already. As you might have guessed, I straighten the first edge on the tablesaw instead of the jointer (see the box on p. 84), but use whatever method suits you.

The main focus of the technique is to keep the board moving safely and at a constant speed during the cut. This requires that you start and end the cut with your right hand pushing from the end of the board. Guide the board with your left hand, placing it as far forward on the board as you can comfortably.

Depending on how long the board is, you may need to start the cut standing a certain distance back from the saw, and take a step or two toward the saw during the cut. This is when keeping the cut steady becomes more difficult, though by no means impossible. The key is to start with your left foot as far ahead of you as possi-

A clean joint line fresh from the tablesaw. *Sawn edges without further preparation can make perfectly good glue joints.*



lean into the cut, shifting your weight forward...

Photos except where noted: Strother Purdy

turn your right hand over when the board's end comes alongside you...

ble so that you need only take one smooth step with your right foot to reach the saw and finish the cut (the photos show how to complete this movement).

A triple-chip blade on a powerful saw

The right blade with this job, as for many things in life, is a compromise. In my experience, combination teeth can't remove material rapidly and produce a smooth edge. But pure rip grinds are often a bit too aggressive to cut cleanly. They remove material much faster than a combination grind but leave an edge that is too rough for gluing. Triple-chip grinds are less aggressive but remove material rapidly enough to provide the cleanest overall ripcut. However, beware of cheap triple-chip blades: I've found a range of quality among them that substantially affects performance.

Tablesaw setup is just as important as blade choice (for more on tuning up your tablesaw, see *FWW* #114, pp. 60-64). The blade must run parallel to the fence. If it

Getting the first edge straight on a tablesaw

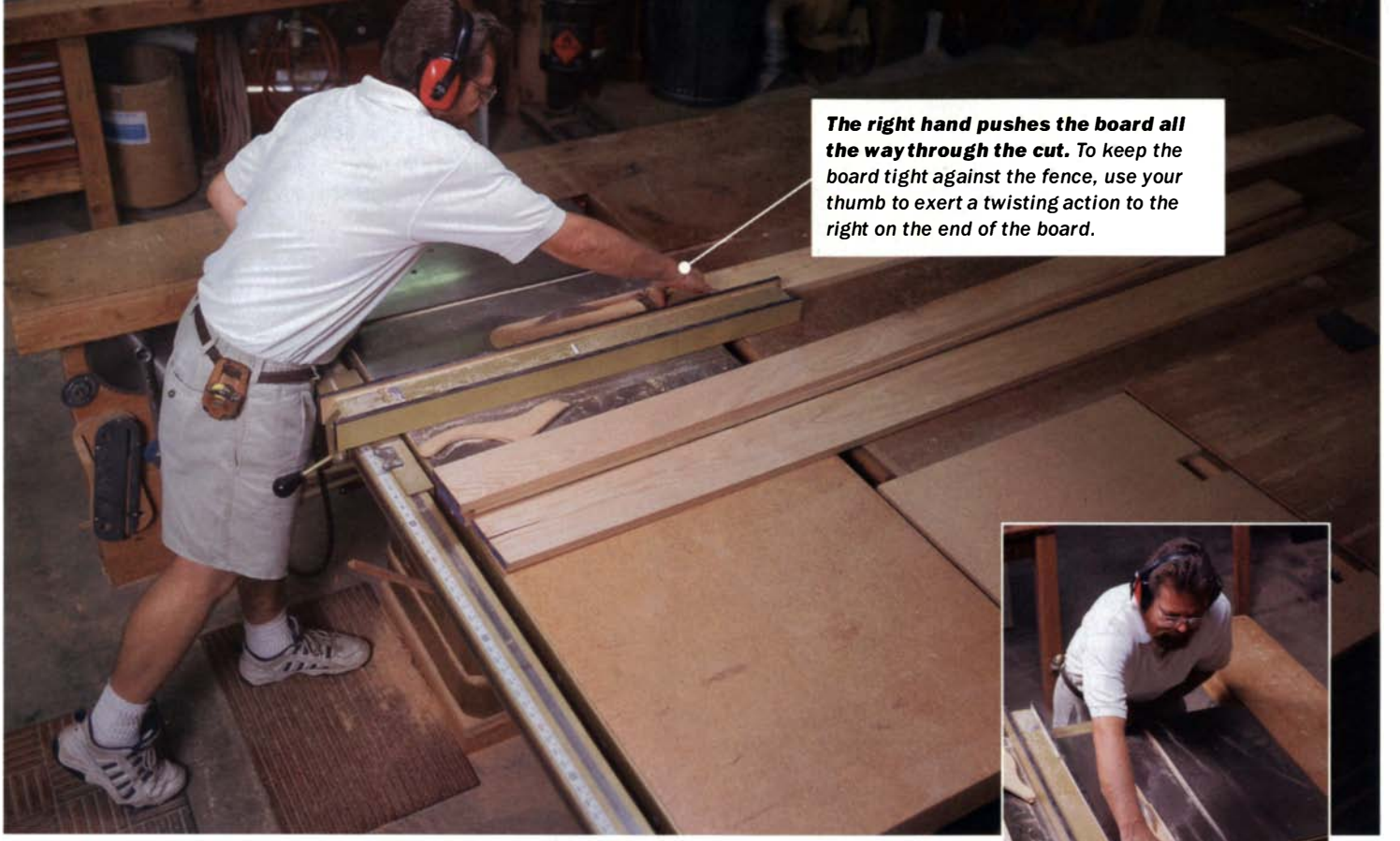
The jointer is unmatched at making a warped board straight and flat on its face. It's what they were designed to do. However, they aren't the only machine that can get a first edge straight on an uneven board. For edge-jointing the S2S lumber I buy, I choose my tablesaw every time. I find it works faster. Where it might take 10 passes over a jointer to get a straight edge, I can do it on the first pass over my tablesaw with a minimum of set-up.

Unlike the jointer, the tablesaw needs a guide to do this. A piece of ¾-in.-thick plywood for a template, slightly wider than the board to be cut, and a few brads are all you need. Make sure that the edges of the plywood are straight and parallel.

I align one edge of the plywood along the board exactly where I want the cut to take place so that the waste edge of the board is peeking out from under the plywood. I then nail the plywood to the top of the board with small brads. You usually only need one nail at each end, and by using a longer-than-needed board, you can cut off each end where the nails left holes.

I set the fence to the width of the plywood and guide the assembly through the saw as I would if it were a single board (see the photo at right). I keep the edge of the plywood against the rip fence, and just like magic, the edge of the board below is cut straight as a string pulled tight.

This technique can be used to straighten rough edges, crooked edges or to cut tapers. —*L.S.*



The right hand pushes the board all the way through the cut. *To keep the board tight against the fence, use your thumb to exert a twisting action to the right on the end of the board.*

and finish the cut with your right hand only.

doesn't, you'll get a condition known as heel and toe, which can produce deep swirl cuts down the edge of the board. For ripping long boards, the hands of a well-intentioned helper are no substitute for a solid outfeed table. The smallest amount of lateral wandering from the line of cut will give you a less than perfect edge.

Edge-jointing without a jointer. *Template registers against rip fence and guides uneven boards through a straight cut.*

There is no substitute for power to get the best edges. It's possible to do it with less than 3 hp, but lower horsepower machines have smaller sweet spots—the range of feed rates that a motor can handle without burning the edge or bogging down. The technique isn't impossible on a contractor's saw with a 1½-hp motor (I used one for years), but it's a lot harder.

If you push a board through any saw too fast, the motor will bog down and the blade will wobble, producing an uneven cut. But if you slow down too much, accumulated friction will burn the board. Both problems will leave you with a flawed edge. Higher horsepower motors can handle a wider range of feed rates—between burning at slow feed rates and bogging down at high feed rates. This makes it much easier to get a clean edge because you're not walking a tightrope between too slow and too fast.

Practice makes perfect

If this all sounds complicated, it is—at first. My suggestion for learning this technique is to practice. I recommend using an 8-ft. length of ¾-in. particleboard about 10 in. wide. Its weight and cutting resistance are similar to hardwood. Using particleboard keeps you from turning a lovely piece of cherry into kindling. The idea is to practice the hand and foot movements until the motion is entirely fluid.

Make several cuts in succession, taking off about ¼ in. with each cut, but never less than 3/16 in. or just enough so the blade is fully engaged with the board. If the blade runs free, it will oscillate slightly. As it engages the wood, the kerf made in the wood dampens this oscillation. The design of a good blade takes this into account. If it is cutting only on one side—not fully engaged in the wood—a tablesaw blade will continue to oscillate and produce a gouged edge.

For the learning session, use your utility tablesaw blade because particleboard is quite abrasive and will quickly dull a triple-chip blade. After a dozen or so cuts, the process should start to feel familiar and will become as natural a movement as any. □

Lon Schleining has designed and built stairs in Long Beach, Calif., for 19 years.

Bottom photo: Joe Romero

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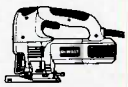

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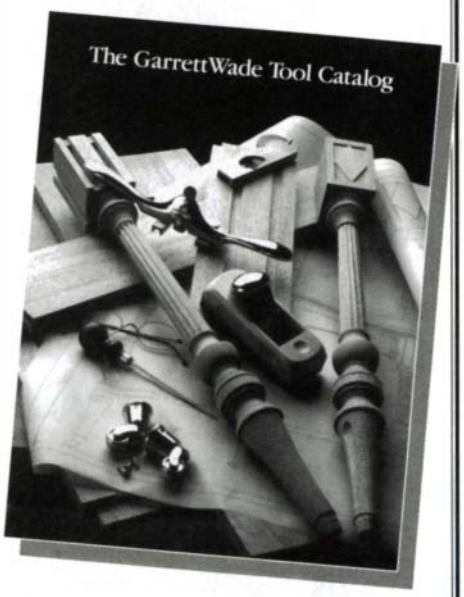

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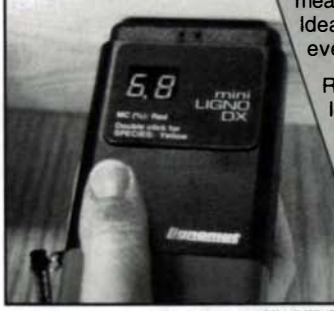

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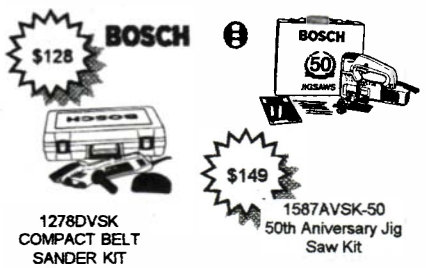

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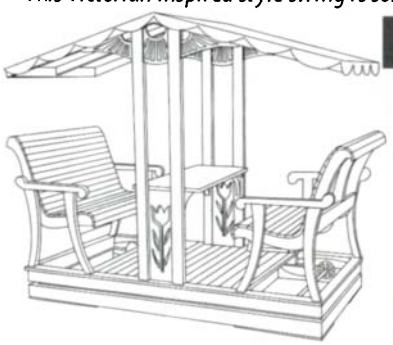

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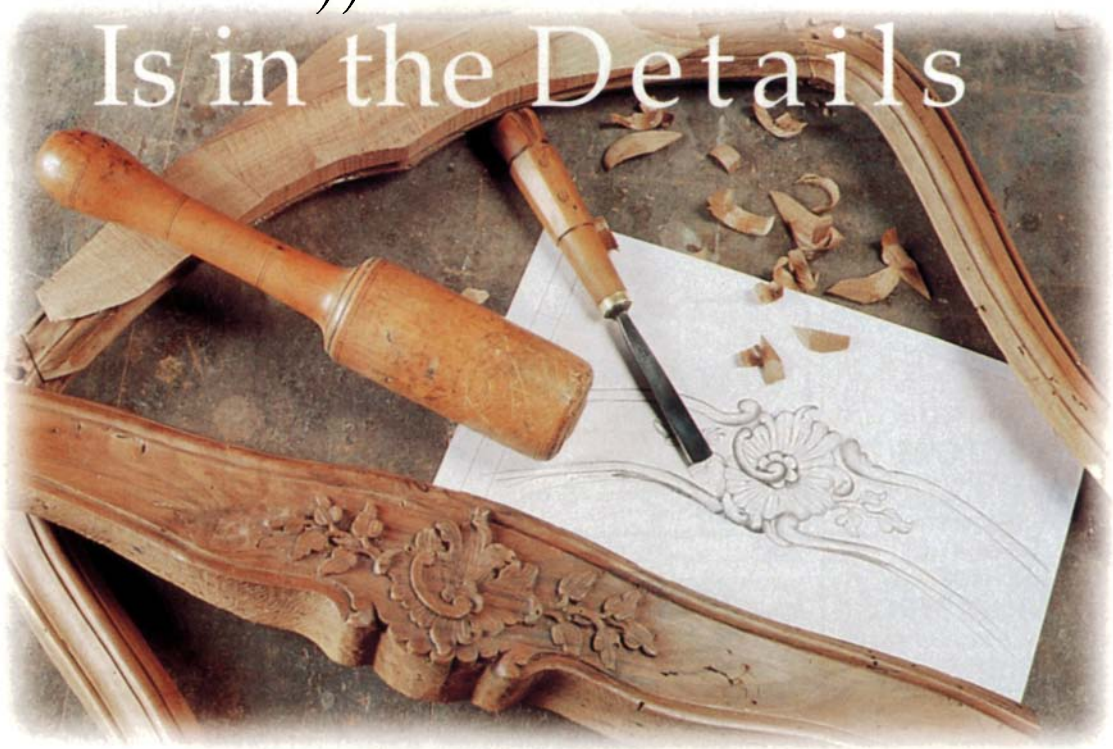

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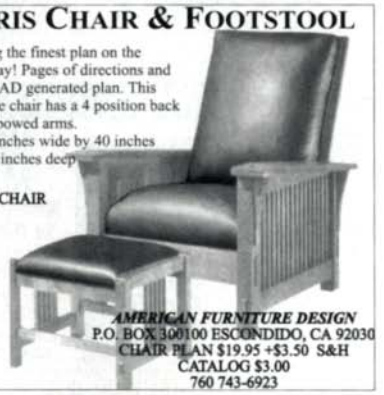

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Improved benchtop planers. *Delta and DeWalt 12½-in. planers have cutterhead locks, which help reduce snipe. Both machines leave a good finish.*

Two 12½-in. benchtop planers reduce snipe

Delta and DeWalt recently upped the standard for benchtop planers. The Delta 22-560 and the DeWalt DW-733, both 12½-in. machines, have cutterhead locks. These locks significantly reduce snipe—a deep bite at the beginning and end of a cut.

The locking cutterheads are a definite improvement over other small planers, which have a tendency to snipe. I used both planers on a variety of hardwoods and found both produced a very smooth surface that required only light sanding. Both machines left only a hint of very tolerable snipe, less than 1/64 in., on the outfeed side of the workpiece (see the photo above).

Both machines have infeed and outfeed tables; DeWalt's tables are 5 in. longer at each end, which is helpful when planing long stock. Delta's machine comes with a stock-return roller on top of the machine.

The DeWalt planer has several details that I really like: a tool tray on the machine, a cord wrap and a scale that indexes off the workpiece to tell how much material will be removed in one pass (see the photo at left). Both are priced less than $450. *—Pat Scruggs*

DeWalt's planer has a material removal gauge. *The easy-to-read gauge indexes directly off the workpiece.*

Keeping oil-based finishes fresh

If you try storing half-empty cans of oil-based finishes such as varnishes and stains, after a time, they will gel or harden. A new product, Bloxygen, can increase the shelf life of these products.

The idea behind Bloxygen, which comes in an aerosol can, is quite simple (see the photo at right). Keep oxygen away from the surface of the finish, and it won't harden. All you do is zap a few seconds worth of the gas, which is a combination of nontoxic carbon dioxide, argon and nitrogen, into the can of finish. These gases are heavier than oxygen and settle on top of the finish.

Finish saver. *Bloxygen, a mix of nontoxic gases, helps preserve oil-based finishes.*

The product performed well on oil-based products. It will not work on shellac, solvent or waterborne lacquers because these finishes dry differently and can't be protected by a blanket of gas.

Bloxygen costs about $9 a can. For availability, call IronWood Designs (805-542-9219), or contact the company by e-mail (IronWood.Designs@pobox.com).

—Jeff Jewitt

Finishes for furniture

Waterborne urethane: It seems not a week goes by that we don't hear about a new finishing product. Here are two that bear mentioning.

Most woodworkers probably have never heard of Van Technologies, a company out

Professional-grade wood finish. *Van Technologies recently entered the waterborne wood-finishing products market.*

Photos except where noted: Anatole Burkin; top right photo: Jeff Jewitt

of Duluth, Minn. (see the bottom right photo on p. 96). The company manufactures coatings for metals and plastics, including the scratch-free coatings used on compact discs. Van Technologies recently entered the wood-finishing products market with a line of waterborne topcoats, sealers and stains. I tried a urethane coating on a table and found it easy to apply with a sprayer, even under terrible conditions—hot, humid weather. The urethane flowed out nicely, dried clear and tough, and has withstood numerous liquid spills. I also tried brushing the finish, but I ended up with lap marks, which required rubbing out. A gallon of urethane sells for about $30. For more information, contact the company at (218) 525-9424.

—Anatole Burkin

Finish comes with applicator: If you want an easy way to apply a finish and don't own any finishing equipment, check out a new line of wipe-on finishes from Deft—Wood Stain Plus and Step Saver Plus (see the photo below). These products come with a pad applicator built into the can. With a press of a button, material from the aerosol can is delivered to the foam pad, which is wiped across the workpiece.

Deft's pad works fine, as long as you are diligent about cleaning it thoroughly between uses. The pad works best on flat or on gently curved workpieces. Both finishes were easy to apply evenly, without lap marks. The products are available in a variety of shades.

Applicator and finish, all in one. *Deft Wood Stain Plus and Step Saver Plus aerosol finishes have built-in applicator pads.*

Step Saver Plus contains both stain and a finish made up of tung oil and urethane resin. Wood Stain Plus is available in 5-oz. and 12-oz. cans for about $7 and $10. Step Saver Plus comes in 8-oz. cans for about $10.

These products are available at many hardware and department stores.

—Roland Johnson

A good-quality HVLP spray outfit for less than $500

With the advent of turbine-driven high-volume, low-pressure (HVLP) guns, spray technology has become available to many finishers with limited resources and space restrictions. A new arrival is a compact unit made by Chiron, a German firm. The SG-90 consists of the turbine unit and the PN-2 spray gun (see the photo above). Also included in the system is a connecting hose, three fluid nozzles, a gauge to check fluid viscosity and a well-written, easy-to-follow instruction manual.

Mid-priced HVLP system from Germany is great for beginners. *Chiron's SG-90 spraying system includes a variable-speed turbine and a gravity-fed gun.*

When I first used the unit to spray a solvent lacquer, the plastic gravity-fed cup leaked at the top, and when I wiped the spilled lacquer off with thinner, the manufacturer's painted decal was removed. I called the manufacturer, and they replaced the plastic cup with an aluminum one. (The manufacturer has since switched to aluminum cups for all of its units.)

I used the sprayer for three weeks and found it to be a real gem, especially the gravity-fed gun, which was very easy to clean after use. Although the turbine looks small, it packs a respectable 81 cubic feet per minute, which is plenty of output to atomize pigmented oil-based paints and waterborne finishes, materials that are tough to atomize properly. The unit is not explosion-proof, so it's not intended for use with highly flammable solvent-type finishes such as lacquer. The turbine has an unusual feature—an infinitely adjustable airflow regulator. This is a real blessing when cleaning the gun or spraying the insides of cabinets, because you can dial it down and reduce bounce-back.

I would recommend the Chiron SG-90 particularly to novices who want to get into spraying but don't know a lot about spray technology.

The Chiron SG-90 costs $495.95, and it is available through Klingspor's Sanding Catalogue (800-228-0000). *—J.J.*

Combo compass and marking gauge

Veritas has come up with a dual-purpose tool: a direct-reading compass and marking gauge. At first sight, the stainless-steel body and plastic guides and pencil holder of this carpenter's gauge seem insubstantial, but in use, the tool proves to be tough enough. You can draw circles up to 12 in. dia.; as a marking gauge, its capacity is 6 in. The tool's scale reads both radii and diameters, in inches and centimeters (see the photo at right). Because of its shape, however, it won't allow you to scribe cabinets.

The gauge accepts any standard pencil, and the pin holder rotates and locks safely out of the way so that you can stuff the tool in your pocket without piercing any body parts. The gauge, which is available from Lee Valley and Veritas Fine Woodworking Tools (800-871-8158), costs $15. *—A.B.*

Two layout tools in one. *Veritas carpenter's gauge can be used to draw curves as well as mark stock.*

Photo at left: courtesy of Deft; top photo: courtesy of Klingspor

Boring jig simplifies aligning drawer pulls

Tad Lostlen of Precision Casewerk, a Southern California cabinet shop, has come up with an ingenious drawer and door pull positioning guide that doubles as a boring jig for 32mm cabinet construction.

Lostlen's jig, called the True Position drill guide, consists of a sturdy aircraft aluminum T-square fitted with adjustable stops. Replaceable bushings in the stops and T-square accept a 5mm drill bit for precise boring. The scales, in inches and millimeters, are easy to read.

The guide will center pulls on drawers up to 17 in. tall. It can be used on left- and right-facing doors. The jig can also be used to position 35mm hinge plate holes and bore 5mm shelf-pin holes. For boring shelf holes, order additional sliding guides. You can even use the guide to draw circles up to 12⅜ in. radius.

The True Precision drill guide costs about $120. For ordering information, call (888) 790-7565. —*A.B.*

Hole-boring jig for hardware. *The True Position drill guide simplifies aligning shelf pins and drawer and door pulls. It can also be used as a guide for 32mm cabinet construction.*

Low-cost stop block for chop saws

If you use a miter saw for cabinet work and furnituremaking, a good fence and stop block can greatly increase the accuracy and versatility of this tool. These accessories are as essential as a good rip fence on a tablesaw.

A gauge for stopped cuts. *The Broset Precision Stop Block works with chop saws, radial-arm saws and tablesaw crosscut boxes.*

An economical way to go is make your own chop-saw station and fence out of wood, and order a Broset Precision Stop Block (see the photo at left).

The stop block is manufactured out of square metal tubing and has a spring-loaded knob, two fine-adjusting screws and a pair of magnified hairline indicators. It is sized to fit a fence made of 2x4 stock. You can use the stop block as is or order self-stick rules (left-to-right or right-to-left reading) and place them on top of your shopmade fence. A few twists of the stop block's locking knob keeps the unit firmly in place. I've banged it with large pieces of lumber, and it has survived just fine.

The Broset will also work on radial-arm saws, crosscut boxes on tablesaws or router fences. The Broset Precision Stop Block, which is manufactured in New Zealand, is available from mail-order catalogs for about $35. The self-stick rules can be purchased for about $7. —*A.B.*

Depth stop for Forstners

SlipStop is an adjustable tripod collar that can be secured anywhere along the shaft of a Forstner or Multispur bit. In use, when the desired hole depth is reached, the tripod feet press up against the workpiece and stop the bit's travel. If you drill gently, as you should with large bits, the plastic tripod feet will not mar a workpiece. SlipStops come in six sizes and will accommodate bits from 9/16 in. to 2⅛ in. dia. They cost about $10 to $11 each and are available from Woodworker's Supply (800-645-9292). —*A.B.*

Depth control. *SlipStop fits over the shank of a Forstner bit, simplifying controlled-depth cuts.*

Pat Scruggs is a carpenter and cabinetmaker in Woodbury, Conn. Jeff Jewitt repairs and restores period furniture in North Royalton, Ohio. Anatole Burkin is an associate editor of FWW. *Roland Johnson builds and restores furniture in St. Cloud, Minn.*

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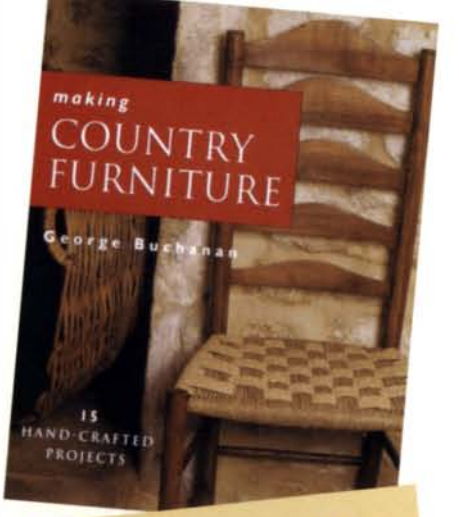

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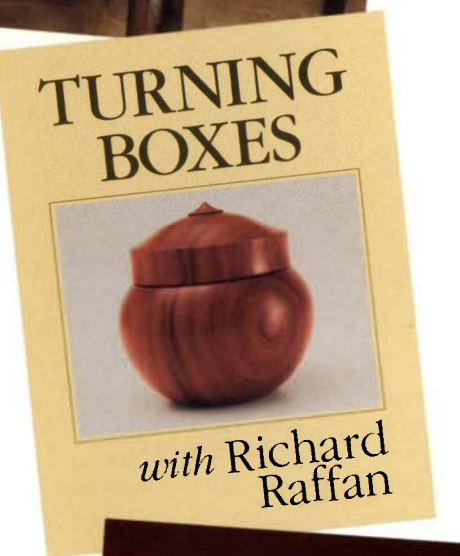
HARDCOVER, 160 PAGES, ISBN: 1-56158-262-X, ITEM# 070389, **$22.95**



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There has never been a book devoted solely to turned boxes—until now. This informative book is for any woodturner interested in adding new skills and ideas to their work through the turning of boxes. Includes detailed illustrations and step-by-step shop photos with thorough explanations of the tools being used. Plus, it offers helpful hints for selling the boxes you make. **Available 3/18/98.**

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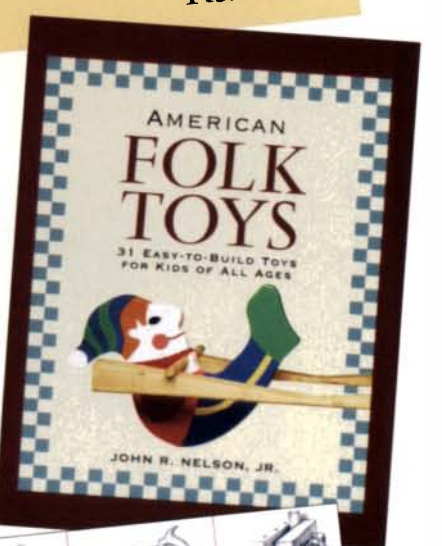

NEW! American Folk Toys *by John R. Nelson, Jr.*

Making folk toys requires only basic woodworking skills and a desire to create lasting treasures. Learn to make toys using the same hand tools yesterday's toymakers used over 150 years ago. Offers over 30 toy projects with detailed instructions including a Carousel, Climbing Bear, Sailboat, Checkers, Doll House and more! **Available 4/15/98.**

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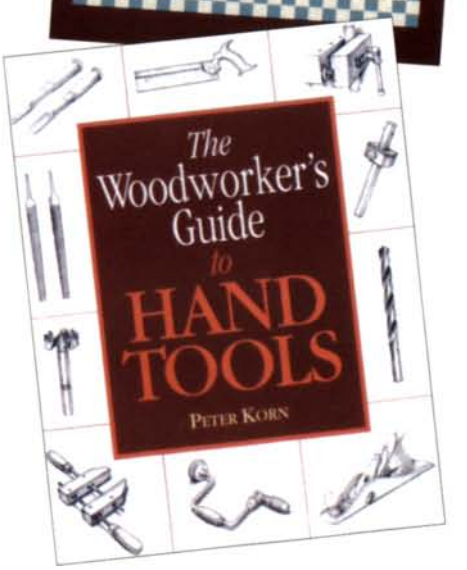

NEW! The Woodworker's Guide to Hand Tools *by Peter Korn*

Virtually all the hand tools commonly used by the contemporary woodworker or furniture maker are covered in detail in this book. Discover each tool's special uses, what to look for when buying a hand tool, and how to tune and use each tool most efficiently. Plus, you'll find a thorough discussion of the advantages of hand tools over power tools. **Available 3/18/98.**

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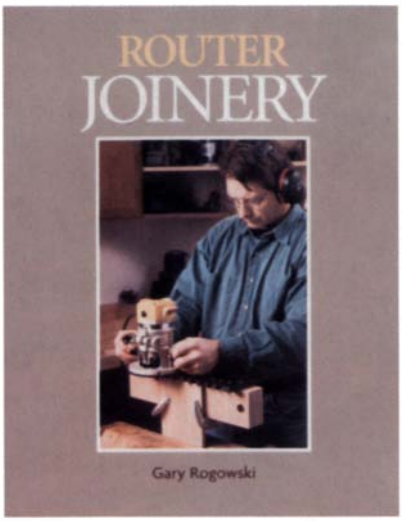
Reviews

Router Joinery *by Gary Rogowski.* *The Taunton Press, Newtown, Conn. (800-888-8286); 1997. $24.95, hardback; 182 pp.*

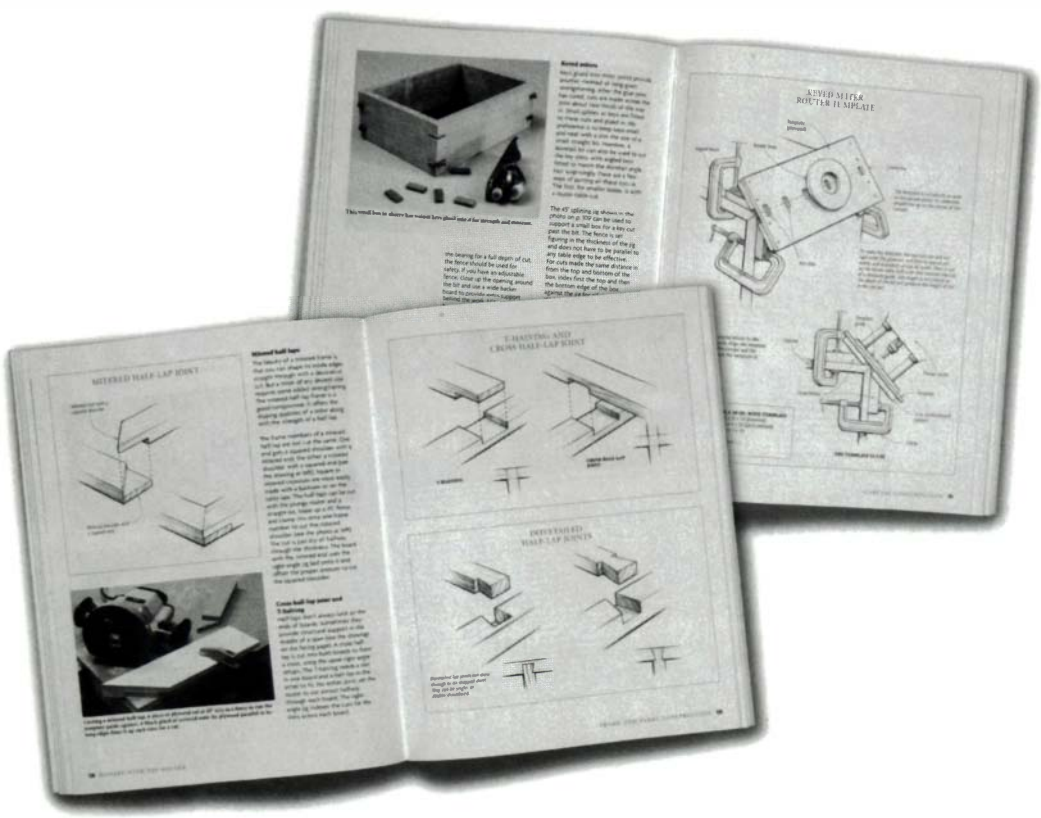


Considering the router's popularity, I wasn't surprised to find a new book on router joinery. What surprised me, though, was to find a router book that offers something different from the rest. *Router Joinery* does not try to be a complete guide to routers. Instead, the emphasis is on how to cut good joinery and to "give you a framework, a way to think about furniture construction" with the router. Rogowski accomplishes this goal admirably.

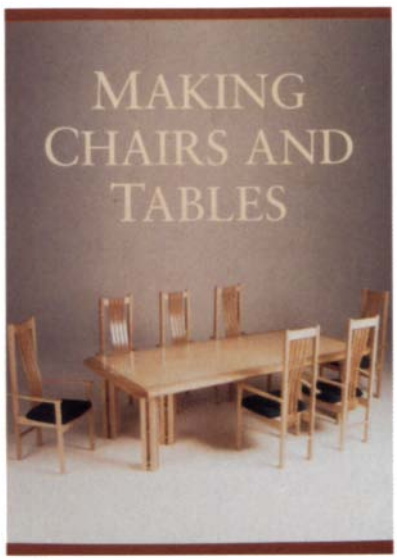
After covering the basics of routers, including their construction, proper use and selection, Rogowski explores basic joinery in a section that I found particularly welcome. Without a grasp of fundamental joinery principles, there is no router information in the world that will salvage your creations.

The last half of the book explores router joinery head-on. With an abundance of clear and relevant diagrams and photographs, Rogowski leads us through dozens of techniques, jigs and several projects. There is a wealth of information on the mortise-and-tenon joint. This seems appropriate to me, considering how much misinformation is published about this simple, elegant and strong joinery method.

Had I received this book along with my first router, it would have saved me countless hours of frustration (and much firewood). There is no book that will stop you from making mistakes; however, *Router Joinery* might just make that learning process less painful.—***Chuck Brown***



Making Chairs and Tables . *Guild of Master Craftsman Publications Ltd. Distributed by Sterling Publishing Co., New York, N.Y. (800-367-9692); 1997. $14.95, paperback; 120 pp.*



This book is a compilation of articles from five British magazines (*Woodworking International, Woodworking, Woodworking Today, Furniture, and Furniture and Cabinetmaking*). I didn't expect to find much of interest here because the pieces are mostly contemporary, and there is no overall sense of direction beyond the subject

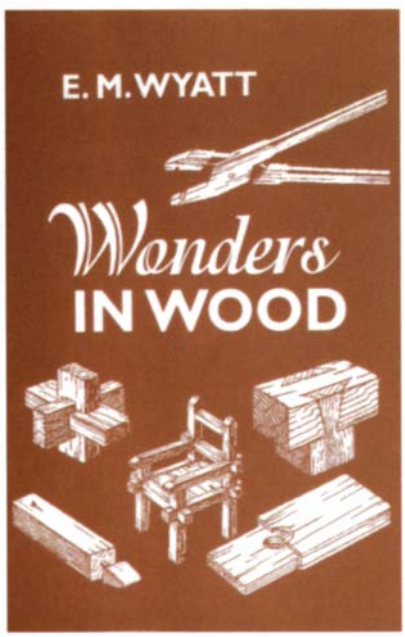
itself. But in the few weeks I've had this book, I've found it has an appeal equal to leafing through a stack of recent magazines, which everyone enjoys. More than that, it's broader and shallower, lacking the narrow focus of a single-author book. This allows for the pleasure of casual reading without any obligation to bookmark the page.

There are several articles on creative chair designs, all in a contemporary mode, and several on tables with a similar theme. As well, there are attractive commissioned pieces that required first-rate construction and functional design: two elements that mitigate against whimsy and overwrought self-indulgence. Though most articles are concerned with modern furniture, there are three articles about Windsor chairs. There are also articles about caning, upholstering, repairs and faux finishing, which together give this apparently modest book an intriguing range.

This is not a book to keep you awake late at night, and it will not get you deep enough into the subject to inflame you with passion. But it is a rather pleasant diversion and will be an agreeable companion on a rainy afternoon.

—Joe Beals

Wonders in Wood *by E. M. Wyatt.* *Linden Publishing, Fresno, Calif. (800-345-4447); 1997. $8.95, paperback; 76 pp.*



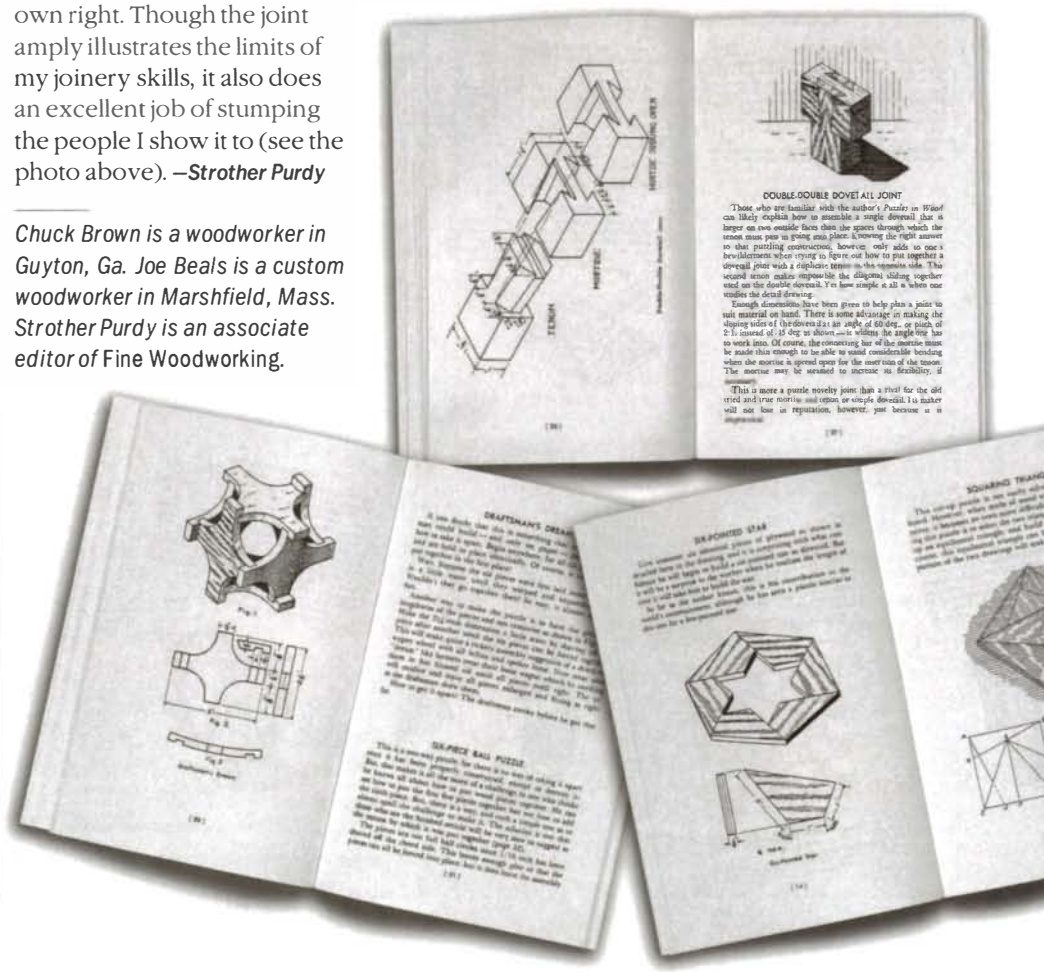
I have an uncle who has a passion for mechanical puzzles. His eyes light up when he makes my brow furrow over five pieces of wood I can't arrange into a star. The longer I'm stumped, the happier he gets. Frankly, I never understood the desire to inflict difficult puzzles on friends and family, until I came across this book.

Wyatt's *Wonders in Wood*, first published 50 years ago, is an eclectic compilation of puzzles, magic tricks, games and just plain clever things to do with wood. Some are rather too clever, such as a pair of wooden scissors. But by and large, the puzzles have a yesteryear charm and are truly challenging to unpuzzle. Projects such as the "eighteen-piece double-cross" and an odd geometrical object called the "draftsman's dream" look like perfect small projects to unwind with—and to stump a nephew.

Wyatt is *very* short on construction details, and a few of the puzzles are annoyingly difficult to build. Several botched attempts to make the "double-double dovetail joint" had me hot under the collar, until it occurred to me that the making of the puzzle was a puzzle in its own right. Though the joint amply illustrates the limits of my joinery skills, it also does an excellent job of stumping the people I show it to (see the photo above). *—Strother Purdy*

Chuck Brown is a woodworker in Guyton, Ga. Joe Beals is a custom woodworker in Marshfield, Mass. Strother Purdy is an associate editor of Fine Woodworking.

Hard to figure out, harder to put together. *The puzzles in* Wonders in Wood *will stump your friends, family and co-workers for no apparent reason—other than amusement.*



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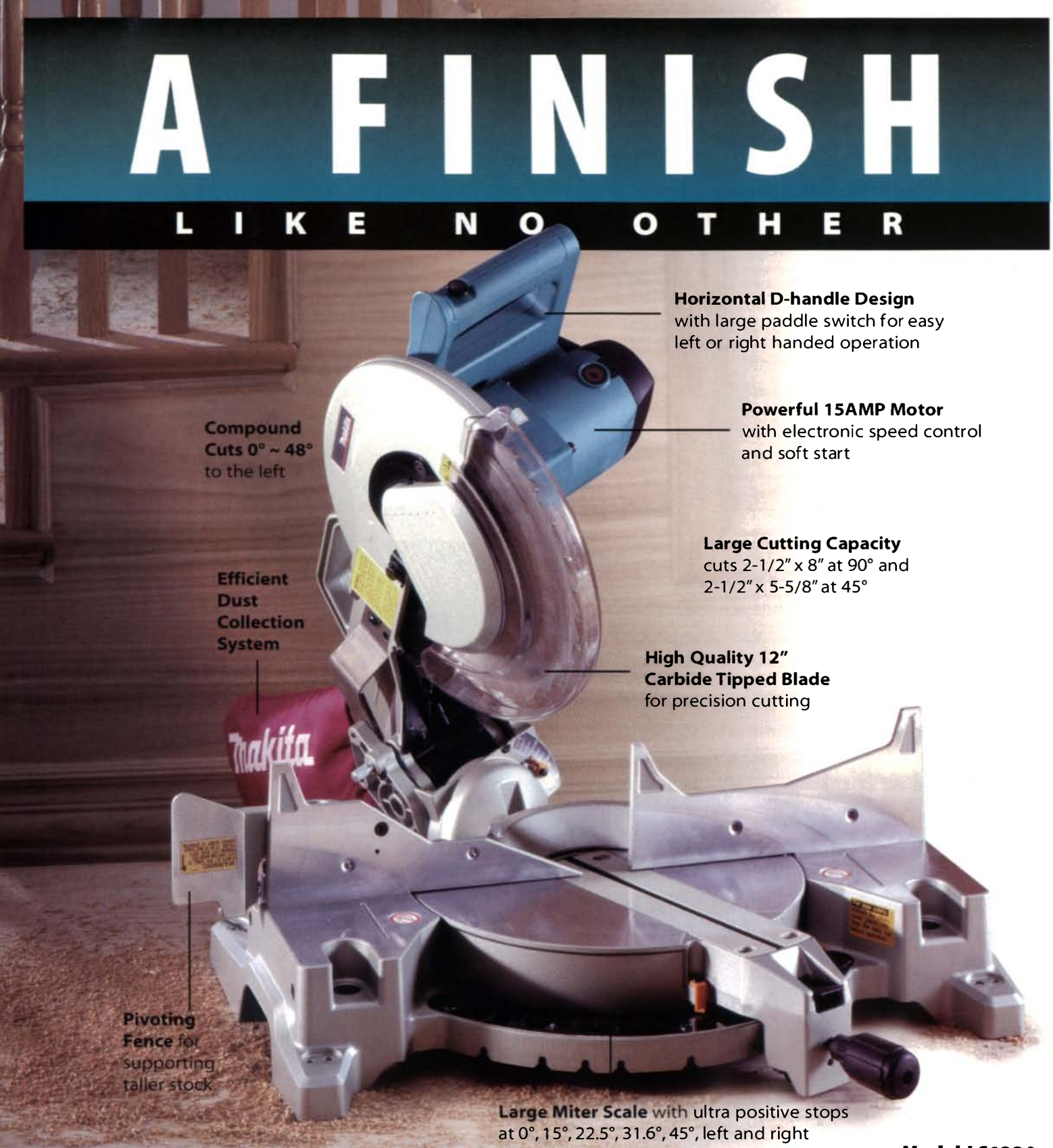

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Events

Listings of gallery shows, major woodworking fairs, lectures, workshops and exhibitions are free but are restricted to happenings of direct interest to woodworkers. Only workshops sponsored by not-for-profit groups are listed. We list events (including entry deadlines for future juried shows) that are current with the time period indicated on the cover of the magazine, with overlap when space permits. We go to press three months before the issue date of the magazine and must be notified well in advance. For example, the deadline for events to be held in March or April is January 1; for July and August, it's May 1, and so on.

ALABAMA: Meetings-Alabama Woodworkers Guild, second Thursday of each month at 7 p.m. Acton Moulding & Supply, Helena. Contact Leonard Sanders (205) 822-6876.

ALASKA: Meetings-Alaska Creative Woodworkers, fourth Monday of each month August to May at 7 p.m. Anchorage Museum. For more info, call Arnold Geiger (907) 345-3077.

ARKANSAS: Meetings-Woodworker's Association of Arkansas, first Monday of each month at 7 p.m., Jacksonville; Central Arkansas Woodcarvers, second Tuesday at 7 p.m. and fourth Tuesday at 6:30 p.m. Arkansas Arts Center, Little Rock. (501) 985-1118.
Meetings-Ozark Woodturners, third Saturday of each month in Mountain Home. (870) 424-5893.

CALIFORNIA: Show-Sacramento Woodworking show, May 1-3. Sacramento Convention Center, Hall B, 1400 "J" St., Sacramento. For info, call (800) 826-8257.
Show-Greater Los Angeles woodworking show, April 24-26. Orange County Fairgrounds, 88 Fair Ave., Costa Mesa. For info, (800) 826-8257.
Call for entries-San Diego Fine Woodworkers Associations 17th annual Design in Wood, June 16-July 5. Deadline: May 1. For more info, call Bob Stevenson (619) 422-7338.
Exhibition-Wood Works, thru March 15. Bedford Gallery, Dean Lesher Regional Center for the Arts, 1601 Civic Drive, Walnut Creek. (510) 295-1416.
Classes-Swings, Tables, Colors and Surfaces with John Grew-Sheridan. Contact California Contemporary Craft Association, P.O. Box 2060, Sausalito, 94966. (415) 927-0321.

COLORADO: Workshops-Summer workshops in woodworking and furniture design, June 8-Sept. 18. Contact Gail Fredell, Anderson Ranch Arts Center, P.O. Box 5598, Snowmass Village, 81615. (970) 923-3181.

CONNECTICUT: Call for entries-49th annual Art of the Northeast, May 8-June 12. Deadline: March 20. Silvermine Guild Arts Center, 1037 Silvermine Road, New Canaan. For info, call (203) 966-2613.

DISTRICT OF COLUMBIA: Show-Washington, D.C. woodworking show, March 20-22. D.C. Armory, Exhibit Hall, 2001 E. Capitol St. (800) 826-8257.

FLORIDA: Meetings-South Florida Woodworking Guild, every second Monday. Constantine, Ft. Lauderdale. Call Charlie Womack (954) 561-0941 or (561) 447-8016.
Exhibition-Fine Crafts, May 9-June 21. Florida Gulf Coast Art Center, 222 Ponce De Leon Blvd., Bellair. (813) 584-8634.
Meetings-Central Florida Woodworkers Guild, second Thursday of each month. American Legion Hall, 2101 Lee Road, Orlando. Contact Bob Lamprey (407) 292-8324.
Meetings-St. Petersburg Woodcrafters Guild, fourth Thursday of each month at 7 p.m. P.V.T.I., 6100 154th Ave. N., St. Petersburg. Contact Wally Hebel (813) 898-0569.
Meetings-Capital City Woodcarvers, every Monday at 7 p.m. Senior Citizen Art Center, Tallahassee. Contact Lee Roberts (904) 893-4293.
Meetings-North Florida Woodturners, first Tuesday of each month, Tri-State Automotive Warehouse, 745 W. Games St., Tallahassee. Contact John Penrod (904) 385-0608.
Meetings-Tallahassee Woodcrafters Society, second Tuesday of each month. For info, contact Walt Behrle (904) 668-6653 or Austin Tatum (904) 386-6876.
Meetings-Furniture Makers Guild, fourth Thursday of the month at Woodcraft Supply, 246 E. Semoran Blvd., Casselberry. Contact Gary West (407) 862-5677.

GEORGIA: Meetings-Woodworkers Guild of Georgia, second Monday of the month. Southern College of Technology, 1100 S. Marietta Parkway, Marietta. (404) 299-3972.

ILLINOIS: Meetings-Chicago Woodturners, second Tuesday of each month. York High School, Elmhurst. For more information, contact Harris Barbier (630) 964-0354.
Show-Chicagoland Woodworking show, April 17-19. Odeum, North and South Halls, 1033 N. Villa Ave., Villa Park. For more info, call (800) 826-8257.

INDIANA: Call for entries-Seventh biennial Works in Wood, Oct. 1-31. Slide deadline: Aug. 7. For applications, write or call Chesterton Art Gallery, 115 S. Fourth St., P.O. Box 783, Chesterton, 46304. (219) 926-4711.

KENTUCKY: Meetings-Kyana Woodcrafters, first Thursday of each month, 7:30 p.m. Walden School, 4238 Westport Road, Louisville. For info, call Ray Thornton (502) 499-1388.

MARYLAND: Exhibitions-Furn-Art-Ture: The Chair, thru April 10. Meredith Gallery, 805 N. Charles St., Baltimore. Call Terry Heffner (410) 837-3575.

MASSACHUSETTS: Classes-Woodworking classes, Boston Center for Adult Education, 5 Commonwealth Ave., Boston. (617) 267-4430.
Classes-Woodworking, carving. Horizons New England Craft Program, 108 N. Main St., Sunderland. (413) 665-0300.
Classes-Woodworking classes, year-round. North Bennet Street School, 39 N. Bennet St., Boston. (617) 227-0155.
Workshops-Shaker box construction, April 4-5. Hancock Shaker Village, P.O. Box 927, Pittsfield. (413) 447-9357.

***Works in Wood.** Chosen pieces of furniture and art designed in wood—like Jim Wolnosky's sculptural corner table of birds-eye maple, wenge and ebonized walnut—will be exhibited at the Chesterton Art Gallery in Chesterton, Indiana.*

Show-Massachusetts Woodworking show, April 3-5. Eastern States Expo, Young Building, 1305 Memorial Ave., West Springfield. For more info, call (800) 826-8257.
Workshops-Stairbuilding seminar and woodturning workshop, March 5-8. E&R System Technik, 85 St. George Road, Springfield. Contact Leon Nadeau (413) 827-7600.
Workshops-Woodworking fundamentals, April 13-17; cabinetmaking, April 20-24; furnituremaking, May 8-12. Heartwood School, Johnson Hill Road, Washington. (413) 623-6677.

MICHIGAN: Meetings-Metro Carvers of Michigan, second Tuesday of each month (except July and August) at 7:30 p.m. Helen Keller High School, 1505 N. Campbell Road, Royal Oak. (810) 771-1040.

MINNESOTA: Meetings-Minnesota Woodworkers Guild, third Tuesday of each month at 7:15 p.m. Demonstrations. Minneapolis. For info, contact Richard Gotz (612) 544-7278.
Show-12th American Craft show, April 17-19. Saint Paul Civic Center, St. Paul. For more info, call (612) 832-5000.

MISSOURI: Meetings-Kansas City Woodworkers Guild, third Wednesday of each month. Eugene (816) 452-6379.
Meetings-St. Louis Woodworker's Guild, third Thursday of each month at 7 p.m. Woodcraft Store, Olive Blvd., St. Louis. Contact Barney Davey (314) 225-2357.
Classes-Wood furniture design with Ron Diefenbacher, thru April 28. Washington University Fine Arts Institute, St. Louis. For more information, call (314) 935-4643.

NEBRASKA: Meetings-Omaha Woodworkers Guild, third Tuesday of each month at 7 p.m. Libert Christian Center, 60th and L St., Omaha. For more information, contact John Cahill, Box 45494, Omaha, 68145. (402) 334-5550.

NEW JERSEY: Meetings-Central Jersey Woodworkers Association, second Wednesday of each month (except July and August) at 7 p.m. Old Brick Reformed Church, Newman Springs Road, Marlboro. (732) 576-3052.

NEW YORK: Meetings and classes-New York Woodturners Assoc. meets bi-monthly. YWCA, 610 Lexington Ave. (53rd St.), New York City. Howard Alalouf (914) 337-0226.
Meetings-Long Island Woodworker's Club, first Wednesday of each month September to June at 7:30 p.m. Brush Barn, 211 Jericho Turnpike, Smithtown. (516) 360-1216.
Meetings-Traditional and contemporary woodworking. The Craft Students League at the YWCA, 610 Lexington Ave., New York City. For more information, call (212) 735-9731.
Fair-Woodstock-New Paltz arts and crafts fair, May 23-25. For info, call Scott Rubinstein (914) 246-3414.
Festival-American Crafts festival, June 13-14, 20-21. Lincoln Center for the Performing Arts, Columbus Ave., W. 64th St., New York City. Contact Sara Cogswell (973) 746-0091.
Show-Expressions in Wood: Collection of Anita and Ron Wornick, thru March 22. American Craft Museum, 40 W. 53rd St., New York City. (212) 956-3535.

NORTH CAROLINA: Meetings-North Carolina Woodturners, second Saturday of each month. Contact Tom Fitz, P.O. Box 1833, Hickory, 28603. (704) 890-4451.
Juried show-Piedmont crafts fair, March 14. Benton Convention Center, Winston-Salem. For more information, contact Kelly Persons (910) 725-1516.
Classes-Woodworking classes. John C. Campbell Folk School, One Folk School Road, Brasstown. (800) 365-5724.

OHIO: Meetings-Cincinnati Woodworking Club, second Saturday of January, March, May, September and November at 9 a.m. Reading High School, Reading. Write the club at 10125 Montgomery, Cincinnati, 45242.
Call for entries-Pathways '98, June 11-30. Deadline: April 3. Cleveland State University Art Gallery, 2307 Chester Ave., Cleveland. For info, call (216) 687-2103.
Meetings-Woodworkers of Central Ohio, second Saturday of September, November, February, April and June. Columbus. For more info, call Chuck (614) 457-3704.
Workshops-Rocker, March 15-21; bow-back chair, April 26-May 2. Lenox Windsor Workshops, 1192 Webster Road, Jefferson 44047. (440) 576-0311.

OREGON: Meetings-Cascade Woodturner's Association, every third Thursday. For more information, contact the association at 11575 S.W. Pacific Highway, #104, Tigard, 97223. (360) 834-6325.
Meetings-Guild of Oregon Woodworkers, every third Wednesday (except December) at 7 p.m. For more information, contact the guild at P.O. Box 1866, Portland, 97207-1866. (503) 492-1515.

PENNSYLVANIA: Show-Mid-Atlantic woodworking and furniture show, April 3-4. Ft. Washington Expo Center. For more information, contact Keith Eidson (704) 459-9894.
Show-Harrisburg woodworking show, March 27-29. Farm Show Complex, Cameron & Maclay Streets. (800) 826-8257.
Show-Philadelphia furniture and furnishings show, April 17-19. Pennsylvania Convention Center. (215) 440-0718.

TENNESSEE: Workshops-Arrowmont School of Arts and Crafts, Gatlinburg. For more info, call (423) 436-5860.
Classes-Lumber selection and more. Tennessee Valley Authority, 17 Ridgeway Road, Norris. (615) 632-1656.
Show-Nashville woodworking show, March 13-15. Nashville Convention Center, 601 Commerce St., Nashville. (800) 826-8257.

TEXAS: Meetings-Woodturners of North Texas, last Thursday of each month at 7:30 p.m. Paxton Beautiful Woods Store, 1601 W. Berry St., Fort Worth. (817) 927-0611.
Meetings-North Texas Woodworker's Association, third Tuesday of each month. Contact Bruce May, P.O. Box 831567, Richardson, 75083. (972) 271-0125.

WASHINGTON: Meetings-Northwest Corner Woodworkers Association, first Tuesday of each month. For more info, call Mike Hess (360) 650-0964.

CANADA: Show-Vancouver Island Woodworkers' Guild: Explorations in Wood 1998, March 14-May 30. Maritime Museum of British Columbia, Victoria. For more information, call (250) 592-4938.

Notes and Comment

Pedaling the virtues of wood

Custom-made wooden bicycle. *Frank Grimminger of Stuttgart, Germany, spent 800 hours building this racing bicycle of ash veneer and plywood. He used standard bicycle components for the drive train, brakes, steering mechanism, hubs and seat.*

Some of the earliest bicycles were made of wood, but manufacturers discovered steel tubing was stronger, lighter and cheaper for mass production. A 24-year-old German cabinetmaker, however, has proved that it is possible to make a strong, lightweight and stylish bicycle out of laminated wood.

Frank Grimminger of Stuttgart, Germany, sent us photos of a racing-style bike he built using ash veneer and birch plywood. The bike, including all the components, weighs only 12 kilograms (26½ lbs.), comparable to a typical mid-priced metal-framed bike.

Grimminger spent about 800 hours building his 12-speed, which he outfitted with high-end parts from Campagnolo, Shimano and Ferrari. The tires are made of rubber. He says he used a waterproof lacquer on all the wooden parts, and he rides the bike every Sunday.

—Anatole Burkin, associate editor

Buying shop time

Woodworking can be an expensive undertaking, whether you do it for a living or do it to forget about work. For those starting out, being able to rent shop space is one way to pursue woodworking without a huge investment.

At the Woodworkers Club by Woodcraft, woodworkers can rent shop space (about $10 to $13 per hour; less if you buy a membership and use the shop a lot). The shops are staffed by experienced woodworkers. Classes are offered as well.

Mark Wirthlin founded the Woodworkers Club, which last year merged with Woodcraft, a woodworking supplies company. There are locations in Boca Raton, Fla., Norwalk, Conn., Rockville, Md., Santa Ana, Calif., and Vienna, Va. *—A.B.*

Marquetry society regroups

If you like to work with small, intricate pieces of wood and glue them up into cool patterns, you might want to know about a new organization that's devoted to the art of marquetry.

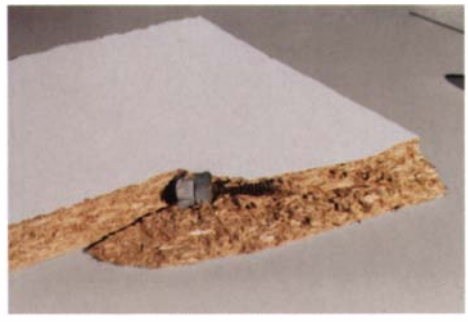
The American Marquetarian, Inc., was created in mid-1997 to pick up the pieces following the closure of the 25-year-old Marquetry Society of America. For more information, contact the organization at P.O. Box 799, Winnebago, MN 56098.

Tablesaw blade meets its match

Sawyers regularly have to contend with metal-impregnated raw lumber. They're well aware of the sometimes deadly consequences of a sawblade meeting a nail or spike. Cabinetmakers, however, don't have the same worries. Except for Reuven Spiers, an artist and recreational woodworker from Safed, Israel.

Spiers was cutting a piece of melamine on his tablesaw when suddenly the carbide-tipped blade made a terrible noise, sent out a shower of sparks and stopped. Spiers, who was uninjured, split the panel open and found a threaded bolt and nut.

"Luckily, I had just changed over to an older blade," says Spiers. The nut and bolt got into the pulp used to make the chipboard and had gone undetected during manufacturing. The incident, adds Spiers, reinforced the importance of wearing safety glasses. You never know when some nut may get in the way of your sawblade. *—A.B.*



A surprise find in a sheet of melamine. *Israeli woodworker Reuven Spiers cut into a nut and bolt that was buried in a sheet of fresh melamine.*

Top photos: Frank Grimminger; bottom photo: Reuven Spiers

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Right Tilt Unisaw shown here with Unifence Saw Guide.

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Left Tilt Unisaw shown here with Biesemeyer Fence.

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Grain-belt sanding

It's a stretch to imagine that the raw ingredients used to make cakes and cookies help prepare the lumber I use to build blanket chests. I use grain—soft wheat grown in northern Idaho—by the ton to create a weather-worn look on lumber.

Texturing lumber with grain is not something the average woodworker can do, unless like me, you run a grain terminal and can place boards in the path of grain being unloaded from railroad cars. Large amounts of any material can be abrasive, and grain is no exception. It takes about 10 railroad cars worth of grain per board to achieve the effect I want.

I use reclaimed lumber from old barns to make my blanket chests. The board is placed in a chute leading from the rail cars to the grain terminal. About five rail cars worth of grain is unloaded over the board, and then I reverse the board's direction. Another five cars worth of grain polishes the board in the other direction. The abrasive action of flowing grain removes the rotten or softer wood faster than the harder wood, and I end up with silky smooth boards. *–Arvid Lyons, Lewiston, Idaho*

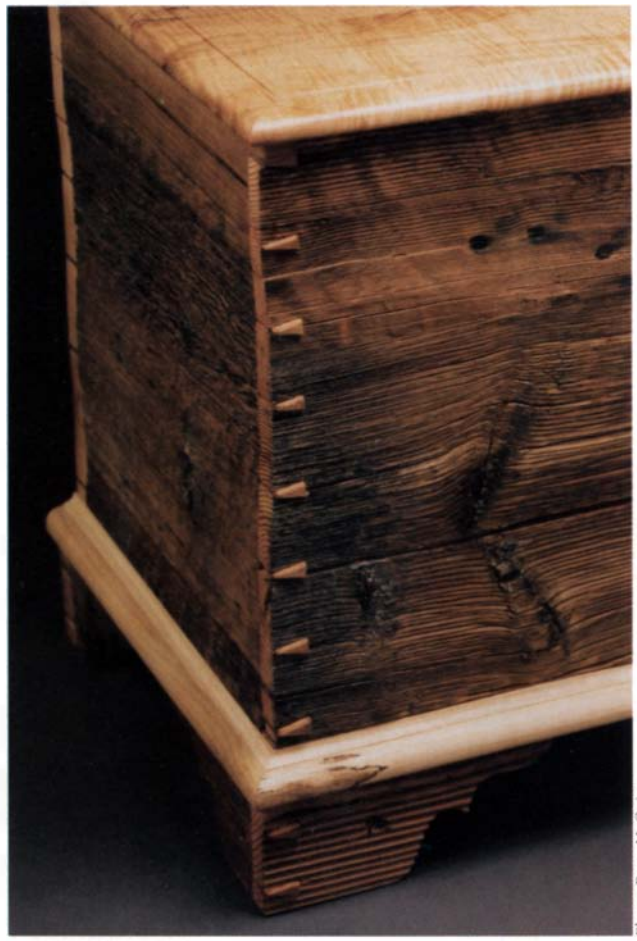

Photo: Ryan McGuire

Photo: Arvid Lyons

Texture supplied by wheat. *Arvid Lyons places lumber recycled from old barns inside grain chutes. The abrasive action of tons of moving grain creates smooth ridges that follow the grain.*

A tablesaw outfeed/extension table to rival all others

This tablesaw platform can handle anything. *Greg Colegrove's massive outfeed/extension table also serves as a router table and has plenty of room for storage.*

I used to rely on rollers for infeed and outfeed support at the tablesaw but all too often while trying to feed a long piece of stock, I'd find myself straightening out a misaligned roller midway through a cut. I felt like it was only a matter of time before this dance would result in injury.

To permanently solve the problem of stock support and create useful shop storage space, I designed a large tablesaw platform using melamine, which I cover with TopCote, a spray-on lubricant that makes the surface slippery and reduces friction. The top, which is 77 in. wide by 97 in. long, doubles as a router table, stationed at the corner opposite the tablesaw.

My platform can easily handle full 4-ft. by 8-ft. sheet goods as well as long lengths of solid lumber. The sides provide plenty of storage room for bar clamps and accessories, and underneath, there's lots of room for offcuts.

–Greg Colegrove, Aurora, Colo.

Notes and Comment

We welcome news stories, anecdotes about the triumphs and pitfalls of woodworking, photographs of unusual work—anything that you think other woodworkers would like to know about. We pay for the material we use. Send submissions to Notes and Comment, Fine Woodworking, *P.O. Box 5506, Newtown, CT 06470-5506.*

Bottom photos: Greg Colegrove

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An Amateur's Masterpiece

John McAlister Jr., a 73-year old native of North Carolina, has been working wood as an amateur for 31 years. "I'm pretty much totally self-taught," he says, "but I've been an avid reader, and I've visited shops whenever I could." He spent a year building this Goddard-Townsend secretary, making trips to New England to measure originals, as well as contacting curators, academics and period furnituremakers. He has long been sustained by something he learned making his first piece, a little William and Mary table. "Of course, it was terrible, but I promptly fell in love with 18th-century furniture," he says. "I don't think you can improve on it."