February 2000
No. 140

# TAUNTON'S Fine WoodWorking

**3 strategies for getting a sharp edge on tools**

For your router: straight bits or spiral bits?

Pick the right bandsaw blade for the job

Drill-press jigs

Selecting wood for your next big project

Craftsman wall cabinet

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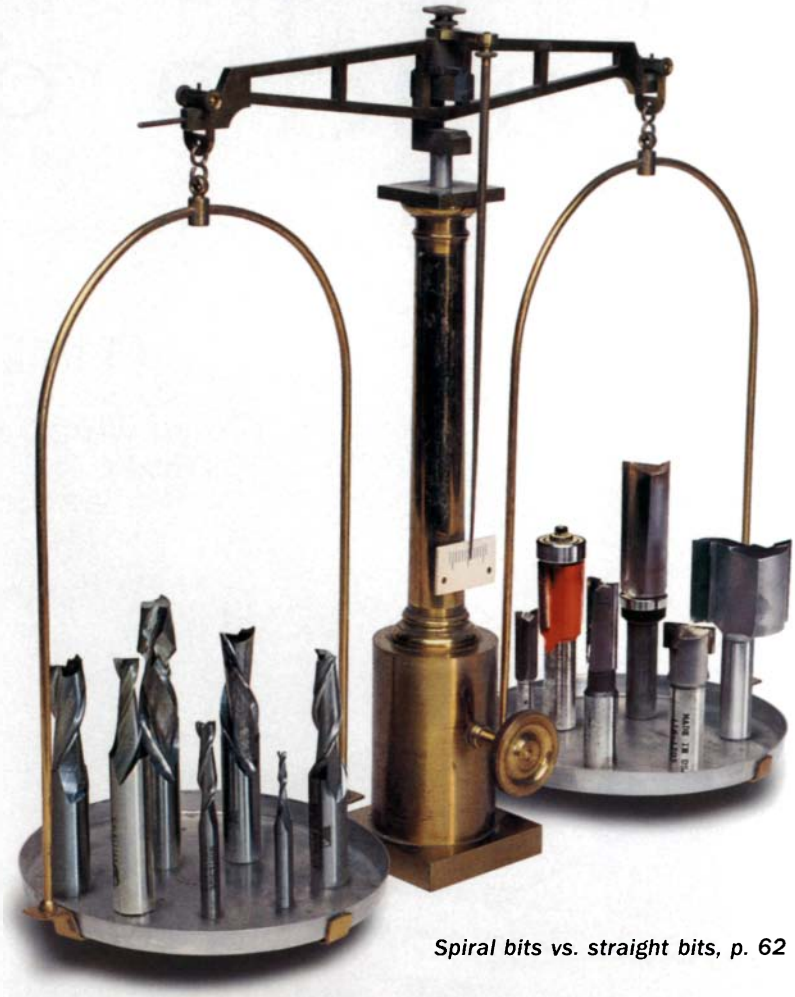
Fine WoodWorking®

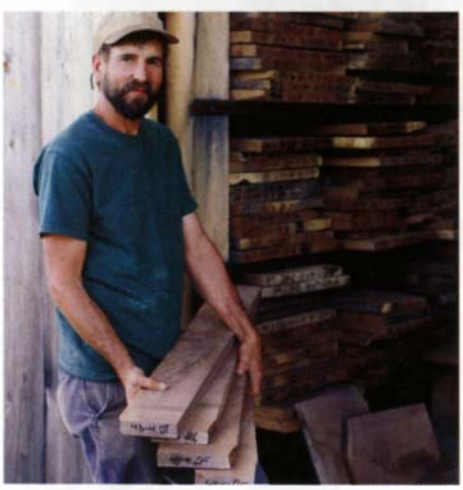
# Departments



***On the Cover:***
*Wax has proven its versatility over time, and it's a fine finish for furniture. But before you pick up that old, dusty can of wax and apply it to your next project, read this wax primer to polish your skills. See p. 46. Photo: Michael Pekovich*



*Spiral bits vs. straight bits, p. 62*



*The right board in the right place, p. 66*

*Getting a sharp edge on tools, p. 56*

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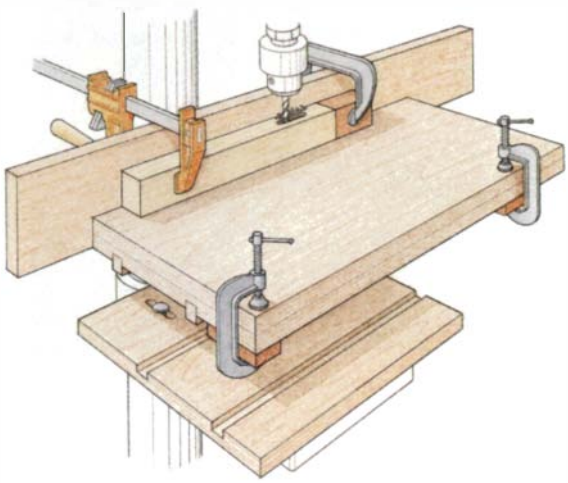
*Craftsman wall cabinet, p. 52*



*Jigs for the drill press, p. 72*

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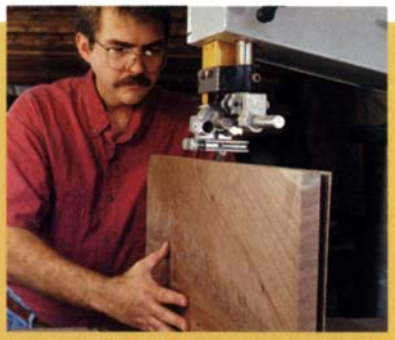

**Lonnie Bird** ("All About Bandsaw Blades") has been a professional woodworker for more than 20 years. He also heads the woodworking program at the University of Rio Grande in Ohio and teaches seminars nationwide. He has written numerous articles on woodworking and is the author of *The Bandsaw Book* (The Taunton Press, 1999). He still manages to take on a number of commissions, specializing in 18th-century furniture.

**Nicholas A. Goulden** ("Four-Poster Bed Lights Up a Room") built custom homes for a decade before deciding he wanted to go into furniture making.

He enrolled in the College of the Redwoods and studied under James Krenov. Goulden has been building furniture for the last 10 years, an occupation that keeps him so busy that he wonders when he'll find the time to work on his own house.

**Louis Irion** ("The Right Board in the Right Place") is a furniture maker who succumbed to his lumber addiction and now runs a small, hardwood lumber business with his wife, Wanda, in the northern Pennsylvania town of Wellsboro. Before launching his lumber business,

Irion spent two decades running a period-furniture company he founded with his college roommate, Chris Arato. Although both founders have now left, the company, Louis Irion Furniture Makers, is still turning out fine work in Christiana, Pa. Irion's father, Louis Sr., ran a period furniture-making business of his own outside Philadelphia that made a set of dining chairs for the White House during the Kennedy administration.

When he was in junior high school, **Stuart M. Altschuler** ("A Wax Primer") began working part-time at Prestige Gallery and Framing, a family business started by his grandfather. Now a certified picture framer and member of the Society of Gilders, Altschuler spends much of his time teaching, although he continues to do

custom framing and gilding. He is a contributing editor to *Picture Framing* magazine and the director and chief instructor of Prestige Framing Academy, a picture-framing school he runs out of his studio in Danvers, Mass. (He also teaches for the Professional Picture Framers Association.) Altschuler can be seen on the circuit of The Woodworking Shows as well as at other related seminars.

**Ian Ingersoll** ("Craftsman Wall Cabinet") left home building for furniture making more than 20 years ago. In the early days his one-man shop in West Cornwall, Conn., focused on building Shaker chairs. These days he runs a shop of eight workers. He has designed and built everything from beds to high-end cabinetry.

**Dave Freedman** ("Barbed Hinges for Fine Boxes") recently moved from Pennsylvania, where he was an editor for *American Woodworker*, to Chicago, where he is a writer, media relations consultant and woodworker. He unpacked his shop just in time to rush this article to us. His first fine box, made 15 years ago as a gift, was a modest walnut piece with surface-mounted butt hinges. The recipient loved it, and Freedman has been making fine boxes ever since. In addition to being the author of *Box-Making Basics* (The Taunton Press, 1997), he sells his boxes at art galleries and fairs.


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***Fine Woodworking***
The Taunton Press, 63 S. Main St., P.O. Box 5506, Newtown, CT 06470-5506 (203) 426-8171
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# Letters



**Who says it's unnecessary?—**Mike Dunbar's essay on unnecessary tools in Rules of Thumb (*FWW* #139, pp. 102, 104) was true for those who want to be cost-efficient. In 1955 I bought a Sears contractor's saw, and it served me well for years. Then I went to a grand opening of a new woodworking store. There it was. THE SAW! I lusted after that saw. I had to have that saw. And now I have it.

I do not need this saw. My shop is small. The saw is huge. The price was outrageous. I do not care. I admire my saw. I polish it. I may sometime actually cut some wood with my saw. I would tell you more, but I've got to go look at a spiffy new bandsaw.

*—Paul Richards, Grants Pass, Ore.*

Ah, the wisdom of the reductivist woodworker. I expect one day to open your magazine to Michael Dunbar's column and find that he has been sufficiently cleansed of materialistic folly as to deplore the use of tools altogether in the working of wood. Trees can be felled by acts of God, lumber dimensioned with a willful mind, and chair seats carved by well-honed teeth. ("While the canines do a good job of roughing out the seat blank, I find the front teeth, ground to a 15° secondary bevel, best for the chamfer and hollow.")

I have Stanley Nos. 45 and 55 planes, and I use them on a weekly basis. I find them reasonably easy to use, they set up nearly as fast as my router, and the majority of the blades have proved useful. The two planes cost me $400 Canadian, an average price. But to have found the equivalent in so many dedicated planes would have taken years, cost a lot more money, and I never would have found so many matching profiles.

While I have found Mr. Dunbar's books to be well written and informative, and his reproductions nicely made, I think his ethos is for the birds (or is that the beavers?). These days when philosophers ask me about going into woodworking, I suggest they stick to Play-Doh.

*—Mark Whidden, Halifax, Nova Scotia*

**Is this diamond a woodworker's best friend?—**After reading Brian T. Derber's interesting report on grinders, "Not the Same Old Grind" (*FWW* #135, pp. 48-51), I think it would be helpful to advise your readers of our response to one potentially misleading statement.

Regarding our Tormek machine, Derber says, "The diamond-tipped wheel dresser works adequately, but it looks to me as though it is likely to wear out quickly because of the way the diamond particles are mounted."

These diamond tips will never wear out in normal use on a Tormek stone. In fact, in my experience over the last 12 years, I have never found any Tormek diamond truing device that shows any sign of wear.

*—Geoff Brown, BriMarc Associates, U.K. distributor of Tormek products*

**A welcome new approach to tool tests—**The *Fine Woodworking* staff should be congratulated for two recent tool reviews, especially the person responsible for coming up with the approach you are using: "Router- Bit Matchup" (*FWW* #137, pp. 84-89) and "Bench-Chisel Review" (*FWW* #139, pp. 52-57). I found the router-bit test very helpful indeed, and the current test of chisels is equally revealing. Too often in the past, reviews have been entirely subjective and basically amounted to, "I liked this one better than that one."

Developing a measurable parameter and subjecting each tool to the same test

**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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leads to results that can be compared by the reader as well as by the people doing the test. It also has the advantage that new products can be compared to items that have already been tested. To wit, the test of the redesigned Jesada ½-in. bit (*FWW* #139, p. 42).

I hope your staff is ingenious enough to think of similarly objective tests for other tools. For example, I think that saws, jointers, planers and handplanes could benefit from the same kind of testing and analysis. In the past I have seen similar tests of battery-powered tools, but in general, they simply measured the life of the battery and told us nothing about the performance of the tool.

Congratulations on your new approach, and I hope you are able to do many more in a similar vein.

*–Herm Finkbeiner, Rexford, N.Y.*

**Microns or microinches?—**"Bench-Chisel Review" (*FWW* #139, pp. 52-57) was an excellent guide to follow in choosing a chisel that represents the best value, i.e., performance vs. cost. The method devised for measuring "toughness" was clever and well-suited to a typical use of a wood chisel.

However, in presenting the data, the article refers to units of measure for the departure from a perfectly smooth edge as "micron inches." There is no such unit. One millionth of an inch (1/1,000,000 in.) is called a microinch. A micron is one millionth of a meter. These are standard, universally accepted definitions. The symbolic identity for the micron is the Greek letter mu (μ). Confusion can arise, however, because machinists in the United States use the microinch as a measure and sometimes express microinches as "μ inches," or μ", with the μ standing for "the millionth part of" and as a shorthand way of writing micro.

*–Richard Snedeker, West Windsor, N.J.*

**EDITOR REPLIES:** Mr. Snedeker is correct. There is no such thing as a micron inch. The measurements were made in microinches, much smaller units than microns. The inadvertent error was introduced during the editing process.

**Thanks for a dream issue—**I just purchased the September/October 1999 issue of your magazine. It is one of your best ever (and I go back to issue #1). The de-

**Call for entries**

In an effort to showcase more of your work, we're adding a new department, called Current Work. It will feature a gallery of finely crafted pieces, with an emphasis on functional furniture. Entries should include photos of the piece and information on dimensions, materials and finish used and a little bit about techniques used or an interesting story about the inspiration, design or construction of the piece. Send submissions to: Current Work, *Fine Woodworking*, 63 S. Main St., Newtown, CT 06470-5506.

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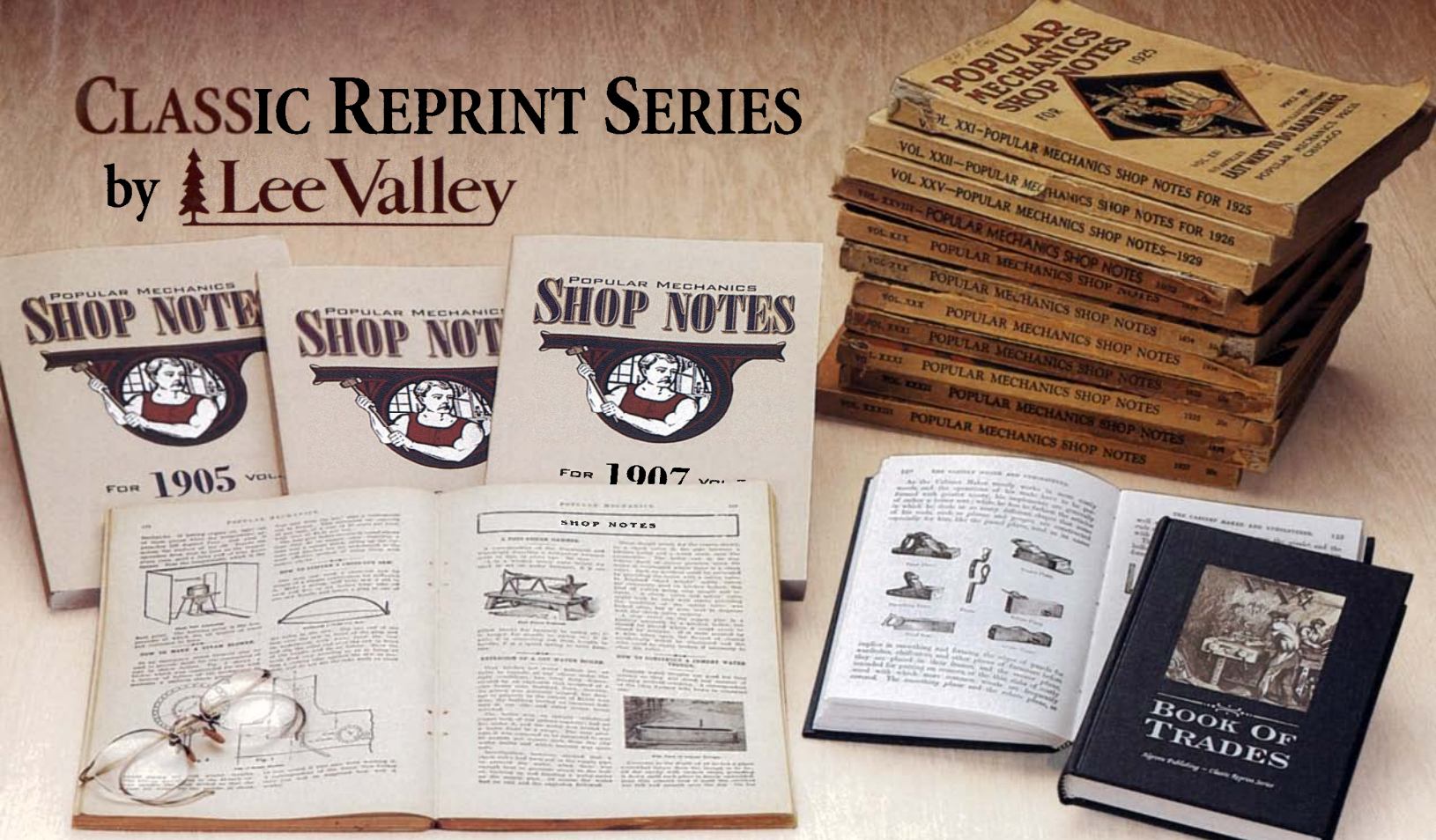


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The books shown here are part of our Classic Reprint Series by Algrove Publishing, the publishing arm of Lee Valley Tools. The signatures are Smyth sewn for a sturdy binding – the pages will not fall out. We have reprinted over 30 books that have been out of print for some time, some of which are listed below:

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### Popular Mechanics Shop Notes

Virtually every woodworking magazine in the English-speaking world has a "Shop Notes" section and has published an accumulation of them in book form. This was all started in 1905 with the first issue of "Popular Mechanics Shop Notes", an annual collection of advice on jigs, fixtures, methods of work, processes and projects. The earlier issues had more emphasis on metal-working than woodworking but the focus was always on small shop practice. As years went by, the contents shifted more and more to wood-working and handyman projects. The advice is always direct and simple, using the tools available in a normal home shop, whether it is describing how to put an end loop on a coil spring or how to make a simple beam compass. The notes are profusely illustrated. The first volume has 385 illustrations and 200 pages but by the second year this becomes 555 illustrations on 228 pages and continues similarly in later years. The early years have excellent line drawings and engravings. Photographs start to creep in only after 1920. Each year has its charm but all issues share the attributes of being clear, concise, and widely informative. We intend to reprint at least the first 25 volumes at the rate of about one per month; these are our first 5 issues. 6½″ × 9½″.

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### Book of Trades

When this book was first published around 1865, it was intended as a guide to the most popular trades of the day, a book that prospective apprentices might read in order to understand the various trades. In general, it shows the tools of the trade, describes the various trade practices, and has illustrations of tradesmen at work. The great value of the book today is its succinct capture of information on trades that either no longer exist or are in decline. For one who is a tool collector, it is a must. Hardcover, Smyth sewn, 4¾″×6½″, 336 pages. Reprinted in 1999. The trades included are:

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- Painter, &c
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- Tailor
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sign article on sideboards was great (*FWW* #138, pp. 42-49), including the text, layout, drawings and photos. The memories of the dark years of *Fine Woodworking* are almost gone (only a few screaming nightmares on occasion).

*–Steve Kocsis, Jacksonville, Fla.*

**Altitude might have affected sprayer tests—**We were very impressed with your approach to testing and evaluating HVLP (high-volume low-pressure ) units, including our T-55, in "Turbine HVLP Sprayers Keep Getting Better" (*FWW* #137, pp. 62-67). However, we wish to convey a few points regarding cfm (cubic feet per minute) ratings. The different ratings are likely due to the way various companies interpret the literature given out by its turbine motor manufacturer. For example, a typical motor used in our industry shows a rating of 97 cfm unrestricted. This is for the raw turbine motor, without the adapter fitting installed in the normal outlet (which is nearly 1¾ in. dia.). We felt a more logical and honest rating was with the hose outlet installed, which has an inside diameter of approximately ¾ in., yielding a rating of 55 cfm.

This rating might also be affected by other variables such as voltage and altitude. After the hose and gun are added, pressure rises in the system, with a corresponding drop in cfm.

The difference between the air-cap pressure you measured and our stated air-cap pressure could be due to altitude. Our testing was done at our Calgary shop (3,700 ft. altitude) with one of the largest needle seats and air caps recommended for use with the T-55. Lower altitude and a standard air cap will yield pressures similar to what you measured. Also your test rig appears to block one of the air-cap holes. This would increase the back pressure, making all units (including ours) appear to have better pressure than they actually do. A better way would be to put a T-fitting in the line from the gun body to paint container, negating any impact from your test rig.

You mentioned that our unit did not have an air-reduction valve. We do have an air-control valve as an option. It was standard with our T-55 system, but it was removed because it was being used as a shut-off valve during startup and during refilling of the paint container. This practice can cause overheating of the unit and force unnecessary back pressure onto the motor of the small two-stage turbine.

*–Patrick Landymore, Lemmer Spray Systems*

**Correction—**In "Bench-Chisel Review" (*FWW* #139, p. 55), the Rockwell-hardness number given for the Harris Tools chisel was incorrect. The correct number is 58C.

***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*, P.O. Box 5506, Newtown, CT 06470-5506.

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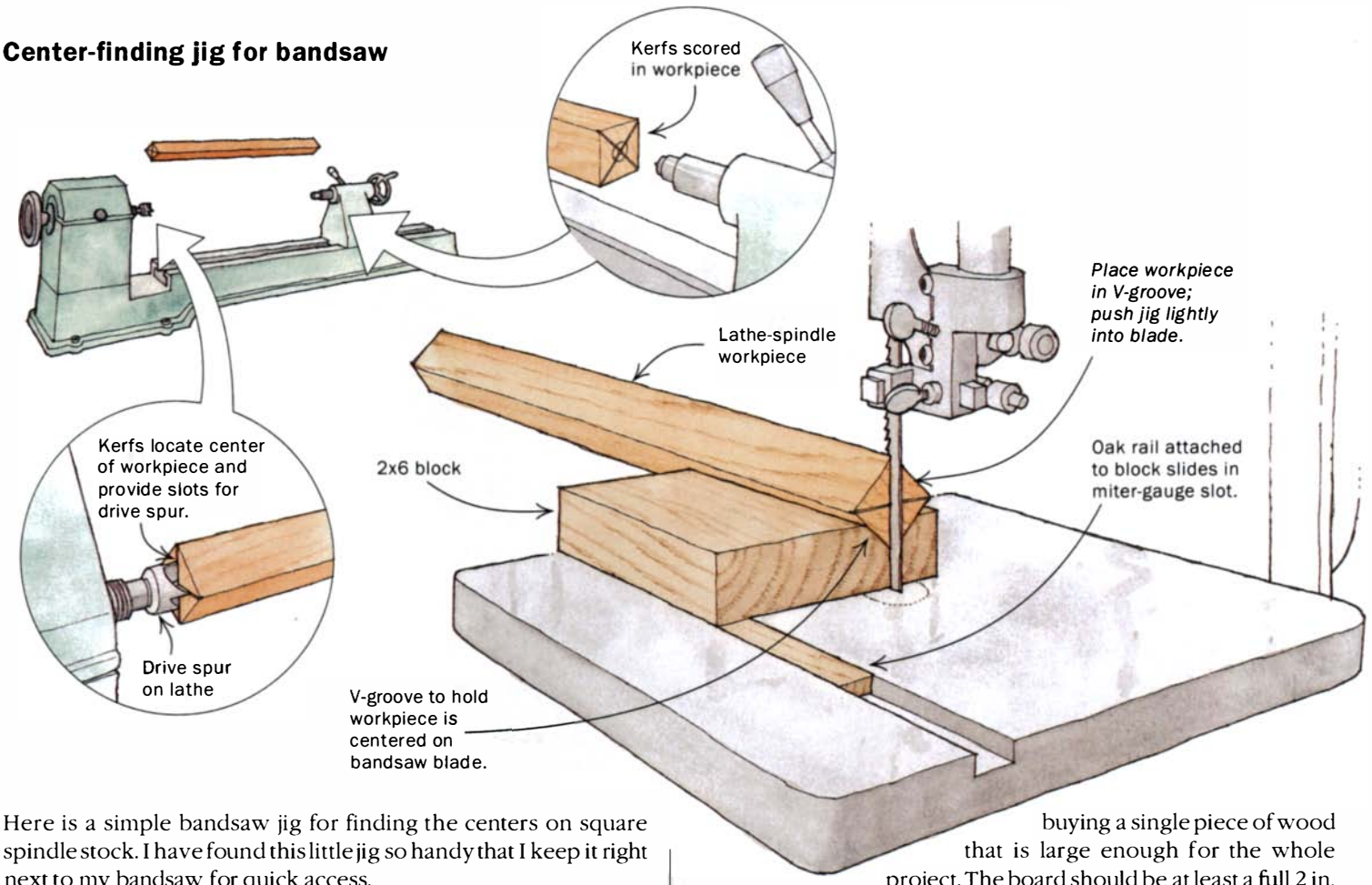
# Methods of Work

EDITED AND DRAWN BY JIM RICHEY

## Center-finding jig for bandsaw




Here is a simple bandsaw jig for finding the centers on square spindle stock. I have found this little jig so handy that I keep it right next to my bandsaw for quick access.

The jig is pretty simple. It consists of an 8-in.-long block of 2x6 framing lumber with a 90° V-groove cut into the length of the block, as shown in the drawing above. I attached an oak rail to the underside of the block to slide in the bandsaw's miter-gauge slot, and I positioned the rail so that the V-groove is centered on the bandsaw blade.

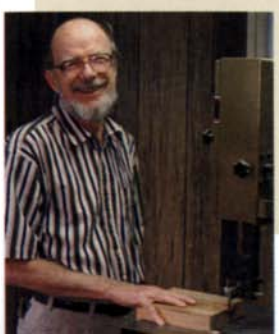
Now when I need to turn a spindle on the lathe, I just place the workpiece in the jig and slide the jig lightly into the blade to saw a diagonal kerf across the end of the workpiece about ⅛ in. deep. Then I rotate the workpiece 90° and make another shallow cut into the end. The resulting kerfs not only locate the center of the stock, but they also provide slots for the drive spur of the lathe to grip. *—Robert F. Reynolds, Columbia, Md.*

## Book-matching a small tabletop

Here's a technique I use to build a nightstand or an end table with a top and legs that are well-matched in color and grain. Start by buying a single piece of wood that is large enough for the whole project. The board should be at least a full 2 in. thick and 6 in. wide. If possible, select a board that is flatsawn. The cutting sequence will give you a quartersawn tabletop.

Cut at least three billets out of the board. The first two are for the tabletop, and the third is for the legs. Make the top by ripping small boards from the two top billets and then gluing them together into a wide panel with book-matched ribbons. To facilitate reassembling the top, mark out the ends of the top billets as shown in the top left drawing on p. 20. The marks will help keep the book-matched pairs together and will show their cutting order from the edge of the billet. To make this process work, it is important that both billets be oriented in the same direction and ripped from the same edge.

The result will be a tabletop that is color matched and symmetrical, showing ribbons of book-matched grain. If there is a stripe of sapwood on the left, there will be one on the right side as well. As noted before, a flatsawn board yields a quartersawn top that will be very stable and—if it's oak—will have some enhanced figure. If



### A reward for the best tip

*Robert F. Reynolds won an engraved Lie-Nielsen handplane for sending this issue's winning tip. His jig (above) makes it easy to find and mark the centers for turning spindles quickly and accurately. Reynolds is retired from a distinguished career first in the U.S. Navy and then as an engineering specialist for the National Security Agency—a federal government department that's so secret its existence wasn't even publicly acknowledged for many years. Nowadays, he restores antiques and builds one-of-a-kind pieces of furniture in his large basement shop. Send us your best tip, along with any photos or sketches (we'll redraw them), to Methods of Work,* Fine Woodworking, *P.O. Box 5506, Newtown, CT 06470-5506.*

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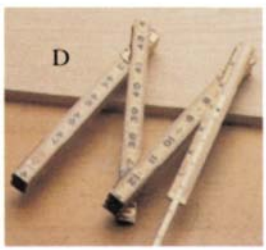


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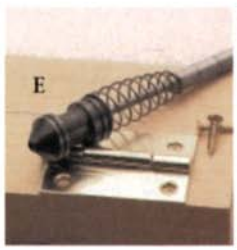


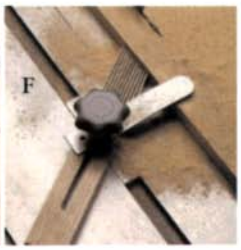


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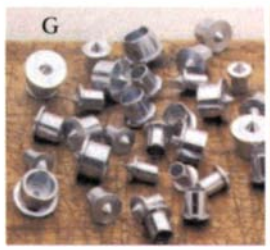



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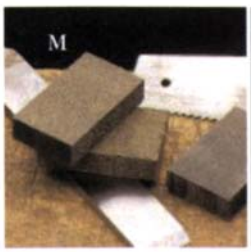



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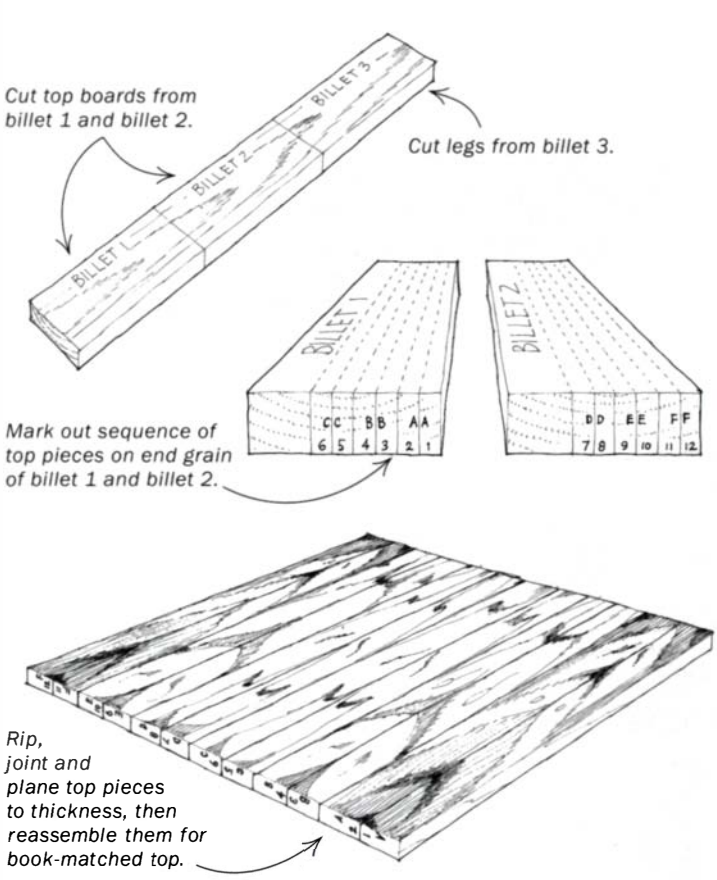
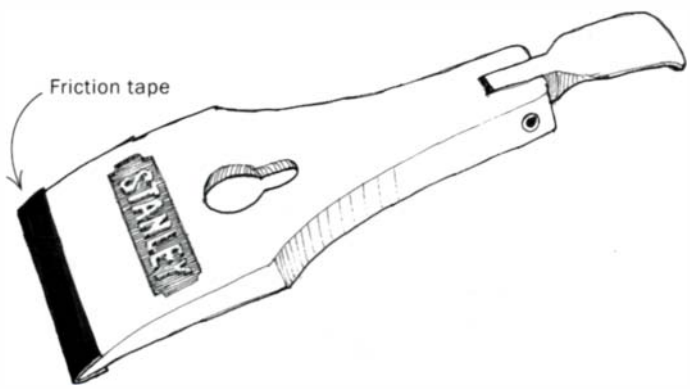



you don't use the entire width of the billets for the top, rip the remainder to yield boards for the skirt, drawers or other parts of the table. Before I rip the legs, I mark the end of that billet so I can face-match the legs as I wish. *—David Sobel, Tampa, Fla.*

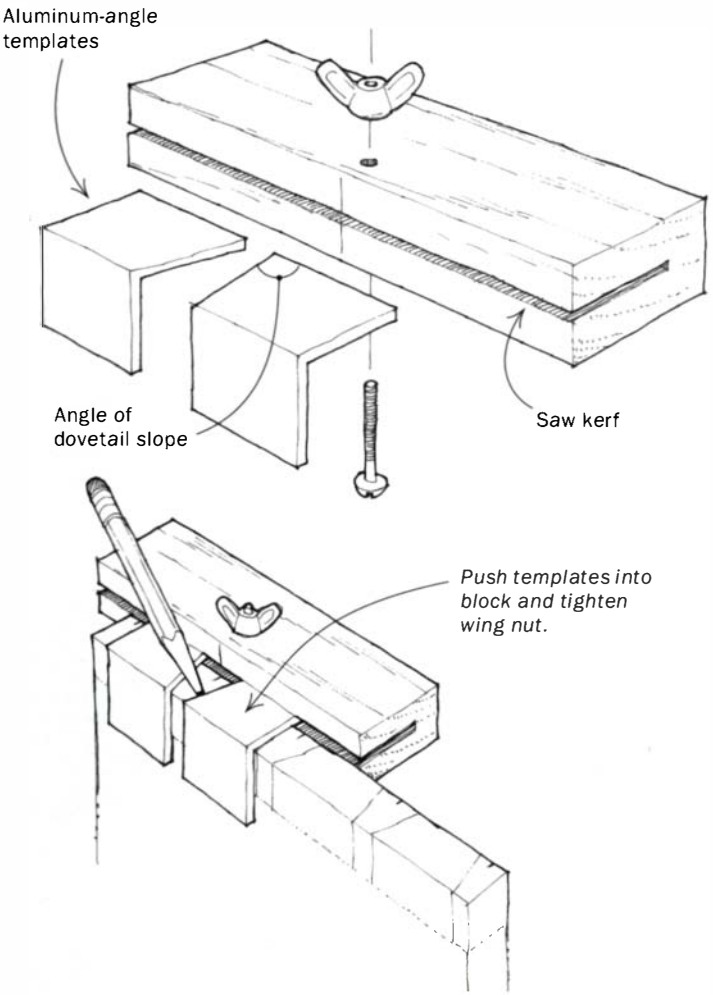
### Deadening vibrations in a handplane




Inspired by Garrett Hack's handplane article (*FWW* #136, pp. 38-45), I set out to deaden the vibrations in the cutting iron of an old Stanley Bailey No. 4 that I had recently restored. I filed and honed the working edge of the lever cap dead flat. Then I folded a piece of friction tape over the nose of the lever cap. I adjusted the lever-cap screw so that the cap is tight but does not heavily compress the cutting iron. In action, the tape deadens the metallic vibrations I used to get when cutting, resulting in a flatter, more even cut. The modified plane performs superbly.

*—David Cancell, Millburn, N.J.*

### Adjustable dovetail marker




Here is a versatile dovetail marker that is simple to make. Start with a length of 1¼-in. aluminum angle and cut two template pieces sloped at your preferred dovetail angle, one left, one right. Now take a block of wood, about 1 in. by 2 in. by 4 in., and saw a kerf in the block so that the two aluminum templates slide into the kerf tightly. Mark a centerline across the middle of the block and install a thin screw and a wing nut to lock the aluminum templates in place.

To use the marker, first mark a pencil line at the midpoint of each dovetail-pin location. Hook the marker over the board and push the templates in against the board. Set the templates equidistant from the centerline on the block to the size you want your pins to be and tighten the wing nut to lock the templates in place. Move down the board, marking out pins, both top and front.

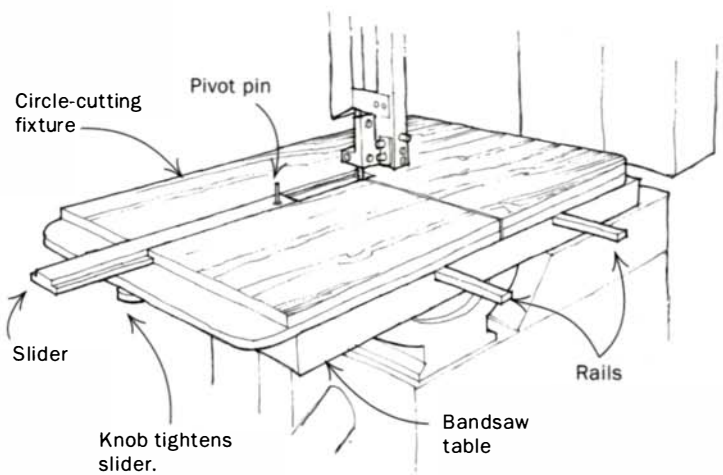
If you prefer to mark tails first, simply put the templates in the other way. *—Zvi Rotem, Kiriat-Tivon, Israel*

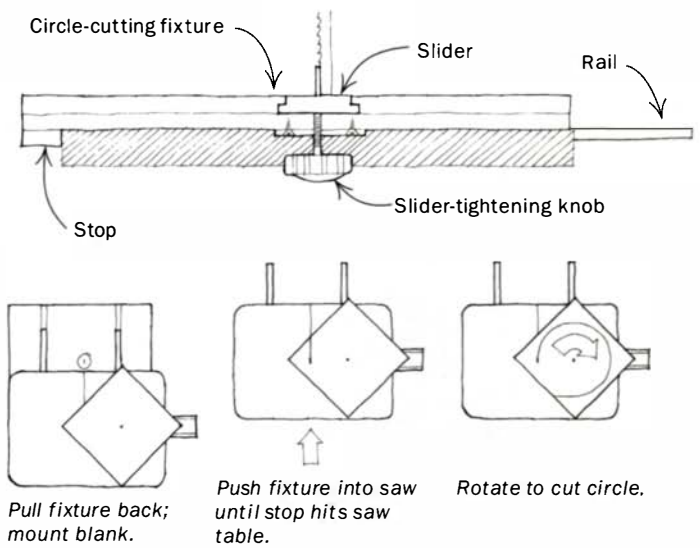
**Quick tip:** If you have a Biesemeyer fence on your tablesaw, try reversing the mounting position of the cam lever that locks the

fence in place. Gravity keeps the lever unlocked, which makes it easier to move the fence with one hand.

*—Kim Newcomb, Lafayette, Calif.*

## Bandsaw circle-cutting fixture




While I make no claims for reinventing the wheel, this bandsaw circle-cutting fixture has a few extra features that make it accurate, reliable and a pleasure to use.

The fixture consists of a base and a slider. The base is laminated from two pieces of ¾-in.-thick plywood. Size the plywood so that the base will extend a few inches beyond the right side of the saw table. Before laminating the two pieces, rout a stepped slot in the top piece so that when the two pieces are glued together the slot forms a T-shaped channel for the slider.

Attach one or two rails to the bottom of the base to slide in the miter-gauge tracks of the bandsaw table. Attach a plywood stop under the front of the base so that it bumps against the table when the bandsaw blade is even with the pivot pin. Also, install a threaded knob under the base to lock the slider in position. The slider is simply a length of hardwood milled to fit the T-shaped slot in the base. Install a ¼-in.-dia. steel rod near one end of the slider to serve as the pivot pin.

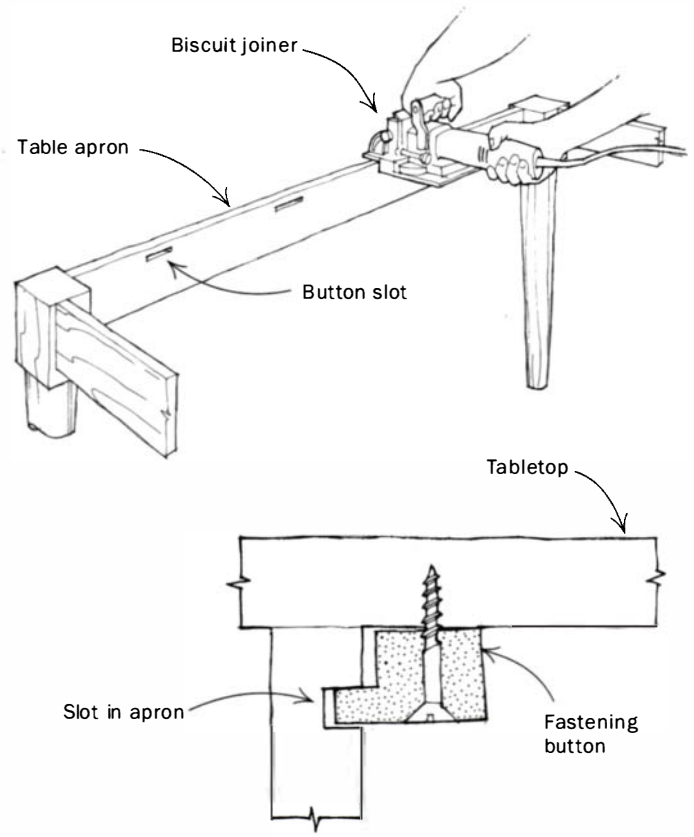
To use the fixture, adjust the slider for the correct radius. (Note that the slider can be turned around to make larger circles.) Drill a ¼-in.-dia. hole in the center of the circle blank and place the blank on the pivot pin. Pull the base back, turn on the saw, then gently push the base into the blade until the base hits the stop. Rotate the blank to cut the circle. When that's done, gently back the fixture out of the blade using the entry cut.

*—George W. Sibbald, Rochelle Park, N.J.*

**Quick tip:** To reduce the pesky static cling that causes wood chips to clog the discharge chute of jointers and other machines, simply wipe down the discharge chute with a fabric-softener sheet. The static cling is gone. Wiping with a fabric-softener sheet also keeps dust from clinging to plastic safety glasses and face shields.

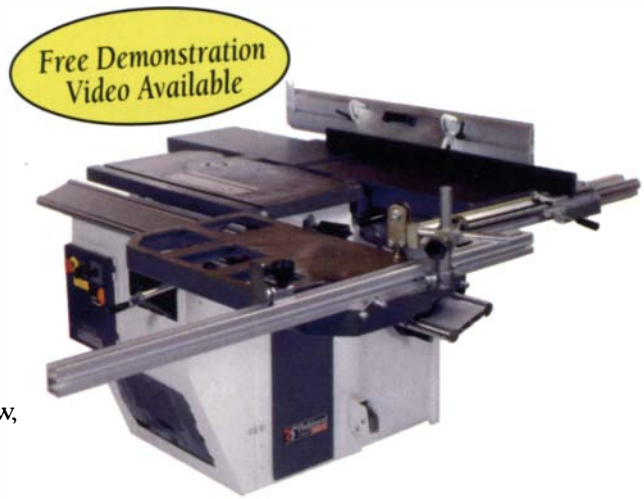
*—Matthew C. Jackson, Rapid City, S.D.*

## Tabletop attachment slots

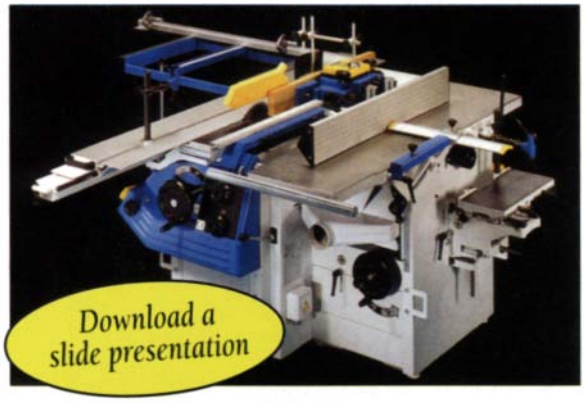



While building a small table, I had the idea of using my biscuit joiner to cut the slots in the apron for attaching the top with small, L-shaped buttons. I discovered that the approach held several advantages over routing the slots or chiseling them by hand. First, it is easier to set the proper distance of the slot from the top by setting the joiner's fence. And it is easier to adjust the width of the slot by simply lowering or raising the fence after cutting the first

When you buy a machine you also buy the company selling the machine. Torben Helshoj, President of Laguna Tools understands the American Woodworker, because he is one. Torben knows firsthand the hard work that goes into every piece of furniture. Having the best tools makes a difference.




TAKE FOR EXAMPLE the Robland X31 combination machine, the #1 selling machine of its kind in the world! Powered by three separate 3HP German motors, the Robland X31 gives you a 10" table saw, 50" of cross cut capacity, a 38" rip capacity, 12" jointer, 12" x 9" thickness planer, reversible shaper and a horizontal mortiser.

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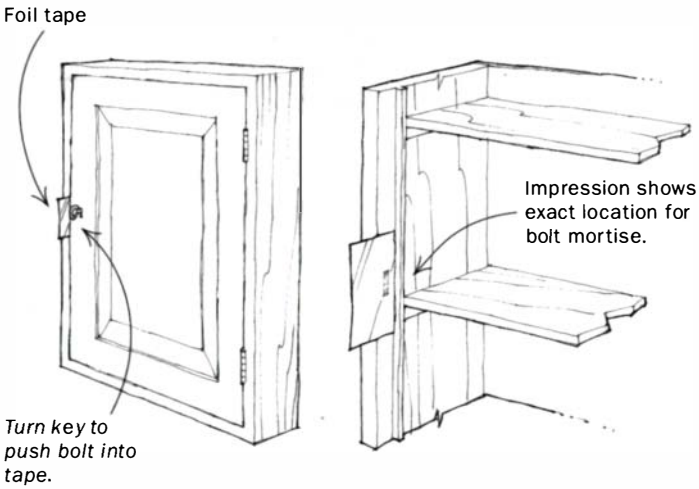
slot. Finally, each slot has rounded ends that enable you to turn the button into position easily.

*—Ian Welford, North Yorkshire, United Kingdom*

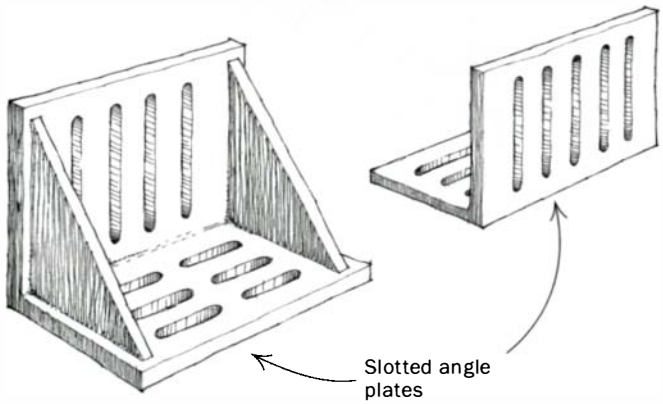
## Using foil tape to locate lock mortises




Here's how I use aluminum-foil tape to find the exact bolt location for a drawer, box or cabinet door lock. Stick a piece of the foil tape close to where the bolt will make contact. Then insert the drawer with lock in place and turn the key in the lock with a little extra pressure so that the bolt presses against the foil. The bolt will leave an imprint in the foil in the exact location where the mortise should be. Mark through the foil with an awl at the corners of the impression to transfer the mortise location to the wood. Foil tape is used in the heating and air-conditioning trade to seal sheet-metal ducts and can be found at most building-product centers.

*—Dennis Kuchenbecker, Chippewa Falls, Wis.*

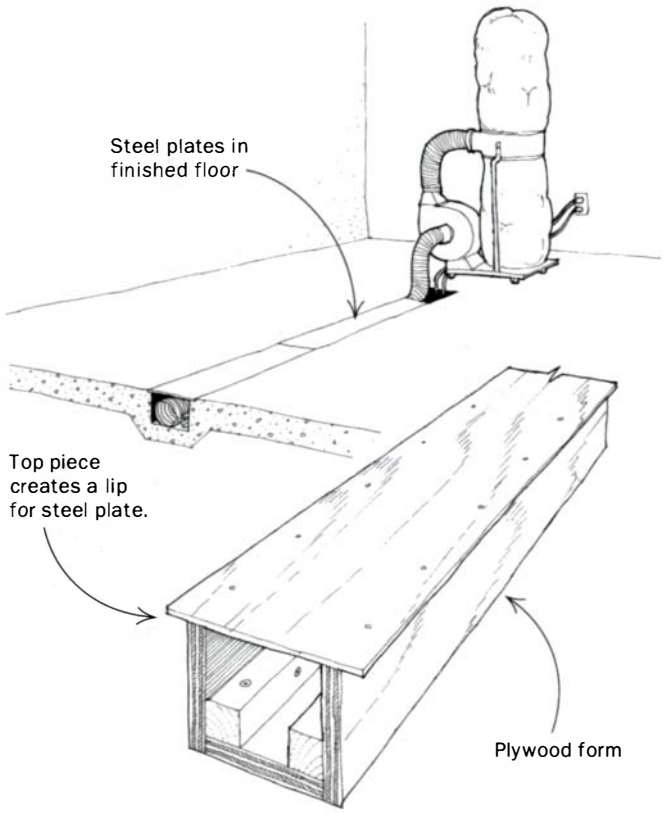
## Slotted angle plates in the woodshop




Tablesaw tenoning jigs and many other woodworking fixtures require two faces to be at a precise 90° angle to each other. In the past, I have spent a great deal of time fussing with wooden fixtures or filing aluminum angles to get a precise 90° angle. While browsing at a local machine-tool supply shop, I stumbled upon an item called a slotted angle plate. This fixture is used in the metalworking trades for various applications. Angle plates come in a variety of sizes, are relatively cheap and have milled slots for attaching wood faces, if needed. They are accurate to fractions of a degree—well beyond the needs of any woodworker.

*—Andrew J. Lenhart, Royal Oak, Mich.*

## Dust collection under the floor




When I built my new shop, one major concern I had was how to run a dust-collection duct and power cord to my tablesaw. I wanted the tablesaw in the middle of my shop for convenience, but I didn't want electric lines or sheet-metal ducts hanging down from the ceiling or cluttering the floor. Also, I was uncomfortable about permanently embedding an air duct in the concrete floor.

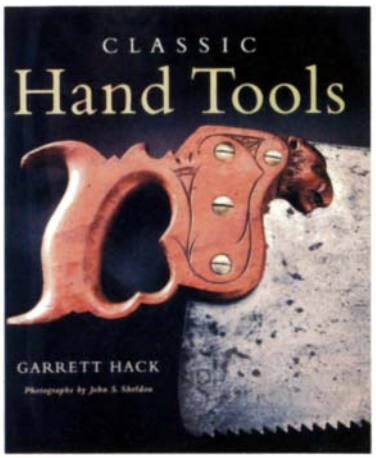
After much thought, I came up with an idea that has worked out well. Before the floor slab was poured, I built a 5-in.-deep, 6-in.-wide plywood form to place in the floor where I wanted to run a channel. I capped the form with a piece of plywood that would create a lip at the top of the concrete channel. I assembled the form with easily accessible screws, so that I could disassemble it from the top after the concrete cured. I then placed the form into the floor and poured the concrete around it.

After the concrete had cured, I removed the form and had a perfect channel in which to run a 4-in. vacuum duct and a couple of extension cords to the middle of the shop floor. I topped off the channel with steel plates that fit neatly into the lip left by the form.

*—Bob Chandler, Rathdrum, Idaho*

# Notes & Comment

## A complete course in antique tools




**Classic Hand Tools** *by Garrett Hack, The Taunton Press, Newtown, Conn.; 1999. $34.95 hardcover; 218 pp.*

I admit to being machine oriented, but over the past several years I have experienced a growing fascination with hand tools, especially the older ones. *Classic Hand Tools*, Garrett Hack's newest book, seems as if it were written just for woodworkers like me.

Hack's beautifully presented previous effort, *The Handplane Book* (The Taunton Press, 1997), offered almost everything you'd want to know about handplanes—how to buy, repair, restore and tune them—so that you could actually put them back into service. His new book gives the same treatment to other revered hand tools—measuring tools, clamps, saws and hammers—and even tells you how to make a few of them from scratch. What I most liked were the tidbits of information scattered throughout the book. I discovered, for example, that 1 in. used to equal three dry barleycorns laid side by side and learned how to outfit a hatchet with a new, handmade handle. I found myself nodding my head as I read his helpful tips—how to true an old framing square, for instance—useful information, indeed.

Even if you have never been inclined to sharpen a handsaw, Hack's simple explanation of the process might just inspire you to try. He tackles the reason why saw manufacturers put small nibs on some of their saws, a subject debated at some length in *Fine Woodworking*.

Lest anyone think I've become a total convert, and as much as I am enjoying taking gossamer-like shavings with my perfectly tuned Bedrock No. 605, I cannot honestly imagine using a hand miter box again, no matter how great the author thinks they are. But that's what I thought about my old and reliable 605 just a few years ago. In fact, at one point, I almost gave it away.

With John Sheldon's beautiful color photography, this book is an inspiration to sharpen up that old chisel, turn a new handle for it and set aside some time to hit the flea market on Saturday morning. It's a book any woodworker would enjoy, even if you're a (mostly) machine guy like me.

*—Lon Schleining, custom stairbuilder and woodworking teacher at Cerritos College in Long Beach, Calif.*

## Wood webs

"Wood webs" is a place for us to highlight useful and interesting woodworking web sites. If you have a web site related to woodworking that you would like to share with others, send the address to mteague@taunton.com.

### Locating lumber

www.woodcentral.com

If you've visited WoodCentral lately, you know there's a new partner site called WoodFinder, a search engine that helps you find suppliers of lumber, veneer, recycled lumber, sustainable-harvest wood or custom sawmilling services. WoodFinder is designed to give exposure to small sawmills and lumber dealers—many of which can't justify web sites of their own—and to promote the use of locally harvested wood. To visit WoodFinder directly, go to www.wdfindr.com/.

### Parts for old tools

www.tooltrip.com

Need a new fence for an old Stanley No. 45? At Stan Faullin's web site, you'll find a gallery of projects, antique tools and numerous items for sale. You can buy hard-to-find replacement cutters and reproduction parts for combination planes as well as books and reprints of catalogs. If you are trying to streamline your collection, click on the "Tools I buy" icon and try to peddle some of your own.

## Teachers with real tenure

Job counseling these days can be boiled down to this: Think like a free agent; for best results, change jobs every couple of years. Luckily, word of this hasn't reached the woodworking department at George School. A co-ed Quaker school established in 1893 in Newtown, Pa., George School has gotten not only great teaching but also great longevity from its woodworking instructors. In the 107 years since the program was founded, the George School shop has needed only four teachers.

I climbed the stairs into the spacious,

***Diversity and good design.*** *Carter Sio (right) continues a George School tradition by encouraging students to design individual projects. Sio stresses the importance of the design process, believing it is applicable to other endeavors.*



Photos, this page (bottom) and p. 28: Jonathan Binzen; p. 30: Robert Wedemeyer

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***Four teachers span a century.*** *Since it was founded in 1893, the woodworking program at Pennsylvania's George School has needed only four teachers: George Nutt (left portrait), Robert "Pa" Brown (center portrait), Palmer Sharpless (right portrait) and Carter Sio (unframed, far right).*

light-filled shop and met the fourth of them, Carter Sio. Youthful and enthusiastic at 42, he's already been running the program for 15 years. As he showed me around the well-equipped shop, my eye was drawn to three framed wall portraits of his long-staying predecessors: George Nutt, who ran the shop from 1893 until 1917; Robert "Pa" Brown, a 1900 graduate of the school who presided over the program from 1917 until 1949; and Palmer Sharpless, a gifted spindle turner who ran the program from 1949 until 1984, when he handed the shop keys to one of his former students, Sio.

There was an air of enjoyment as well as industry among the students working in the shop. As a veteran of a rigid public-school shop program, I was surprised to see an array of projects underway—a music stand with bent-laminated legs, a delicate bowl being turned, a live-edged coffee table, a solid-body electric guitar, a Shaker nightstand, a rustic Windsor chair. All displayed well-conceived, imaginative design. Sio stresses the importance of design to his students, feeling that even if a student never works wood again, he or she will benefit from exposure to the design process.

From the founding of George School, manual training has been an essential complement to academic training. Permitting students to build different projects, which goes back at least as far as the 32-year tenure of Brown, reflects the belief that the program should be shaped to the individual, not the other way around.

Brown is credited with having launched another school tradition when he built a bending form in 1925 so one of his students could build a canoe. Nearly every year since then at least one student has used the old form to bend the ribs for another canoe. So far, some 75 George School canoes have hit the water. The makers have included a dozen women, including a mother and daughter 31 years apart, and a number of brothers, including two grandsons of George Nakashima.

*—Jonathan Binzen, senior editor,*
Fine Woodworking

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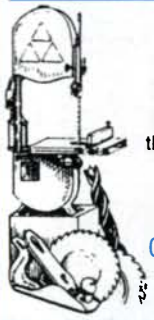

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## Mountain bike in miniature

California woodworker Phillip Anderson recently set out on what his friends called an impossible task—to reproduce a mountain bike entirely out of wood, at quarter scale. The 16-in.-long and 10½-in.-tall bicycle is hand-crafted of nine different species of wood and has more than 3,000 individual parts—the bike chain is composed of 530 separate wooden links, and each tire has 480 different pieces of applied tread. The lettering for the bike was hand-carved and mounted one letter at a time. Anderson tried to make it as realistic as he could, relying on a cork seat and hand grips to mimic the soft feel of a mountain bike's ergonomic design.

After six months and 650 hours, he worried that his hobby had turned into an obsession. But now that the bike is perched atop his coffee table, he feels sure it was worth the work. *—Matthew Teague, associate editor,* Fine Woodworking

***Wooden minibike.*** *This replica of a mountain bike, which stands only 10½ in. tall, contains more than 3,000 separate parts and took California woodworker Phillip Anderson some 650 hours to complete.*

## Society of Period Furniture Makers holds first meeting

Spurred by the interest they found at last year's conference in Colonial Williamsburg, Va., Working Wood in the 18th Century, furniture makers Steven Lash and Mickey Callahan have established the Society of American Period Furniture Makers. The SAPFM is open to professionals and amateurs alike, anybody bent on pursuing or promoting the craft of period furniture making. The first formal meeting of the SAPFM is scheduled for this year's conference in Williamsburg, on Jan. 24.

To register for the meeting, send a check for $20 to Steven Lash, 4331 Geislers Court, Bloomfield Hills, MI 48301. Registration to the Working Wood in the 18th Century conference, which is cosponsored by *Fine Woodworking,* is not required to attend the SAPFM meeting. This year's conference is scheduled for Jan. 23-26. *—M.T.*

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# Tools & Materials

## Veritas carving bench provides a comfortable work surface

**Carver's benchtop tilts and swivels.** *The Veritas bench lets you stay in one spot and move the work to suit.*

Most carvers prefer working while seated on a stool, but that limits one's mobility around a piece of work. The Veritas Carver's Bench is designed to solve that problem. The Veritas benchtop tilts from horizontal to 90°, and the entire bench surface swivels 360°.

The 360° swivel is the true jewel of this bench. Grain direction and carving angles require the carver to work a piece from different angles. With this bench I can lightly tension the yoke that controls the swivel and turn the benchtop by hand. This gives easy access to the carving from any angle.

To test the strength and stability of the Veritas design, I secured a piece of white oak to the bench and whaled away at a deep relief carving. The bench proved to be very stable. The screws that control the adjustments are easily accessed and, when tightened, allow no movement.

This bench is good for panel carving and half-round work. The bench is limited in that it will not accommodate full round carvings. Long moldings are difficult to secure and support on the 24-in. square top. A side bench for tools is necessary. If you do a considerable amount of panel carving or half-round work, this bench will reduce strain on your back and shoulders. The Veritas (800-871-8158) bench costs $495; a set of cast-iron legs is an extra $130.

*—Lee Grindinger*

## Wood business

### Jet buys Powermatic

The long-awaited sale of Powermatic was finally completed in October when Jet Equipment & Tools sealed the deal. Jet picked up Powermatic from DeVlieg-Bullard, the parent company, which went bankrupt. Delta, Sunhill and others had also expressed interest.

The immediate effect on consumers is that more Powermatic tools should be available now that Jet is pumping money into the company. Based in McMinnville, Tenn., Powermatic shut down its plant for a period of time last summer.

Bob Skummer, president of Jet, said Powermatic will be run as an affiliate, much the same relationship as with Performax, which Jet also purchased last year. "Powermatic was a good business. We don't want to screw it up," Skummer said. Money was being provided to upgrade Powermatic's foundry and increase production of its core products, including the Model 66 cabinet saw. Skummer said there were no plans to move the company.

Asked about any major product changes, Skummer said it was too early to say, but he did not rule out a possible color change for Powermatic products. Last year Jet changed the color of its woodworking tools from blue to white.

### Amazon.com buys Tool Crib's mail and on-line catalogs

Amazon.com, one of the biggest on-line book merchants, bought Tool Crib of the North's mail-order and on-line business in November. Tool Crib's retail outlets in North Dakota and Minnesota were not sold and will remain privately held.

One of Amazon.com's attractive features for consumers is the $4.95 shipping fee, which will apply to any item purchased, including a 400-lb. thickness planer. For more information, log on to its site at amazon.com/homeimprovement.



Photos, except where noted: Anatole Burkin; this page: Lee Valley/Veritas Tools

READER SERVICE NO. 66



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READER SERVICE NO. 64



READER SERVICE NO. 116





READER SERVICE NO. 81

## DeWalt tablesaw scores high marks

After getting a peek at the new DeWalt tablesaw at a summer trade show, we were anxious to get our hands on a production model to see how it stacks up against other contractor's saws. We finally did, and the short answer is very well, indeed.

Asked to summarize their opinions of the DW746, most *FWW* staffers used words such as "solid" and "well-thought out." The center table is cast iron, flanked by a pair of heavy steel extension wings. Power comes via a 15-amp, 1¾-hp, belt-driven Marathon induction motor. We were able to rip 8/4 white oak at a comfortable pace.

It's funny to watch woodworkers give this saw a going-over. At some point they all stoop down and rap their knuckles against the bright yellow legs, which suggest plastic. Wrong. The entire base is made of heavy-gauge steel. The cast feet even have provisions for leveling the unit to an uneven floor.

Like some high-priced European saws, this machine has a blade shroud and dust port for connection to a shop vacuum (2¼-in.-dia hose). It works well. The fence has an extruded-aluminum face, which can be positioned fore and aft. Adjusting the fence parallel to the blade is a simple matter of loosening three large screws.

The only problem we found was in the tabletop surface. Although it mostly measured within 0.006 in. out of flat, one of our measurements revealed a dished-out area about 0.018 in. deep. A DeWalt spokesman says the company aims for a surface that's within 0.010 in. of being flat and will look into it. The arbor flange had under 0.001 in. of runout, a very good tolerance.


***A well-designed contractor's saw.*** *DeWalt's 1¾-hp saw is compact and solidly built.*

We liked the switch design, a large red paddle. It's big enough to shut off easily with a tap of the knee, a good safety feature. The mechanisms for raising and lowering the blade operate smoothly. Adjusting the trunnion stops for 90° and 45° doesn't require one to climb inside the saw because the stops are accessible from the tabletop via recessed Allen screws, same as on Delta contractor's saws.

The basic saw comes with a rip capacity of 30½ in. A 52-in. model is also available. We were unable to test the sliding table, which was not yet available.

All in all, this saw, five years in the making, is nicely engineered. Even the assembly manual gets high marks for clarity. The saw, which comes with a 30-tooth combination blade, costs $900, more than the competition. But it sets a new standard for contractor's saws.

—*The* Fine Woodworking *staff*

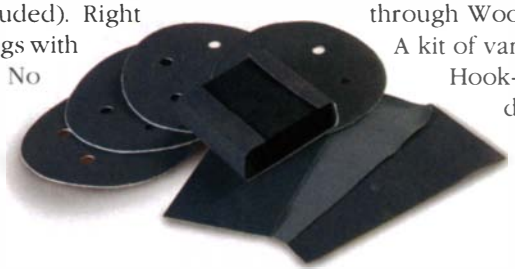
## Extrafine abrasive for rubbing out finishes

If you're intimidated by the thought of using pumice and rottenstone but still want a superior rubbed-out finish, there is an alternative: Micro-Mesh.

Originally developed for polishing aircraft windows, this product is ideally suited to leveling and polishing wood finishes, most notably water- or solvent-based lacquer. Micro-Mesh is available in grits of 1,500 to 12,000; the 1,500 grit roughly corresponds to 400-grit sandpaper.

The sheets are fabric backed and have a soft feel to them, which helps them follow the sometimes-uneven contours of a piece of furniture. The abrasive crystals are very consistent in size, which limits unwanted scratches. And the stuff is durable, outlasting sandpaper many times over.

When rubbing out a finish, start with a sheet of 1,500 grit wrapped around the foam block (included). Right away the sheet clogs with white powder. No problem. Just dust it off on your trusty blue jeans and keep rubbing. Soon you will see the finish start to level. As you progress through finer grits, the amount of finish removed is reduced with each step. For a final step, after rubbing to the desired gloss, apply a coat or two of a good-quality paste wax. Micro-Mesh is available through Woodcraft (800-225-1153). A kit of various grits costs $37.99. Hook-and-loop pads for random-orbit sanders are also available.



—*James Andrews*

## Affordable reproduction hand tools from Kelly Tool Works

High-quality antique woodworking tools can command very steep prices, and that puts them out of reach of many woodworkers. As a result, an increasing number of boutique toolmakers are offering well-made reproductions for sale at nonauction prices. The latest to enter the market is Kelly Tool Works.

Tim Kelly and his wife, Kristen, began their business by manufacturing a copy of the Miller Falls No. 1 spokeshave. This unusual-looking tool, which resembles a cigar, has the ability to cut a very small radius. I found it perfect for cleaning up Windsor chair seats and the tight instep of a cabriole leg. Kelly's elegant version is milled of high-carbon steel and fitted with slender rosewood handles. The company also produces a delightful miniature chisel plane that fits in the palm of your hand. It measures 3½ in. long and has a 1-in.-wide blade. The Kelly design is about half the size of the Lie-Nielsen version.

***Hand-crafted hand tools.*** *The Kelly Tool Works line includes (from left) a shoulder plane, a spokeshave and a chisel plane.*

I also tried Kelly's chisel plane and shoulder plane. All of these tools perform beautifully. They are easy to adjust, they hold their settings, and the blades keep an edge even after rigorous use.

I find some fault, however, with the fit and finish on some of Kelly's tools. For instance, the sole of the small chisel plane reveals a small threaded hole for the main hold-down screw. Although it doesn't seem to affect the tool's performance, it's just plain odd. Also, metal filler material sometimes is used to hide small gaps in the dovetails, which join the sides of the planes to the soles.

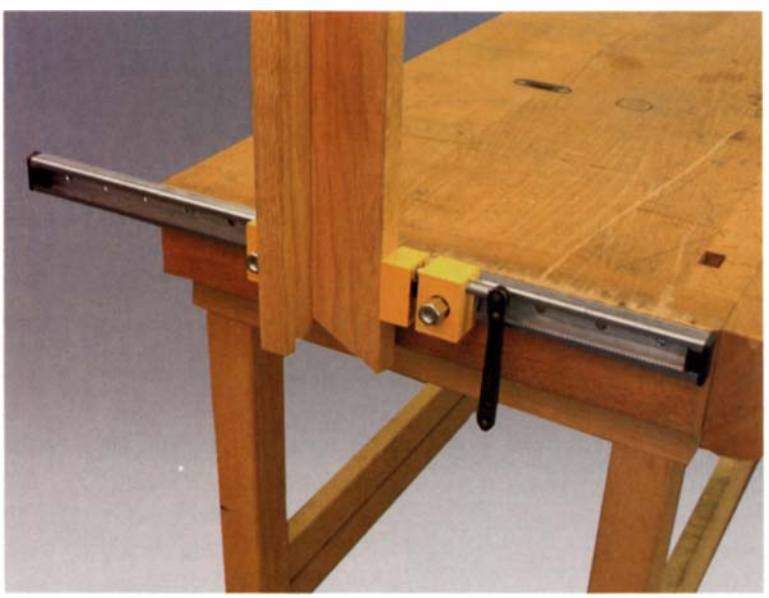
I think these design and manufacturing quirks are the result of Kelly attempting to keep the tools affordable. For example, the No. 4 shoulder plane sells for $195, the No. 1 spokeshave is $70, and the chisel plane costs $90. Those are very reasonable prices for handmade tools that perform well. To order, contact the company at (760) 376-4804. *–Mario Rodriguez*

## Rali Press is a universal vise

The Rali Press looks like a cross between a bar clamp and a bench vise. Each unit has a pair of jaws that can be positioned anywhere along the length of the bar. The unit can easily be attached to a bench. It's a bit cumbersome to tighten the adjustable jaw if it is positioned anywhere other than at the end of the bar because the hinged handle must be flopped over every half turn.

I used a few of these devices to glue up a run of cabinet doors, and they did a fine job of keeping the stock nice and flat. But at $58 apiece for the 38-in. units, they seem a bit pricey.

Rali Presses can also be affixed to the front of a bench and used to clamp stock vertically. They come in several sizes. For more information, contact Gross Stabil at (800) 671-0838. *–Gary Williams*



***It's a vise and clamp, all in one.*** *The Rali Press from Gross Stabil can be used as-is or screwed down to a work surface.*



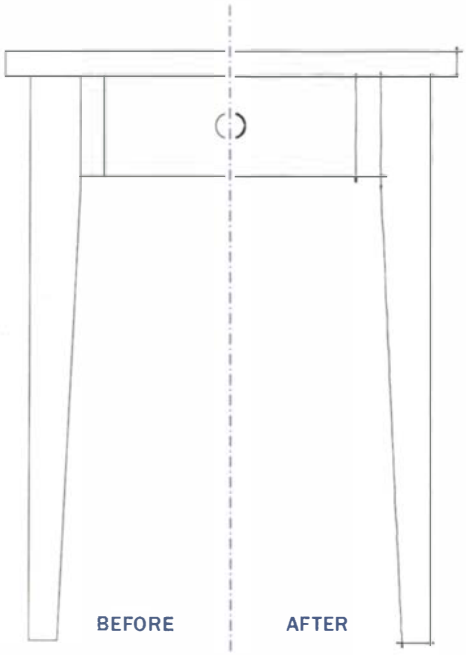
Photo, this page (top): Mario Rodriguez

## CAD with a human touch

I can't draw. I get embarrassed when clients look at me blankly as I try to convey my design ideas with pencil on paper. When I noticed that some of my clients' refrigerator art looked better than my sketches, I decided to take the plunge into CAD (computer-aided design).

Learning to use CAD was not a simple task, but I think the investment of time and money will eventually pay off. My CAD program certainly has a better sense of proportion and scale and straightness of line than I do. But perfectly rendered CAD drawings look impersonal and antiseptic. My business is building one-of-a-kind items to meet the needs of individual clients, and I don't want my drawings to look like factory blueprints.

The solution is a software program called Squiggle, which makes CAD drawings look like they were done by hand. The examples, from the program's canned set of styles, range from the steady hand of a master draftsman through a felt-tipped pen on a paper napkin to a wavy effect reminiscent of my hand drawings.




***Software lends a soft touch to computer drawings.*** *Squiggle makes CAD drawings look like they were drawn by hand.*

The fun part comes, though, in creating your own deviations from CAD perfection. Squiggle provides six ways of distorting a line (bend, slide, wiggle, etc.), each with two adjustable parameters having to do with locations and amount of distortion.

Squiggle works only with Windows-based software. It can be used with almost any CAD program that can generate HPGL or HPGL/2 output (Hewlett-Packard's graphic languages). You do not need an HP plotter—most CAD programs contain a driver for an HP plotter, and you simply plot to a file, which then serves as the input for Squiggle. My plotter is an entry-level ink-jet printer, and Squiggled drawings print just fine. Squiggle 3.0 costs $99. For information, contact Insight Development at (925) 244-2000 or visit its web site at www.insightdev.com. *—Donald Brown*

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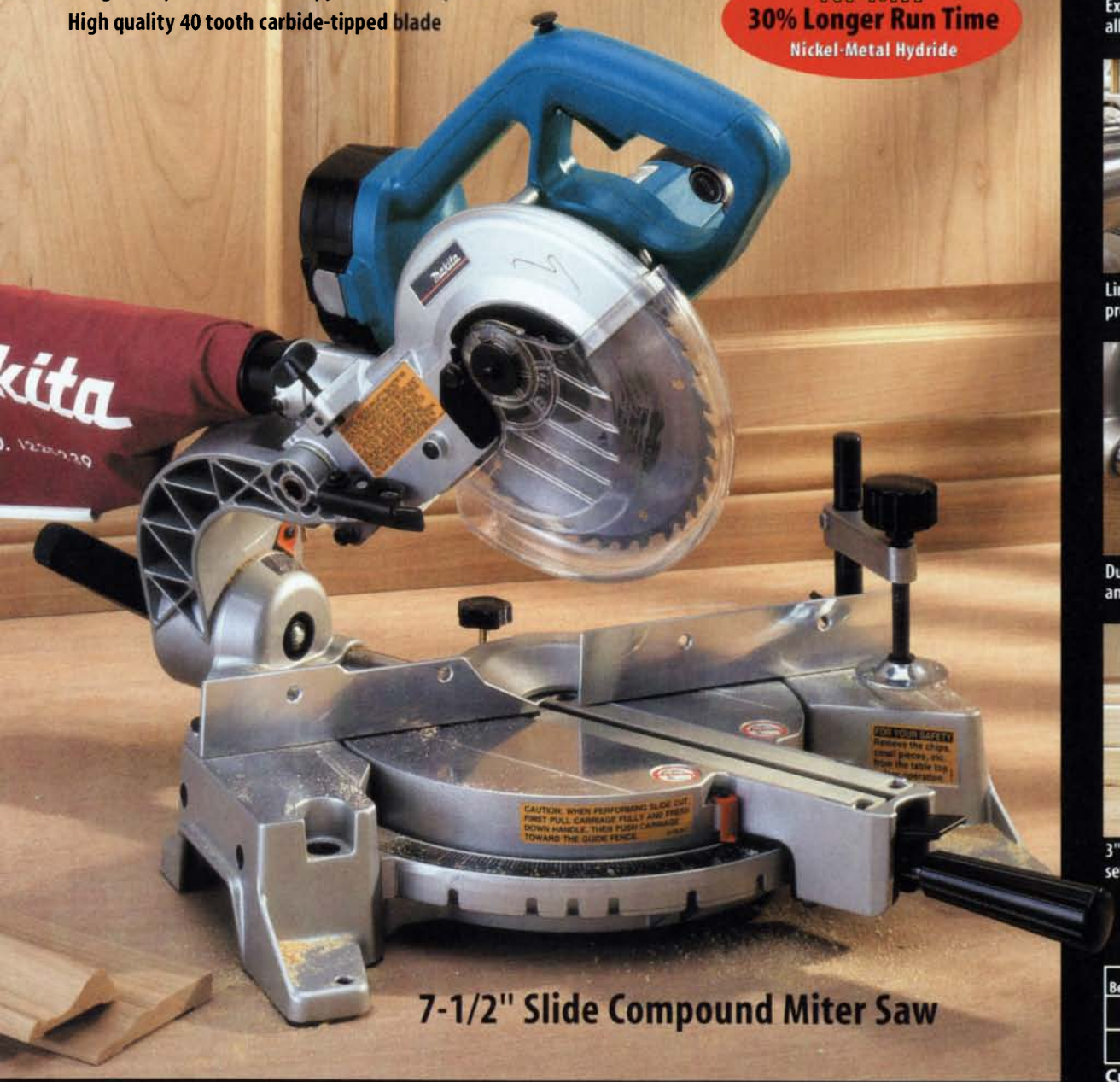

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## BeadLock loose-tenon joinery system is surprisingly simple

***Another way to make a mortise-and-tenon joint.*** *The BeadLock jig simplifies the job of drilling mortises. The company sells loose-tenon stock in two sizes.*

BeadLock is called a loose-tenon system, but there's nothing loose about it. Used like a doweling jig, the BeadLock might more accurately be described as a mortise-tenon-mortise system.

Like most good inventions, this jig is disarmingly simple. All it takes is a clamp and a drill. Just make a mark across the joint, as you would with a doweling jig, then clamp the BeadLock on either piece. A large window makes finding your mark easy. Drill two ½-in. holes, slide the guide over to its other stop, drill one more hole, and your mortise is made. When using the ⅜-in. kit, you must drill five holes instead of three.

The key to this system is the specially machined tenon stock. It looks like a bunch of dowels stuck together (but it is solid wood) and comes in 12-in. lengths, which can be cut to suit. Small flats on two edges provide adequate glue relief.

After drilling, shavings must be picked out of the mortise, and sometimes there's some fuzz that needs to be trimmed with a knife. But if you use a sharp drill bit, the tenon stock goes in with a nice fit, and the resulting joint is strong.

BeadLock is available from Woodcraft and other catalogs for about $35 for either the ⅜-in. or ½-in. jig or about $45 for both. Tenon stock retails for about $6 for a bag of three 12-in.-long pieces. *—G.W.*

*Lee Grindinger is a furniture maker in Livingston, Mont.; James Andrews is a chief petty officer and navy recruiter in Fairbanks, Alaska; Mario Rodriguez is a contributing editor to* Fine Woodworking; *Gary Williams is from Lakeside, Calif.; Donald Brown builds furniture in Havana, Fla.*

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READER SERVICE NO. 195

# A Wax Primer

Although it's not waterproof, wax is a simple finish that can be blended, buffed and tinted

BY STUART M. ALTSCHULER


Wax is one of the most versatile finishes around, in part because it is more than a finish. In addition to adding protection and luster to a piece of furniture, it can help drawers slide more easily, it lubricates steel tools such as handsaws, and it is perfect to use as a rust-inhibitor on tablesaw or jointer beds.

Perhaps because it's such a staple in any shop—and almost used as an afterthought in the finishing process—woodworkers often use whatever wax product they have on the shelf without knowing a lot about what it does, when to use it, which kind to use or how to apply and remove it.

## Wax as a finish

Plain wax and the variety of mixtures of wax with solvents, pigments and other ingredients (hence wax "polish") are traditional wood finishes that have been used for centuries, and they haven't changed much in all that time. In fact, it's worth taking the time to learn something about wax polishes because they are easy-to-use topcoats appropriate for many types of fine woodworking.

Since the early part of the 20th century, wax has faded from use as a primary finish due to the invention of other, more durable coatings. Today, wax has been relegated to being used as the topcoat, that is, as the final layer over another finish. Occasionally,



Photos, except where noted: Zach Gaulkin

## Animal, mineral or vegetable

Wax is used for everything from coating supermarket apples to making lipstick glide more easily. And of course, wax is one of the oldest furniture finishes, having been in use since the 16th century. There are many types of wax, each with its own characteristics. Commercial furniture waxes can be made from animals, minerals and plants or a combination thereof.

**ANIMAL WAX**

*Although wax can come from whales and wool, animal-based furniture wax comes from bees. Beeswax is not the hardest wax, and it has a relatively low melting point. A simple mixture of beeswax and turpentine makes a good, simple paste to use on wood.*

**MINERAL WAX**

*No wax is waterproof, but mineral waxes such as ozocerite, microcrystalline and paraffin are the most water resistant. Paraffin is a by-product of petroleum refining, and because of its softness, it is often added to other harder waxes such as carnauba.*

**VEGETABLE WAX**

*Carnauba wax comes from a palm tree, and candelilla wax comes from a shrub. Both waxes are very hard and melt at 185°F. When buffed, carnauba and candelilla produce a high sheen.*

**BLENDED WAX**

*In their unadulterated states, most waxes are solid. Adding solvents softens wax and makes it easier to apply. Different waxes and solvents are blended to make mixtures with the attributes of all of the ingredients. Manufacturers are sometimes guarded about their blends of waxes and solvents. See pp. 48-49 for recipes on making your own blends.*


in a situation where little protection is needed, waxes (particularly specialty waxes) can be used alone, often yielding results that are quite pleasing.

### What does wax do?

All wooden surfaces deteriorate, and like other finishes, wax both protects and preserves the surface (other finishes underneath) or the wood itself if there is no other finish. The primary culprit that attacks wood is not always wear and tear. Ultraviolet rays, exposure to the air, airborne pollutants and microbes also take a heavy toll. Why wax? Because wax is extremely resistant to dirt, fungi and even moisture.

Although wax retards the deterioration process and protects an underlying finish, it's not a hard coating like lacquer or varnish. And even though wax does resist water—as we all know from ads for car waxes in which water beads and runs off—I wouldn't use it on a dining table or on any surfaces that get wet a lot. The thickness required to be truly water resistant is far greater than what is practical for furniture—a heavy buildup of wax is both unsightly and sticky.

Think of all those other pieces of furniture that won't be exposed to water. On these pieces, wax is one of the easiest finishes to apply and maintain. Unlike varnish or lacquer, a wax topcoat never needs to be sanded or stripped. In fact, the solvents in a wax polish will dissolve a previous coat of wax. Also, with a little pigment, wax can be used to create all sorts of special effects, and it can be buffed out to almost any degree of polish.

### Types of wax

There are many types of wax, each with its own characteristics, and many waxes have an application in woodworking. They are divided into three categories: mineral (paraffin, ozocerite, montan, microcrystalline), vegetable (candelilla, carnauba, Japan) and animal (beeswax).

The first wax used in finishing was beeswax, in the 16th century. It was dissolved in turpentine and settled into a creamy texture. This mixture was applied to furniture and provided some protection, but beeswax is soft, melts at 145°F, a relatively low temperature, and it yields only a low luster.

Carnauba and candelilla, both vegetable waxes, are very hard (carnauba is the hardest), and they melt at 185°F. These harder waxes can produce a high-gloss sheen on a surface when buffed.

Petroleum-based (or oil-based) mineral waxes such as ozocerite and microcrystalline are the most resistant to water. Paraffin wax, also petroleum-based, was commonly used to carry the slurry when rubbing a finish. It also can be used in the same fashion with wet-or-dry sandpaper to carry away the slurry of the abrasive.

### Wax polish

The wax you are most likely to have stashed on a shelf above your workbench, however, is more than just a wax. It's probably a wax polish of some sort—a combination of different types of waxes mixed

Photos, facing page (right) and this page: Michael Pekovich

with a solvent and possibly some pigment. The solvent creates a workable viscosity that makes it easier to apply.

The most traditional solvent is pure gum spirits of turpentine, but turpentine is getting hard to find these days because (like many other solvents) it is hazardous. If you wander into a large home center and ask at the paint department for turpentine, you will most likely be shown a turpentine substitute. Don't be fooled by names that are close—they won't work quite the same in a wax mixture. Read the label on the can to make sure you get the real thing.

Another solvent in wax is toluene. If you are making your own wax polish (see the story at right), you can do so without toluene, which is a strong solvent that can eat into finishes such as varnish if they are not fully cured. Toluene is used in the mixture for many wax polishes, including common brands such as Briwax. Toluene is a more powerful solvent than turpentine, and therefore a greater quantity of the harder waxes, such as carnauba and candelilla, can be incorporated into the polish while maintaining a workable viscosity.

***One of the oldest finishes around.*** *A creamed beeswax polish, made by dissolving pure beeswax in turpentine (not mineral spirits), has been used on furniture for centuries.*

In most off-the-shelf brands of wax, the blend is usually a mixture of beeswax and the harder carnauba wax. It's hard to tell, however—most brands do not let you know what's in them. Briwax prints the ingredients on the label (it's beeswax and carnauba wax dissolved in toluene) but

## For best results, make your own wax polish

**Many people resist making something from scratch that can be bought premade—especially when it comes to finishes—perhaps because they are in a hurry to see results. But when you use a premade product, you lose control. You don't always know what is in the can, so how can you adjust the mixture for best results?**

**The answer is to make your own. Making your own wax polish is easy; simply follow any of these recipes.**

**A few simple precautions: First, remember that the solvents are flammable. Never use an open flame of any type to heat the waxes. Second, remember that hot wax is just that—hot. Be careful not to get burned, particularly from wax that splatters when you pour from one container to another.**

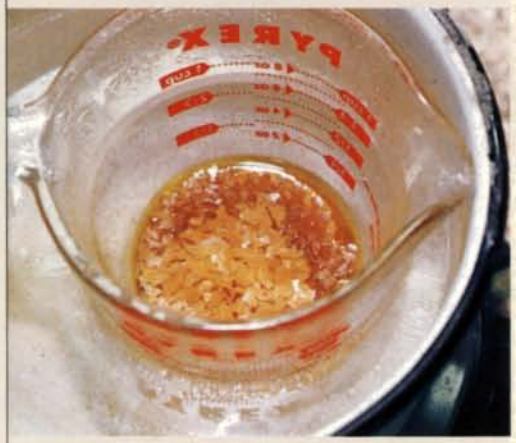
### STANDARD BEESWAX POLISH

**This is an easy wax polish to make and is a fine finish on all types of wood for imparting a low luster.**

**3 parts turpentine**
**1 part beeswax, shaved into thin pieces**

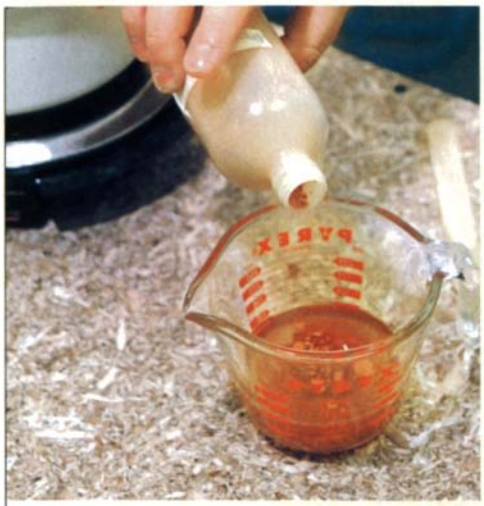
**1. Melt the wax in a double boiler (a bowl or jar floating in a pot with water) over an electric hot plate. Although it is not necessary, shaving the wax into small pieces makes the process go faster.**
**2. Remove it from the heat. Add turpentine while stirring.**

***Grate the wax so that it dissolves faster.*** *The first step in making wax is to melt or dissolve it. This process goes faster if you shave the wax into small pieces.*



***Use a shopmade double boiler to melt the wax.*** *Most waxes will dissolve in turpentine, but it's faster to melt them (waxes used in polish melt between 145°F and 185°F). Place the wax in a heat-proof glass container, and put the container in a pot of hot water.*

Photo, this page (top right): Michael Pekovich



***Add remaining ingredients to the melted wax.*** *Before the wax cools and hardens, add the remaining ingredients, such as turpentine or pigment (top). Stir the mixture well, then pour it into a jar or a clean, pint-sized paint can and allow it to cool (bottom).*

As an alternative, you can make this recipe without heating the ingredients. Simply combine the beeswax shavings and turpentine in a jar, stirring occasionally. The beeswax should dissolve into the turpentine overnight. If it does not, add more turpentine very slowly.

The addition of solvents changes only the viscosity of the polish, not its characteristics as a polish. If your polish is too dry, add a few drops of solvent. If the consistency is too thin or runny, leave the cover to your container open so that some of the solvent evaporates. In other words, there is no such thing as bad or unusable wax.

### CREAMED BEESWAX POLISH

A suitable finish for most furniture and easy to apply, creamed beeswax should not be used on open-grained woods because it might leave an unsightly residue in the pores if not carefully applied and buffed.

1 pint turpentine
1 pint water
5 oz. beeswax
1 tablespoon ammonia

1. Melt the wax, using the double-boiler method described previously.
2. Remove it from the heat and add the turpentine while stirring.
3. In a separate container, combine the ammonia with the water.
4. Add the ammonia-water mixture to the wax-turpentine mixture while continuing to stir.
5. Transfer to a clean container while still warm.

### NO-SOLVENT WAX POLISH

This blend can be used in situations where a finish could be damaged by a strong solvent.

1 part beeswax
1 part ammonium carbonate
8 parts water

Note: Use a pot that is at least four times the size of all of the ingredients because the mixture will bubble and foam when the ammonium carbonate, available from Kremer Pigments (see Sources of Supply on p. 51), is added.

1. Melt the wax in water, using the double-boiler method.
2. While stirring, add the ammonium carbonate a small amount at a time. If the solution threatens to spill over, remove it from the heat, continuing to stir, until it subsides.
3. Add pigment, if desired.
4. Transfer to a clean container while still warm.

### GLOSSY WAX POLISH

This mixture is suitable for everyday polishing. The recipe produces a nice, glossy sheen without being too hard to buff out.

8 parts beeswax
3 parts carnauba wax
9 parts turpentine

1. Melt the waxes, using the double-boiler method.
2. Remove the wax from the heat and add the turpentine while stirring.
3. Add pigment, if desired.
4. Transfer to a clean container while still warm.

### HIGHEST-SHEEN WAX POLISH

This recipe makes a hard wax that produces a glossy sheen. But because of its hardness, the wax is more difficult to apply and buff.

5 parts beeswax
2 parts carnauba wax
2 parts candelilla wax
27 parts turpentine

1. Melt the waxes, using the double-boiler method.
2. Remove it from the heat and add the turpentine while stirring.
3. Add pigment, if desired.
4. Transfer to a clean container while still warm.

***Adding pigment to clear wax works, too.*** *If you don't want to go to the trouble of making your own wax, you can add pigment to any liquid or paste wax. You can use dry artist's pigments or mica powders (shown above). The author mixes the wax on glass, which is easy to clean.*

***Buff a surface like you're shining shoes—with a brush.*** *To bring out the shine in a waxed surface, start with a quill brush (above right) and finish with softer hog-hair brushes (above left). The more you brush the surface, the harder and shinier it gets.*

***A random-orbit sander makes buffing fast and easy.*** *Although the author seldom uses one, a random-orbit sander equipped with a soft buffing pad will make short work of large surfaces. Make sure the wax has fully cured before buffing for the highest sheen and hardest surface.*

does not divulge the mixing proportions. Briwax 2000 substitutes another (unspecified), less-hazardous solvent. Most of the creamed beeswaxes are beeswax dissolved in turpentine—the traditional formula for centuries.

Turpentine and toluene can be used to remove wax (depending on the type of wax). Mineral spirits (paint thinner) also works, though not as well. If mineral spirits doesn't work, try naphtha, which is stronger than mineral spirits.

## When to use wax

It has often been said that there is no surface that wouldn't be helped by a coat of wax. But this couldn't be further from the truth. For instance, wax wouldn't be my first choice for anything that will see a lot of moisture, such as dining tables, coffee tables or (obviously) any outdoor furniture. Still, some people like the look and aroma of wax, so if you absolutely must use wax in these situations, I would recommend something that is microcrystalline, which has the highest water resistance. Renaissance wax would be a good choice. It is expensive, but when applied in very thin coats, it offers the best protection from water.

Also think about the use of a particular piece of furniture before waxing it to a high polish. Chairs and benches, for instance, are not good wax candidates because you don't want them to be too slippery. Also, a wax with low heat resistance might begin to melt and get sticky from body heat.

What finishes can you apply wax over? Varnish, oil and shellac love a coat of wax on top. The solvents in wax polish won't dissolve a water-based finish, so they will sit happily (and beautifully) on top of most water-based coatings.

***Pigmented wax works like a stain.*** *Highly pigmented waxes such as these (manufactured by Liberon) can create interesting effects on open-pored woods such as oak and ash. The author is using a clear paste wax to remove excess pigmented wax.*

Remember, the wax itself is not going to be harmful to much of anything. It is the solvent, particularly toluene, that may cause problems. Be sure to let a finish fully cure before waxing it, and your best bet is to test the wax on a sample piece or in an area that won't be seen. And, of course, don't apply anything over the wax finish, except for more wax.

***Wax puts a specialty finish within anyone's reach.*** *Pigmented or liming finishes work best on open-pored woods such as the white oak of this side table. Applied the same way as plain paste wax (inset), the white liming wax fills the pores of the oak, creating a pickled finish.*

## How to apply wax

Wax polish is easy to apply. Start with a clean, smooth, dust-free surface. If the surface has been previously waxed, it is not necessary, in ideal conditions, to remove the old wax. Over time, the wax polish will wear away so that you really aren't building up too much polish. You should only have to remove old wax that has yellowed or become brittle.

On older furniture, if the surface is extremely dirty, you may want to use a commercial degreaser. Vulpex, a soap often used in conservation and restoration work and available from Conservator's Emporium (775-852-0404; www.consemp.com), can be diluted in water, denatured alcohol, mineral spirits and other solvents.

Wax polish comes in liquids or thicker formulations known as paste wax. Keep in mind that the consistency of wax affects not how it looks but how easy it is to apply. If you have a can of old wax that looks dried out, try adding a little turpentine to thin it. If the wax seems too runny, let the solvent evaporate until it thickens.

In its liquid form, wax polish can be applied evenly using a brush or a rag. Wipe off the excess when the surface feels dry to the touch. If you're using a paste wax, you can place a generous amount of the wax directly on the surface to be waxed, or you can make a wax pad or "rubber" by folding a chunk of wax inside a clean cotton cloth. After applying the wax, but before allowing it to dry, remove the excess by rubbing with a clean, dry cotton cloth.

You also can use 0000 steel wool (or the synthetic variety) to apply wax, but this is usually reserved for rubbing out a hard coating such as varnish, because it gently abrades the surface, creating a matte finish.

## Two coats and a buffing out

Like many other finishes, the wax polish surface is built up. You should be able to achieve a nice sheen in two coats. If you do not, the application is probably too heavy and the buffing too light. Shine occurs when the molecules of the wax polish are compressed and reflect more light.

After applying the first coat and wiping off the excess, let the surface sit for at least two hours while the solvents evaporate. The longer the evaporation time, the better; a day or two is not too long. Apply a second coat and let it dry for the same amount of time.

Buffing can be done using a soft cotton cloth for low sheen. For higher sheen, you will need more pressure. A number of different brushes will yield a higher sheen. For open-pored woods such as oak, start with a quill brush to compress the polish. Then switch to a hog-hair polish brush similar to the kind used for polishing shoes. For large projects, it may be practical to use a random-orbit sander fitted with a buffing pad.

## Specialty waxes

Finally, a word on some specialty waxes that are available. Liming wax allows you to achieve a pickled, limed or French country look in just minutes with the application of two coats of wax polish. Patinating wax comes in a number of colors (black, green, terra-cotta and blue) and can create a startlingly beautiful effect. Both of these waxes work best on open-pored woods such as oak or ash, and wire-brushing the surface of the wood to deepen the grain can enhance the effect.

When it comes to pigmented waxes, being able to mix your own and adjust the ingredients is important. True, manufactured wax polish comes in many colors, but it's often easier to make the color yourself. You can do this by making wax polish from scratch or by adding pigments to clear polishes (or sometimes even to those already pigmented).

Natural earth pigments (see Sources of Supply below) work best, but you can use any dry pigment. Special effects are easy to achieve by adding pigments or mica powders to the polish. Micas are nontarnishing, nontoxic metallic pigments that will not react with the solvents in the polish.

One important piece of advice: Keep track of the exact ingredients of anything that you make or modify. You never know when you'll have to duplicate a recipe. □

*Stuart M. Altschuler is a woodworker, certified picture framer, gilder and teacher. His studio and school, Prestige Framing Academy, is in Danvers, Mass.*

## SOURCES OF SUPPLY


Some waxes are available through woodworking catalogs. The sources at right have a wide selection of pure waxes, pigments and other unusual items mentioned in this article.

**LIBERON/STAR WOOD FINISH SUPPLY**
P.O. Box 86
Mendocino, CA 95460
(800) 245-5611
www.woodfinishsupply.com

**KREMER PIGMENTS, INC.**
228 Elizabeth St.
New York, NY 10012
(212) 219-2394
www.kremer-pigmente.de

**BAGGOT LEAF CO.**
430 Broome St.
New York, NY 10013
(212) 431-4653
www.goldleaf.net

**SEPP LEAF PRODUCTS**
381 Park Ave. S.
Suite 301
New York, NY 10016
(212) 683-2840
www.seppleaf.com

# Craftsman Wall Cabinet

## A simple construction with a refined door and a tilting drawer

BY IAN INGERSOLL

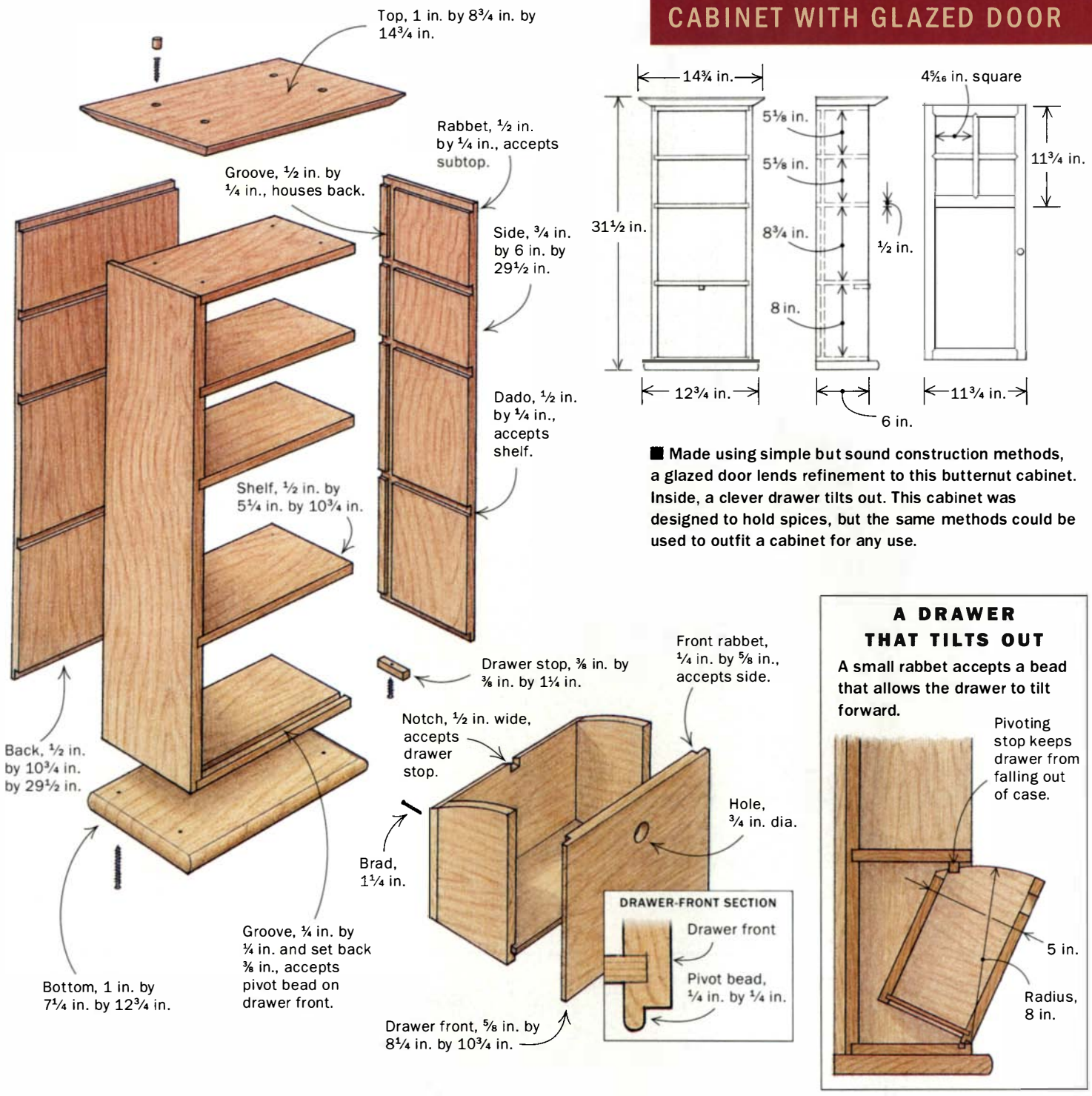
There is always a spot for a wall cabinet, especially a small one. This Craftsman-style piece is modeled after a clock, and at a little more than a foot wide it fits well in almost any tight, vertical space. I made it out of butternut, an underused, medium-toned wood that works easily. Because this cabinet was destined for a kitchen, I outfitted the inside to accommodate spices, but the same-sized cabinet could hold anything from pottery to small books. The shelves, in this case, are spaced to fit off-the-rack spice bottles, with the bottom shelf roomy enough for larger, bulk-sized decanters. The tilting drawer at the bottom is made to fit large packages of tea.

When it comes to construction, the simplest answers are often best. On this small, vertical cabinet, I could have dovetailed the case, but I saw no need to spend the time when countersunk and plugged screws would do. And on such a simple piece, I didn't want anything to detract attention from the door, where I spent most of the design and construction energy. I used a flat panel at the bottom of the door to cover the drawer and bulk items, but at the top I installed glass to show off the nicer-looking spice bottles and to make the piece a bit more interesting. Over the single piece of glass, I installed muntins, giving the appearance of two-over-two panes of glass.

Begin by milling up the lumber: The top and bottom are 1 in. thick; the sides, door rails and stiles are ¾ in. thick; the drawer



Photos, except where noted: Matthew Teague; this page: Michael Pekovich




**Made using simple but sound construction methods, a glazed door lends refinement to this butternut cabinet. Inside, a clever drawer tilts out. This cabinet was designed to hold spices, but the same methods could be used to outfit a cabinet for any use.**

### A DRAWER THAT TILTS OUT

**A small rabbet accepts a bead that allows the drawer to tilt forward.**




parts are ⅝ in. thick; the back and shelves are ½ in. thick; the muntins and door panel are ¼ in. thick.

## Building the basic case

Don't waste energy with overly complex methods of building the case. Use ¾-in.- and ½-in.-thick stock and trim everything to width and length on the tablesaw. Set up the tablesaw to cut ½-in. dadoes for the shelves. Use a stop on your miter gauge to ensure that the dadoes in the back and sides will line up. It's not really necessary to dado the back panel for the shelves, but doing so eases glue-up.

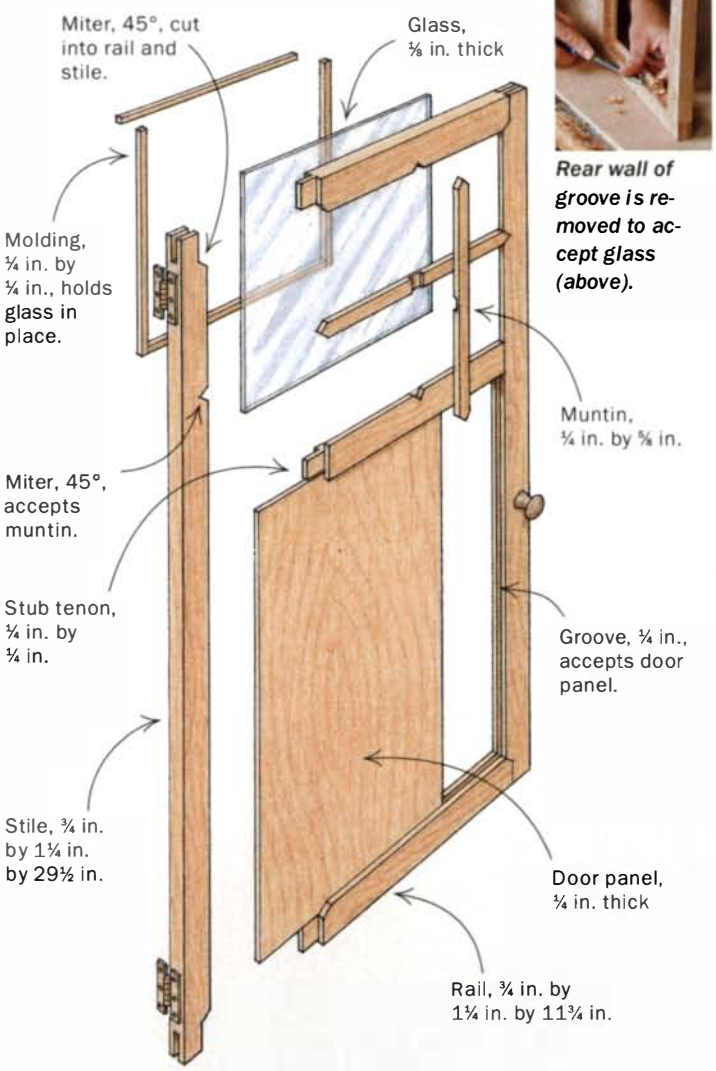
The first step in the process is rabbeting the top and bottom—because the same stop location can be used for each—on all three pieces. Then locate each shelf and set the stop on your miter gauge. When the dadoes have been cut on each of the three pieces, they should all line up perfectly. On the two sides, use the same setup to cut another ½-in. dado, inset ½ in. and ¼ in. deep, to house the back panel.

With the dadoes lined up on the back and sides of the case, trim all of the shelves to width and length and install the ⅜-in. drawer stop on the bottom shelf. Locate the position by marking off the width of the drawer front, then inset the stop another ⅛ in. A screw holds the stop in place and allows it to pivot. On the bottom shelf,

Drawings: Vince Babak

## AN EASY AND ELEGANT DOOR

**To lend a more elegant look to a simple door, muntins overlay a single piece of glass, giving the appearance that there are four separate panes.**






*Rear wall of groove is removed to accept glass (above).*

cut a ¼-in. by ¼-in. groove with the dado setup on the tablesaw. This groove will work as a hinging mechanism for the tilting drawer. With the drawer stop installed and the groove cut, you can glue up the case, which should go smoothly on such a small piece.

### Installing the top and bottom

Making the bottom of this case out of 1-in.-thick stock gives the piece a grounded look. Just remember to leave a ½-in. overhang on the front and sides, and make sure you account for the door. Rout a 1-in. bullnose on the edges of the bottom and leave the decoration for the top.

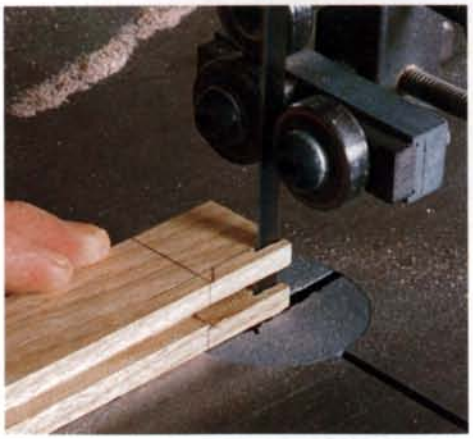
The treatment for the top is one I regularly use on tabletops. It lends the piece a nice, finished look and helps draw your attention to the glass panels in the door. Start by cutting a ¼-in. bead on the outside edge at the front and sides. Then establish the overhang, in this case 1½ in., and mark a line there. If it feels safe, use the tablesaw. With the piece held upright, sight down the raised blade and adjust the angle until it enters at the bottom of the bead and exits at the overhang line. You can achieve the same results by cutting to the line with a handplane. The result is a rounded top edge that angles back sharply toward the case. Both the top and bottom are simply screwed onto the case and pegged.

### Building the drawer

When you open this case, the drawer at the bottom is a nice surprise. Instead of sliding as a normal drawer would, this tall drawer tilts forward and down so that you can reach in for tea or whatever you decide to store inside. The sides and back are rounded so that the drawer slides open easily with the pull—nothing more than a ¾-in.-dia. hole in the front—but the stop keeps the drawer from falling out on the floor. By twisting the stop you can easily remove the whole drawer for easy cleaning or restocking.

The four sides of the drawer are cut to size and dadoed with a ¼-in. blade to accept the plywood bottom. Make sure you cut the front ¼ in. wider so that there will be enough material to form the pivoting bead along the bottom. The side edges of the front and back are rabbeted to accept the sides. The two sides and the back are all shaped on the bandsaw, and a small notch is removed from the top center of the back to allow for the drawer stop.

## Making an easy bridle joint



***An easy but refined door detail.*** *With the rail grooved and the mortise cut, a bandsaw trims away the inside edge to accept the stile.*

***A mitered door joint.*** *With a 45° miter jig clamped to the rail, a chisel pares to the line. This simple detail lends a framed and finished look to the door.*

***A perfect fit.*** *It's best to work out any problems before you begin glue-up. A dry run ensures that everything fits and that the bridle joints pull tight.*

To provide the tilting action, the bottom of the front of the drawer has a ¼-in. bead that protrudes down into the groove cut into the bottom of the case. Rout this bead on the inside of the drawer front, then use a dado blade to remove the front edge. This bead should fit nicely into the groove on the bottom of the case and allow the drawer to fall forward. The drawer is glued up with the bottom floating in the dadoes, and a few brads in the sides and back hold everything in place.

### Building and glazing the door

The bulk of the work on this small piece involves the cabinet's natural focal point: the door. First, cut the rails and stiles to 1¼ in. wide and trim them to length. Use bridle joints to frame the door. Bridle joints not only offer plenty of strength, but they also make easy work of measuring. Because the tenons run the full width of the door, simply mark the length of each piece off the case itself. The center rail is the one exception, and it is cut with small tenons that fit into ¼-in. by ¼-in. grooves on the stiles.

By cutting the tenons and mortises 1 in. deep instead of 1¼ in. deep (the full width of the rails and stiles), you leave material to cut the 45° haunches at the joints. These haunched tenons not only look more refined, but they also allow you to rip the rail and stile grooves full length on the tablesaw.

Use a ¼-in. dado setup to cut the grooves on the inside faces of the rails and stiles. For the median and upper rails, you also remove the inside portion of the groove so that the glass can slide into place after the door has been assembled.

Using the same dado setup and a simple jig that fits over the tablesaw to hold the stiles upright, raise the blade to 1 in. and cut a tenon slot on the ends of the rails. Adjust the fence so that in two passes you're able to leave the ¼-in.-thick tenon. At the bandsaw, trim down the width on the inside of the tenon by ¼ in. You'll notice that this leaves the tenon length ¼ in. shy of mating correctly. A simple miter jig clamped onto the rails and stiles helps guide the chisel for the 45° cuts.

Once you've milled and trimmed a center panel for the bottom of the door, the door can be glued up. When the glue dries, you'll still have to remove the inside of the groove on the upper portion of the door where the glass will be installed. Do this with a straightedge and a box knife, then clean it up with a chisel.

The final touch to this door is to install the muntins. Cut them ⅜ in. wide and center them on the square upper portion of the door. Then use a small gentleman's saw to cut the 45° miters that accommodate the muntins. Once the two pieces press-fit into place, lay one across the other and mark the centers. Cut a ⅛-in. groove where the two cross each other. When installed, a few drops of glue at the groove and on the mitered ends, along with a little tension from the door itself, hold everything in place.

Once the glass slides in, small pieces of molding are used to secure it. All that's left to do is to hang the door and apply the finish and hardware. I used an oil varnish from Waterlox to give this piece a natural look and to provide protection. The hinges I used are antiqued, solid brass H-hinges from Horton Brass (860-635-4400), and the knob is a Shaker-style bronze knob from Colonial Bronze (860-489-9233). After you're done, open the cabinet, reach in the drawer, and fix yourself a cup of tea. □

*Ian Ingersoll designs and builds furniture in West Cornwall, Conn.*

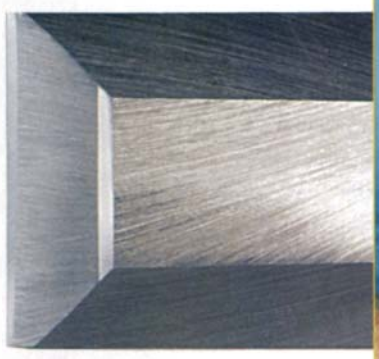
## Setting muntins in place

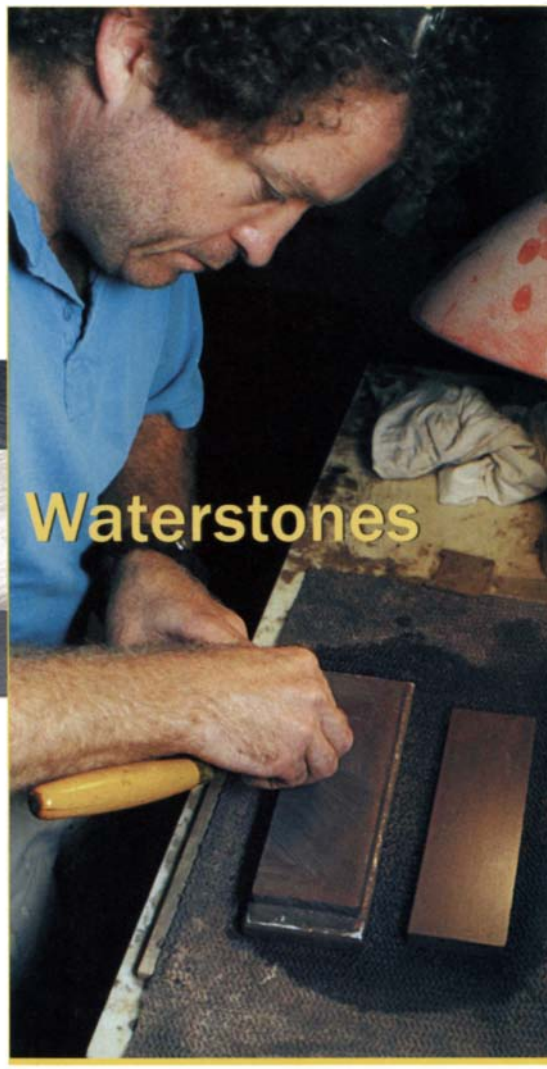
***Panes for the glass.*** *With two 45° cuts on each muntin end, the muntins are laid in place, and the miters are marked on the rails and stiles.*

***Cutting miters in the rails and stiles.*** *To accept the muntin ends, a small gentleman's saw cuts miters on the door frame.*

***Crossing the glass.*** *To give the appearance of divided panes of glass, muntins are added. The half-lap joint is cut on the tablesaw.*

# Getting an Edge






BY JEFFERSON KOLLE

Many years ago, as the new, inexperienced guy on the carpentry crew, I was in charge of lugging giant piles of plywood from one side of the job site to the other. "I went to college for this?" I used to ask myself. There was a guy on the crew, Mark Fortenberry, who had the sharpest tools. He made finish work look effortless—smooth, fluid, precise. Every morning he'd pour coffee from his stainless-steel thermos and sharpen the tools he needed for the day. Different-colored stones were unwrapped from an oily towel; a little can of three-in-one oil appeared; and Mark would sharpen.

Knowing I would need to acquire tools and skills if I ever wanted to do anything other than get intimate with sheet after sheet of rough plywood, I bought a block plane and a roll of chisels, the same plane and chisels that Mark had. But there was something wrong with my tools—maybe they were defective. The problem was they were dull. "Dull as a hoe," Mark said.

Eventually I got lots of tools: tools I used everyday, tools I didn't really need, tools I never used. And I got my grandfather's two sharpening stones—oily, black things, one with a big chip out of the corner. Often when I tried to sharpen something, I think I made it duller. (What's duller than a hoe? A hoe handle, maybe.) The whole process mystified me. I decided that electricity would remove the mystery of sharpening, so I bought a powered waterstone made by Makita.

It's a great tool: The platterlike, 7-in., 1,000-grit stone moves at fewer than 600 rpm, and water drips onto its surface from a plastic reservoir. The tool comes with a honing guide and an attachment for holding planer or jointer blades. It couldn't be more jerk-proof. Fill the reservoir with water, turn on the tool and hold the blade against the stone. The motor thrums along quietly, reassuringly, telling you that now, finally, you are going to get truly sharp tools. And I did. For the first time since Mark sharpened some of my stuff, my plane irons and chisel blades would shave hair off my forearm.

Eventually I went into business for myself, restoring houses, building an occasional piece of furniture, and the Makita never failed me. I got to the point where I stopped using the honing guide. Instead, I held blades freehand against the turning stone, and after a while I wore a trough in the stone, which made it harder and harder to get a flat edge. If the machine has a fault, it is that it is messy. Water gets flung around, especially when you're trying to true the back of a blade. Every time I sharp-


# Different woodworkers use different sharpening methods

ened, my shirt would get soaked right at my belt line, and I would have to mop water off the workbench when I was through.

I got a catalog recently that devoted seven pages to sharpening stuff. Waterstones, oilstones, synthetic stones, diamond stones, electric-powered stones, jigs for this, jigs for that, rouges, powders, potions. I'm sure they all work. There are a zillion ways to sharpen steel—I know a woman who sharpens her kitchen knives on the unglazed bottom rim of a dinner plate—but what works for one person might not work for another. For two days, I drove around New England, visiting three woodworkers, talking to them about their methods of getting an edge.

## Waterstones and the art of sharpening

Scott Schmidt has a shop in The Button Factory, a warehouse of artists and craftsmen in Portsmouth, N.H. Schmidt was schooled at North Bennet Street, and he uses Japanese waterstones. "The way I was taught," he said.

At the end of his shop, there is a bench dedicated to sharpening. In more than 20 years of woodworking, Schmidt has used up one waterstone, and he is halfway through another. All sharpening stones are sacrificial—they wear away as steel is rubbed over them—but waterstones are softer than most, and it is the gritty slurry that's created as the stone erodes that works with the stone itself to provide the sharpening medium.

Schmidt soaks his stones in a grungy, water-filled plastic basin—the type of container a deli might use to store coleslaw or potato salad. The basin lives under his bench, and he pawed through it, pulled out a dripping stone and set it on the benchtop, wiping off the water with his hand. On top of his bench is a piece of rubber rug padding that keeps the stone from moving. He set the stone on the pad, and before touching steel to stone, he spritzed the stone with a water bottle. "I think of sharpening as a process of constantly flattening the stone, keeping it flat by using its whole surface," he said. "You can't make a blade flat with an unflat stone."

The natural tendency, one that Schmidt takes pains to avoid, is to work a blade onto one spot in the center of the waterstone, creating a declivity—in effect, unflattening the stone.

Schmidt sharpened one of his favorite chisels while I was at his shop. For a new tool or one with a badly damaged edge, he'll first work the blade on an electric grinder before going to his waterstones. For a long time he used a magnifying glass

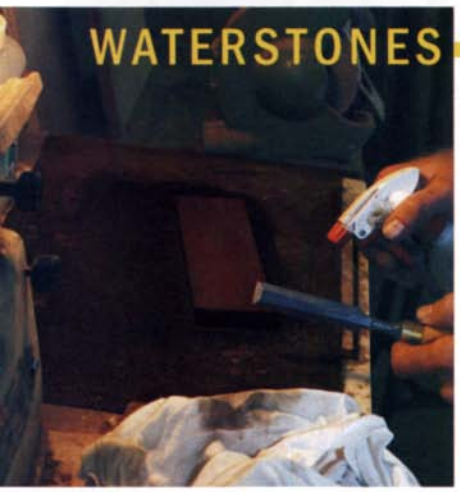
Photos: Author

to inspect the edges he'd honed, but familiarity with his tools has enabled him to forego this practice. He told me that it's easier to sharpen a tool he uses a lot. "If you know the way a certain tool cuts, you know the way that tool will take an edge. A large part of both processes, cutting and cutting an edge, is done by feel." He does not use a protractor or angle gauge; rather, it's a matter of touch and sight.

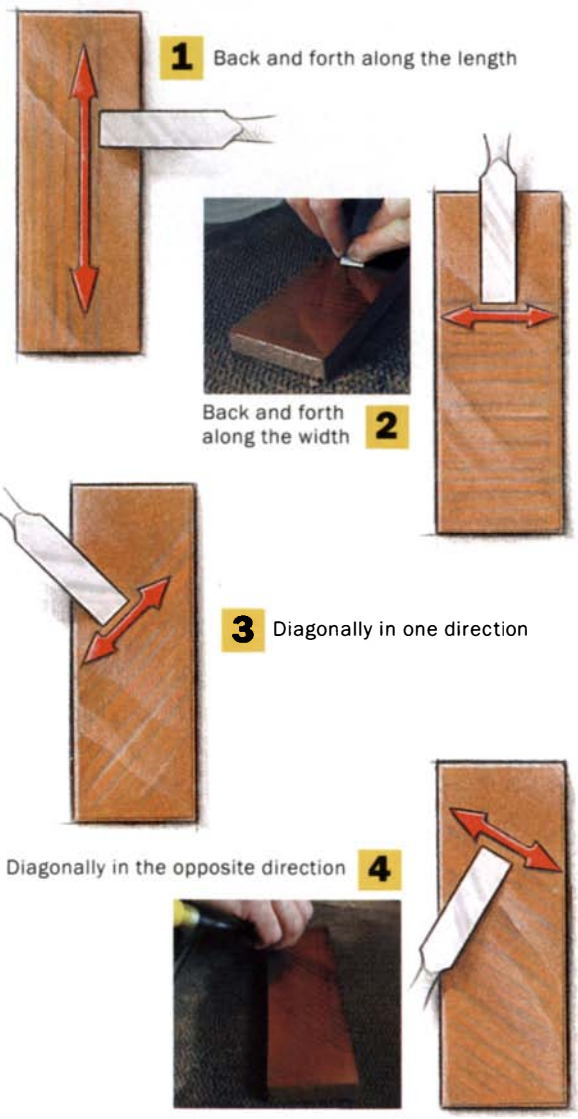
He started on the back of the chisel using a 1,200-grit waterstone, working the steel back and forth along the length of the stone and mixing up a slurry of water and abraded stone particles. He often stopped and checked the chisel's surface, tilting the tool to look at the shiny areas and the dull spots. "I can feel that this stone has a little high spot on this end," he said, concentrating his efforts in that area. "When the stone is perfectly flat, you can feel sort of an even suction between the wide surface of the chisel's back and the stone. If there's a high spot on the stone, the steel grates a little bit, sounds rougher."

When the chisel's back had a uniform shininess—no dull spots to be seen in the steel—Schmidt turned to the bevel. As he did on the back of the chisel, he started the bevel by working it back and forth along the length of the stone for several minutes. Then Schmidt changed tack. Another spritz or two with the water bottle, and he was working again, this time pushing the blade back and forth along the width of the stone. And then he switched again, running the blade in a series of diagonal strokes, crisscrossing the stone from one corner to the other. The slurry built up in little waves. He spritzed again and changed his stance so that he could work the steel from the opposite corner, this time making Xs of slurry. By the time he was finished, the bevel had been worked across the stone in four directions: back and forth along the length; back and forth across the width; and diagonally across the stone in two directions.

He felt the edge with his fingernail. A thin, wire edge had developed, which he removed with several strokes on the chisel's back. When Schmidt was finished, he repeated the process on both the back and bevel, using a finer, 2,400-grit stone and then, finally, a 6,000-grit stone. After five minutes on each stone, the chisel was razor sharp. The back and bevel shone like mirrors.




**DIFFERENT STROKES. Scott Schmidt works a blade across a waterstone in four directions. He repeats the process with stones of 1,200, 2,400 and 6,000 grit.**




### Schmidt's cinder-block secret

*To flatten a waterstone, rub it on a concrete block. A little water and a little rubbing on a concrete block will true an unflat waterstone. The concrete abrades the stone quickly; true a stone only when it really needs it.*

## Oilstones, kerosene and a little diamond paste

After a hard right turn at the end of a Vermont dirt road, I arrived at the shop of Garrett Hack. Hack is a father, a farmer and a woodworker, in no particular order. He is somewhat of a traditionalist, and it shows in the architecture of his slate-roofed brick shop and in the furniture he makes. But there's also a contemporary side to Hack. A Federal-style chest he made has an outrageous band of checkerboard inlay, and the bright-green trim and certain interior details of his shop belie a man who is not a slave to history. Hack's sharpening methods parallel his architecture; he favors traditional oilstones, but he occasionally uses a new product—diamond paste—to get a keen edge in hard steel.

Spread on his benchtop was an array of planes, ready to be sharpened. Hack removed the iron from an old Stanley No. 3. "I just got this," he said, giving the plane a critical eye. "The back of the iron has probably never been flattened. It needs to be



Drawings: Bob La Pointe


**LUBE JOB.** Any oil will do, but Garrett Hack likes kerosene for his oilstones. A quick drizzle of kerosene keeps the stones from clogging with abraded metal. When sharpening, Hack's stones are held stationary in a cleated wooden frame.

***Stone hone.*** *Exerting firm, even pressure on the blade, Hack moves the steel in a figure-eight pattern around the surface of the stone. A good grip on the blade allows him to move the steel off the edge of the stone without tipping, and thus he can use the whole stone.*

***A dab'll do you.*** *A dab of 4-micron diamond paste is Hack's secret weapon for getting a good edge. He mixes the paste with a little kerosene and smears it around on his hard, black Arkansas stone.*

lapped." For the quick removal of steel, Hack will use a diamond stone with an aggressive grit. Because it is messy—he uses a lot of water with the diamond stone, constantly dousing the surface—he usually works outside on the shop's granite steps. The diamond stone is also good for removing small nicks in a blade's bevel.

Hack dipped the diamond stone into a water bucket and worked the back of the plane bade against the stone in slow figure eights. After a while, he held the steel up to the light. The shine on the blade was uneven, meaning the back of the blade still needed work. "Lapping the back of a blade takes some time, but once it's lapped flat, you should never have to do it again."

Hack stores his sharpening paraphernalia in a drawer built into the underside of his workbench. The drawer is full of oilstones, each in its own wood box. And there are tiny plastic jars of diamond paste in different grits and an oil can filled with kerosene. He reached in the drawer and removed a small, trapezoid-shaped wooden frame. The frame, spotted and stained with oil, had a cleat on the bottom. When Hack rested the cleat against the edge of his bench, it was apparent that it was made to hold his sharpening stones at about 30°. "It's a comfortable work angle," he said.

After the blade had been lapped, Hack, like Schmidt, started his sharpening on the back of the plane's iron. He squirted a few drops of kerosene on the stone, telling me that there are all sorts of honing oils available. "But anything will work," he said. "I heard of a guy who uses olive oil." He hunched over the first stone—a manmade India oilstone—again working the steel in slow, lazy figure eights, moving around the whole surface of the stone. After some time, the back of the blade had an even, slightly dull shine. Hack then turned his attention to the bevel. He held the front of the blade flat on the stone and rocked the blade up onto the bevel, starting again with the figure-eight pattern. When the bevel had an even shine, just like the blade's back, he switched to a finer-grit stone—a hard, black Arkansas stone—and repeated the entire process.

Hack's secret weapon is 4-micron diamond paste (which is the abrasive equivalent of a 4,000-grit waterstone). He picked up a sliver of wood from the shop floor and scooped out a half pea of paste. "It doesn't take a lot," he said. "Even this is probably too much." He wiped the paste onto the fine stone, smearing it around with the wood sliver, mixing it in with the kerosene. And again he started on the back

*Hack uses the whole stone by working tools in a figure-eight pattern.*

## True grit

***To true his oilstones, Hack uses gritty silicon-carbide powder mixed with a little water. Hack mixes the paste on plate glass and works a stone in a circle. Later, he checks the flatness of the stone with a straightedge.***

of the iron, working the steel, checking it in the light, until he was sure of the evenness of the shine. Same thing for the bevel.

When he was finished he checked the sharpness of the blade by using it to pare the end grain of a scrap of soft pine. "Why not hardwood?" I asked.

"Almost anything will cut hardwood," he said. "But only a truly sharp blade will cleanly cut the end grain of pine without tearing some of the fibers and leaving a ragged edge. If it's really sharp, the blade will sever all of the wood fibers evenly, leaving a cut on the end grain that looks almost burnished."

Hack flattens his stones with gritty silicon-carbide powder, water and a scrap of plate glass. "It's pretty messy," he said. "Sometimes I do it outside." It's also pretty simple: Hack sprinkled some powder on the glass, added a little water and worked the face of the stone in big circles. When he thought the stone was flat, he held it up to the light and checked it with a straightedge. "Needs a little more right here in the center."

Again he worked the stone against the paste-smeared glass. He checked it one more time and could see no light coming through between the stone and the straightedge. Satisfied, he wiped off the stones and the little can of kerosene, and everything went back into the drawer, except for the oily rag, which he hung off the corner of the bench to dry.

## IS IT SHARP?

*If a blade can shear the end grain of soft pine without tearing or crushing the fibers, it is truly sharp.*

### Plate glass and sandpaper

Even before Mike Dunbar opened The Windsor Institute, where he instructs 600 students a year in the craft of making Windsor chairs, he was a teacher, albeit an itinerant one. He traveled all over the country, going to woodworking shows and giving demonstrations at woodworking stores. He packed a lot of stuff for his trips: chair parts and tools. It was a hassle to find a way to sharpen tools on the road; either he had to bring all of his oils and stones or rely on the store to provide them. Most good inventions are born of necessity; Dunbar's so-called scary-sharp method of getting an edge with plate glass and sandpaper is no exception.

"Sharpening tools doesn't earn any money for a woodworker," Dunbar said. "I like to get my tools sharp and then get to work. Using glass and sandpaper is an extremely fast way to get an excellent edge." Along the back wall of Dunbar's shop is a dark-green, built-in cabinet, and right on the edge of the cabinet's countertop sat a dirty piece of ⅜-in.-thick plate glass about 8 in. by 40 in. Next to the glass were three rolls of adhesive-backed sandpaper.

Dunbar grabbed a razor-blade window scraper and gouged off the three strips of spent paper from the plate glass (the glass is held on the bench with a couple of wood strips). "We sharpen a lot of tools here, and we go through a lot of sandpaper." He went over to a wall-mounted rack of the school's tools—planes, chisels, gouges and drawknives—and grabbed an almost-new, 1½-in. chisel. All of the school's shop tools are spray-painted bright green. "If they're painted, they don't walk," he said. He looked at the edge of the chisel and noticed two big nicks in the blade. I asked him if he would not ordinarily grind out the nicks from the student-abused blade. "I'm telling you," he said, "this method is really fast."

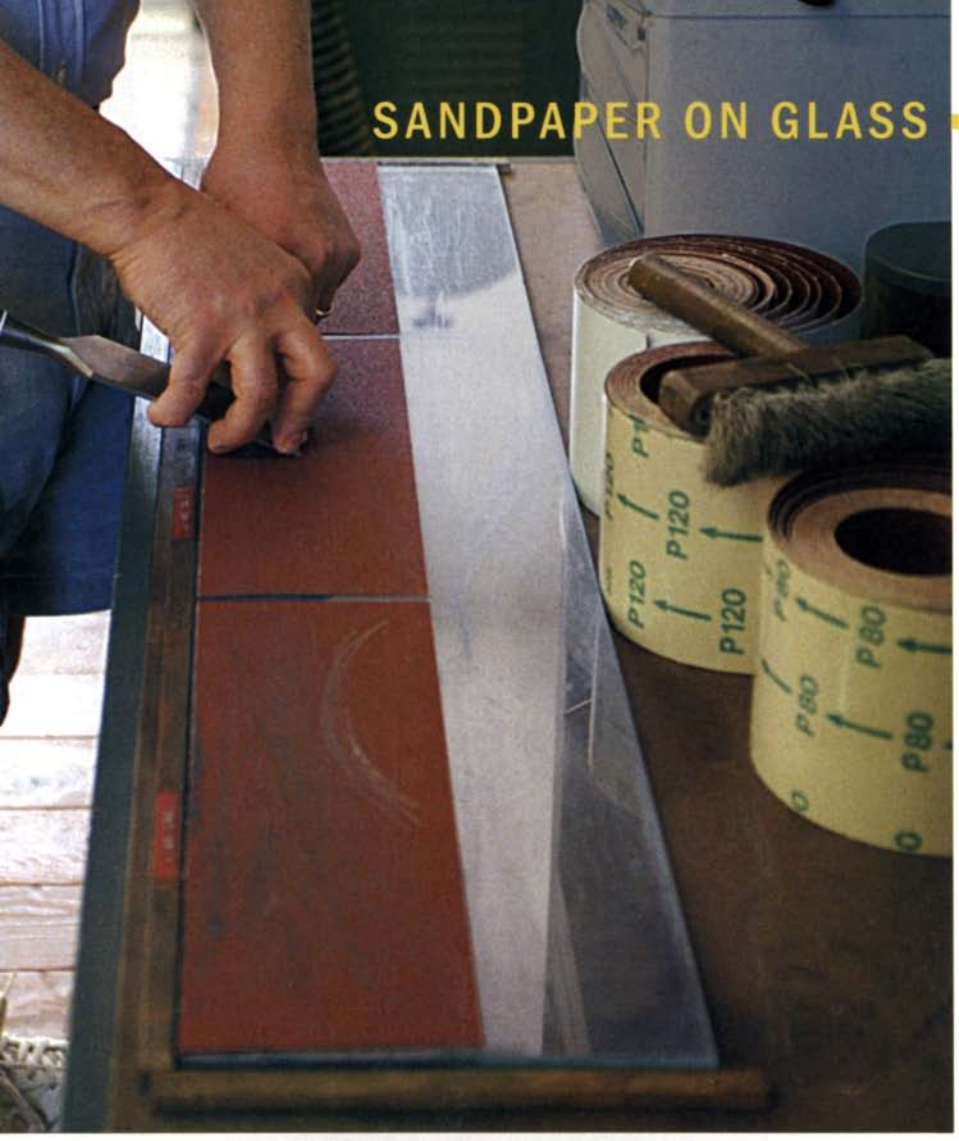
He cut three strips of sandpaper from the 4-in.-wide rolls, one each of 80 grit, 120 grit and 320 grit, and adhered them to the glass. Holding the chisel handle in one hand and using the palm of his other hand on the top side of the chisel, he started to rub the tool back and forth along the length of paper, checking occasionally the evenness of the shine on the back of the blade.

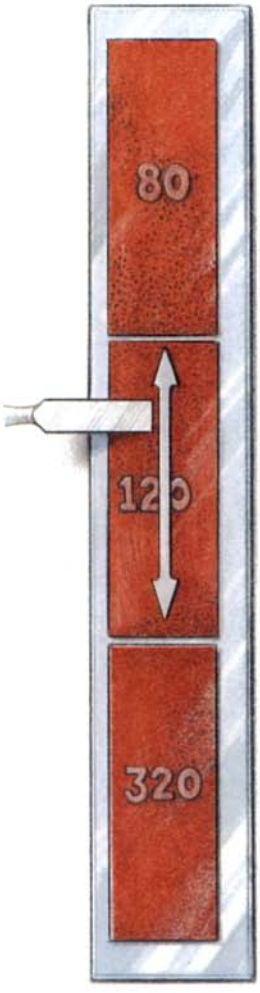
When the back was even with scratches from the 80-grit paper, he colored the back of the chisel with a red, felt-tipped marker. "The marker works like machinist's chalk," he said. "If there are any low spots on the blade, the marker won't get removed when I rub the blade on the sandpaper." He worked the blade against the paper again, and when he held it up to the light, only a faint trace of red showed in the center. Dunbar decided the back was flat enough and told me that future sharpening will make the blade truly flat. Then he switched to the bevel, or bezel, as Dunbar calls it. "Check your dictionary," he told me. I made a mental note.

Dunbar held the front of the chisel on the sheet of 80-grit paper and rocked the blade forward until it rested on the bevel. "Simple," he said. "You don't need a honing guide or anything like that. Just rock the blade until you can feel the beveled surface resting on the paper." With one hand on the handle and the other putting pressure on the back of the chisel, he worked the blade side to side along the length of the 80-grit sheet. A forward-and-back motion or a figure-eight pattern would tear the sandpaper.

He worked the blade for a minute or two and then asked me if I wanted to try it. I told him that I felt like Huck Finn being fooled by Tom Sawyer when Tom convinced Huck that it was fun to paint a fence. "No one believes how easy and fast this is," Dunbar said, "until they try it." I looked at the blade and saw the nicks. I worked the bevel against the sandpaper the way he showed me. After a minute I looked at the blade again; the nicks were almost gone. He looked at me looking at the blade. I smiled, and he raised an eyebrow, knowing he'd won another convert.

After a little more work, Dunbar had removed the rest of the nicks. Total time to remove the nicks in the blade was about five minutes. Then he switched to the 120-grit paper but not before sweeping away the filings with a mason's brush. "Keeps the paper from clogging, and you don't want to get coarser grit on the finer-grit paper." When all of the scratches from the 80-grit paper had been supplanted by the 120-grit scratches, he swept the filings and moved onto the 320-grit sheet.




**SIDE TO SIDE WON'T TEAR PAPER.** Mike Dunbar sharpens his tools with sandpaper stuck to ⅜-in.-thick plate glass. Working steel across three grits of paper, 80, 120 and 320, cuts an edge in no time.

### Plate glass never needs flattening

*When the sandpaper gets dull, scrape it off the glass with a razor blade and stick on a new piece.*

***Felt-tipped marker shows a blade's low spots.*** *When lapping, Dunbar colors the back of a blade (left). After working the blade across the sandpaper, the ink is removed from all but the low spots on the blade (middle).*

***Rougher grit holds finer-grit paper in place.*** *For the keenest edges, Dunbar uses fine-grit sandpaper without adhesive backing. Tools sharpened with 2,000-grit paper are truly scary sharp.*

The sequence was the same: He worked the chisel on the 320-grit paper until there was an evenness of scratches, brushed off the paper and moved to the next-finer grit. After working the chisel, Dunbar placed a piece of 600-grit wet-or-dry paper right on top of the 320-grit sheet. The roughness of one paper holds the finer-grit paper in place. For most tools he feels that 600 grit gives a sharp enough edge; for the keenest edges he will go from 600 grit to 1,000 grit and sometimes all the way up to 2,000-grit paper. A blade honed on 2,000 grit shines like chromium.

Unlike using oilstones, waterstones or powered stones, with Dunbar's method you don't have to worry about flattening the stones. The plate glass is always flat, and when the sandpaper gets dull, you scrape it off and stick on another piece.

As I drove home, I thought of my Makita electric sharpening stone lost in the garage of my ex-wife's house. I thought of Schmidt and Hack and how well their sharpening methods worked for them. (Different strokes for different folks?) And then I thought of the glass store near work, and I decided to stop in and get myself a piece of ⅜-in.-thick plate glass. Tom Sawyer wins again. □

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*Jefferson Kolle is the managing editor of* Fine Woodworking.

# Spiral Router Bits VS. Straight Router Bits

## Can the old standby straight bits compete with the new, more expensive spiral bits?

BY PAT WARNER

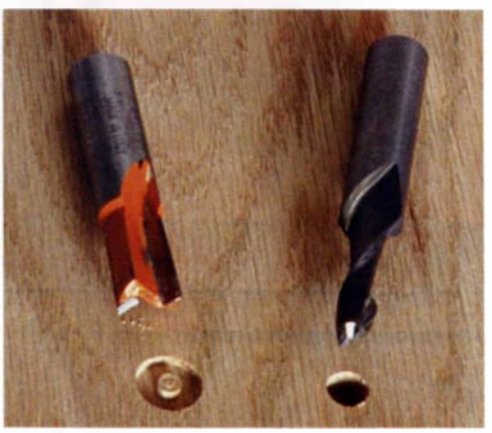
The increasingly popular spiral router bits borrow technology from the metalworking industry. Spiral bits look like drill bits and are most often made of solid carbide, so they are super sharp and leave a superior cut on wood. Two flutes ground around the body of a spiral bit smooth vibration by spreading the cutting action over a longer edge. With their drill-like point, spiral bits are also better for plunge-cutting. All of these advantages also mean less wear and tear on the router. But don't throw out all of your old straight bits just yet.

The new solid-carbide spiral bits come with some disadvantages. The first is that the cutters are expensive. A typical solid-carbide spiral bit is likely to cost at least $50. A similarly sized straight bit with carbide-tipped cutters will run somewhere in the range of $7 to $23. With a cost differential that large, you will want to know what you are going to do with this bit and that you will use it often enough to get your money's worth. To highlight other differences, let's compare the qualities of spiral bits and straight bits.

### Both spiral and straight bits have "plunge-ability"

You can plunge with both types of bits, so they'll both work for, say, cutting mortises. But because most spiral bits are ground on the tip end of the flute, somewhat like a drill, you can plunge straight down as far as you like, without stopping. You can't really plunge any deeper than about ⅛ in. with a typical straight bit. Inspect the end, and you'll see why (see the photo below). On most straight bits there is a space above the web, between the cutters, where no cutting takes place during a straight plunge because there is no cutter overlap. Chuck a straight bit into your drill press and plunge it into a piece of wood. After about 3⁄32 in., the middle of the bit bottoms out. To go any farther, the bit has to abrade the wood away in this middle area.

This doesn't mean you can't cut mortises or plunge with a straight bit. You just have to sweep the router while you are plunging. You should probably cut mortises in passes not much deeper than ⅛ in. anyway, but with a straight bit, such shallow passes are just about a must.



***Why spiral bits are better for plunge cuts.*** *Because a spiral bit is designed much like a drill bit, it makes plunge cuts easily. The cutters of a straight bit do not overlap, so if you plunge straight down deeper than 3⁄32 in., you might burn away the wood in the middle, but you won't cut it.*

### Spiral bits leave a clean edge

The three basic cutter configurations for spiral bits are up-cut, down-cut and a combination of the two, known as a compression bit. (For more on distinguishing between up-cut and down-cut bits, see the story on p. 64.) A down-cut bit sends the chips downward; an up-cut bit sends them up toward the shank. (On a router table, all directions are reversed.) Besides directing the chips, the advantages of these configurations are best illustrated by the quality of cut, especially on veneered plywood (see the top photos on p. 64). A down-cut bit will leave a clean edge on top but a ragged



Photos, except where noted: Michael Pekovich; this page: Tim Schreiner


**THERE'S NO CLEAR WINNER**

Solid-carbide spiral bits are becoming increasingly popular because they make a very clean cut. But they have many limitations compared to the straight bits that have been popular for years.

Antique scale courtesy of E. Buk, Spring Street, NYC

## DIFFERENT CUT, DIFFERENT SPIRAL CUTTER

**All spiral bits make clean cuts. This veneered plywood shows the effects of the three types of spiral bits on top and bottom edges.**


edge on the bottom; an up-cut bit will accomplish the opposite. This is great until you want to cut a dado with no tearout on the face. A down-cut bit will leave a clean top edge, but it sends the chips downward, into the dado where they have no place to go. You can make this cut, but you have to take it slower than usual to give the chips a chance to clear.

For woodworkers who work with A-grade veneers on both sides of the stock and must have a clean edge top, bottom and middle, the compression bit is a good choice. It has an up-cut configuration on the tip of the bit and a down-cut spiral ground on the shank. By lining up the bit just right, you can get a superior edge across the entire thickness of the wood. This virtuosity comes at a hefty price: A typical compression bit will cost about $90.

### Straight bits come in many sizes and bearing configurations

Router-bit manufacturers have difficulty making solid-carbide spiral bits with cutting diameters larger than their shanks. So for small-shop hand routers you won't find many bits with a cutting diameter larger than ½ in., the size of the largest bit shank. Spiral bits also come pretty much in a few standard fractional sizes up to ½ in. Straight bits, on the other hand, go through dozens of fractional sizes, all the way up to 2-in.-dia. cutters. Depending on the job you have in mind for your router bit, straight bits also come in a variety of cutter lengths. So you can buy close to exactly the length of cutter you need.

Straight bits also have a huge advantage over spiral bits when it comes to template routing, because you can buy them with guide bearings. And those bearings can be mounted on the tip of the cutter or on the shank of the cutter, depending on your needs and your template. The bearings are made for a variety of cutter diameters and lengths. It is really too bad that solid-carbide spiral bits can't accommodate bearings a little more readily. With their superior edge cut, spirals make great template cutters when used with collar guides. But when it comes to bearing-guided bits, spirals seem to be available only with bearings mounted on the end of the bit. There

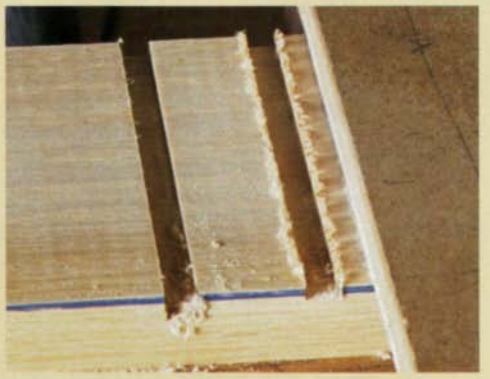
### How to tell an up-cut bit from a down-cut bit

UP-CUT BIT DOWN-CUT BIT

**Let's say you have an up-cut spiral bit and a down-cut spiral bit on your cabinet shelf but haven't used them in a while. How can you tell quickly which is which?**

**First, look at the right side of the bit (it doesn't matter whether the tip is facing up or down). Look at what direction the flute is heading as it goes around to the back side. If the flute is moving up as it curls around the right side of the bit (as in the bit on the left in the photo), you are looking at an up-cut bit.**

**For a second test, hold the bit in your hand with the tip pointed down and away from you. Turn the bit in a clockwise rotation and watch the reflection of any light on the bit. If the light moves up the bit as you turn it, you are holding an up-cut bit. The light will move downward on a down-cut bit.**



***Down-cut spiral bits are great for dadoes, but go slow.*** *Cross-grain dadoes can be cut with a down-cut bit (left) or an up-cut bit (right). The down-cut bit leaves a better surface, but you have to move more slowly to give the chips time to clear out of the cut.*



Photo, this page (bottom right): Tim Schreiner

are some problems with this: The cost is high (about $80); it precludes cutting only partway through the work, which means full-thickness cuts only; and the template has to be under the work, an inconvenience. Shank-shod, bearing-guided, solid-carbide bits (spiral bits with the bearings on the shaft end of the bit), which would permit template routing with the template on top of the work and trim cutting through only part of the work face, are not available. For this type of routing, you'll have to stick with straight bits.

### Sharpening spiral bits is difficult, if not impossible

Some woodworkers like to sharpen their straight bits, although I find it difficult to get it right and always send out my bits for sharpening. Carbide-tipped straight bits usually have enough carbide thickness to be reground four or five times, and the technology to do so is common.

A few services claim to be able to sharpen spiral bits. But I haven't found anyone who can sharpen spiral carbide to factory standards. To me, this translates into a substantial loss. Here's why: The spiral bit costs twice as much—or more—as a straight bit, and the straight bit can be reground up to five times. A sharpening service charges about $4 to regrind a straight bit, and the cutter often comes back sharper than it was from the factory. So even if I pay $23 for a straight bit and sharpen it five times, I still pay only $43. Spiral bits might stay sharp longer than straight bits, but even so, the cost of using spiral bits will always be higher.

### Spiral bits can be risky to use

Spiral bits work incredibly well in the production environment and especially in CNC (computer numerically controlled) router industrial applications. But in a hand router, their use sometimes imposes unusual risks not associated with the equivalent or bigger straight bits. The down-cut spiral bit's screw-driven forces are sufficient enough to pick the router up and twist it out of your hands—with no warning. I know, because it has happened to me. On end grain the spiral bit is getting even more traction, so the risk is even greater—a pity, too, because a sweet end-grain finish is attractive.

The up-cut spiral bit can have the opposite effect. It wants to pick up the work. So you must secure the work in some kind of fixture or hold it by a clamp. (I never rout anything that is not secured or clamped, but some people do.) The up-cut bit's tendency to pick up the work also happens quickly and without warning.

My teaching and woodworking are centered on routing, so I have a cabinet filled with more than the weekend woodworker's supply of router bits. I do keep a few solid-carbide spiral bits because, when I want a beautiful face cut or I am cutting narrow mortises, and I have the money, there is just nothing better. But my cabinet is mostly full of a wide variety of straight bits. For general-purpose work, for template and pattern routing and for those times when I need a large-diameter bit, I still reach for one of my straight bits. □

*Pat Warner stores his bits at his home shop in Escondido, Calif.*

## Pick the best bit for the job

***A clean sweep.*** *Because of its plunging ability, a spiral bit is great for cutting mortises. You can plunge straight down, then move laterally. To plunge-cut mortises with a straight bit, you must plunge and sweep at the same time.*

***For pattern routing, straight bits have the right bearing.*** *It is difficult if not impossible to find spiral bits with bearings for pattern routing, whereas straight bits are available with bearings on either the shank (above right) or cutter (above left).*

Photos, this page: Tim Schreiner (top) and Dennis Preston (bottom left)

# The Right

# Board in the Right Place

## A guide to selecting the best wood for each part of a piece of furniture

BY LOUIS IRION

Wood is the constant among woodworkers. It doesn't matter if you build contemporary furniture that borders on sculpture or exacting period reproductions—at both extremes and everywhere in between there is great pleasure and great impact to be gained from working with wonderful wood. In my case, having grown up the son of a period furniture maker and having run my own period shop for 20 years, furniture has always meant reproductions. But it was a book by James Krenov, given to me by my wife soon after I started out, that opened my eyes to the paramount importance of the wood. I've come to think of wood as the star of a piece of furniture—I think its natural beauty should be showcased, unadulterated by heavy stains and homogenizing glazes.

Over the years, I've spent more and more of my time on the trail of wood: buying logs, having them sawn, drying, sorting and storing them, and then selecting just the right wood for the many pieces of furniture being built by the men in my shop. With this article, I hope to convey some of what I've learned about lumber and particularly about selecting specific pieces of wood for the various parts of a piece of furniture. Although I've chosen a Newport secretary to illustrate the reasoning behind my wood selection for a complex piece, the principles can be applied to any furni-

Photos, except where noted: Jonathan Binzen

## SELECTING WOOD FOR A SECRETARY

**The principles of selecting wood for furniture cut across stylistic and period boundaries. I've chosen to demonstrate some of them by describing the wood needed for a Newport secretary. Such a complex piece illustrates a wide variety of situations and tests the versatility of a cabinet wood, requiring, in different parts, great figure, strength, ability to hold carved detail, stability and a range of other properties.**

### BACK OF LOWER CASE

Planks of secondary wood, shiplapped and run horizontally, are nailed or screwed into a rabbet. The top plank may be left off during fitting of the desk interior while lower planks stabilize the case.

### DESK INTERIOR

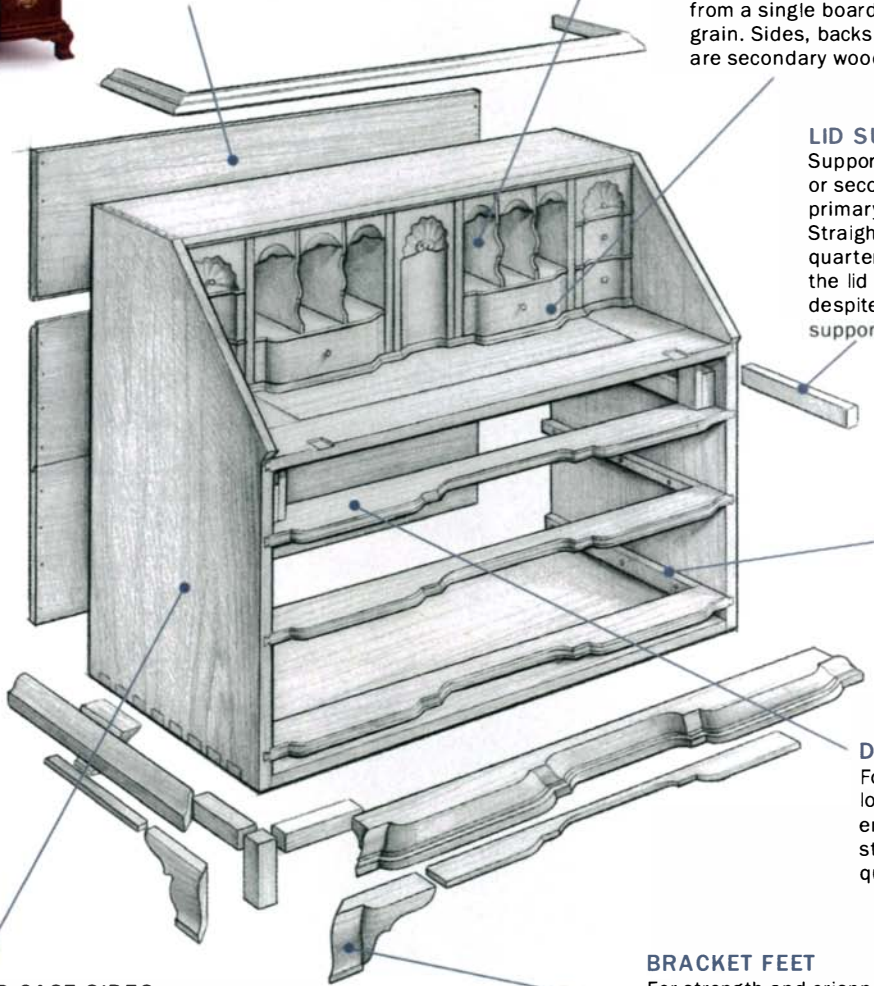
No need for flashy wood here. Choose straight grain, low figure.

### INTERIOR DRAWERS

Fronts should be cut consecutively from a single board with strong grain. Sides, backs and bottoms are secondary wood.

### LID SUPPORTS

Supports may be either primary wood or secondary wood with a cap of the primary wood glued on the front end. Straight-grained stock is essential; quartersawn material is ideal because the lid support must never stick, despite the tight fit required for best support of the lid.

### DRAWER RUNNERS

Runners should be made of straight-grained secondary wood; for increased wear, maple is sometimes substituted for a softer secondary wood like poplar.

### DRAWER BLADES

For maximum stability in these long pieces supported only at the ends, choose straight-grained stock with little figure; quartersawn material is best.

### LOWER CASE SIDES

Optimally, the lower and upper case sides should be cut from a single, wide board long enough to nest all four parts.

### BRACKET FEET

For strength and crispness of carving, the feet should be cut from dense, straight-grained stock. All of the feet should be taken from one plank, if possible, and laid out so that the grain wraps around the front feet.

ture in solid wood. Some of the methods I recommend require extra time, but the rewards are great.

### Got a match?

A great deal of the period furniture that has been my inspiration appears to have been built mostly from lumber from the same tree, and I try to follow this ideal. There is tremendous variation within every species of wood—in color, grain and even density—and these differences are often obvious only after a finish has been applied to the piece. I combat this by using matched lumber whenever possible. Matched wood—planks cut from the same tree—is much simpler to work with because the maker does not have to examine every piece for color and grain matches. Of course, the average lumberyard will not have boards stacked in sequence, but with a little detective work you may be able to identify boards cut from the same tree. Small mills may also be a source for matched lumber. And there are a number of specialty dealers (like myself) who sell matched planks and will ship the wood, if necessary.



Photo, this page (top): courtesy of Irion Co. Furniture Makers

**PEDIMENT BOARD**
This piece should be cut from a single, wide board of calm stock that won't compete with the pediment panels applied to it.

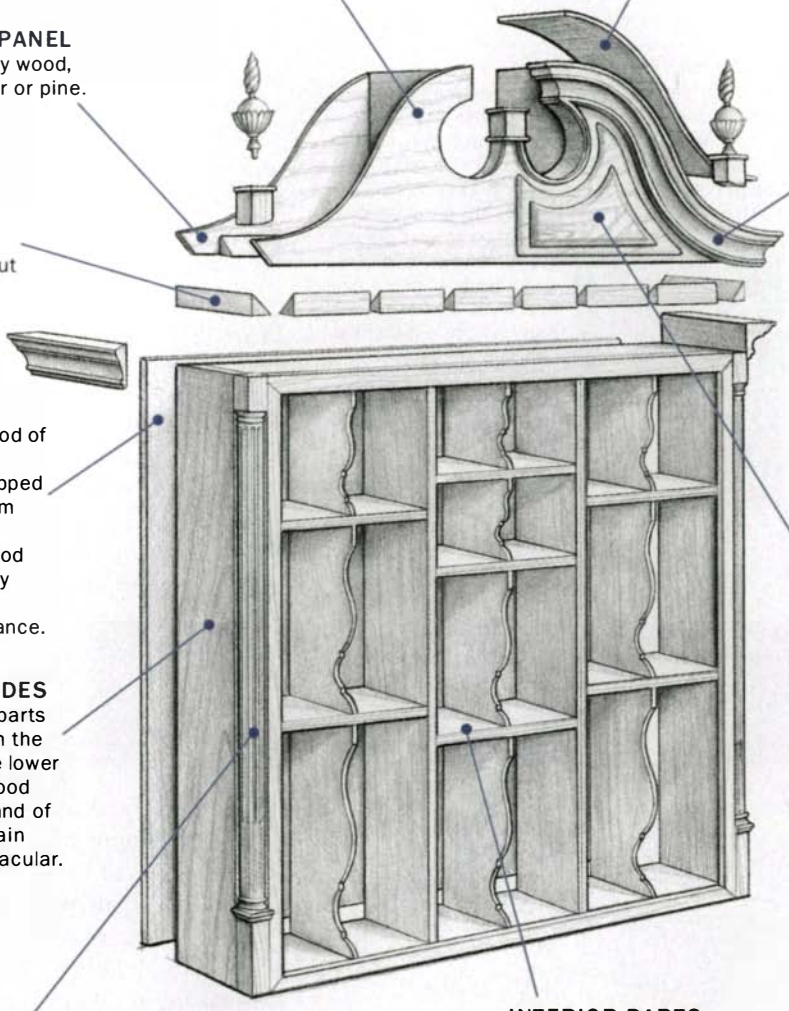
**BONNET COVER**
Sliced thin and stained dark, this secondary wood should have its grain run front to back.

**BONNET BACK PANEL**
Made of secondary wood, traditionally poplar or pine.

**GLUE BLOCKS**
Can be cut from secondary wood scrap; most anything will do, but avoid punky or knotty stock.

**BACK OF UPPER CASE**
Use secondary wood of quiet appearance. Boards are half-lapped to keep cracks from opening between them when the wood contracts, and they are beaded for an appealing appearance.

**UPPER CASE SIDES**
If possible, these parts should be cut from the same plank as the lower case sides. The wood should be dense and of excellent color; grain need not be spectacular.



**PEDIMENT MOLDING**
Lay out curved moldings so that they lie parallel to the long grain; the wood should be straight grained and unfigured. The straight side sections of molding should be cut from the same stock.

**PEDIMENT PANELS**
One of the focal points of the piece, these panels should be resawn and book-matched from stock with good color and strong grain or figure. The pediment panels should match the door panels, the lid and the drawer fronts.

**INTERIOR PARTS**
Use primary wood with straight grain and decent color. Avoid defects and try to use matched or like lumber, but wood for these parts need not be spectacular.

**QUARTER COLUMNS AND FINIALS**
Straight-grained stock is best here, and it should be dense so it holds detail well. Figured stock would be harder to carve and might compete with the lines of the carving. All of the finials should come from the same plank, but because they stand apart, it isn't necessary for them to match any other part of the cabinet.

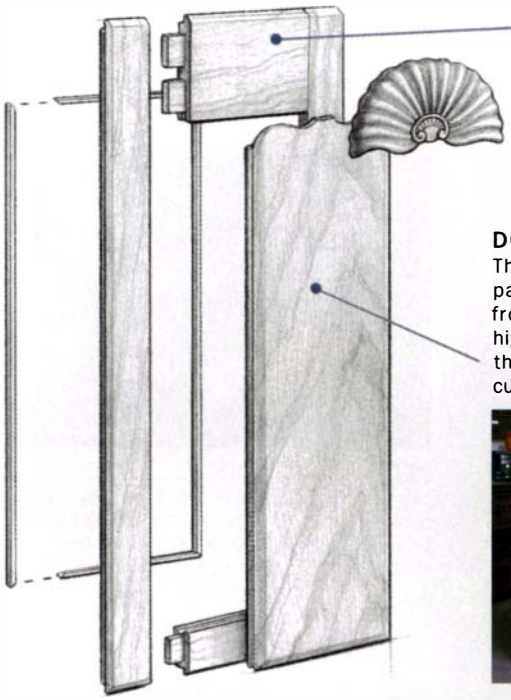
It is particularly important to match the focal parts of a piece of furniture, especially those that are on the same plane or face. In a piece like the Newport secretary above, the primary focal points are the pediment panels, the door panels, the lid and the lower drawer fronts. In an ideal situation, these parts should all be cut from the same plank or set of planks and should contain the strongest grain and/or figure in the piece. The wood for rails, stiles and face frames should usually be chosen from calmer-grained stock: These parts should support rather than upstage the panels. If an important part of a piece is not in the same plane as other focal points—the top of a low desk or the top of a table, for instance—you want a special piece of wood, but it does not necessarily have to match any other part.

## Wide is good

To me, there's no contest—wide boards are best. Yet a certain attitude persists: *Wide boards are unstable.* This myth, passed on from one woodworker to another, is overdue for debunking. I have been building

Drawings: Bob La Pointe

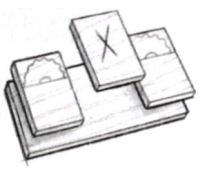
## PICKING WOOD FOR THE DOORS AND LID

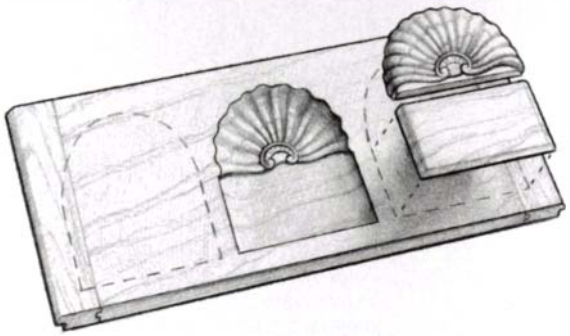


**DOOR RAILS AND STILES**
These parts should be cut from the same plank. They can have some figure but should not upstage the panels.

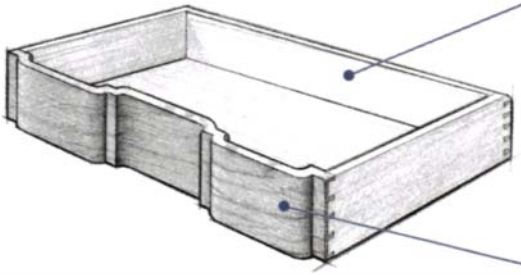
**DOOR PANELS**
The door panels, along with the pediment panels, the lid and the three large drawer fronts, are the focal points of the piece, so the highest-quality wood should be reserved for them. If possible, all of these pieces should be cut from a single 12/4 plank with good density and good to very strong grain and figure. If one large plank is not available, try to find planks from a matched set. The strongest figure should go into the door panels, all three of which can be resawn from a single piece of 12/4 stock, yielding a triple match.


**DESK LID**
The lid should be resawn. The blocking is shaped and then glued back in place, resulting in a perfect grain match. The shells can be carved from the same wood, but if the wood is highly figured, straighter-grained wood of similar color can be substituted for crisper carving. The breadboard ends should come from the same plank as the lid.





**DRAWER SIDES, BACKS AND BOTTOMS**
These parts are made of secondary wood, most often pine or poplar. Bottoms are one piece where possible, with the grain running side to side to minimize wood-movement problems.



**DRAWER FRONTS**
Strong figure and deep color here should match the lid, door panels and pediment panels.

furniture with wide boards—one-piece sides for cases, tops for tables, etc.—for years, and I have examined many period pieces and have seen far fewer problems with single, wide boards than with glued-up panels. Yet over and over I hear woodworkers say that gluing up narrow boards to form a wide panel is more prudent than using wide stock. I understand the theory behind reversing the growth rings to avoid warping in a glued-up panel, and it is valid for joining narrow boards cut from small logs. But wide boards come from big trees, and they are typically cut close to the center of the log, where the grain orientation is typically rift or quartersawn—the most stable lumber in the log.

When you consider the beauty of the grain or figure moving across a single, wide board and compare it to the potential disharmony of mismatched boards, it isn't really worth debating. Wide material may not always be available or practical, but for it to be shunned as unreliable just doesn't make sense.

Obtaining the best-quality matches and sizes of lumber often requires extra effort. As much as possible, I have logs sawn to my specifications. Although that's not possible for most woodworkers, it's advantageous to know that the closer you get to the saw, the more you'll know about your wood. I tend to have logs sawn against convention; mills typically saw for clear lumber without regard to width; they constantly turn the log to find a clear face. In general, this results in long, narrow boards with fewer knots and defects. Yet I would estimate that most boards used in furniture are 4 ft. long or less, so for furniture makers, wide boards with some problems that can be worked around are more valuable than narrow, clear boards.

### Organized storage is crucial

Whether you have a few dozen boards on hand or a few thousand, an organized system of storage is critical if you want to be able to retrieve lumber quickly. I keep my lumber on horizontal racks with as much information as possible on the end of each board (see the photos on the facing page). This way, I can identify the major characteristics of a board at a glance, simplifying the search to a great extent. The board I am

looking for is invariably on the bottom of the rack, but at least digging it out should not be an exercise in futility.

I cut up damaged boards into usable pieces and store them so they can be readily accessed. If a set of boards has great figure or grain but a lot of problems, it gets cut into drawer fronts and panels and is kept together on short racks. Short, wide pieces resulting from a defect are cut and stored for tops and panels, and crotches and figured pieces are separated from the straight grain, labeled and kept on short racks as well.

### Don't rush the lumber

Even wood that has been carefully stickered, dried, labeled and stacked is not ready to use. From the time it was cut, the wood has had other wood stickered or stacked on top of it in piles or packs to keep it flat. When it finally gets all of those other boards off its back, the wood wants to move a little and adjust to the humidity of its new environment.

When you have pulled the boards for an upcoming job, stand them up so the air can circulate freely around all sides. In a few days, rough-mill the wood, let it stand a few more days and then mill it to final dimensions just before use. If you are making a large piece, don't mill all of your parts to finished size at once; finish-mill only those pieces you will be machining and assembling right away. Good furniture is designed so that all of its components work together to stabilize the piece, and its parts—the sides, top and bottom in a well-joined case, for instance—work to keep each other straight. So the safest place for your wood is in the piece of furniture, and for best results the wood should be milled as close as practically possible to the time that the parts will be connected.

All wood will meander when left to its own devices, but properly dried wood that has acclimated to the shop and been worked and assembled in a reasonable amount of time will present minimal problems. In a world where so much is hurried, the wood is going to dictate the pace, and you either heed its nature or pay in frustration and disappointment. I think this is one of the properties I have come to love most about wood. It can't be hurried. □

*Louis Irion sells lumber for fine furniture in Wellsboro, Pa.*

## Label your lumber when you stack it

***Big stack or small...*** *Unsorted lumber can be a nightmare to pick through. The author keeps thousands of board feet organized and easily accessible by reading each board as he stacks it and recording its dimensions and other features on the end. He sorts not only by species but also by figure and by length.*


***The Louie decimal system.*** *The author's code tells him this board is one of a set of five cut from log No. 2; it is 19 in. wide; it has two clear 5-ft. cuttings and a 3-ft.-long section that will yield excellent drawer fronts; it is curly cherry; and it rates an A-minus for figure.*


***Shorts deserve separate racks.*** *For easy retrieval and efficient use of storage space, the author built separate racks for short planks.*

# Jigs for the Drill Press

## Increase the versatility of this basic machine using low-cost, shopmade accessories

BY GARY ROGOWSKI

Like most power tools, the drill press won't tackle too many woodworking jobs without jigs to hold work safely and securely. I make all of my jigs out of wood and wood products such as plywood and medium-density fiberboard (MDF). I make the jigs as simple as can be and use them to handle stock of odd shapes and sizes and to bore at any angle.

The drill press is primarily designed for metalworking. Its metal stock table is too small for clamping large boards. So the first order of business is to add a larger auxiliary table made of MDF or plywood. A simple solution is to screw the auxiliary table to the stock one. Or if you prefer a table that's fast to remove, make one that can be clamped to the metal table (see the photos at right).

### Every drill press needs a fence

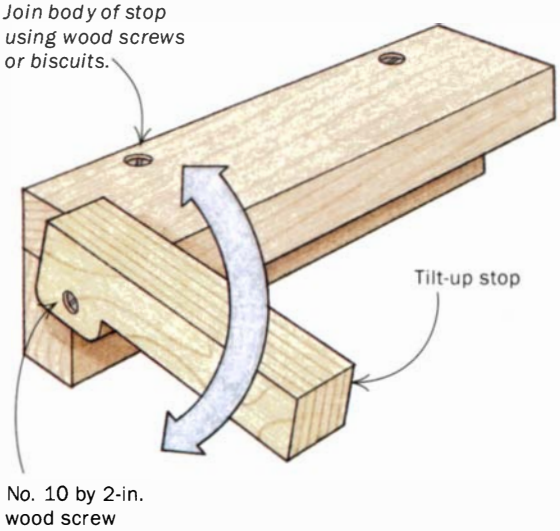
When drilling a large hole, a bit can grab a board and turn it into a spinning weapon. Unless you enjoy getting slapped around by lumber, keep a fence clamped to your drill-press table. Even if

A BIGGER TABLE

**To provide a larger working surface, clamp an auxiliary table made of plywood or MDF to the stock drill-press table.**

## REPETITIVE, ACCURATE DRILLING

**Stop blocks, either hinged (left) or in the form of spacers (right), guarantee accurate results when boring multiple pieces or a series of holes.**




stock isn't butted right up to the fence, it still provides a measure of safety because it will stop sudden rotation of a workpiece.

A fence is a must when you need to drill multiple holes a set distance from the edge of the stock. The only critical adjustment is the distance from the center of the drill bit to the edge of the fence. Clear away chips from the edge of the fence when registering stock against it. And use a straightedge to check your fence regularly to make sure it hasn't warped.

**Use stop blocks when drilling multiples—**Whenever you must drill more than one of something, use stop blocks to register stock. The method is faster and more accurate than marking individual pieces. A stop block is nothing more than a piece of wood clamped to the drill-press fence. I also have a shopmade tilt-up stop that I can move out of the way, but not so far away that I misplace it (see the drawing and left photo above).

For drilling multiple holes in a workpiece, such as when drilling shelf pins for a bookshelf or cabinet, I use a series of spacers to register stock (see the right photo above). Line the spacers up along the fence, registering the first one against a stop block. Position the stock against the last spacer, drill a hole, then remove one block. Repeat. I have a stack of different-sized blocks within easy reach of my drill press.

### Two ways to cut mortises on the drill press

Before I owned a plunge router, I used my drill press for mortising. A brad-point bit will do a pretty good job of establishing a neat row of holes that can be cleaned up with a chisel (see the photo at right). Use a straight fence and stops to locate both ends of the mortise. Drill the two outside holes first and then work your way down the mortise, overlapping holes a little. Leave some wood for the brad-point center to bite into; otherwise, the bit will drift.

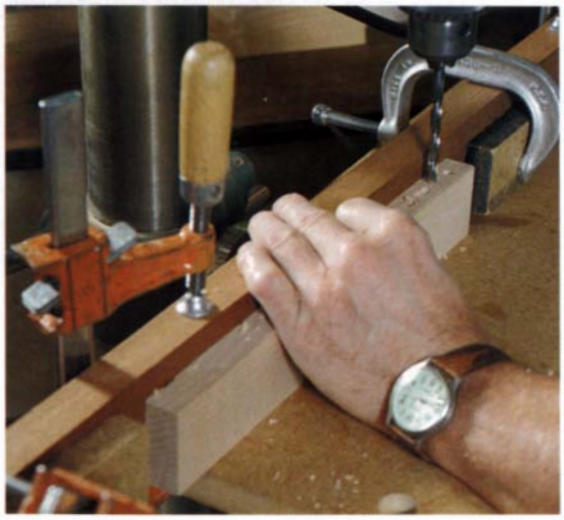
I also made a sliding table for mortising on the drill press. The table has two parts: a movable sled, which is fitted with a pair of runners, and a base, which has grooves for the runners and is bolted to the drill-press table (see the top photos and drawing on p. 74). The sled is made up of a double layer of glued-up material, thick enough to plow grooves for the runners, which are glued in place, without weakening it.

The sliding table has a fence and requires a stop block to locate the start of the mortise. I also clamp a stop block to the underside of the sled to control the length of the mortise. To use the jig, hold or clamp stock in place and use an end mill, a metalworking bit, to bore the mortise. Take light passes. If it chatters, switch to a brad-point bit, smaller in diameter than the end mill, predrill a series of holes and clean up the walls of the mortise using the end mill.

### Nonsquare stock must be held firmly

Once in a while you'll need to drill stock that isn't flat or square. Bowling balls come to mind, but that's another article. Cylindrical stock can be held using a V-shaped block, which provides two-

## BASIC MORTISING

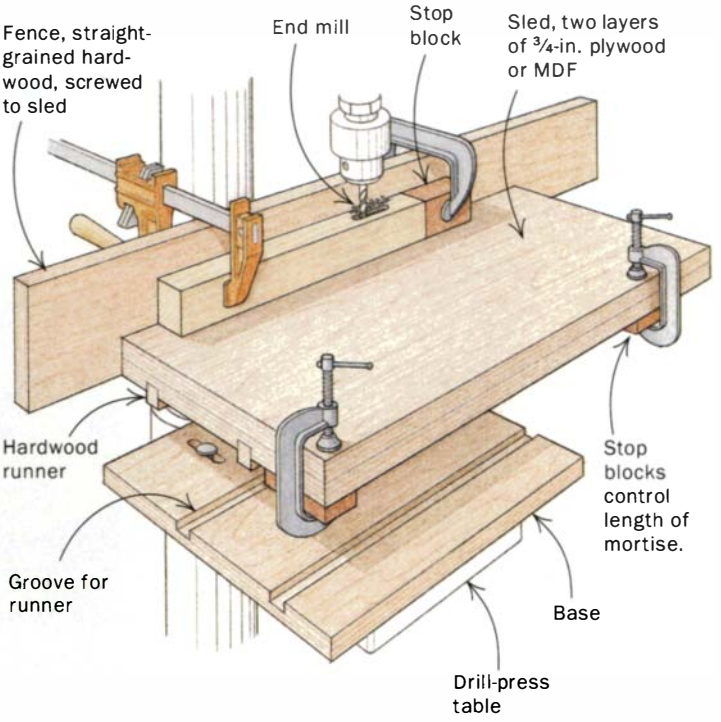


**By trapping stock between two stop blocks, a mortise can be roughed out using a brad-point bit.**

Drawings: Vince Babak

## MORTISING JIG

**The jig slides back and forth on runners. Using an end mill (a metalworking bit), the author takes light passes to cut a mortise.**




point contact and plenty of stability (see the left photo below). To make a V-block, rip a groove on one side of a thick piece of wood, such as a 2x4, using the tablesaw with the blade tilted 45°.

For other shapes, you just have to improvise. Wooden screw clamps are good at holding oddly shaped pieces. Clamp the wood screw to the drill-press table, then clamp the stock to be drilled in the screw clamp. Err on the side of more rather then fewer clamps if you have doubts.

### Tilt the stock when drilling at angles other than 90°

Most drill-press tables tilt along one axis. But I am admittedly lazy, and I don't like moving my table back and forth and retruing it to 0° if I can avoid it. Plus, the angle gauges that come with most drill presses leave a lot to be desired.

I have found that the simplest way to drill angles other than 90° is to tilt the stock, not the drill-press table. The first step is to mark the desired angle onto the stock. Then place a piece of scrap wood under one end of the workpiece. You may have to move things around until the layout mark is in line with the drill bit. Use a square or triangle, if needed. Before drilling, be sure the workpiece is stable.

A more stable angle-drilling jig can be made by joining two pieces of plywood with a piano hinge (see the right photo below). By wedging a wood block between the two plywood pieces, you

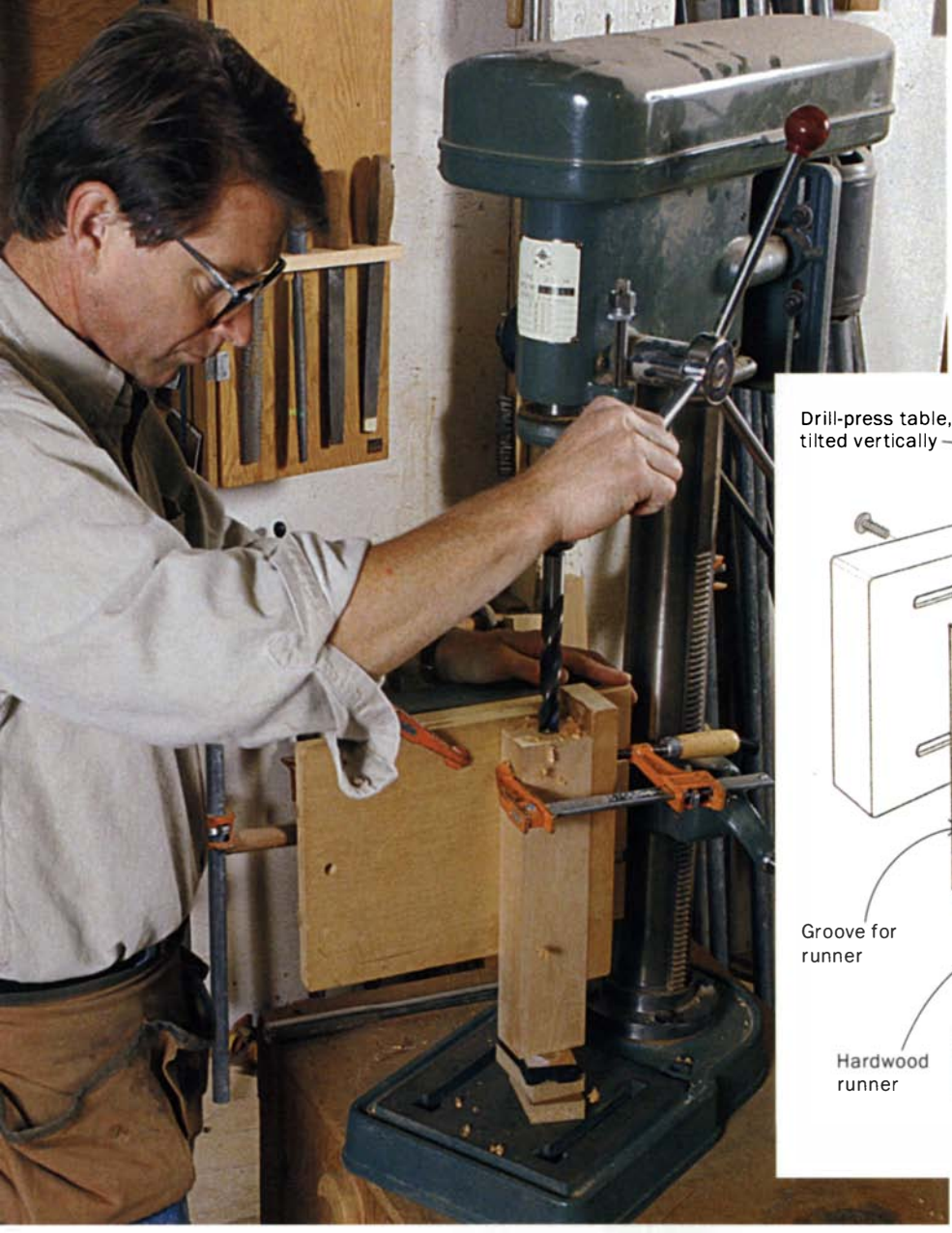
## JIGS FOR ROUND STOCK OR ANGLED WORK

**The V-block can be made on a tablesaw by ripping a groove in thick scrap with the blade set at 45°.**

**Connect two pieces of plywood with a piano hinge. Fit a wood wedge between the leaves to create the angle needed.**

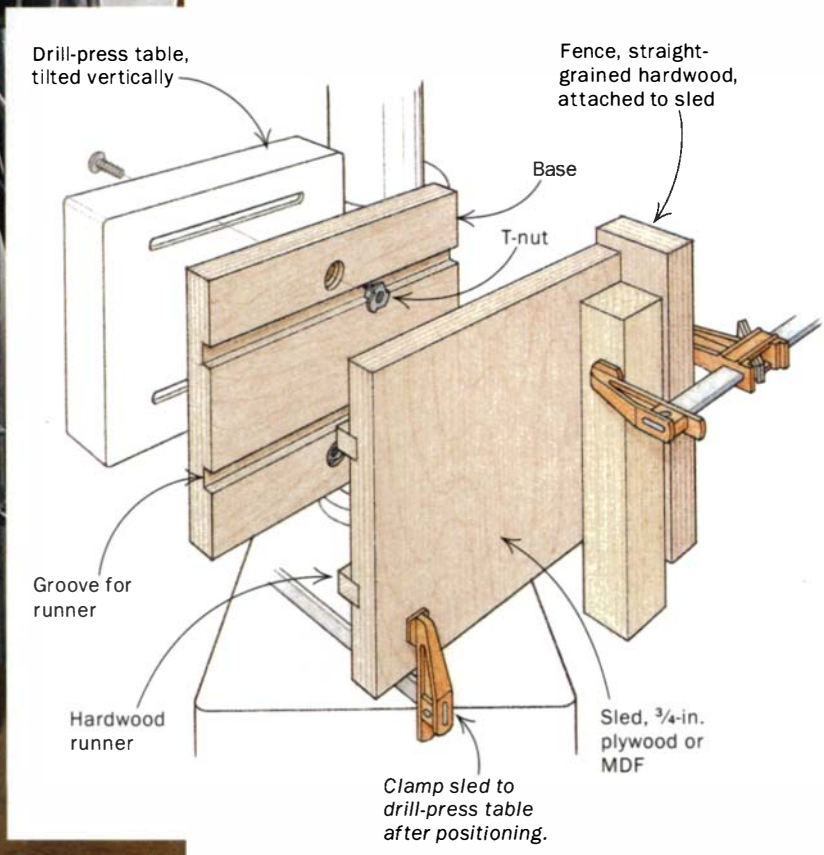


Photos: Anatole Burkin



## VERTICAL BORING JIG

**For boring into end grain, an adjustable table and fence provide a solid clamping surface. Wedges may be placed between the stock and base of the drill press for additional stability.**




can reach the desired angle. Or better yet, screw the block in place so that it won't creep on you.

**A dedicated angle jig for drilling pocket holes**—There are a lot of ways to attach a tabletop. One method is to run a screw through a pocket hole drilled on the insides of the table's aprons. I drill these pocket holes using a dedicated tilted fence on the drill press. I made the fence of solid stock and ripped one face at 15° on the tablesaw.

To drill the apron, hold or clamp it against the fence. Use a standard twist-drill bit when drilling at an angle, although a Forstner bit would also be appropriate. Feed the bit slowly to prevent it from grabbing.

**Compound angles**—There are two types of compound angles: equal and unequal. Equal is just that; both angles are the same. But chairs are rarely that simple. For example, a stool leg may hit the floor at an 80° angle from one side and 82° from the other side. That's an unequal compound angle.

Compound angles force me to tilt the drill-press table. That gets me the first angle. The second angle comes by way of a piano-hinged jig. As a precaution, place layout marks on the stock and double-check them before boring away.

### Use a two-part jig to drill into end grain

Drilling into long boards requires one of two things: great patience or another indispensable jig. You can simply tilt your drill-press table to 90° and maneuver the stock into position and clamp it. That usually entails a lot of fiddling.

Here's a better way. Make up a vertical two-part drilling jig (see the photo and drawing above). The jig is similar to the mortising jig in that it consists of a base and a movable sled with a fence. Stock clamped to the fence and the workpiece can be moved fore or aft and remain plumb (or at whatever angle the jig was set to).

Just like a tablesaw, the drill press can handle a lot of jobs in the workshop, but the machine demands a host of jigs before it truly performs to capacity. □

*Gary Rogowski is a contributing editor to* Fine Woodworking *and an author and teacher in Portland, Ore.*

# Four-Poster Bed Lights Up a Room

## Create fine stringing by laminating contrasting layers of veneer and selectively exposing them

BY NICHOLAS A. GOULDEN

An accidental discovery inspired the design of this queen-sized bed. About a year ago, while working on a veneered piece, I noticed that a stopped chamfer along a corner produced a glue line, which converged to a V-shaped point. To explore this further, I made a mock-up, laminating two layers of contrasting veneers over a four-sided blank. Then I cut chamfers. The exposed inner veneers created fine lines that appeared to be inlaid stringing.

This bed was designed around that detail, which is shown to full effect in the tapered posts. Even though a four-poster bed is a classical design, I think the choice of wood, black acacia, with its highly figured grain, imparts a contemporary feel to this piece. Another modern twist is the incorporation of quartz-halogen lights into the finials atop each post that bathe the bed in a soft canopy of light.

### Begin with the posts

The posts are actually fairly simple to construct, though time-consuming. The core is poplar, inlaid with walnut corner blocks, then covered with commercial maple veneer, and veneered again with bandsawn black acacia veneer. Each post has 15 pieces of wood assembled in seven separate glue-ups (see the photos and drawings on the facing page).

To settle on the dimensions of the posts, I drew one full-sized on a large sheet of medium-density fiberboard (MDF), cut it to shape and placed it in a bedroom to get a feel for its scale. It's important to see how a large project will look in an environment other than your shop. I also get a good idea of how difficult it may be to move a large piece. All major components of this bed can be broken down to make the piece easier to move. Bed-rail hardware connects the posts to the headboard and footboard as well as to the side rails.

To form the posts, I glued up two pieces of 8/4 poplar (maple would also make a good core) about 4 in. wide and 8 ft. long. Each post half has a dado running down the center to route the wiring for the lights. I glued the blanks together, being careful not to use too much glue; squeeze-out can clog up the dado. For insurance, I ripped a hardwood strip that I used to push through the wire chase immediately after glue-up.

The tapering jig was simply a scrap of plywood ripped to make its sides parallel.

The post stock overhung the edge of the jig only by the amount to be cut off; a block held the stock even with the edge of the plywood at the beginning of the taper. Two tapering jigs had to be made because the headboard taper starts higher, just above the base of the headboard.

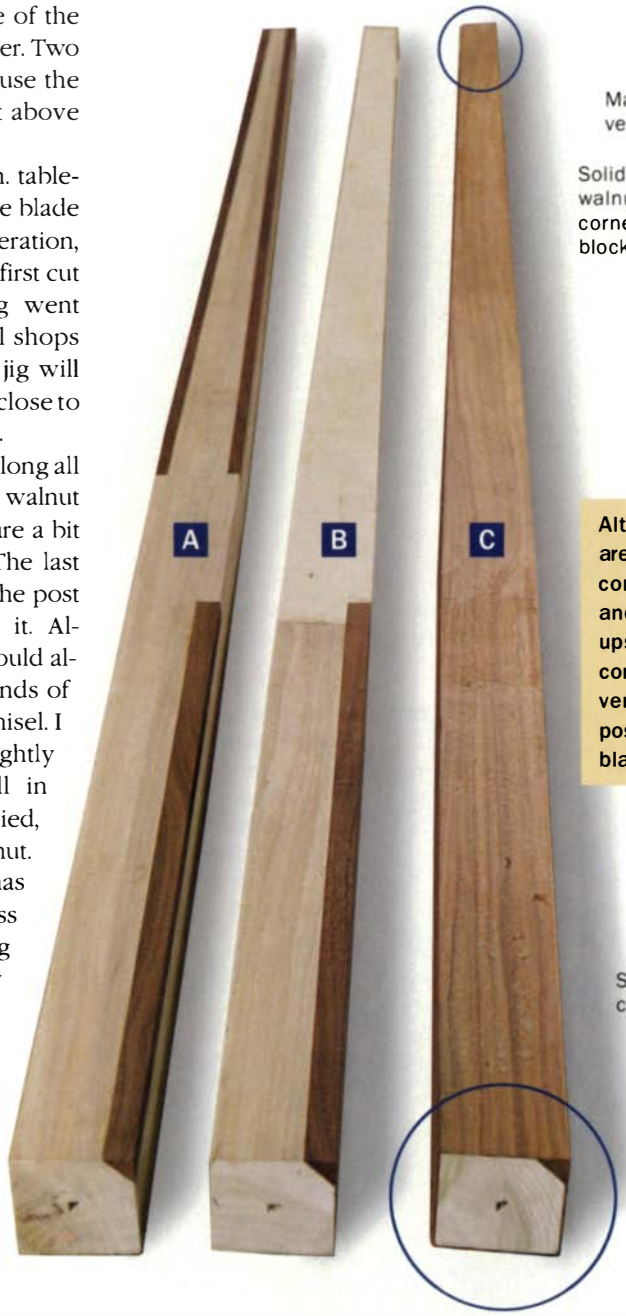
The tapers were cut using a 12-in. tablesaw with a 14-in. blade. Because the blade guard must be removed for this operation, there's a lot of exposed blade. The first cut was a bit scary, but the ripping went smoothly. I realize that most small shops don't have such a large saw. The jig will work fine with a bandsaw, too. Cut close to the line, then handplane to the line.

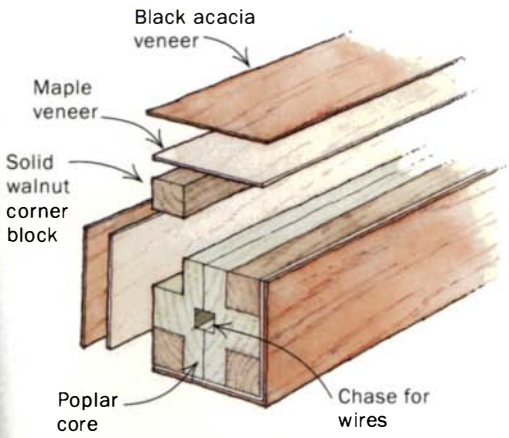
Next I cut ⅝-in. by ⅝-in. rabbets along all tapered corners of each post for the walnut corner blocks. The corner blocks are a bit wider than the actual chamfers. The last thing I wanted to do was cut into the post core, which would have ruined it. Although I used a shaper, a router would also work to cut the rabbets. The ends of the rabbets were squared using a chisel. I cut the walnut corner blocks slightly oversized and clamped them all in place at once. After the glue had dried, I used a router to flush-trim the walnut.

The lower portion of each post has only one chamfer, on the mattress side, without the maple stringing detail. Rather than machine away a huge rabbet (this chamfer is wider than the upper one), I cut a 1½-in.-wide chamfer with a tilting-head shaper, but the same cut can be made on a tablesaw or bandsaw. I glued an oversized piece of walnut to the chamfer, then flush-trimmed the edges.

To provide a good glue surface

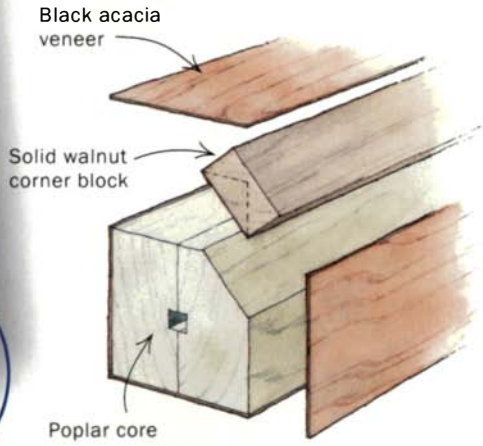
## Corner blocks and veneer spice up the posts




TOP OF POST

**Although not technically difficult, the posts are time-consuming to build. Each post is composed of 15 pieces of wood and veneer and is assembled in seven separate glue-ups. First, corner blocks are glued onto the corners of the tapered blank (A). Maple veneer is applied to the upper faces of each post (B). Then the entire post is veneered in black acacia (C).**




BOTTOM OF POST

## Acacia can be difficult to work

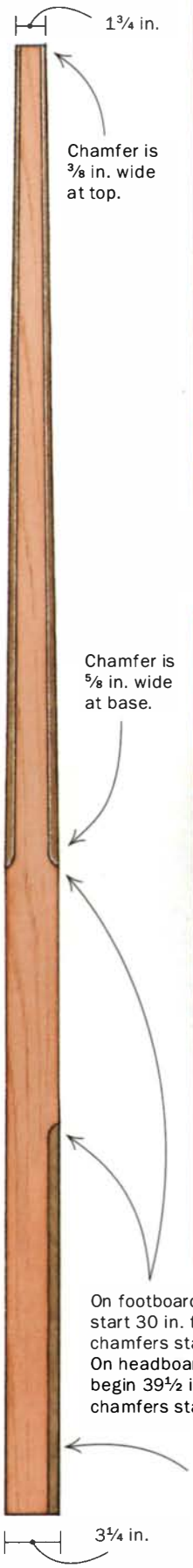
**On the central coast of California, two species native to Australia are commonly used for landscaping: *Acacia balleyana* and *A. melanoxylon*. The latter, known in Australia as blackwood, goes by the common name of black acacia in California. Trees that have been cut down to make way for development are sought out by small sawmill operators who mill them for the custom-furniture trade. The wood is prized for its intense, reddish-brown color and figure marked by thin, black bands, much like koa, to which it is related.**

**The color and grain of black acacia can vary a lot from tree to tree, and sometimes within the same log. The grain ranges from straight to interlocked. One supplier, Evan Shively, said, "Don't feel inadequate if you have to head to the wide-belt sander when working with black acacia." Handplaning can be difficult. One moment you're getting perfect shavings, and then the iron catches and tears out big chunks of wood. The only way to tame the wood is by scraping and sanding. The reward is a beautiful, shimmering wood, full of character.**

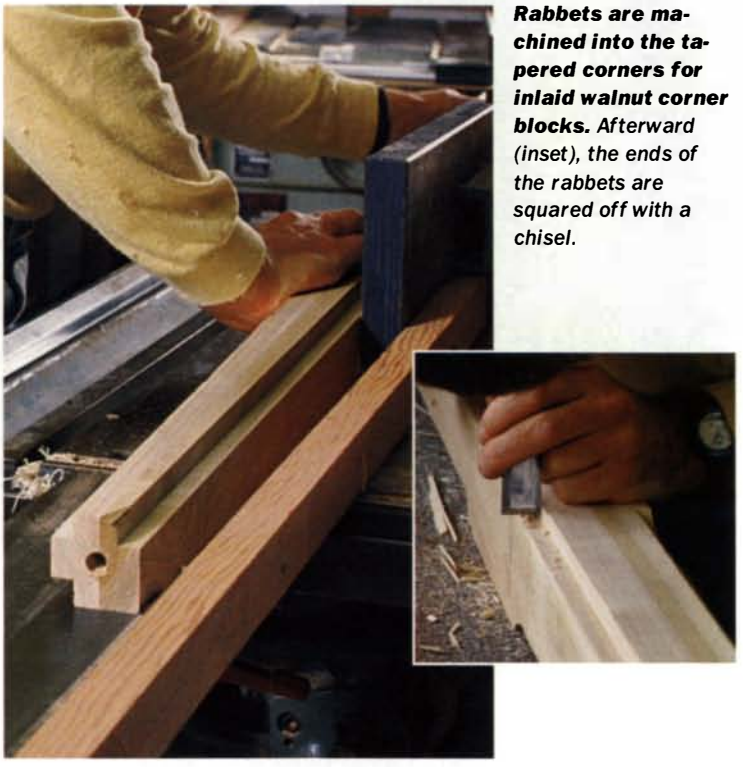
***Witness marks keep the flitch organized.*** *The author book-matches each leg using bandsawn black acacia veneer.*

Photos, except where noted: Anatole Burkin; facing page: Paul Berg

## Bed posts are the most time-consuming parts to make




***The upper portions of the posts are tapered.*** *The author uses a shop-built tapering jig and a 12-in. tablesaw with a 14-in. blade. The blade guard is removed for this operation.*



***Rabbets are machined into the tapered corners for inlaid walnut corner blocks.*** *Afterward (inset), the ends of the rabbets are squared off with a chisel.*

for the first layer of veneer, which is maple, I handplaned the posts smooth. I rough-trimmed the standard-thickness maple veneers slightly wider than the posts and about 2-in. longer than the corner chamfer. Because the maple veneer was shorter than the post blank, I ended up with a slight step where the maple ends and the poplar is exposed. I feathered the transition smooth using a handplane and sandpaper after all four sides had been veneered to provide a smooth surface for the final veneers.

Two opposite sides of a post were veneered simultaneously. I used MDF cauls lined with heavy paper and clamps every few inches. The paper absorbs moisture from the glue and prevents any glue that bleeds through the veneer from gluing the caul to the post. It's important to remember when gluing up the veneers (both maple and black acacia, later) to mark the outside surfaces, showing where the hidden walnut strips are located. Once the glue cured, I trimmed the veneer using a laminate trimmer. I made a climb cut because the veneer is fragile and prone to tearout. I cleaned up the edges with 120-grit sandpaper attached to a block of MDF.

**I bandsaw my own black acacia veneers**—I bought black acacia from a local sawyer who specializes in unusual, locally grown species (for more on acacia, see the story on p. 77). I clearly marked the edge of the blank before cutting so that I could keep the cutoffs in sequence.

When resawing, I took cuts from alternate sides of the blank, which helps equalize any tensions stored in the wood and reduces the chance of warping. After cutting one slice from each side, I jointed the blank before taking the next pair of cuts. After resawing, I took the veneers to a commercial door shop and had them thickness-sanded.

The veneers were taken off the stack in groups of four and book-matched around the posts. They were then labeled clearly with corresponding marks on the post faces and glued on in the same manner as the first layer of veneers. The acacia veneers, unlike the maple, run the full length of the posts. If you prefer not to cut your own, 1/16-in.-thick veneers are available from Certainly Wood (716-655-0206). But be prepared for a lot of sanding.

After flush-trimming the veneer, I cut the chamfers on a tilting-head shaper set at 45°. This gave a symmetrical start to the chamfers. (If you use a router, the beginning of the cut, where it comes to a point, won't be symmetrical, so you'll have to carve or sand it so.) I used stop blocks attached to a fence extension to register the

Drawings: Jim Richey

***Walnut corner blocks are clamped into the rabbeted sections of the posts.*** *The walnut strips are proud of the blank and flush-trimmed once the glue cures.*

***Veneers are trimmed flush using a laminate trimmer.*** *Black acacia veneer will be glued over the maple veneer shown here. The walnut corner blocks are already in place.*

***Chamfers, cut with a tilting-head shaper or router, expose the maple veneer, which looks like stringing.*** *A handplane tapers the chamfers, which are widest at the lower portions of the posts.*

stock. The headboard and footboard posts required different setups because their chamfers start at different locations.

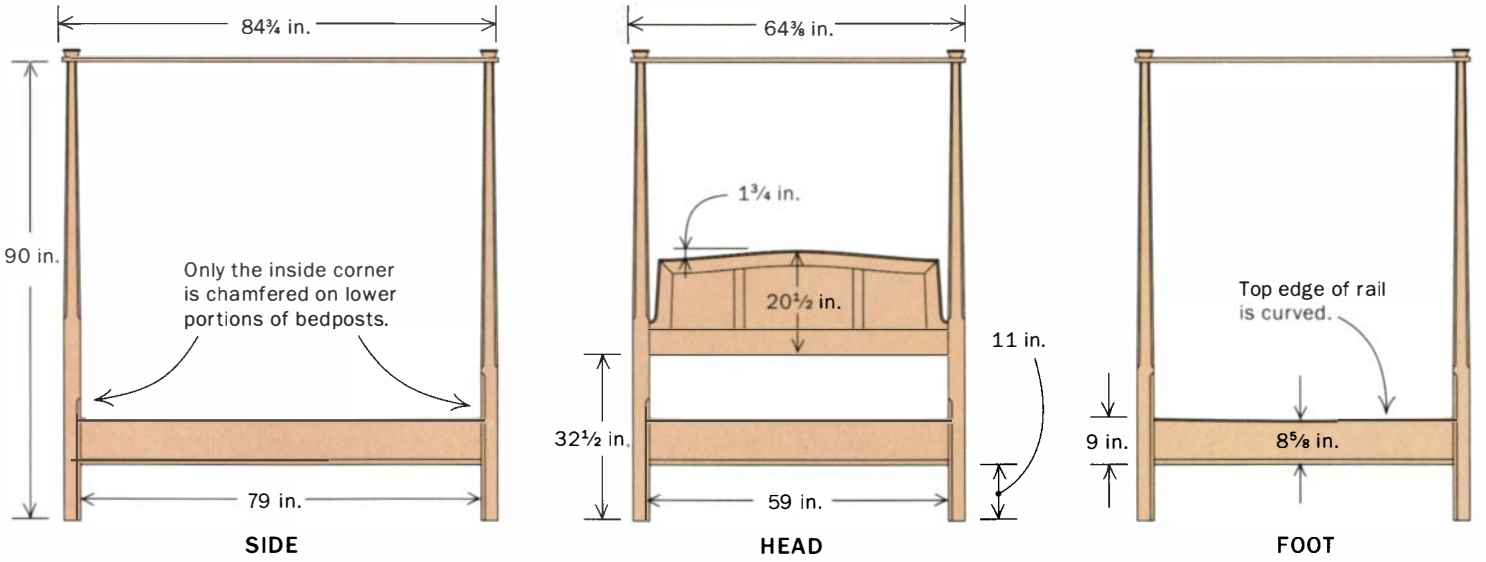
I make a fair number of design decisions as I go. When I cut the first chamfer late one night, I decided that the detail wasn't working near the beginning of the cut. The chamfer at the fat end of the post was too narrow. So I set up the shaper for a deeper cut and removed a few inches of material at the start of the chamfer. It was one of those 30-second decisions that scares the pants off you. When I turned off the shaper, I examined the cut, and it looked too deep. Dejected, I went home. My wife asked me how the day had gone, and I told her that I thought I had destroyed the posts. The next morning I took a handplane to the chamfer and blended the two cuts. To my relief, the proportions looked good. Designing as you go not only has its risks but also its rewards. There are some things that just don't show up on paper.

## Bed rails are the easy part

The bed rails are very straightforward. The dimensions given allow for only a thin blanket to be tucked behind the rail. For use with a heavy quilt, I would add a couple of inches to each dimension. I used bed-rail fasteners to attach the posts to both the rails and to the headboard and footboard. The rail height is about 9 in. But mattresses and box springs vary in thickness. It's best to design this section once the other components have been chosen.

I was able to cut full-width veneers for the rails, but I was lucky to get extrawide stock. Black acacia is an ornamental tree, and it's rare to find thick, wide usable planks. That's why one must often resort to veneering when working with it. I use a poplar core for the rails, but two layers of ½-in.-thick birch plywood glued together would do the job, too. I designed the tops of the rails with a very slight curve, not enough to make them look droopy but just enough to avoid the boring straight line. The same curve was used on the rails of the headboard and footboard.

The stringing detail carries over from the




posts onto the rails. I used thicker, 1/16-in.-thick maple veneer between the black acacia rail and walnut trim (top and bottom) because thinner material would get lost visually against the wide rails.

The maple veneer was glued onto both edges at once using MDF cauls. Next, walnut trim was glued to the outside edges. The top piece is thinner than the lower, and both project beyond the outside edge of the rail. The top piece was shaped using a router with a thumbnail bit; the lower piece has an oval profile, which I achieved by taking partial cuts using a ¾-in. roundover bit, then fairing the transition with handplanes and sandpaper.

### I designed the headboard with the posts in front of me

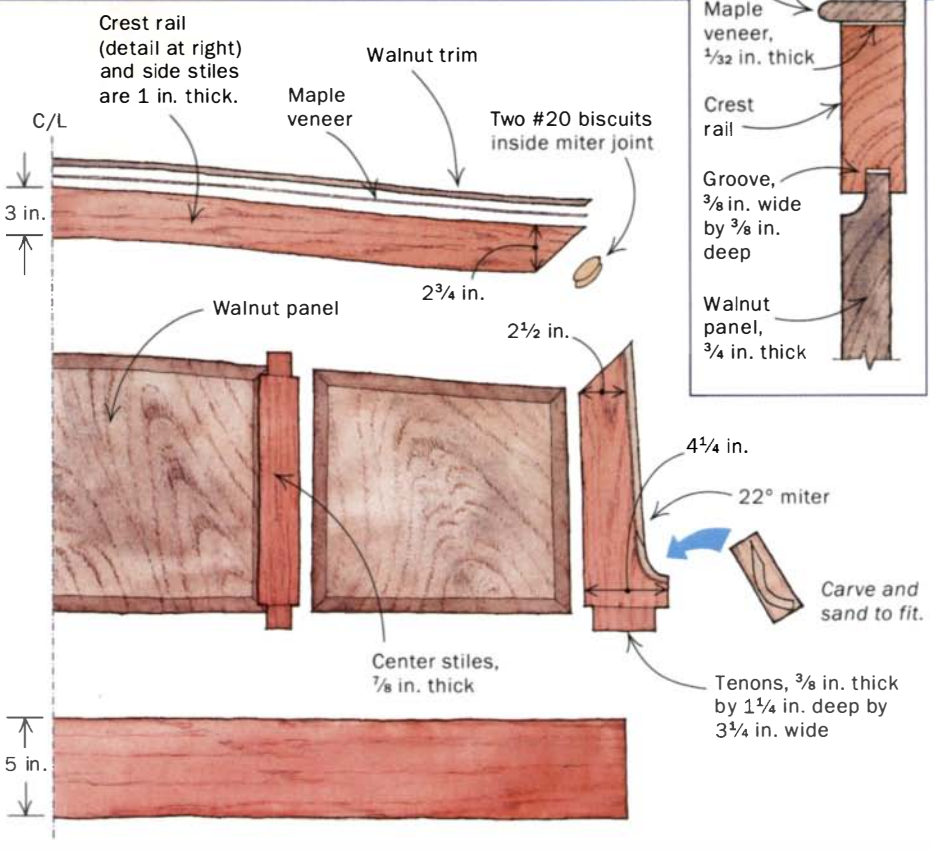
Although the posts are the inspiration for the bed, the headboard turned out to be the most challenging section to build. That's partly due to the fact that I work out a lot of design details along the way. Additionally, the headboard has a lot of curves, and it takes time to hand-fit parts.

After assembling the posts and rails, I clamped a piece of ¼-in.-thick MDF to the posts and sketched a headboard full size. This approach was much faster and more accurate in terms of getting the right feel because I was working off actual parts. I played around with the drawing, changing

## Headboard has a lot of curves

***Dry-fit the headboard to determine the size of the panels.*** *The author makes panel templates out of MDF.*

***The walnut panels for the headboard are shaped on the router table.*** *A bowl bit is used to detail both faces of each panel.*



the height, curves and sizes of the various elements. I made a point to walk around the project and examined the drawing from various angles. When I settled on the full-sized sketch, I fine-tuned the drawing using rulers, squares and battens.

I used the full-sized MDF drawing to make templates for all of the curved parts. Stock for curved parts was chosen based on grain direction. For the crest rail I found a particularly suitable plank with a wavy grain pattern.

I template-routed most of the curved parts. I used the ¼-in.-thick MDF drawing templates to make ½-in.-thick templates. The ¼-in.-thick MDF I used for the drawing didn't provide enough bearing surface to make safe, accurate routing templates. Also, the thinner MDF is not stiff enough for template work. I attached stock to the templates using screws and double-sided tape.

Both edges of the stiles slope toward the center of the headboard. The inner edge, however, is left square to the base to make cutting the tenon straightforward. After the tenon had been cut, the second angle was cut on the bandsaw and planed down to the line.

The headboard section was standard frame-and-panel construction; mortise-and-tenon joints were used everywhere except at the upper corners of the crest rail, which was mitered and reinforced with double biscuits. The panels are made of black walnut crotch, which came from a tree I harvested 10 years ago. This bed seemed to deserve this beautifully figured plank. I shaped the panels with a bowl bit (sometimes called a tray or dish bit) in a table-mounted router. The bit does not have a bearing. To follow the curve of the panels, I used a finger-point fence. Most of the bit is under the fence, and the panel bears on the finger point.

Glue-up proceeded in a specific order. First, the end stiles were glued to the lower rail. Next, I planed down the center stiles ⅛ in. thinner than the rest of the frame. This created a shadow line that reinforces the curve of the crest rail. The end panels must be in place for this glue-up because they are captured by the center stiles. The final fitting of the crest rail took place next. I planed the miters a little at a time until I achieved a snug fit.

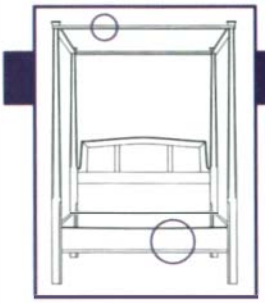
To repeat the three-tone motif used on the posts and side rails, I glued a piece of maple veneer (standard thickness) along the outside edge of the headboard (end stiles and crest rail). That was topped by a thicker piece of walnut trim. The walnut easily bent to follow the curve, but when it reached the base of the stiles, the radius was too tight to bend anymore.

I considered several options. Then my eye caught a quotation (author unknown to me now) taped on my tool-cabinet door: "Chew down near the line, finish with ingenuity." Although I was not sure I could live up to the second half of this, it best describes the approach taken.

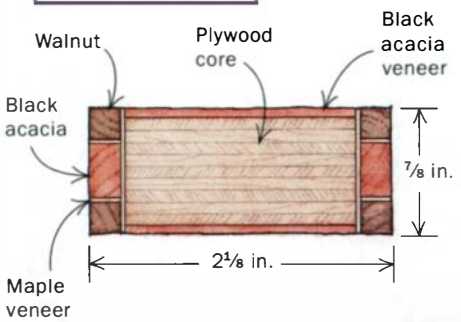
I started with a thick block of walnut for each side. After bandsawing and sanding it to fit the curve, I routed half the profile with a roundover bit. I then cut the inside of the curve on the bandsaw. The block goes in first, then the short vertical strip is fit in, and then they are faired. Before gluing this in place, I rough-cut a miter approximately 22° and planed it square and flat. I glued it in place using five-minute epoxy. Next, I mitered and glued on the vertical trim, then sanded the walnut using coarse sandpaper until it blended with the side trim. Last, I routed the outside profile.

## Build the upper sections last

The top rails, called testers, are black acacia veneered over ¾-in.-thick ApplePly. I applied shopmade edge-banding made up

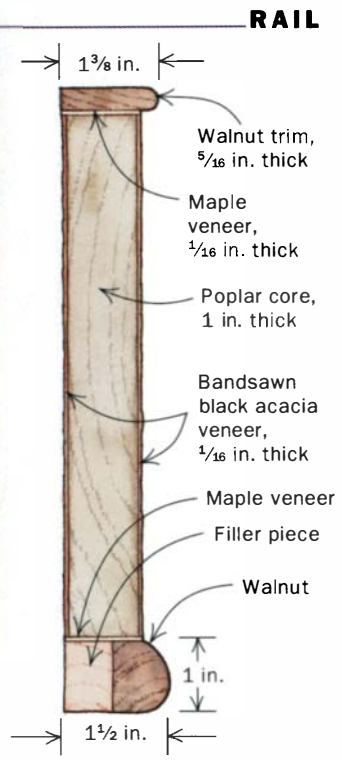


## Bed rails and testers add dressing




***The rails along the top of the posts, called testers, have a plywood core.*** *Each tester is veneered in black acacia and dressed with edge-banding made of black acacia, maple and walnut.*

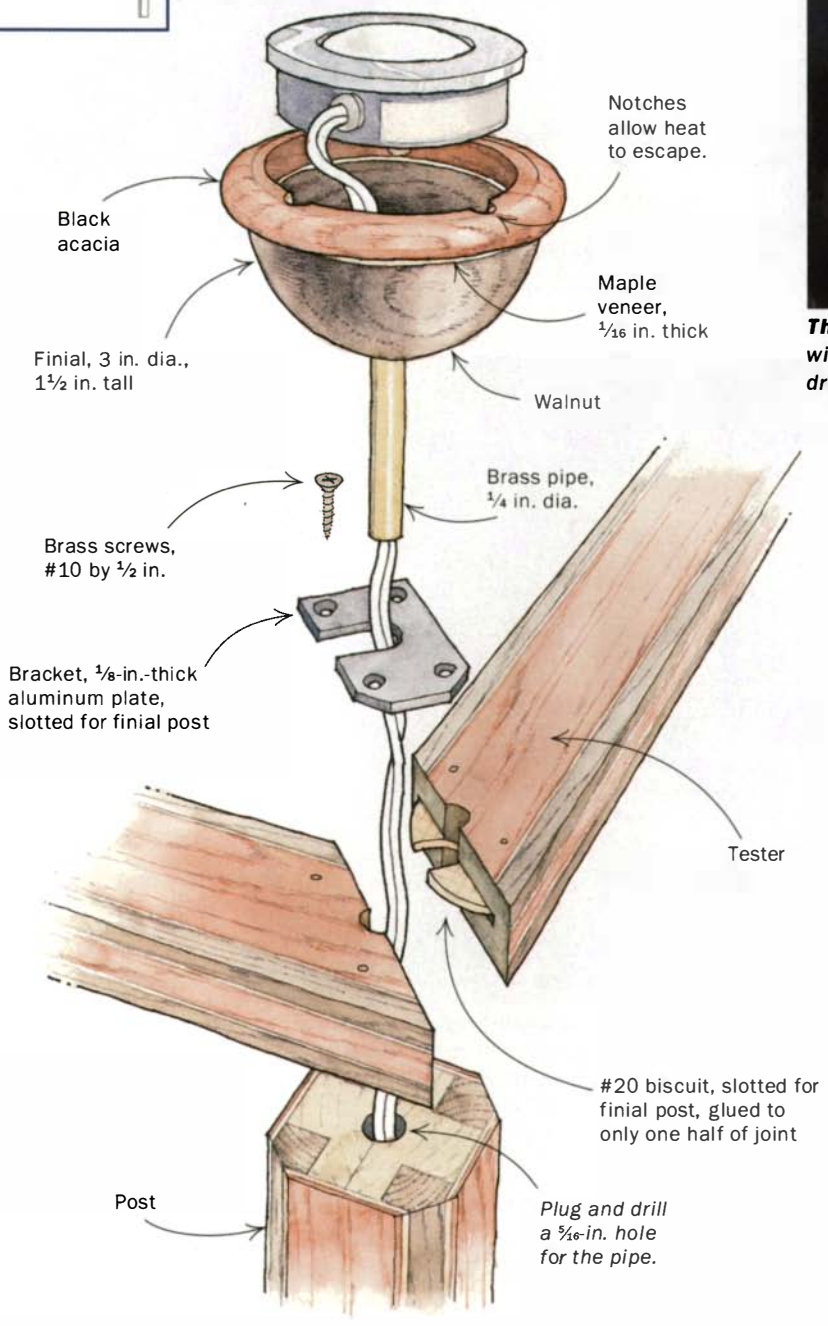
***A slight curve cuts across the upper edge of the bed's rails.*** *The rails have a poplar core and are veneered in black acacia and trimmed in walnut and maple.*



## Lighted finials cap the corners

**Turned finials house quartz-halogen light fixtures that point toward the ceiling. Sections of brass pipe are epoxied into the base of the finials. The pipes fit into matching holes in the testers atop the posts.**

***The lights are connected to one master switch.*** *The wires exit near the bottom of each post through holes drilled below the bed-rail hardware.*




of black acacia, maple and walnut, which relates to the rest of the piece.

The testers were mitered to fit on top of the posts. To help align the testers during assembly, each miter had a biscuit joint cut into it. I glued the biscuits into one half of each. The miter must also be drilled out to accept the finial rods. To hold the testers together at the corners, I made four connection plates using ⅛-in.-thick aluminum bar stock. Four screws connect each plate to the testers The plate was drilled out to allow the finials to be inserted. I slotted one side of each plate as well. That way, when disassembling the testers, the plate must only be unscrewed from one half of the joint.

I asked a local ornamental turner, Ray Churchill, to turn the four finials on top of the posts. The finials, small bowls just large enough to house the low-voltage lights, were made of curly walnut, curly maple veneer and black acacia. Because I was concerned about possible heat buildup in the finials, I replaced the stock 20-watt bulbs with 10-watt bulbs. The transformer and switch can be mounted anywhere that's convenient.

### Finish with tung oil

I use a tung-oil finish for beds, which don't require a lot of protection. Oil goes on easily and really lets the natural beauty of the wood shine. Some sections, such as the panels in the headboard, were finished before glue-up. Large, long pieces such as posts can be suspended from wires so that finish may be applied to all four sides in one session.

I used a cheap bristle brush to apply the first heavy coat of oil. I can avoid cleaning brushes and get months of life out of them by storing them in a jar of water between uses. Before reusing, I shake the brush vigorously. There's no risk of water messing up the finish because water won't stick well to the oily bristles. Each coat needed about a day or more to dry. Then I rubbed it out with 0000 steel wool and used a rag to wipe on a thinner coat of oil. All in all, four coats were applied. Once the finish cured, I applied paste wax. □

*Nicholas A. Goulden builds custom furniture in Petaluma, Calif.*



Photo, this page: Author

# Barbed Hinges for Fine Boxes

## They're inexpensive, easy to install and quite respectable

BY DAVE FREEDMAN

I get a lot of satisfaction from installing a pair of $17 Brusso butt hinges in a gorgeous, one-of-a-kind jewelry box. It takes a while to rout and chisel the mortises to precise dimensions, center and drill pilot holes and install the hinges with eight little screws. I also find joy in producing a short run of six to a couple dozen beautiful boxes, quickly sliding a pair of $1.75 barbed hinges into convenient slots—no fasteners needed—and ending up with some highly treasured gifts for holidays and special occasions or for selling at prices that most people can afford.

Barbed hinges (also known as slot hinges) may seem chintzy to some woodworkers at first glance, especially if they are accustomed to using those thick, solid-brass, high-end models. But the people who buy or receive boxes outfitted with barbed hinges think they are lovely. When the hinges have been installed, you see only the barrel, no expanse of flashy metal, which makes them ideal for contemporary box designs.

### These special hinges need special tools

Barbed hinges are available in two sizes. The small hinge is 5/16 in. wide by 7/8 in. long, measured with the leaves open. The large hinge is 7/8 in. by 1 1/8 in. Hinges cost less than $2 a pair, and you get discounts when you buy more than 10 pairs.

To cut accurate slots you need a special cutter, essentially a miniature circular-saw blade intended to run at 3,000 rpm. You need a different cutter for each hinge size, and each costs $20. Then there's the arbor on which you mount the cutter, another $20. The hinges, cutter and arbor are available from Rockler Woodworking and Hardware (800-279-4441). I occasionally receive hinges that are stiff and hard to open and close; I send those back to Rockler in exchange for new ones.

### Box dimensions determine hinge size

Barbed hinges are often used on a box that begins as a closed, six-sided box, where the lid is then sawn apart from the carcase. With this type of construction, the lid's sides (which frame a lid panel) must be wide enough to house the hinge leaf. But

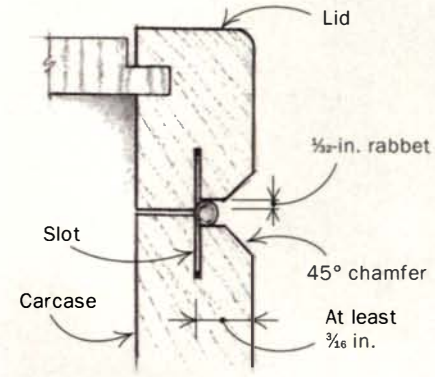
***Great for small gift boxes.*** *Although barbed hinges are moderately priced and relatively goof-proof, they are reasonably good looking because the only part that shows is the barrel. The hinges come in two sizes.*

Photos, except where noted: Michael Pekovich

## BARBED-HINGE LAYOUTS

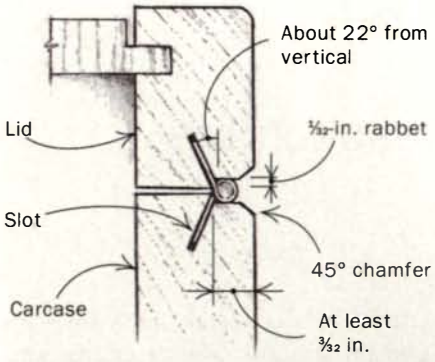
### SIMPLE, VERTICAL SLOT

Vertical slots are centered 3/16 in. from the edge for small hinges (¼ in. for large hinges). The 45° chamfers should end no more than 3/64 in. from the outside edge of the slot. The 1/32-in. rabbet cut in the lid and carcase makes room for the 1/16-in.-dia. hinge barrel.

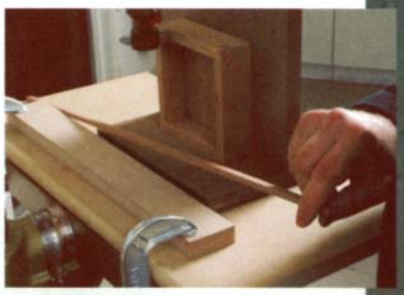



### ADVANCED, ANGLED SLOT

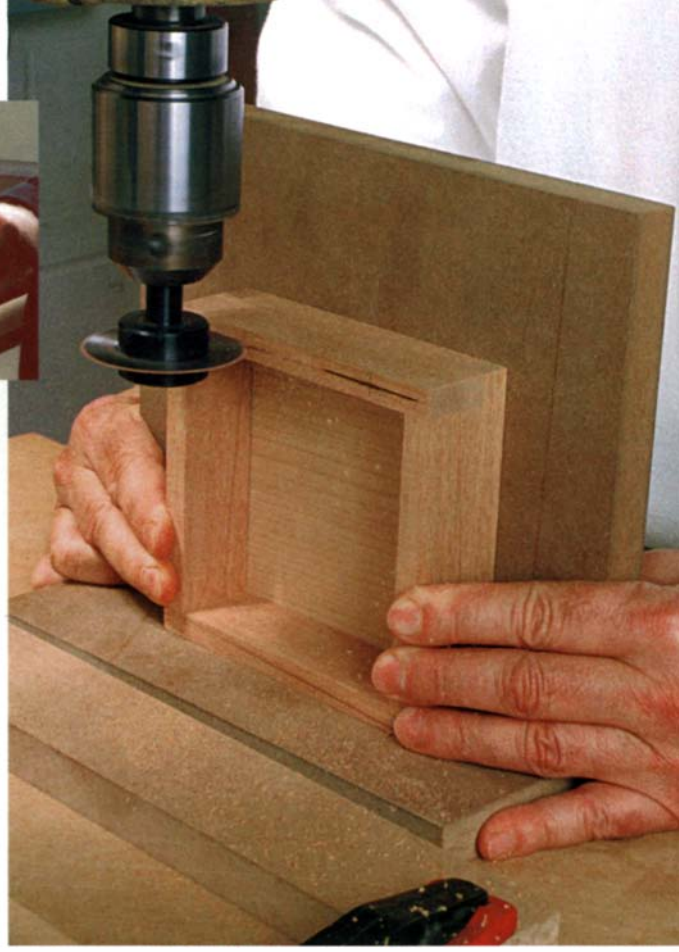
Slots cut on a 22° canted jig minimize the visibility of the chamfers. The beginning of the slot cut is centered 3/32 in. from the outside edge for small hinges (⅛ in. for large hinges). The chamfer should end about 1/32 in. from the back of the slot. Then the rabbet is cut 1/32 in. deep on the lid and carcase.




***Angled slots for a slightly more pleasing look.*** *By making an angled carriage jig and cutting the slot at a 22° angle, you can start the slot cut closer to the back of the box, reducing the size and visibility of the chamfer.*



***On the drill press.*** *With a special arbor and cutter chucked in the unplugged drill press, move the box and its jig up to the cutter so that it hits your layout marks (above). Use a spacer or measure (⅜ in. for the small hinge) from the carriage jig to a stop block that will limit the depth of cut. Remove the spacer, turn on the drill press (3,000 rpm) and move the box into the cutter at the hinge layout marks (right).*



you can use barbed hinges on any box as long as the lid (if it's a solid, one-piece lid) or lid frame is thicker than the depth of the saw cut (⅜ in. for the small hinge; ½ in. for the large hinge), so the leaf does not poke through the lid.

As far as which size hinge to use, I have a rule of thumb. If the perimeter of the box is 30 in. or greater, I use ½-in.-thick wood and large barbed hinges. If the perimeter is less than 30 in., I use ⅜-in.-thick stock and small barbed hinges. You'll develop your own rules of thumb as you go—simply trust your own eye and judgment—but if in doubt, rely on mine.

## Installation requires careful layout and a simple jig

Barbed hinges are very easy, forgiving and quick to install. However, one drawback is that once you install them, they are difficult to remove from the slots without tearing out a bit of wood. That's because these hinges have barbs die-cut into the leaves, which keep them in place. After the hinges have been installed, you can adjust them horizontally with impunity. But if you need to remove them, pull them out very slowly and carefully to minimize tearout.

You won't receive any instructions when you purchase barbed hinges. I learned to install them by trial and error, with helpful advice from other woodworkers. Before you cut your first slots, you'll need to lay out the locations and build a simple jig to support the workpiece on the drill press.

**Laying out the hinge locations**—Start by marking the locations of the slots on the mating edges of the box carcase and lid frame. For easy reference later, make corresponding marks on the *outside* surfaces, pointing to the centers of the slot locations. The slot for a large hinge should be centered about 1½ in. from the end of the carcase or lid; a slot for a small hinge should be centered about 1 in. from the end. A barbed hinge needs at least 5/16 in. of wood supporting it on both sides (see the top drawing at left). But if the lid panel is heavy or the lid frame is made of softwood, you should leave at least 7/32 in. of wood on both sides of the hinge.

**Setting up the cutter**—With the locations laid out, chuck the cutter in the drill press and set the speed to 3,000 rpm. Clamp a flat auxiliary table to the drill-press table. To ensure accuracy and safety, build a simple right-angle carriage jig to help slide the workpiece upright on the auxiliary table into the cutter (see the right photo above). Without the support of the carriage jig, the workpiece may wobble as you move it into the cutter, causing a sloppy cut or bend-



Photo, this page (bottom): Author

ing the thin cutter. Wax the bottom of the jig so it will slide smoothly.

To set up the cut, set the box carcase on the carriage jig, with the bottom flat against the jig's vertical backstop. With the power off, slide the jig toward the cutter until the carcase's rim almost touches the cutter's teeth. Adjust the table up or down to align the cutter with your layout marks.

Set a stop to limit the depth of cut (see the inset photo on the facing page). Measure the width of your chosen hinge leaf at its widest point, and add ⅛ in. So, for the large hinges, the depth of cut will be about ½ in.; for the small hinges, ⅜ in. This extra ⅛ in. gives you some flexibility if the mated slots aren't precisely positioned.

***On the router table.*** *Cut a 45° chamfer on the carcase and lid. The chamfer should end no more than ¾₄ in. from the outside edge of the slot.*

***Cut the rabbet.*** *After cutting the chamfer, cut a rabbet slightly more than ⅓₂ in. deep on the carcase and lid to make room for the ⅛-in.-dia. hinge barrel.*

**Cutting the slots**—With the setup complete, turn on the drill press. Hold the box carcase tightly to the carriage jig and slowly slide the jig forward, into the cutter. Aim the left-hand center mark on the carcase toward the cutter first. Push the carcase into the blade until you feel the base of the jig hit the stop, then back it away from the cutter. Repeat the procedure for the right-hand mark. Then turn off the drill press. With a slip of paper, measure the depth of the slots to make sure they're at least as deep as the hinge leaf. Repeat the procedure for the box lid, but remember to reset the stop because the lid is a different size than the box carcase.

If you are tempted to cut the slots on a router table, don't. The router's high speed can cause the cutter to burn the wood. Even at the low end of a variable-speed router, a cutter will generate so much heat that it may present a fire hazard.

## Chamfers and rabbets provide clearance for the lid

Before installing the hinges, cut 45° chamfers along the back edges of the lid and carcase to provide clearance for the lid to open. Then cut small rabbets to accommodate the hinge barrel, which is about ⅛ in. dia. This is done quickly and simply on the router table. The chamfers, which are cut first, should end no more than ¾₄ in. from the back edges of the slots, so that the chamfers theoretically point to the center of the hinge barrels. And thanks to the chamfers, the lid opens just past 90° and stops, so you don't need lid supports.

If you think the ¼-in.-wide chamfer in the back is unsightly, you can cut angled slots to minimize the width and visibility of the chamfer. By angling the slots 22° from vertical, you can start the slot closer to the back of the box (cut the distance in half), putting the hinge barrel closer to the back (see the bottom drawing and photo on the facing page). You will need rabbets with the same dimensions as for vertical slots. However, the chamfers, which must still point to the hinge barrel's center, will be practically negligible (they end ⅓₂ in. from the back of the slot).

The rabbets should be slightly larger than ⅓₂ in. deep. With the lid and carcase held in the closed position, measure the rabbet after you cut it to make sure that it is big enough for the ⅛-in.-dia. hinge barrel.

After you've cut the slots, finish the box completely. When the finish has cured, insert the hinges in their slots in the box carcase. Then slide the exposed leaves into the slots in the lid. Close the box and press the lid and carcase together at the hinge locations. Adjust the lid so that the sides are flush, and you're done.

Barbed hinges might not be suitable for boxes in museum displays, but for small gift boxes, the hinges are quite respectable. In fact, you will find them at high-end, urban craft galleries around the United States. Alexander Thomas, who operates Wood of a Kind in Los Angeles, sells thousands of such boxes each year, and he says he's never heard a negative comment from a customer about the hinges. □

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*Dave Freedman is the author of* Box-Making Basics *(The Taunton Press, 1997).*

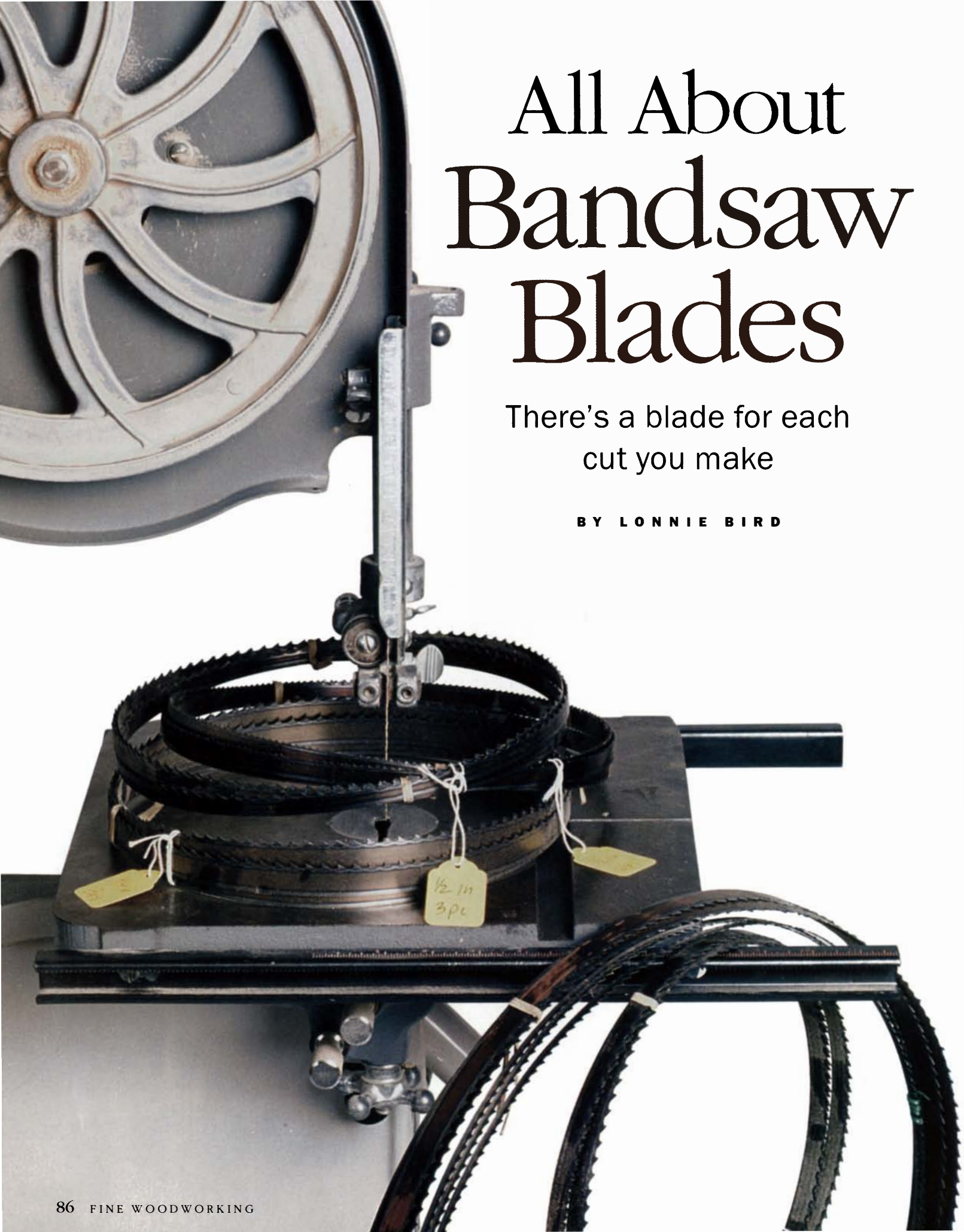
***Finish the box before assembly.*** *After the finish has cured, insert the hinges into the carcase (left photo), then the lid (middle). If necessary, you can easily make minor adjustments after the lid and carcase have been pressed together. Simply slide the lid side to side (right) to make it line up perfectly. However, unlike other hinges, these barbed hinges cannot be removed without tearing out the wood around the slots.*

Drawings: Erika Marks

# All About Bandsaw Blades

There's a blade for each cut you make

BY LONNIE BIRD



It didn't take long after I bought my first bandsaw to realize the importance of having the right blade. Whether you own an inexpensive home-shop bandsaw or the finest-quality industrial-grade bandsaw, the blade is, without a doubt, the most important part of the saw. An average bandsaw will cut much better when outfitted with a quality blade, but even the best bandsaw will disappoint with a poor blade.

The versatility we all desire from our bandsaws depends entirely on selecting the proper blade for the job at hand. Most of us probably mount a 50-tooth alternate-top bevel (ATB) combo blade on our tablesaw and leave it there until it needs resharpening. That one blade will miter, rip, crosscut and do just about anything else we need it to do. But this approach doesn't work on the bandsaw, where the blades are much more specialized. The best blade for cutting the contours of a cabriole leg won't accurately resaw veneer. This article will help you develop an arsenal of blades appropriate for the work you do.

## Bands of steel

A bandsaw blade performs a very demanding job. The back of the blade must be soft and pliable to flex around the wheels of the bandsaw at several hundred revolutions each minute, yet the teeth must be hard and resist dulling. Today's blades are stronger, cut smoother and stay sharp longer than ever before. They also cut with greater efficiency and less feed resistance.

Manufacturers use one of three methods to make the teeth hard and resistant to wear. For carbon-steel and spring-steel blades, teeth are cut into the band, set and then hardened. In the second method, a band of hard, high-speed steel is welded to a softer band, and the teeth are cut into the harder steel. These are called bimetal blades. For carbide blades, individual carbide teeth are brazed to a flexible steel band. Carbide blades are the most expensive because of the high cost of the material and the process used in making them. Each blade type has advantages and disadvantages, so I'll discuss them individually.

**Affordable carbon-steel blades are best for less-demanding work**—Bandsaw blades made entirely of carbon steel are the most

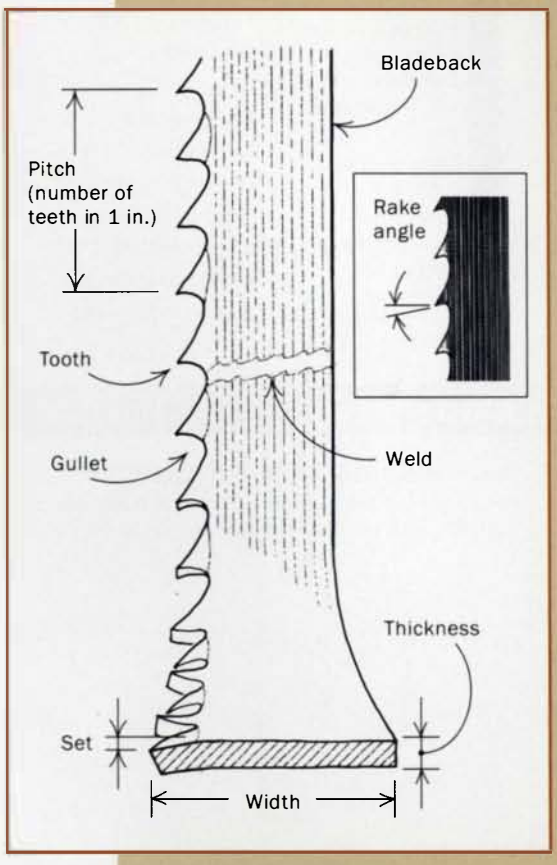
## Terms you need to know

**BLADEBACK** The body of the blade not including the teeth. The bladeback must be both tough and pliable to withstand the continuous flexing as the blade runs around the wheels of the saw.

**GULLET** The curved area at the base of the tooth that carries away the sawdust. The size and efficiency of the gullets decrease as the pitch is increased.

**PITCH** The number of teeth per inch (tpi) as measured from the tips of the teeth. The pitch determines the feed rate at which the blade can cut and the smoothness of the sawn surface. Pitch can be either constant or variable.

**RAKE ANGLE** The angle of the face of the tooth measured in respect to a line drawn perpendicular to the cutting direction. Regular- and skip-tooth blades have a 0° rake angle, which gives them a slow, scraping action. A hook-tooth blade has a positive rake angle, which causes it to cut more aggressively.




**SET** On blades designed for woodworking, every tooth is set (or bent) left or right, in an alternating sequence, to create a kerf wider than the bladeback. The set of a blade helps prevent binding during cutting. Although carbide teeth are not bent, they are wider than the steel body to which they're brazed. Then they're ground to create a set pattern that helps keep the blade running true.

**THICKNESS** The thickness of the steel band measured at the bladeback. (in general, thick blades are wider and stiffer than thin blades.) Thick blades require larger-diameter bandsaw wheels to prevent stress cracks and premature blade breakage.

**TEETH** The cutting portions of the blade. Teeth must be sharp, hard and resistant to both heat and wear. The tip is the sharp part of the tooth that shears away the wood fibers. During sawing, the tooth tip is under tremendous stress and is subject to both heat and wear. The heat produced from friction during sawing can sometimes rise to 400°F on the tip. This occurs because the wood insulates the blade during cutting.

**WIDTH** The dimension of a blade from the back of the band to the tip of the tooth. Wider blades are stiffer and resist side-to-side flexing, making them the best choice for resawing. Narrow blades can cut tighter contours.

Photos, except where noted: Author; facing page: Michael Pekovich

common and can be found in almost every consumer woodworking catalog. Carbon-steel blades are sharp, cut well when new and are available in a variety of widths and tooth forms. They are also inexpensive, which is probably the major reason for their popularity. The main disadvantage of a carbon-steel blade is that it dulls rather quickly, particularly when used for demanding applications such as resawing.

**CARBON STEEL**

**Pros:** Inexpensive; weld or braze your own; readily available

**Cons:** Dulls quickly; cannot be sharpened

**Use:** Cutting contours in relatively thin stock

Sawing thick hardwood stock places the greatest demands on any blade. If the tooth tip becomes too hot, it becomes soft and quickly loses both its edge and set. Once the set and sharpness are lost, the blade deflects during cutting. The result is that the expensive stock you're sawing is ruined. For these reasons, I use a narrow carbon-steel bandsaw blade only for less-demanding applications such as sawing contours.

**Thin spring-steel blades are used for veneer work—**Spring steel is most often associated with the cheap, stamped-out blades found on new benchtop bandsaws. Spring steel is soft and flexible, which allow it to bend around the small-diameter wheels of benchtop saws. But because spring steel is so soft, it doesn't hold an edge for very long.

Several years ago, however, a unique spring-steel resaw blade—marketed under the trade name Wood Slicer and sold by Highland Hardware (800-241-6748)—was introduced. Instead of being stamped, the teeth on this blade are carefully ground, hardened and polished. The teeth have a variable spacing that limits harmonic vibration. These blades make smooth cuts, and best of all, the kerf is a mere 1/32 in.—approximately half the kerf width of a typical carbide or carbon-steel blade. This means you'll get more veneer and less waste out of each plank. Additionally, because the Wood Slicer blade is only 0.022-in.-thick spring steel, it easily flexes around the medium-sized wheels of benchtop bandsaws.

**STAMPED SPRING STEEL**

**Pros:** Inexpensive; very flexible for use on bandsaws with small-diameter wheels

**Con:** Stamped teeth dull very quickly

**Use:** Light-duty cuts on small bandsaws

**Bimetal blades offer the best of two worlds—**The methods used for making bimetal blades are very different from those used for making most carbon-steel and carbide blades. A bimetal blade is actually two steel ribbons that are welded together. The back of a bimetal blade is composed of soft, flexible spring steel; the blade front, where the teeth are milled, is made of much harder high-speed steel. This strip of cobalt steel is welded onto the spring-steel blank before the teeth are cut. When the teeth are cut, all that remains of the cobalt steel is the tooth tip.

This combination produces a relatively inexpensive blade with longer wear than

## Stock thickness dictates blade pitch

**Pitch, the number of teeth per inch (tpi) on a blade, determines the feed rate and the smoothness of the cut surface. A blade with a continuous pattern of teeth has a constant pitch. A blade with teeth that vary in size has a variable pitch.**

**A blade with a fine pitch has more teeth per inch than a blade with a coarse pitch. A greater number of teeth means that each tooth is small, taking a small bite that leaves a smooth surface. A greater number of teeth also reduces the size of the gullets. Because small gullets can't haul away dust very quickly, a fine-pitch blade cuts slower and tends to get hotter than a coarse-pitch blade.**

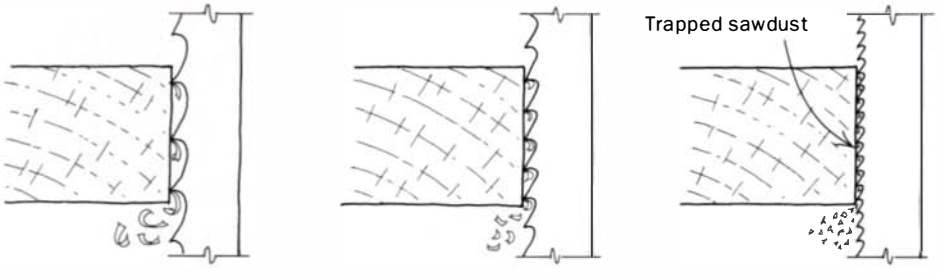
**On a coarse-pitch blade, both the teeth and the gullets are larger, so each tooth bites off a greater amount of wood, and the large gullets can easily remove the sawdust from the kerf.**

**The major factor to consider when selecting proper tooth pitch is the thickness of the stock. In general, you want a blade that will have no fewer than six and no more than 12 teeth in the stock at any given time (see the drawings above). For example, if you're cutting 1-in.-thick stock, a 6-pitch blade would be a good choice, but a 14-pitch blade would be too fine. However, if the stock were only ½ in. thick, a 14-pitch blade would be best. Although the range of available pitch is broad, from 2 tpi to 32 tpi, wide blades generally have fewer teeth, and narrow blades have a greater number of teeth.**

**Choosing the correct pitch will substantially increase blade life. Take, for example, a carbon-steel blade, which is easily damaged by overheating. A fine-pitch carbon-steel blade will overheat when used on thick stock because the gullets become packed with sawdust. This causes the blade to dull quickly and lose its set, rendering the blade useless.**

**SELECTING THE APPROPRIATE PITCH**

You'll get the best cuts when there are between six and 12 teeth in the stock (center). The cut is smooth, and because the sawdust is rapidly carried away, the feed rate can be faster.




Fewer than six teeth in the stock can cause vibration and a rough cut.

Correct pitch for board thickness results in a fast, smooth cut.

With more than 12 teeth in the stock, the small gullets fill with sawdust, and the blade overheats.



Drawings: Vince Babak

**BIMETAL**

**Pros:** Cobalt-steel teeth don't readily overheat; high tension means greater beam strength

**Con:** Don't last as long as carbide

**Uses:** Demanding applications that generate a lot of heat, such as resawing and cutting thick stock

an ordinary carbon-steel blade. Unlike a carbon-steel blade that loses its sharpness and set at 400°F, the cobalt-steel teeth of a bimetal blade can withstand 1,200°F.

Another advantage of a bimetal blade is the beam strength of its spring-steel back, which can withstand great tension. The beam strength (see the top drawing at right) of a bimetal blade, combined with its resistance to heat, has endeared this type of blade to many woodworkers.

**Carbide blades are pricey but will last**—I'm sure that almost every woodworker is familiar with carbide. Carbide cutting tools have almost made high-speed steel a thing of the past. A significant difference between carbide and steel blades is that each carbide tooth is individually brazed onto a strong, flexible spring-steel blade back. In fact, the recommended tension for a carbide blade is almost twice that of a carbon-steel blade, giving a carbide blade much greater beam strength. The carbide teeth are precisely ground on the face, top and both sides, which results in truer, more precise cuts.

**CARBIDE**

**Pros:** Smooth cut; high recommended tension; outlasts carbon-steel blades 25:1

**Con:** Initial cost is very expensive

**Uses:** Resawing and other demanding applications

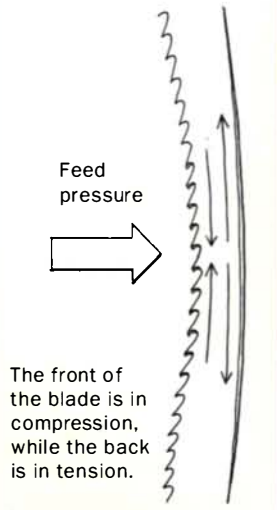
As you would expect, a carbide bandsaw blade is significantly more expensive than an ordinary carbon-steel blade. However, a carbide blade will typically outlast a carbon-steel blade 25:1, and carbide can be resharpened. Although more expensive initially, a carbide blade is much more economical than a carbon-steel blade, especially for resawing.

**Stellite is softer and less brittle than carbide**—Stellite is the brand name of a unique type of carbide that is reportedly better suited for woodworking applications. Stellite isn't as hard as regular car-

## Wider blades need more tension

**BEAM STRENGTH**

A bandsaw blade bows when the beam strength isn't great enough to resist the feed pressure.



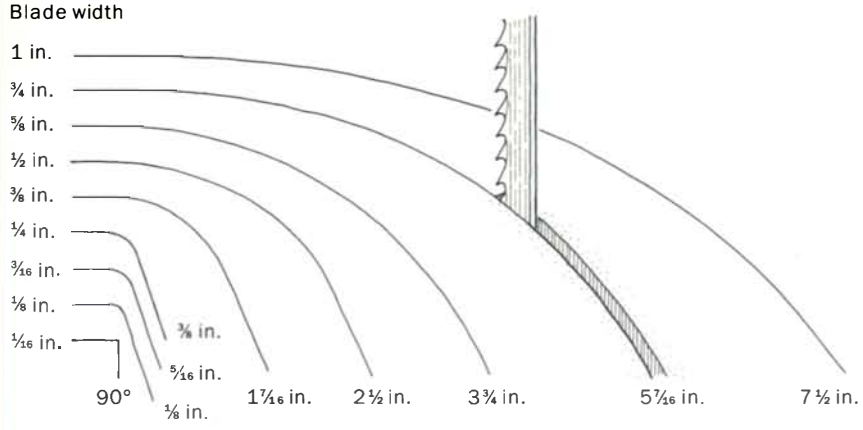

**As blades get wider, the steel used for the blades gets thicker. The width of a blade relates to its beam strength—the wider the blade, the stiffer it will be (see the drawing at left).**

**A wider blade has more beam strength, but the blade must be properly tensioned. Overtensioning can stress and distort the bandsaw frame, possibly beyond repair. Excessive tension also places potentially damaging forces on the saw's wheels, shafts and bearings. When resawing, use the widest blade that your bandsaw can properly tension. Keep in mind that the widest blade a saw can tension may not be the widest blade it can accept. For smaller saws, you'll most likely get better results from the next-size narrower blade.**

**The most accurate way to determine the proper tension of a blade is to use a tension meter. But a meter has a price tag of around $300, so many choose a simpler route. If you set the upper guides about 6 in. off the table, the blade should deflect under the pressure of a fingertip, but no more than ¼ in. For resawing, the tension should be even a little tighter. Bear in mind that the 14-in. saws common in many small woodworking shops work best with blades no wider than ½ in. Each blade width has a minimum radius that it can cut. Squeezing a blade through a turn that is too tight can break the blade, twist the teeth into the guides (which causes them to lose sharpness and set) or pull the blade off of the saw's wheels, which could damage the teeth or bend the blade. The blade-radius chart below provides the minimum radius that each width of blade can turn. I keep a similar chart posted on my bandsaw.**

**You may be wondering why you can't mount a narrow blade (such as ¼ in.) and use it for cutting all curves. This does work, but only to a degree. Narrow blades have a tendency to wander. If you try to cut a large radius, such as a 36-in.-dia. tabletop, for example, you'll have a hard time keeping the blade on the line. You'll cut more precisely with a 1-in.-wide blade. However, with practice you'll probably cut a majority of curved work with a ¼-in. or ⅜-in. blade.**

**HOW BLADE WIDTH AFFECTS THE CUTTING RADIUS**




Minimum radius the blade can cut without difficulty

**STELLITE**

**Pro:** More shock resistance than carbide

**Cons:** Cost; not as hard as carbide

**Use:** Resawing wide stock

bide, but it's also less brittle. This gives Stellite greater shock resistance. Like carbide, Stellite promises longer wear and better-quality cuts.

In many other ways, Stellite blades are a lot like carbide blades. The Stellite teeth are brazed onto the band, then precisely ground. And like carbide blades, Stellite blades are expensive.

## Different tooth forms for different jobs

Tooth form refers to the design of the tooth and gullet, specifically the tooth size, shape and rake, or cutting, angle. The three commonly known tooth forms for cutting wood are regular, skip and hook. Another form that is gaining in popularity is the variable tooth.

**Regular-tooth blades**—The regular-tooth blade, sometimes called the standard form, has evenly spaced teeth for smooth, precise cutting. Teeth and gullets are the same size, and the rake angle is 0°. This combination of features leaves a smooth surface. For cutting curves, a regular-tooth blade is often the best choice because it has the greatest number of teeth. This, combined with a 0° rake angle, gives you a smooth finished surface that requires little cleanup.

The disadvantage of a regular-tooth blade is that the gullets are too small to cut thick stock effectively. Remember that the purpose of the gullets is to haul away the sawdust from the kerf. If you attempt to cut thick stock with a regular-tooth blade, the gullets become full before the teeth exit the stock, which slows cutting and overheats the teeth. Obviously, a regular-tooth blade is not designed for fast cutting. In fact, if you push the stock too hard in an effort to increase the cutting rate, the cut actually slows down as the gullets become packed with sawdust.

**Skip-tooth blades**—As you might assess from the name, the skip form "skips" every other tooth. A skip-tooth blade has fewer teeth and larger gullets than a regular-tooth blade. The large gullets can efficiently carry the sawdust away from the kerf, making a skip-tooth blade fast cutting. Like a regular-tooth blade, a skip-tooth blade also has a 0° rake angle that scrapes the wood away cleanly. But because it has fewer teeth, a skip-tooth blade doesn't cut as smoothly as a regular-tooth blade.

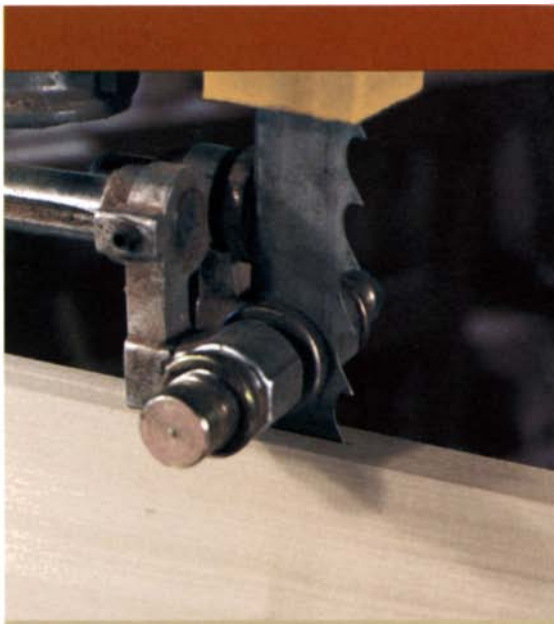
A skip-tooth blade is best suited for resawing and ripping thick stock. It also works well for cutting softwoods. But because the hook-tooth blade is more efficient, the skip-tooth blade is outmoded. Why do manufacturers still produce skip-tooth blades? One sawblade manufacturer said his company still makes skip-tooth blades mainly because—short of sending people a free hook-tooth blade—it's difficult to convince people to change.

**Hook-tooth blades**—The hook tooth is really a further development of the skip tooth. A hook-tooth blade has large gullets and teeth like that of a skip-tooth blade, but the teeth have a positive rake angle that makes them cut more aggressively. Because of this aggressive nature, a hook-tooth blade has less feed resistance than a skip-tooth blade. It is a great choice for resawing and ripping thick stock. A hook-tooth blade is my choice for general resawing, such as sawing thick planks into thin drawer parts. The coarser pitch and positive rake angle of a hook-tooth blade make quick work of any hardwood.

**Variable-tooth blades**—The variable-tooth blade is a hybrid among bandsaw blades. A variable-tooth blade can have regular teeth with a 0° rake angle or a more aggressive, positive rake angle. But the unique feature of this type of blade is that the tooth size and spacing vary on the same blade. This means that both the teeth and gullets vary in size but not in shape. The unique design dramatically reduces vibration; the result is a quieter blade and a very smooth cut.

To understand how this works, it's helpful to think of a bandsaw blade as a string on a musical instrument. A bandsaw blade is under tension, just like the strings on a violin but for different reasons. You want a string on an instrument to vibrate so that it produces a sound. This is called harmonic vibration. But you want to limit vibration on a bandsaw blade because vibrations create a rough surface on the stock. By varying the tooth and gullet size, you effectively limit the vibrations and create a smoother surface.

When sawing veneer from a plank of valuable hardwood, a hook-tooth blade will do a great job, but a variable-tooth



***Resawing poplar is easy.*** *This 2-pitch bimetal blade makes quick work of softwoods. A carbide blade would also work well but would be more expensive.*

***Smooth operator.*** *A variable-pitch, hook-tooth carbide blade cleanly slices 1/16-in.-thick veneer from this crotch walnut plank.*

## Which blade should you use?

Choosing a blade can be confusing until you're familiar with all of the factors. Here are some examples to get you started.

**RESAWING 6-IN.-WIDE POPLAR FOR DRAWER PARTS**

**Option 1: carbide, 3 pitch, hook tooth**
**Option 2: bimetal, 2 pitch, hook tooth**

**Comments: Poplar is soft and cuts easily. The bimetal blade would be less expensive, but the carbide blade would last much longer. For greatest beam strength, use the widest blade that your bandsaw can tension.**

**SLICING 1/16-IN.-THICK VENEER FROM A 9-IN.-WIDE CROTCH WALNUT PLANK**

**Option 1: carbide, 2/3 variable pitch, hook tooth**
**Option 2: spring steel, 3/4 variable pitch, hook tooth**
**Option 3: carbide, 3 pitch, hook tooth**
**Option 4: bimetal, 3 pitch, hook tooth**

**Comments: Walnut crotch has dramatic figure and is expensive. I try to get as much veneer as i possibly can from a valuable plank like this. A carbon blade would be my last choice because it dulls quickly. The variable-pitch carbide blade is very expensive, but the cut is incredibly smooth. Both of the carbide blades are stiff and require a strong frame to tension properly. The spring-steel variable-pitch blade is an excellent choice, particularly for saws with wheel diameters under 18 in. It tensions easily because it's only 0.022 in. thick. This blade cuts incredibly smoothly, and it's relatively inexpensive compared to carbide blades—although you can't expect it to last as long. Best of all, the kerf from this blade is a slim 1/32 in., half that of the other blades in this category. You'll definitely get more veneer from this blade.**

**RIPPING 2-IN.-THICK HARDWOODS**

**Option 1: carbide, 4 pitch, hook tooth, 1/2 in. wide**
**Option 2: carbon steel, 4 pitch, hook tooth, 1/2 in. or 3/4 in. wide**

**Comments: if you have a 14-In. bandsaw, you'll probably get truer cuts with a 1/2-In.-wide, 0.025-In.-thick blade than with a 3/4-In.-wide, 0.032-In.-thick blade. Your saw stands a better chance of tensioning the thinner and narrower blade.**

**CUTTING CONTOURS IN 7/8-IN.-THICK MAPLE (MINIMUM RADIUS 9/16 IN.)**

**Option 1: carbon steel, 10 pitch, regular tooth, 1/4 in. wide**
**Option 2: carbon steel, 6 pitch, regular tooth, 1/4 in. wide**

**Comments: The 10-pitch blade would create a smoother surface, thus requiring less cleanup of sawmarks.**

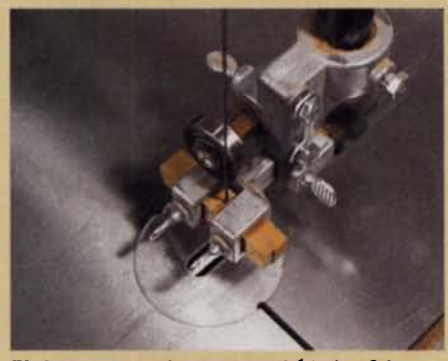
**CUTTING SCROLLS IN 1/4-IN.-THICK HARDWOOD (MINIMUM RADIUS 1/16 IN.)**

**Option: bimetal, 24 pitch, regular tooth, 1/16 in. wide**

**Comments: This tiny 1/16-In.-wide blade is your only choice for cutting tight contours. You'll need to replace the steel guide blocks with hardwood blocks or Cool Blocks. This blade can't be used on bandsaws equipped with bearing guides.**

***The right blade for hardwoods.*** *Ripping hardwoods on the bandsaw is easy with a 1/2-in.-wide, 4-pitch blade.*

***Good for most curves.*** *A 1/4-in., 6-pitch blade can cut most contours, but a 10-pitch blade leaves a smoother surface.*



***Tight curves, clean cuts.*** *A 1/16-in., 24-pitch blade cuts intricate scrolls with little or no cleanup required.*

blade will leave a much smoother finish.

Tooth form affects the performance of the blade more than any other factor. A regular-tooth blade gives the smoothest cut; a hook-tooth blade cuts aggressively; and a variable-tooth blade cuts both smoothly and aggressively.

### The right blade choice

Rather than thumbing through the pages of an industrial bandsaw blade catalog, it's much easier to narrow the blade choices based upon the types of cuts you'll be making. For every job, it's important to consider the blade width, pitch and tooth form. I always begin by selecting the blade width. Width is determined by the type of cut you're making—whether you're sawing a straight line or a curve. Tooth pitch is dictated by the thickness of the stock you'll be cutting, and tooth form influences how aggressively or smoothly the blade will cut.

To get the most out of your bandsaw, you'll have to change blades often from wide to narrow or from few teeth to many. Each type of blade is best for a certain kind of cutting. You must decide which is more important to you—speed or smoothness. You can't get the best of both in the same blade. However, you can select a blade that is a good compromise. □

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*Lonnie Bird is a woodworking teacher and author. This article was adapted from* The Bandsaw Book *(The Taunton Press, 1999).*

# Fine WoodWorking®

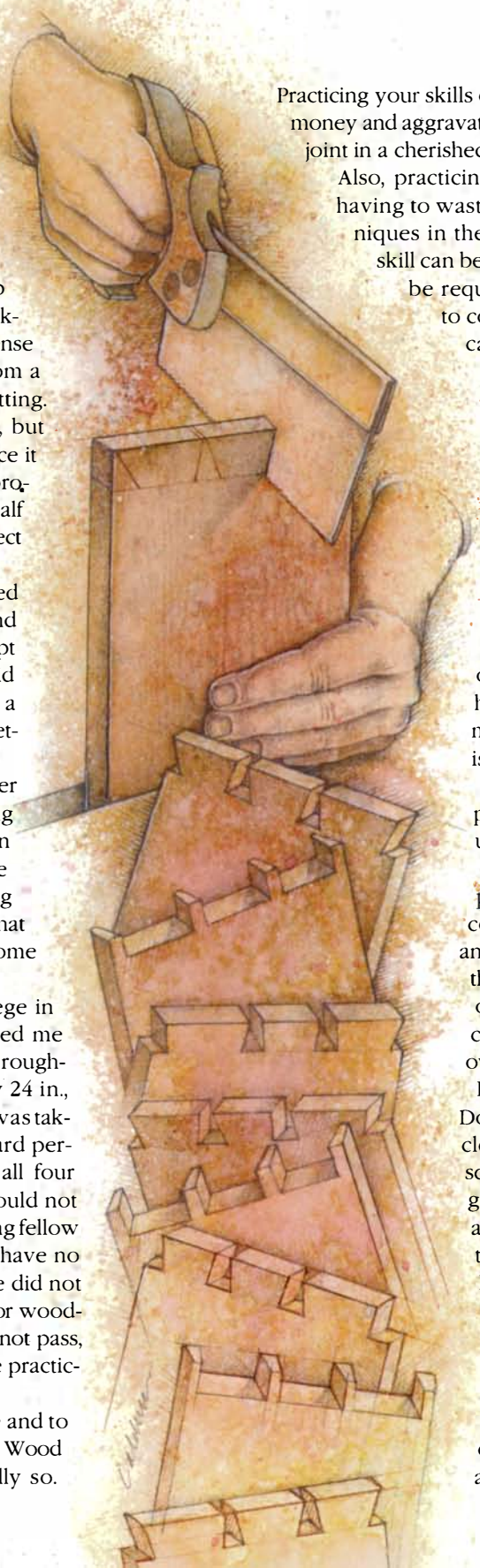
## Index to issues 134 through 139

This alphabetical index covers all issues of *Fine Woodworking* published during 1999 (*FWW* #134 through #139). Starting in 1988, *Fine Woodworking* has published annual indexes in the January/February issues, beginning with *FWW* #74. The Taunton Press also sells a cumulative index covering issues #1 through #120 for $12.95. You can find the index on-line at www.finewoodworking.com. The format of each index reference is issue number:page numbers. A hyphen between page numbers means the discussion is continuous; commas between page numbers indicate an intermittent discussion. This index, like all previous indexes to *Fine Woodworking*, was prepared by Harriet Hodges, chair maker.

# Rules of Thumb

BY MIKE DUNBAR

## Practice makes closer to perfect



Golfers regularly go to the driving range, hit a bucket of balls and practice drive after drive. Tennis players stand at the end of the court and practice serving. Woodworkers are different. Many often jump into a challenging project and learn a particular skill right on the job.

The temptation to learn a skill on the job can be traced to the ways in which woodworking is learned, ways that can create a false sense of immediacy. How-to articles take you from a project's beginning to its end in a single sitting. Demonstrators at shows are lightning fast, but you do not get to witness the years of practice it took to develop their skills. How-to TV programs show entire projects being made in a half hour. Setups are not shown, and imperfect practice cuts are edited out.

When I was a young woodworker, I decided to learn to cut dovetails. I took two boards and dovetailed their ends. I cut off my first attempt and dovetailed the freshly exposed ends. I did this over and over again until I was left with a couple of stubs. By that time I had gotten pretty quick and sure.

I frequently demonstrate turning a baluster chair leg for students at my chair-making school. Knowing that I gave up production chair making 15 years ago, the students are amazed that I can still do this complicated leg in about seven minutes. They do not realize that when I was a chair maker, I turned that leg some 8,000 times.

I remember visiting a woodworking college in the early 1980s. While the instructor showed me around, I noticed a student working a short, rough-sawn board, perhaps only 1 in. by 12 in. by 24 in., with a wooden jack plane. I was told that he was taking a test. To pass, he had to make the board perfectly flat and uniform in thickness, with all four edges square. Until he passed this test he could not advance to making actual furniture. The young fellow seemed pretty skilled with that plane, so I have no doubt he succeeded. However, I am sure he did not take the test cold. His test is not a bad one for woodworkers to try once in a while. If you could not pass, you might pledge to spend a little more time practicing your skills.

There are several good reasons to practice and to make it a regular part of your woodworking. Wood is expensive. Exotic wood is astronomically so. Practicing your skills on poplar or pine could save you a lot of money and aggravation when you get ready to cut a complex joint in a cherished board of bird's-eye maple.

Also, practicing woodworking skills spares you from having to waste precious shop time by learning techniques in the middle of a project. A well-rehearsed skill can be put to use in much less time than would be required if you had to learn it while trying to complete a project. Through practice you can also learn a lot of labor- and time-saving tricks. Don't forget to practice maintenance skills as well. Sharpening is a good example. If you can raise a keen edge with a couple of minutes of honing, you are back to work almost immediately. You are more likely to stop and take time to sharpen your tools if you can do it quickly. There are two benefits here as well. Working with sharp tools is easier and safer. The same advice applies to machines. If a blade on your bandsaw is dull, and you know how to change it quickly, you are much more likely to replace it with a blade that is sharp.

Good workmanship is a function of experience. If you learn to make a joint or to use a technique on the job, you will seldom get the best result. You will be happier with and take more pride in your completed projects if you have practiced and developed the skills required to make them. There are also tasks where you have one shot and from which there is no recovery from a mistake other than to start over again.

Here is another advantage of practicing: Doing something repeatedly creates muscle memory. I teach students to use a bevel square as a guide when they drill the angled holes used in chair making. They are always amazed that I start the hole and then check myself with the bevel square. I am seldom off the mark. It is nothing more than muscle memory. Having your body tell you something is wrong is a nice fail-safe. Muscle memory sticks with you. Even if you have not employed a technique for a long time, it will come back to you quickly, like getting on a bike and riding with no hands.

Drawing: Kirk Caldwell

READER SERVICE NO. 241

# Q&A

## Bubbling veneer under shellac

***I recently used Mario Rodriguez's technique for veneering using an iron and polyvinyl acetate (PVA) glue (FWW #108, pp. 48-51). Everything went fine until I let it sit a day and laid on a coat of shellac. With the introduction of shellac, the veneer immediately started to bubble. What could have caused this?***

***—Jerry Cole, Victoria, Australia***

**Mario Rodriguez replies:** The PVA glue and iron technique is a quick and painless introduction to veneering for the novice woodworker and can be a lifesaver for the professional in a pinch. But the technique has some limitations and has been known to create a range of unusual and mysterious problems.

I always caution woodworkers to prepare a practice panel, using the exact veneer, substrate, method of application (brush or roller), glue, iron and temperature that will be used on the actual job. If any of these factors varies, it can affect the final result.

The shellac seems to have caused the veneer to swell with the absorption of the alcohol contained in the shellac. I frequently use shellac to finish veneered projects and have never encountered this particular problem. The alcohol used to mix the shellac might be old or simply poor and contains a lot of moisture. Introducing this moisture to a low-grade PVA could have caused your problem, but this still seems unlikely. More likely, the veneer wasn't fully adhered before you laid on the shellac, and the moisture in the alcohol caused the veneer to expand and bubble.

Make sure you're using fresh, quality alcohol and a high-grade PVA. You might try an extra coat of glue on both the veneer and the substrate and raise the iron's temperature a little—higher-grade PVAs need higher temperatures.

Another technique I use to control the effects of direct heat applied to the veneer is to pre-iron the veneer. This will shrink the veneer just before gluing and might significantly reduce the amount of buckling.

[Mario Rodriguez is a contributing editor to *Fine Woodworking*.]

## IRONING ON VENEER

**With a steam iron and polyvinyl acetate (PVA) glue, it takes only a little patience to make a veneered panel. The same method works for curved surfaces.**


***Shrinking the veneer.*** *Pre-ironing dries and shrinks veneer, lessening the chance that it will buckle when glue is applied.*

***Laying on PVA.*** *Using a small paint roller with a short nap, coat both the veneer and the substrate with PVA glue.*


***Ironing veneer in place.*** *After the glue dries for about 30 minutes, the veneer is laid onto the substrate. An iron heats and reactivates the glue, securing the veneer to the substrate.*

## Replacing a leather desktop

***I've inherited my grandfather's mahogany writing desk and would like to replace the worn and gouged leather on the top. What is the best way to remove the old leather, and what glue do I use to lay on new leather?***

***—Bruce Friedman, Key West, Fla.***

**William Tandy Young replies:** The old leather was probably glued down with hide glue or wheat paste. If the glue is dry and crumbly, you may be able to pull the old leather off easily. If the glue is still holding strong, the leather will separate and you'll only be able to pull off the top layer. You can remove the remaining layer when you clean the glue off. If the leather doesn't separate easily, slice it free with a razor knife.

Next, steam and sponge off all of the old glue with an iron and wet rags, being careful not to harm the surrounding wood border. Steam also softens most white or yellow PVA glues. Alternatively, you could try De-Glue Goo, which is effective but must be rinsed well because it's acidic. If neither of these methods works, try a solvent such as acetone, naphtha or toluene. If solvents don't work, you'll have to scrape the glue off.

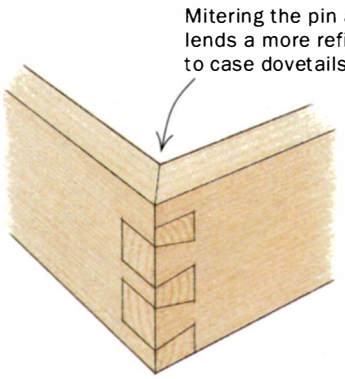
Once the substrate is clean, let it dry for a day or two. Cut the new leather slightly oversized, apply a moderate, even coat of Franklin's Liquid Hide Glue to the



Photos: Matthew Teague

substrate and smooth the leather down firmly. The glue's natural tack should hold the leather in place without clamps. After the glue hardens, trim the leather to fit within the surrounding raised border and remove excess glue with a warm, damp rag. Inject a little hot water under the trimmed edges with a syringe and then press the leather flat and tight against the border. If necessary, warm the edges with a hair dryer and clamp them flat with Plexiglas cauls. Work neatly and carefully to protect the appearance of the new leather as well as the border. Before tackling the desktop, consider practicing these techniques on a small project.
[William Tandy Young is the author of *The Glue Book,* The Taunton Press, 1999.]

## Box dovetails with a mitered edge

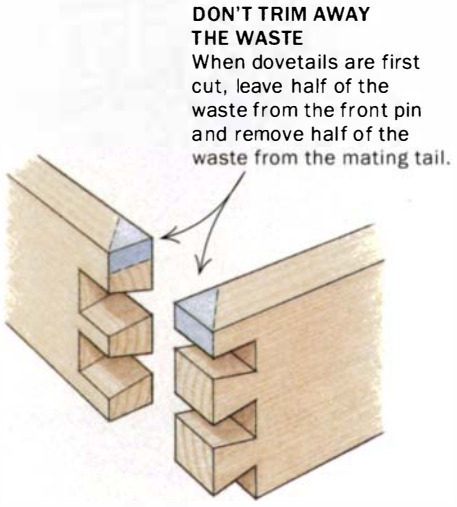


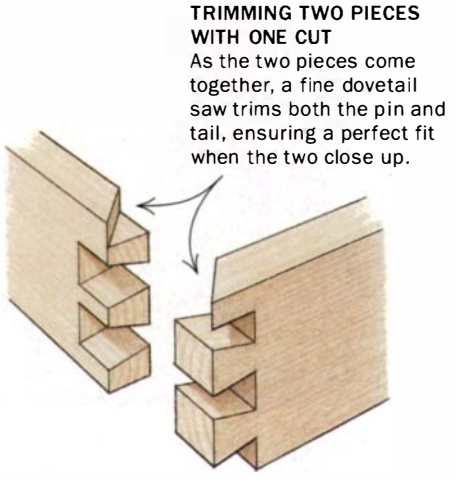

***I have seen some small carcases constructed with what (from the side) appear to be normal dovetails, but from the front (open) side, I see that they are mitered. How is this kind of joinery cut?***
***—Matt Whisnant, Pikesville, Md.***

**Dan Faia replies:** The joint you describe is most commonly used in carcase construction when the edges aren't covered by a face frame, molded strip or some other kind of decoration. At North Bennet Street School, where I have studied and taught, this is one of the first joints students learn. Many use it to give a more refined look to their toolboxes, the first project the students build.

The joint is more decorative than functional. With normal box dovetails, the exposed edges of a dovetailed carcase appear from the front to be butt-joined, a look that most woodworkers find undesirable. The intent of this mitered box dovetail joint is to make the top and bottom look as if they are joined to the sides with miters, which gives the piece a much more finished appearance.

The joint is made by removing half of the front pin and leaving half of the waste on the tail. Prior to fitting the dovetails, trim the two slightly oversized to approximately 45°. As the dovetails fit deeper and deeper, you will have to trim these mitered surfaces more and more. You can do this with a chisel, but I find it easier and more precise to pass a very fine dovetail saw between the two. The set of the saw's teeth will trim both surfaces at the same time and give you a perfect match.




After the two miters have been trimmed and mated, the joint should draw up tight. It's a simple joint to cut, and it lends a nice effect.
[Dan Faia teaches woodworking at North Bennet Street School and The Windsor Institute.]

## Trouble with dust and furnace

***I'm working in a small basement space that I have to share with an oil furnace. Is there any danger of fire or explosion from sawdust and the heating unit?***
***—Scott Molody, Northampton, Mass.***

**Curt Corum replies:** If you create dense clouds of fine sawdust, almost any source of ignition could create an explosion—static electricity, smoking, open flames, even a spark from a faulty light switch. If you were to run a heavy-duty sander until the room was filled with fine sawdust, the furnace kicking on could be a source of ignition. This threat is a good reason to install reliable dust collection. In reality, however, the threat to a sensible hobbyist is slim. The cloud of dust necessary to cause a fire or explosion would be so thick that I can't imagine working in it.

On an industrial scale, if you were to blow a 1-qt. container of fine wood dust into the air in a 4,500-sq.-ft. shop with a 10-ft. ceiling, you would be in violation of the permissible exposure limit set by the Occupational Safety and Health Administration (OSHA).

All shops should at least have spot dust collection (right at the machine) by using portable or central dust-collection systems. To prevent dust clouds in the shop, the proper-sized, self-contained dust collector, filter material and hooding are very critical. A self-contained, ceiling-suspended air cleaner is also a good idea. The object is to keep dust out of the air so that there will be neither fire nor health risks. Hand-sanding operations should be done over a downdraft table with sufficient airflow.

Many commercial and non-commercial woodshops, especially in New England, heat with oil- or gas-fired furnaces that are located in the shop. One customer in Connecticut heats his woodshop every winter with two woodstoves. He operates a two-man shop with 11 woodworking machines. He has proper dust collection and good housekeeping. So as long as you're sensible about the amount of dust



Drawings: Vince Babak

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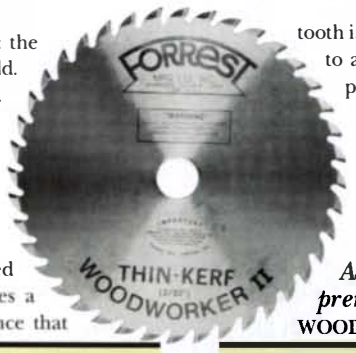


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that gets into the air of your shop, there shouldn't be a problem.
[Curt Corum designs, manufactures and installs dust-collection systems in Woodbridge, Conn.]

### Lacewood or silky oak?

***A friend gave me a few boards of a wood he called lacewood, but another, very experienced woodworker tells me it is silky oak. Are these two different woods? The wood has a beautiful, lustrous figure and a warm, pinkish-tan color. What can you tell me about it?***

***—Jason Mariner, Saluda, N.C.***

**Jon Arno replies:** The names lacewood and silky oak are used pretty much interchangeably in the trade these days, but what you probably have is more correctly referred to as silky oak, *Grevillea robusta.* This is a very hardy, drought-resistant species native to southeastern Australia that is now used for reforestation projects in warmer climates throughout the world.

Years ago, a close relative of silky oak, *Cardwellia sublimis,* native to northern Australia, was also an important timber in international trade, and it was marketed as lacewood. Even though silky oak now dominates the supply, the name lacewood has not totally gone away.

Frankly, I think this flap over common names is much to do about nothing, in that the woods of these two species are virtually identical. When cut to expose the wood rays at just the right angle, they both produce a stunningly beautiful, lacelike figure. The density of silky oak is comparable to that of American black walnut and, considering its extremely large rays, it has surprisingly good working characteristics.

Although its resistance to decay is not outstanding, it is a very nice cabinet wood for interior projects. It machines well, turns well and finishes to a beautiful, deep, almost translucent natural luster. The only serious downside for the woodworker is that silky oak's chemistry is potentially toxic. It contains a phenol capable of producing symptoms similar to those of poison ivy. While most woodworkers experience only minor irritation when exposed to the dust, for the unfortunate few who develop an allergic reaction, it is a wood better left alone. The way to get to know silky oak is to approach it with caution and moderation. Minimize your exposure to the dust until you've worked with it at least two or three times. With allergic reactions, the first exposure may not trigger any symptoms.
[Jon Arno is a wood technologist and wood consultant in Troy, Mich.]

***Silky oak***
***Grevillea robusta***

***Send your questions to Q&A,* Fine Woodworking, *P.O. Box 5506, Newtown, CT 06470-5506 or e-mail it to fwqa@taunton.com.***

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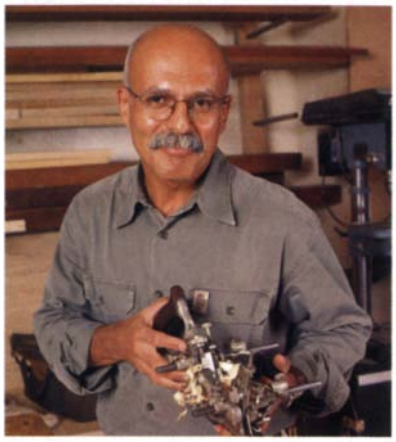
# Master Class

## The Stanley No. 55: king of combination planes



BY MARIO RODRIGUEZ

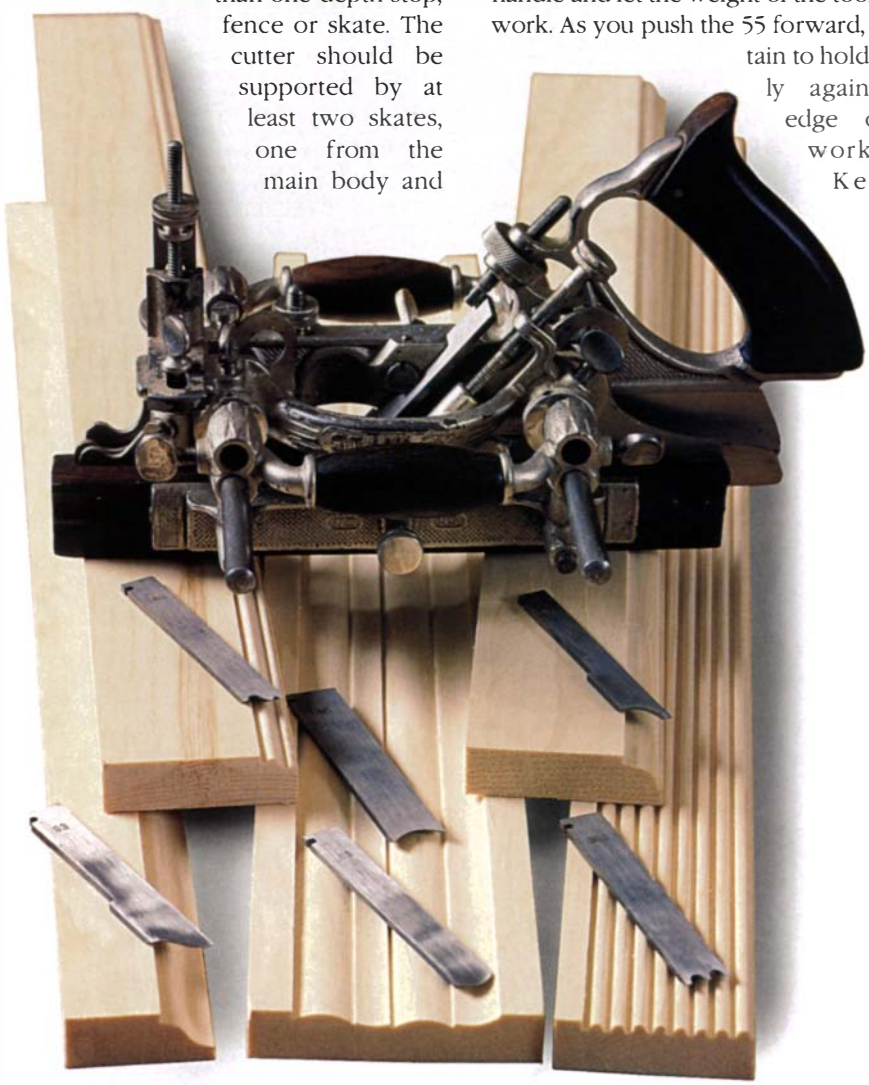
The Stanley No. 55 is unique among planes. Produced from 1899 until as late as 1962, this majestic contraption was touted as "a planing mill within itself," capable of cutting any molding profile imaginable. Unlike wooden molding planes, which could cut only a single profile and so had to be stockpiled by the trunkful, the 55, a single adjustable body that came with more than four dozen different cutters, could produce an endless variety of molding profiles. It is truly a minor mechanical marvel, and I confess to having a soft spot for it in my heart (as well as in my toolbox).

Most often I call upon my 55 to run off a few feet of molding for a piece of furniture or a piece of trim missing from some architectural treasure. I can match nearly any molding, because if the standard cutters don't suit, I can quickly make up custom cutters from unhardened tool steel.

Some woodworkers complain that the 55 is a booby trap, enticing them with visions of complex moldings easily cut only to frustrate their every attempt to use it. True, the 55 is not a tool you master the first time you pick it up. And it's never going to replace the shaper or router table for cranking out molding in quantity. But with some persistence, an experienced handtool woodworker will probably find, as I do, that the 55 is very efficient for small quantities of molding and is also a real pleasure to use. To avoid frustration, start out cutting simpler shapes to get the hang of the tool; then you can move on to more complex moldings. I use routers for many things, but when I'm making a small amount of molding, it's not hard to choose between the ear-splitting whine of a router and the quiet whoosh of a handplane.

The cutters of the 55 are literally suspended in midair—without benefit of a wooden molding plane's shaped sole to support the cut. Every setting and adjustment to the 55 must be made with this in mind; the key to success with the 55 is to provide as much support for the cutter as possible. This often means using more than one depth stop, fence or skate. The cutter should be supported by at least two skates, one from the main body and the other from the sliding section. Adjust the skates carefully so they line up with the profile of the cutter. If the cutter is wide or the profile complex, the auxiliary center skate should be used as well.

The minimal support also means the cutters must be razor sharp and set for the lightest-possible cut; anything heavier will cause the cutter to dig into the wood and stall the cut, a common problem when using the 55. Another way to avoid it is to remember that unlike a bench plane, which works best with steady downward pressure applied to the front knob, the 55 cuts most smoothly when you get behind the handle and let the weight of the tool do the work. As you push the 55 forward, be certain to hold it firmly against the edge of the workpiece. Keeping



***Swiss Army Knife of handplanes.*** *With its single body and scores of interchangeable blades, the Stanley No. 55 was intended to replace the wooden molding plane. The 55 and the other multiplanes did upstage their wooden predecessors for some decades but were soon supplanted by the electric router.*



Photos: Jonathan Binzen

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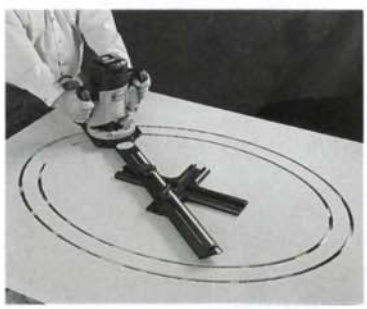

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the fence against the edge of the stock is essential to create a uniform profile. Unlike wooden molding planes, which are often "sprung"—made to be used while tilted to counteract the tendency to wander—the 55 must be held vertically. Any tendency to drift away from the workpiece can only be corrected with constant lateral pressure.

It is a mistake to guide the 55 by holding the rosewood handles attached to the fences. Gripping the tool there puts your hands too high above the cutting surface and too far from the main body of the plane to provide good control of the cut. And holding there also throws off your balance. I prefer to place my left hand below the rosewood handle and directly against the fence proper.

Stanley provided a valuable 22-page instruction manual with the 55. It covers all of the basics of setting up and using the plane. All of the plane's parts are identified in a clear, exploded-view drawing, and a separate chart lists all of the cutters. An experienced hand-tool woodworker could probably learn to use the 55 with this booklet and a few hours of bench time. The booklet has its faults—it doesn't emphasize key points and possible pitfalls—but anyone learning to use the 55 will want to have a copy. You can get one free from Stanley by writing to: Repair Parts Dept. (Lori Goucher), 480 Myrtle St., New Britain, CT 06053.

The 55 was designed for architectural work in softwoods like pine, but hardwoods can be worked with it as well. I've

## Setting up the No. 55 is not a cinch

***Engage the cutter.*** *A notch at the top of the cutter engages a post on the adjusting knob's threaded shaft.*

***Fit the sliding section.*** *The sliding section snugs up to the main body. With skates that adjust up and down, the sliding section separates the 55 from all other multiplanes.*

***Line up the skates.*** *To provide maximum support during the cut, get the skates in line with the high points of the cutter's contour. Set their heights just below the cutter's.*

***Adjust the auxiliary skate.*** *An auxiliary skate can be attached to the sliding section for additional support. It can be adjusted laterally as well as vertically.*

achieved great results with mahogany, butternut and soft maple. For the best results your material should be straight-grained and clear. If the material has minor faults, such as small knots, be even more vigilant about keeping the cutters sharp, and set the plane for a very light cut.

Sharpening the cutters frequently is essential, so get accustomed to the process if you want to enjoy using the 55. I've read accounts of sharpening that suggest cutters should be laid flat (bevel-side up) on a honing stone to preserve the exact original profile. That method never made any sense to me, and I don't understand how it could work. I'd no sooner sharpen my 55 cutters on their backs than I would my bench-plane blades and chisels.

Exercising care, the contoured cutters can easily be honed with slip stones while held upright in a vise. I carefully match a slip stone to the contour of the blade, then pass it over the bevel from the heel of the bevel toward the cutting edge, while preserving the original bevel angle. I start with a coarse Carborundum slip stone and proceed to a hard Arkansas stone of the same shape. My aim is to produce a burr on the back (flat side) of the blade along the entire profile. Then I strop off the burr on a flat stone. A variable-speed Dremel-type tool fitted with abrasive cones will also do a nice job.

I sharpen uncontoured cutters—dado and rabbet cutters, for instance—just the way I sharpen chisels or bench-plane blades: I start on the grinder, then hone the bevel on a series of waterstones.

## Final setup, then action

**Fix the fence.** *The fence slides along the arms and can be positioned in height as well.*

**Set the depth stop.** *Depth of cut can be controlled by one or both of the 55's two depth stops.*

***The mechanical workhorse in action.*** *For best results, push the 55 from behind and let its considerable weight take care of downward pressure. To keep the plane from wandering in the cut, maintain inward pressure on the fence.*

## A quick, new cutter





*To match an old molding when none of the standard cutters will do the job, you can make your own. Paint (or use a marker) one end of a piece of unhardened tool steel and trace the old profile in the paint with a scratch awl (1). (The old molding must be cut at 45°, because this is the plane's bed angle.) Use a hacksaw and grinder to remove most of the waste (2), then file the contour smooth (3). Finally, grind and file the bevel angle (4), and you have a cutter ready to be hardened, sharpened and used. Before hardening, while it's still easy to modify, plane a few feet to check the cutter's profile. To harden the cutter, heat it to red hot and then quickly quench it in oil or water.*

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* Excerpted from Hand-Applied Finishes: Applying Topcoats with Jeff Jewitt
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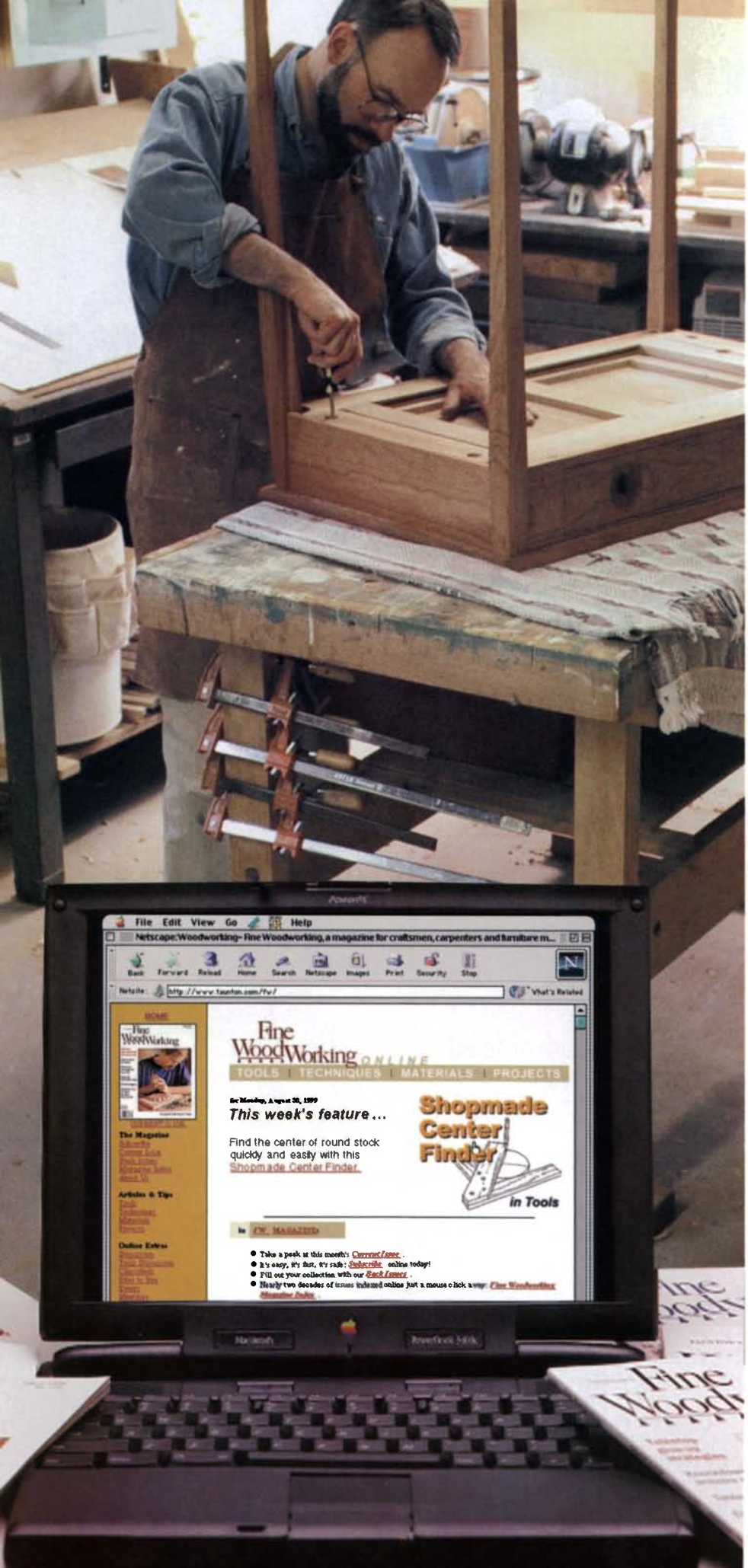


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# Finish Line

BY CHRIS MINICK

## Shopmade stains enhance your finishing talents

Modern stains are wonderful products: Smear some on your wood projects, and you can be reasonably certain that the color will match from can to can. Woodworkers in days gone by didn't have it so easy. They had to make their own stains—usually from vegetable matter or other readily available materials—and they took their coloring cues from the textile industry. Those woodworkers adapted many of the dyes used for coloring cotton fabrics to color their wood furniture.

Learning how to make your own stains can add versatility to your finishing arsenal. Also, some of these shopmade stains color wood in ways that cannot be duplicated with modern aniline dyes. Here are a few home brews I've used with great success.

### Nut husks create a rich, brown stain

Dye stain made from walnut husks is a staple in my shop. I always have a batch brewed and ready for use. This fade-resistant, golden brown dye stain looks great on most woods, but it positively excels at coloring walnut sapwood to blend with the heartwood (see the left photo below). Also, a washcoat of this dye stain adds deep color to that lifeless, gray hue so commonly found in kiln-dried walnut.

Husk stain is easy to make if you have access to a walnut or a butternut tree. I gather walnuts in the fall, after they've turned brown and fallen from the tree. When gathering the nuts, wear gloves: Those soppy, brown husks will stain your skin. A half-full grocery bag of nuts makes about 2 gal. of stain. After shucking the nuts, I dry the husks on my shop floor for a week or so, then make the stain a quart at a time as needed.

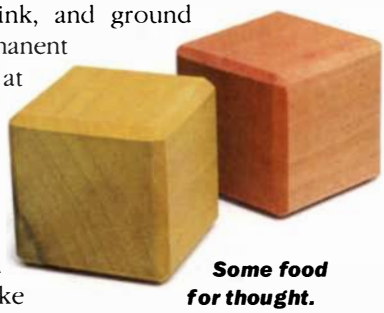
To make the stain, loosely pack a quart jar with dried (or fresh) nut husks. Add water until the level is about ½ in. above the husks, then set them aside to soak. After a day or two, add two tablespoons of household ammonia to the brew and let the mixture sit for at least a week. Ammonia raises the alkalinity of the solution, which causes more of the natural dyes to dissolve in the water. Some woodworkers use lye (caustic soda) to increase the alkalinity, but residual lye left on the wood after the stain has dried can cause some finishes to fail. Household ammonia is the safer choice: Excess ammonia evaporates as the stain dries, and none is left on the wood to cause problems with the finish later on.

***One sweet stain.*** *The tannins in walnuts and butternuts produce a warm, brown stain that can't be beat for coloring wood from those same trees.*

Filter the stain through cheesecloth or old nylon stockings and use it like any other water-based dye stain: Preraise the wood grain with clear water, let that dry, sand it flat, then apply the water-based stain. Walnut-husk stain keeps well in a sealed jar but turns a little smelly after three months or so. A splash of household ammonia every month will keep the dyes in solution and minimize the bad odor.

### Vegetables and herbs make red and yellow stains

Even though modern aniline dyes are nontoxic, I prefer to use natural vegetable dyes for children's toys. Two dyes I've often used are beet juice, which makes a maroon color on wood that eventually fades to pale pink, and ground turmeric root, which makes a permanent bright yellow stain (see the photo at right). Layering these two stains on the same piece of wood produces orange.



***Some food for thought.*** *You may not want to encourage kids to eat their toys, but if they do, stains made from vegetables and herbs won't hurt them.*

The raw materials can be found at most any grocery store. Fresh beets—the ones with the green tops and dirt still on the bulbs—make a more intense stain, but the juice from precooked canned beets will work in a pinch. Wash off the dirt, cut the green tops from the beets and slice them (skin and all) into a cooking pot. Add enough water to cover the beets, then simmer for about an hour. The dye is done cooking when the beet slices are pale red and the water is an intense maroon color. To concentrate the dye, remove the spent beets and boil away about half of the liquid. When it has cooled, the dye is ready to use.

Beet-juice dye fades fast when applied to wood, shifting to light pink in a few months. You can delay that process by

Photos: Michael Pekovich

first applying a washcoat of alum water to the wood before staining it with beet juice. Prepare the alum solution by dissolving one teaspoon of alum in one pint of water. Alum, found in most grocery stores, is a mordant for beet juice. It acts much like a primer. The alum adheres well to both wood and beet juice, which intensifies the color and slows fading.

Turmeric-root stain is even easier to make, and the intense yellow color is exceptionally resistant to fading. Stir one or two teaspoons of ground turmeric root, a spice often used in East Indian cooking, into a quart of water. Add a dash of household ammonia to intensify the color, then let the mixture soak overnight. Filter it through a coffee filter to remove the sludge and use it as you would any water-based stain. Because neither turmeric-root nor beet-juice stain keeps well, it's best to use them soon after preparation and to discard what you don't need.

***An ebony stain known for its colorfastness.*** *Vinegar and iron make a black stain that resists fading, unlike many dye stains on the market.*

## Vinegar and iron produce a black stain

I don't use this stain often, but it's nice to have on hand when I need a strong, permanent, fade-resistant black dye. You can make a convincing ebony substitute by dyeing quartersawn walnut with this shopmade stain. This concoction couldn't be easier to make. Fill a jar about one-third full with any rusted metal you can find—old nails, steel wool, old car parts, etc. Thoroughly rusted steel—the kind that falls apart in your hands—makes the blackest stain. Add white vinegar (the clear kind) to the jar until it is two-thirds full. Screw on the cap and let it sit for a week or two. When the vinegar is a transparent yellow color, it is ready to use. Filter the solution through cheesecloth to remove the leftover rust, then brush the rust-and-vinegar stain onto the wood. As the stain dries, the color will appear. Woods high in tannic acid (such as oak and walnut) turn jet black, while woods low in tannic acid turn a silvery, weathered gray.


The surface tension of the rust-and-vinegar solution is high, so it will not normally "wet out" the pores of oak. As a result, an interesting black-and-white effect is produced when rust-and-vinegar stain is brushed on oak: The flat grain turns black, and the pores remain uncolored (see the photo above). The effect is quite striking. If you don't like it, a few drops of liquid dishwashing soap will lower the surface tension enough to color the pores fully.



## Potassium dichromate ages wood

Although it's not really a dye, potassium-dichromate solution is another of my favorite stains. Potassium dichromate—available from Garrett Wade Co. (800-221-2942) as "bichromate of potash"—is a strong chemical oxidizer that artificially ages wood. It produces a natural-looking patina that is hard to achieve by any other method. You can add 10 years to the look of cherry in 15 minutes with a washcoat of 1% potassium-dichromate solution. The resulting rich, reddish-brown color is hard to tell from naturally aged cherry (see the photo below). White oak takes on a deeply fumed, brown appearance, English yew turns cordovan colored, mahogany darkens, and pine turns a light shade of brown when treated with potassium dichromate.

A potassium-dichromate solution is easy to make but comes with some hazards. This chemical is toxic when ingested or inhaled. Rubber gloves and a good respirator are essential. Mix the chemical only in plastic or glass containers. (It's always a good idea to keep strong oxidizers away from metals to prevent corrosion.) I weigh the potassium-dichromate crystals and water on an accurate scale when I make my solutions, but measuring by volume will get you close. One teaspoon of crystals dissolved in 1 qt. of water will make about a 1% solution. Once mixed, it looks like orange drink, so take special care to keep it out of the reach of children.

***Aged cherry in no time.*** *Potassium dichromate ages cherry better than any pigment or dye stain, without the inevitable blotches.*

When the solution is first applied, the wood looks lemon yellow. But this changes to brown or reddish-brown, depending on the species, as the surface dries. The full color change often takes several hours to develop, so wait at least a day before judging whether you've achieved the right color. Changing the amount of potassium-dichromate crystals in your solution will modify the final color: Higher concentrations and multiple applications will produce darker colors.

Always experiment on some scrap before committing this technique to your whole project. Once wood has been darkened with potassium dichromate, the only way to remove the color is to sand it off. Seal the treated wood with a coat of dewaxed shellac before proceeding with subsequent finishing steps. Shellac is unaffected by potassium dichromate and will prevent any residual oxidizer left on the surface from interfering with other finish layers.

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# An American Original



Harold Ionson must know what Tolstoy felt like when he was writing the last chapter of *War and Peace*. Ionson, 79, has nearly finished a project he's spent the better part of two decades building in his garage shop in Westwood, Mass.—nine reproductions of Thomas Seymour's Derby commode of 1809. One of the finest examples of American Federal furniture, Seymour's commode is extremely challenging to build. Ionson's accomplishment is impressive not only for its monumental scale but also for its superb execution: His commodes are impeccable in every detail. Early this year, the newly formed Society of American Period Furniture Makers will acknowledge Ionson with its first award for achievement.

*Ionson had brass lion's feet cast from a wooden copy he carved of the original foot. The lion's-head pulls came from England.*

*A cork-lined plywood cradle held the triangular side drawers so Ionson could drill accurate holes for the hinges.*

*For many tasks on the commodes, Ionson made custom tools. The short, ball-topped chisels chopped mortises in tight spaces.*

*A passionate jig-builder, Ionson made this one to smooth curved core stock for drawer fronts. A convex jig smoothed the outer face.*

*Ionson veneered the satinwood and mahogany sunburst over shop-made bass lumber core. He also made his own edge-banding.*

Photos, except where noted: Jonathan Binzen; lower left: Henri Hirschel;