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AMERICAN WOODWORKER™

OCTOBER 1996 #54

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Issue No. 54
October 1996

Features

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On the cover: *AW's Andy Rae routs perfectly centered mortises with our easy-to-build jig. See page 41.*

PHOTO BY JOHN HAMEL

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AMERICAN WOODWORKER™

A RODALE PRESS PUBLICATION

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AMERICAN WOODWORKER

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The Ultimate Woodworking Event

The 1996 AMERICAN WOODWORKER Show™

AMERICAN WOODWORKER is taking its show on the road. The AMERICAN WOODWORKER Show™, the biggest and best woodworking event in the country, will be coming to two great locations this fall—Chicago's famous Navy Pier (September 20-22, 1996) and the Fort Washington Expo Center outside of Philadelphia (November 8-10, 1996). Whether you're a beginner or an expert, hobbyist or pro, this is one woodworking show that you *don't* want to miss!

Learn from the Masters

The AMERICAN WOODWORKER Show™ is like no other woodworking show you've seen. The emphasis is on learning, and we've put together an all-star lineup of more than 20 expert demonstrators that reads like a *Who's Who* of the woodworking world—Ian Kirby, Mike Dunbar, Frank Klausz, Toshio Odate, Mark Duginske, Leonard Lee and many others—all there to share their expertise with you.

Come meet these master craftsmen and learn their tricks of the trade. They'll demonstrate their skills in hands-on workshops and seminars on a broad range of topics, including furniture making, joinery, carving, hand-tool techniques, power-tool techniques, woodturning, veneering, and much more. Whatever your woodworking interests, you'll learn something new at The AMERICAN WOODWORKER Show™.

And don't miss a chance to meet our special guest, Norm Abram. Norm will appear at the Chicago show only, and he'll give a free seminar on Saturday and Sunday, September 21 and 22.

Pick Up a Bargain

And if you need a few things for your shop, the AMERICAN WOODWORKER Show™ offers a unique opportunity to see, touch, try out and buy. Over 200 exhibitors will sell everything from the latest in power tools to hard-to-find hand tools and specialty hardware and supplies.

Bosch, Delta, DeWalt, Freud, Garrett Wade, Porter-Cable and Woodcraft are just a few of the many quality manufacturers and retailers you'll find. You've never seen so many woodworking tools under one roof—many of them at show-special prices that you won't find anywhere else.

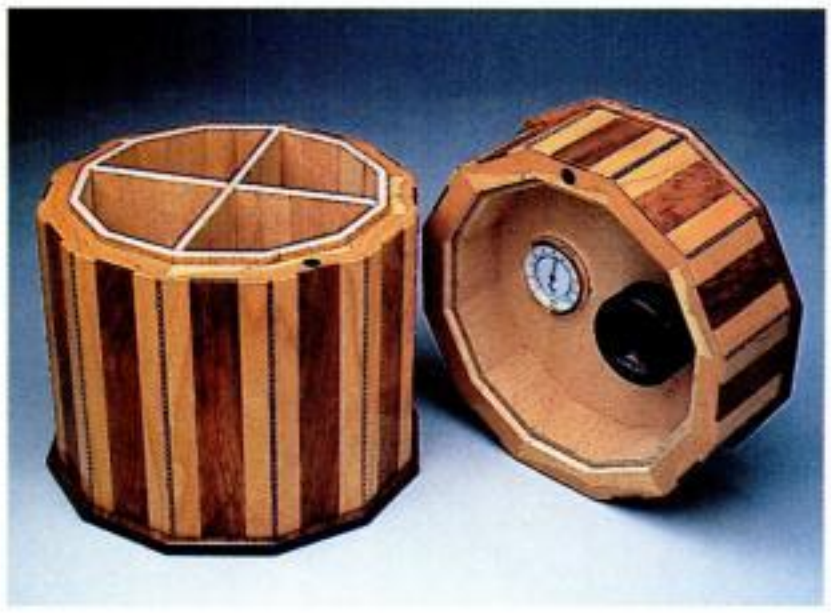
Don't miss it! For more info on The AMERICAN WOODWORKER Show™, call (610) 967-7601. See you there!

David Sloan
Editor & publisher

Humidor in the Round

I enjoyed reading Dereyk Patterson's article on designing and building a cigar humidor (AW #53). Perhaps there are a few cigar aficionados and woodworkers out there who would be interested in seeing the 12-sided humidor I designed and built recently. Sized to hold about 40 cigars, it's made from bubinga and cherry, with herringbone inlays. The lining is Spanish cedar, as Patterson recommends. I mounted the hygrometer and humidifier in the lid.

Jerry Beall
Newark, OH



12-sided cigar box. *Jerry Beall's humidor is made from bubinga and cherry, with herringbone inlays.*

More Plane Truths

Regarding the ongoing debate over storing hand planes upright or on their sides (AW #51, page 8): In over 25 years of woodworking, I haven't found that it makes one bit of difference whether you set your plane on sole or cheek. I do whichever suits me at the time. This seems to be one of those arcane questions that woodworkers debate endlessly to no conclusion. Rather than waste time worrying over such an inconsequential matter, most woodworkers would be better off learning the finer points of sharpening and tuning a plane rather than fretting over how to properly set it down.

Mike Dunbar
Hampton, NH

Breath of Life for Finishes

Let me add a helpful tip to Michael Dresdner's advice on extending the shelf life of finishes ("Q&A," AW #52). When you're done using a can of finish, take a deep breath, lift up the lid, blow into the can, and quickly replace the lid. Repeat this procedure several times, then seal the lid tight. The carbon dioxide from your breath displaces most of the oxygen from the can, which minimizes the threat of oxidation. I've used this technique for years, on all types of finish. It's a good way to avoid finding that irritating film of dried finish on a can that's been sitting for a while.

Merlyn Person
Garden City, MI

Backwards Back Cutter

Your article on panel-raising bits was informative (AW #52), but I hope you don't try to make any cuts with the bit shown in the top right corner of page 53. It looks like the back cutter portion of the bit is backwards. Fred Matlack's strategy for using these bits is a good one: You remove the back cutter for the first few passes, then reattach it when the profile is nearly complete and you're ready to relieve the back. Just remember to reattach the bit the right way around!

Karl Almgren
Detroit, MI

Editors reply: Thanks for pointing out an error that's easy to make.

More on Tablesaws

After reading your Tablesaw Showdown (AW #49) and the letters that resulted, and having bought a cabinet saw recently, I knew it was time to write. There are really only three proven contenders in your tablesaw test: Delta, General and Powermatic. These are the three saws I priced, all equipped as follows: 3-HP motor, premium fence with at least a 50-in. rip capacity, and a mobile base.

I asked local suppliers for their best price on these saws, delivered to my garage. I knew from the outset that I wanted to buy from a local dealer. When you're buying a machine that will outlive you, having nearby parts and service will be a big plus when you get into a moment of need.

I bought a Unisaw. The delivered price was $1,895, including Wisconsin sales tax. The Powermatic would have cost $100 more; the General, $300 more.

Unisaw components are machined and assembled in the USA. The major components are supplied by some of the best names in their respective fields. The motor is made by Marathon Electric, in Wausau, WI, and has been for more than 20 years. The major castings are also made in Wisconsin.

But there's more to tell, and it has to do with company integrity. My saw was not flawless. The original splitter was too wide for my thin-kerf blade. I called Delta. They sent me another

Continued on page 10

STAY IN TOUCH! ***If you have comments, corrections or news to share, we want to hear from you.***

- To write us, address letters to: **Editor, American Woodworker, 33 E. Minor St., Emmaus, PA 18098.**
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- Too busy to write? Call our Letterline: **(610) 967-7776.**
- For e-mail correspondence, send letters to: **AWLetters@aol.com**

= Electronic Mail

blade guard and splitter, but I had the same problem. I called again, and they said I'd have a replacement promptly. Well, they didn't replace my saw. Instead, they sent me a Uniguard—gratis. Wow! It was easy to install, worked perfectly and gave me what every saw should have (which I did not realize originally)—a functional, user-friendly blade guard and splitter that are always in place. Now *that's* customer service.

Aaron A. Gesicki
Sparta, WI

Window on Dust Collection

Yeung Chan's dust-collector upgrade ("Shop Solutions," AW #50) was an outstanding idea, and I built one as soon as I saw it. The only thing I did differently was to cut a hole in the door and insert a piece of clear acrylic. This window allows me to see the level of dust and chips in the bag without opening the door.

John Cyples
Swansboro, NC

Safety Upgrade for Router Table

I built a router table similar to your "Revolutionary Router Table" design (AW #44), and I located the on-off switch in the same position. One day, about a month ago, I accidentally turned on the router in the table when a pocket on my shop apron snagged on the switch.

Luckily, there was no wood near the bit, and no injury resulted. But I decided to build a wooden safety cover for the switch, and I recommend this alteration to anyone else who has a similar switch on any router table.

The safety cover is nothing more than an oak box that fits around the on-off switch cover, with an oblong hole routed in the face of the box, above the switch. You can reach in easily with your finger to turn the switch on or off, but there's no chance of snagging the switch accidentally.

Dave Gromanski
Freeport, TX

Router-Table Router Advice

I'd like to follow up on Ellis Walentine's discussion of choosing a plunge-type or fixed-base router for your router table ("Q&A," AW #52). I bought a Porter-Cable model #693 plunge router, which I use for most hand-held routing operations. Then I bought a model #1001 fixed base (for about $30), which I mounted permanently in my router table. The router's motor housing fits both the plunge and fixed bases. With this system, it's very easy for me to switch from freehand routing to table routing, and I didn't have to buy two routers.

W.E. Pestall
Morristown, IN

Safer Gouge Grinding

As a retired Industrial Safety Engineer, I appreciate your attempts at keeping us safe. It's the concern for safety that prompts me to write about the gouge grinding jig shown on page 24 of issue #50. If the handle of the gouge slips, or if the jig's adjustment loosens, the gouge could dig into the wheel, breaking it and sending fragments flying. I have a 4-in. scar across my left palm from a grinding disc that broke.

I would prefer a tool rest similar to the Veritas model pictured on page 3 of the same issue. This rest supports the blade near the wheel, at the proper angle. It should be adjusted to within 1/8 in. of the wheel to prevent things (like fingers) from being caught in the wheel. Also, there should be a substantial guard for deflecting sparks or, if the wheel should come apart, pieces of the wheel.

Robert Koch
Payson, AZ

Alternative to Explosion-Proof Motors

Let me add some helpful advice about explosion-proof motors for ventilation in solvent spraying situations (AW #49, page 12). When you are purchasing a fan and motor for a spray booth, the classification of the solvents, chemicals or paints being used determines when and if electrical equipment may be installed in a spray booth or in the exhaust ductwork.

Section 516-3 of article 516 of the National Electrical Code refers to wiring and equipment in Class I locations.

In many cases, the best fan system would have a "Tube-Axial" type fan, where the fan is belt-driven by the motor. This keeps the motor out of the air stream, away from volatile vapors or residue. Usually this type of fan equipment is less expensive than an explosion-proof motor and fan; it's also easier to install.

Harold Hagfors
Area Electrical Representative (retired)
MN State Board of Electricity
Stanchfield, MN

More Power Required for Bowl Turning

There's a significant typo on page 12 of AW #53. The minimum motor size for a bowl-turning lathe should be 1 1/2 HP, not 1/2 HP.

Steve Blenk
Sequim, WA

Raves for Product Reviews

Your article on waterborne finishes (AW #49) was excellent! I really appreciated being able to compare performance ratings on 35 different finishes. No other magazine has undertaken such a comprehensive product test.

Carl C. Larson
Farmington, MI

I appreciate your unbiased opinions when testing products. If a tool has weaknesses, you say so, whether the company is an advertiser or not. This shows a strong commitment to your subscribers.

Walter Deminici
Parma, OH

Pushrod Burnisher

Concerning the search for a low-cost burnisher (AW #50, page 6): I've found that an auto engine pushrod (it connects the valve lifter to the rocker arm) makes a wonderful burnisher. Pushrods come in all lengths; they're round and hard; and, best of all, they're usually free at salvage yards. Fit a wooden handle on one and it's probably as good as the ones you'll find in woodworking catalogs.

William Flynn
Wayzata, MN

Kudos from the U.K.

Congratulations on your excellent magazine, which unfortunately beats anything published here!

Doug Cheyne
Devon, England

Winding Sticks

Q I read an article that suggested using "winding sticks" to determine how badly a board is twisted. What are these tools and how do you use them?

Anthony Termano
New York, NY

A The use of winding sticks—which are simply straight sticks—is based on the principle that parallel lines lie in the same plane. Hold a straight stick horizontal at arm's length, and another one horizontal at half arm's length. Now sight across the two. You'll find it easy to tilt them so they're close to perfectly parallel.

When laid across workpieces in this way, winding sticks are convenient for measuring the degree to which a carcase is torqued, a plank twists or a plane sole *winds* from flat.

For example, I learned early on to sight across the pair of sawhorses that I use for assembly supports. My barn floor can create non-parallel support surfaces, and if I don't account for this, it might yield a built-in twist in a door or cabinet. Workbenches and assembly tables must also be checked for winding if you hope to use them for accurate planing or assembly.

Here's another example. Suppose you discover a plank with a "crank" rocking on your jointer bed. The question is whether it will yield the thickness you need once the twist is planed out.

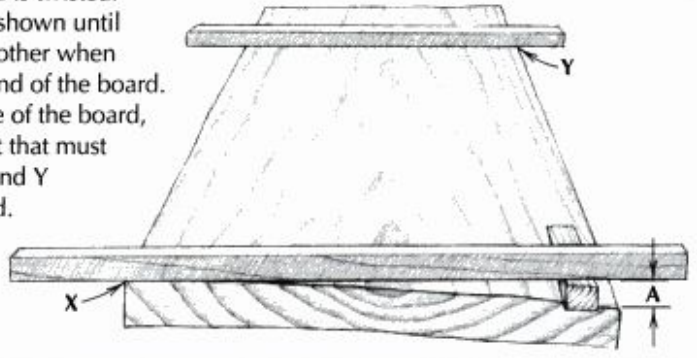
To find out, place your winding sticks across each end of the plank, step back and sight across them. Shim up one end of either stick until both of the sticks are parallel. (See drawing.) Vertical distance A is the amount of twist. In order to make the surface flat, an amount totaling A must be removed from corners X and Y.

I keep stable, 12-in.-long by ½-in.-square teak rippings handy for checking wooden plane soles and for planks or frames up to 12 in. wide and 5 ft. long. For larger work, I turn the nearest long, straight scrap strips into instant winding sticks.

Ric Hanisch
Furniture maker and designer
Quakertown, PA

USING WINDING STICKS

Winding sticks show how badly a board is twisted. Shim one stick as shown until it's parallel to the other when sighted from the end of the board. Gap A, at the edge of the board, is the total amount that must be removed at X and Y to flatten the board.



Preventing Brush Marks In Polyurethane

Q When finishing a table recently, the oil-based polyurethane I was using tacked up so quickly that I was left with brush marks. What can I do to slow down the drying time?

Reno Unger
Kutztown, PA

A Most oil-based polyurethanes are formulated too thick to brush right out of the can. Try thinning your finish about 10% to 15% with mineral spirits or turpentine. Brush the finish on thin, applying it in the direction of the grain, not across it. Cover one narrow section entirely with finish, then "tip it off" by holding the brush nearly vertical and lightly dragging its tip in long strokes to evenly distribute the finish. By tipping off as you go, it won't matter if one side of the table is dry before you complete the rest of it. Working in a cool room and out of direct sunlight will also help decelerate the drying time.

Michael Dresdner
AW contributing editor
Tacoma, WA

Resawing on Track

Q I would like to resaw lumber on my bandsaw, but the blade wanders and sometimes bogs down in the cut. What's causing this and how can I correct it?

Charlie Taylor
Lafayette, CA

A Blade *drift* is a common problem on bandsaws. A bandsaw blade seeks its own cutting direction for a number of reasons, including the set and condition of the teeth. Whatever the reasons for drift, you compensate for it by setting a fence parallel to the feed direction.

One way to do this is to make an L-shaped fence of plywood or solid wood. Make it about as high as the stock you want to resaw and about as long as your bandsaw table. The vertical part of the L will support your stock; the horizontal part gets clamped to the table.

To determine the angle at which to clamp your fence, use a scrap about 18 in. long. Joint one edge of it and then gauge a line on it to the width of your desired resaw cut. Saw freehand along the cutline, allowing the blade to dictate the feed direction. Halfway through the cut, turn off the saw while firmly holding the scrap to the saw table. Without moving the scrap, place your fence against it, clamp the fence to the table and complete the rest of the cut. If the blade doesn't fight the direction of the cut, you've found the right approach. Now you can cut your workpiece with this same fence setup.

Paul Anthony
AW associate editor

Q & A

Attaching Case Molding

Q What's the best way to attach a molding across the grain of a solid-wood carcase, to allow for cross-grain wood movement?

Bob Draper
Bodega, CA

A It depends on the size of the molding. I attach thick moldings with screws from the inside of the case, spacing the screws about 6 in. apart. On case sides wider than 8 in., I slot all of the screw holes except the first one. When installing the molding, I glue only the first inch of it to the case side.

If the molding is too thin to accept a screw from the inside, I tack it on from the outside with brads. They flex enough to allow for wood movement over a span of about 12 in. Small moldings are seldom used on pieces larger than that.

Lonnie Bird
AW contributing editor
Rio Grande, OH

Reducing Hand-Plane Tearout

Q I'm trying to hand-plane an oak panel, but I'm getting a lot of tearout. What can I do to reduce it?

Gerald Crotty
Atlanta, GA

A Tearout occurs as wood fibers split apart in front of the plane's cutting edge. It can have several causes. Assuming the blade is sharp, the problem might be the flatness of the plane's sole or the size of the mouth opening. You can check flatness with a straightedge and correct it by rubbing the sole against silicon-carbide sandpaper (180 grit or finer) that's adhered to a flat surface, such as a jointer table. (See AW #51, page 65.)

More than anything else, a small mouth opening will help eliminate tearout. Adjust the frog to move the blade forward, leaving a very small gap in front of the blade. That way, the section of the sole immediately in front of the blade will hold down the wood fibers, so they can't tear out. Set the blade for a very light cut, and make sure it is clamped securely by the lever cap.

Of course, not all boards can be hand-planed without tearout, no matter how well your plane is tuned. The oak board you mention may be among them. Planing at a diagonal to the grain can help. Your best bet, though, may be to use a scraper plane or cabinet scraper, either of which will surface contrary wood with no tearout whatsoever.

Peter Korn
AW contributing editor
Rockport, ME

WHERE TO FIND IT

Colored paste waxes for general finishing and repairs are available from Liberon, Box 86, Mendocino, CA 95460, (800) 245-5611.

Glass eyes for realistic carving projects are available from Van Dyke's, Box 278, Woonsocket, SD 57385, (800) 843-3320.

Tracing Lathe Vibration

Q My lathe vibrates a lot, even when I run it without a workpiece. How can I eliminate this vibration?

Jerry Richards
Tupelo, MS

A Lathe vibration that isn't caused by an out-of-balance workpiece is most often the result of a badly adjusted drive system. Make sure your belts are properly aligned and tightened and the motor mounting is solid and tight. Also make sure the belt sheaves (pulleys) are intact. Multiple stepped sheaves often crack and need replacing. If the vibration is coming from the headstock, your spindle bearings probably need replacing. Check the spindle for end play and listen for a grinding noise when rotating it by hand. Don't wait too long to replace bad bearings, or you'll be replacing a spindle as well—an expensive mistake.

Steve Blenk
AW contributing editor
Sequim, WA

Increasing Saw-Blade Performance

Q I can't afford a top-of-the-line carbide circular blade right now. Is there any way to get a cleaner cut from my standard 40-tooth blade?

Neil Watkins
Salt Lake City, UT

A By altering the top bevel angle on an average blade, you can achieve performance similar to that of the highest-quality blades on the market.

Out of the package, a typical blade has a 10° top bevel angle on the teeth (as viewed from the front of a tooth). This angle is a fairly good compromise between an aggressive cutting rate and a durable tooth.

If the angle of the teeth is increased, the blade will cut cleaner and with less tearout. However, the cutting rate will be slower, more force will be required to feed the work, and the blade will dull a little faster than it otherwise would. Many woodworkers are willing to make this tradeoff for a cleaner cut.

Next time your saw blade is due for a sharpening, ask your sharpening service to increase the top bevel angle of the teeth by 5°. If you're happy with the cutting results, stick with that angle. If not, have them increase it by another 5° next time. I wouldn't recommend an angle of more than 25°, though.

Be sure you've chosen a quality saw-sharpening service to do the work. (See AW #45.) And remember that the angle modification won't correct any blade deficiencies such as a warped plate or a sloppy arbor hole.

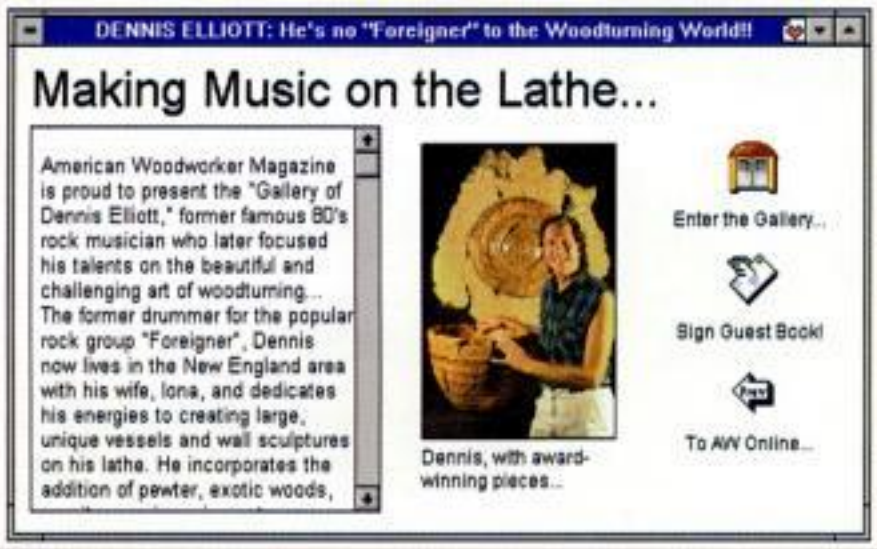
Matt Ver Steeg
Professional sharpener
and blade designer
Carlisle, IA

WOODWORKING QUESTIONS?
Send them to: "Q&A," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. Or e-mail them to: AWQA@aol.com

NET NEWS

Special exhibits— AW Online's new graphic format gives you even more exciting ways to discover woodworking online. Right now you can visit the online gallery of woodturner and former rock star Dennis Elliott, and browse through winners of AW's past "Excellence in Craftsmanship" competitions.

Specially scheduled chat! Turners: Look for a live chat with Dennis Elliot, coming to an America Online auditorium on September 11, at 10 pm eastern time. Dennis will discuss his award-winning turned sculptures and share his favorite tricks of the trade. Keyword "wood" takes you to the AW Online main screen.



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TWO TOOL RECALLS

Ryobi America has issued a recall for the locking on-off switch on two tablesaw models. Affected models are the Ryobi BT-3000 and the Sears Craftsman 315.22185. The switch might not be locking in the "off" position. If you own one of these saws, call (800) 867-9624. Ryobi will provide a replacement kit or direct you to a service center.

Porter-Cable has issued a recall on several power tools which might pose a shock hazard. The chart at right shows which models and serial numbers are affected. If your tool's model and serial numbers fall into one of these categories, please call (800) 487-8665. Porter-Cable will help you exchange your tool.

MODEL NO.	SERIAL NO.
Saw	
9737	24049 to 27983
Profile Sander	
9444-444	37515 to 40151
Cutout Tool	
7499	20503 to 20754
Circular Saw	
345	172580 to 173973
Biscuit Joiner	
556	227431 to 227768
	227819 to 228381
Jigsaw	
7549	127677 to 127750
	128263 to 128774
	129310 to 129392

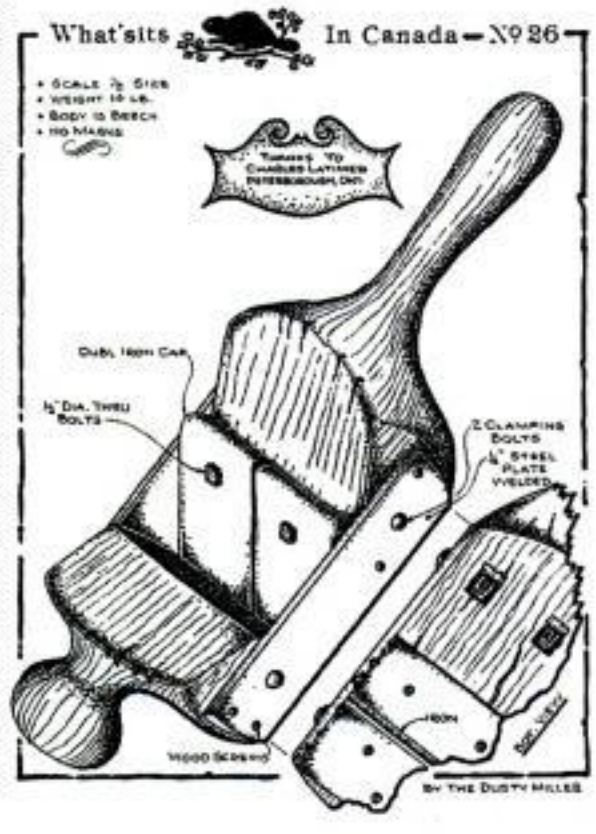
DRILLS FOR THE 21ST CENTURY

In the year 2010, Black & Decker will mark its 100th anniversary—but the venerable company has no intentions of slowing down. B&D is already working with industrial design students at the University of Wisconsin-Stout to develop the drills of the future. The students have dreamed up a mind-blowing range of designs—everything from drills shaped like conch shells to retro ray-gun models—but the major emphasis is on function. For instance, Jamie Zimmer designed his prototype (above) with a movable handle, so you can hold it three different ways: like an in-line screwdriver, like a pistol-grip drill, or like a pencil for detailed work. No word yet on which designs will make it to the assembly line, but Black & Decker hopes to use some of the new ideas for future product development.

HAND-TOOL BRAIN-TEASERS

Lock a bunch of talkative hand-tool buffs in a room together for more than 10 years, and you're sure to come up with something interesting—like this booklet from The Tool Group of Canada. It has 44 pages of unusual old tools from Canada and the U.S., some of which are still unidentified!

The "What'sits in Canada" booklet costs $8 U.S. in the States, or $9.50 Canadian in the Great White North. Price includes shipping. Send a check to: The Tool Group of Canada, 7 Tottenham Rd., Don Mills, Ontario M3C 2J3, Canada.



What's it? *This is obviously a plane—but what was it used for? This and many other mystery tools appear in The Tool Group of Canada's booklet, "What'sits in Canada."*

UNSTOPPABLE SHOPS

Colorado shop teacher Craig Conrad is a happy man. Students at Moffat County High wait in line to sign up for his classes, and the woodshop shelves are lined with brand-new tools.

The secret of Conrad's success? The "Unstoppable Shops" program. Conrad and his students have streamlined a sales and production process that brings in almost $20,000 a year—and teaches kids valuable entrepreneurial skills.

Students choose a design for mass production, estimating time and cost of production and the expected profit. Then they hit the streets and sell. Once the products are delivered, each kid gets a course credit and a paycheck.

Conrad holds startup classes for shop teachers. A booklet, video, plans and flow chart are available. Send a SASE to: Craig Conrad, Moffat County High, 900 Finley Lane, Craig, CO 81625.

School-shop success. *Craig Conrad's high-school shop class made and sold more than 300 videotape holders this year, bringing in nearly $20,000 in revenue.*

PHOTO BY ANGIE LAUDICK

ENLON GONE STAR TOOLS OPENS

Enlon Imports, a well-known retailer of woodworking machinery, has gone out of business. A new retail company, called Star Tools, has been created to sell a complete line of woodworking machinery from the same supplier. If you own an Enlon tool and require warrantied parts or service, you can write to Star Tools at: 9825 Pioneer Boulevard, Santa Fe Springs, CA 90670, or call: (888) 678-8777.

TOP-SECRET CHAIRMAKING AT THE CIA

Mike Dunbar, a well-known Windsor chairmaker and AW contributing editor, recently passed along an intriguing story of spies and chairmaking tools, from the spring 1996 issue of his newsletter, *The Windsor Chronicles* (available by calling Mike at 603-929-9801).

It seems Leon Robbins of Crown Plane Co. in Bath, ME, received a phone call from someone at the Central Intelligence Agency inquiring about his chairmaking tools—specifically his compass plane and travisher. Later Robbins received a purchase order printed on very plain stationery with the agency's logo at the top. An agency check for the full amount was included.

This story piqued Dunbar's curiosity, so he called the CIA and managed to track down the officer who placed the order. "Do you know where you have called?" came the reply.

The officer told Dunbar he just buys what he's told to, and didn't know the intended purpose for either tool.

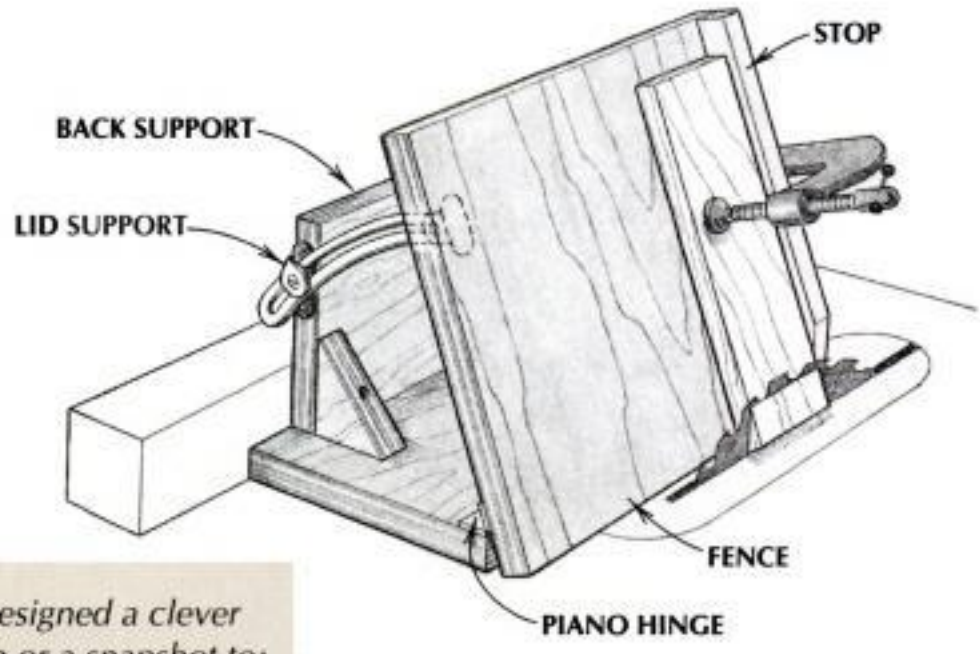
So the mystery remains. Maybe a band of bodgers is plotting to overthrow the government…

Sawing Steep Angles

Best tip of the issue

Some of my birdhouses have steep roofs which require cutting angles of 60° or more on the tablesaw. Instead of making several fixed-angle jigs, I built this adjustable one from 3/4-in. plywood. Two lid supports allow the jig to adjust to angles from 45° to 90°. Make sure that the back support is high enough so the lid supports clear your fence.

Floyd Foltz
Lafayette, CA

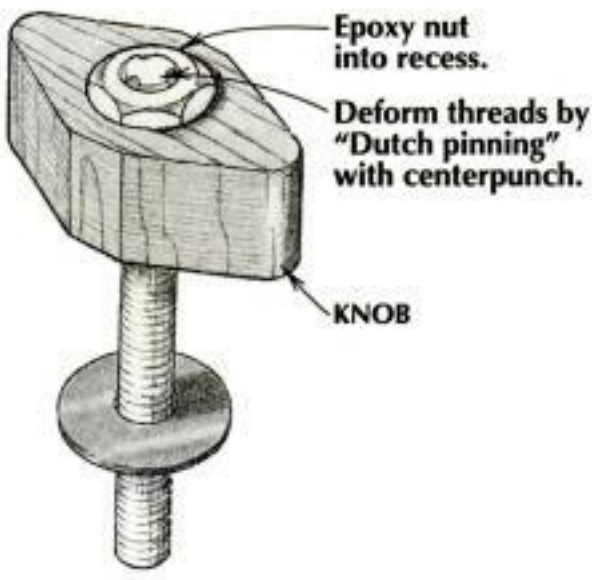


Best tip wins $200. *Know a better way of doing something? Designed a clever jig? Send your original woodworking tips, along with a sketch or a snapshot to: "Tech Tips," American Woodworker, 33 E. Minor St., Emmaus, PA 18098. We'll pay $50 for each tip we publish and $200 for the best tip of the issue.*

Shop-Made Knobs

I recently needed a knob with a longer threaded stud than I could find in any catalog. I bought a length of 1/4-in.-dia. threaded rod, cut off what I needed and put a nut on one end. I froze the nut by "Dutch pinning" (see drawing) and then epoxied it into a drilled recess in a wooden knob.

Karl Palme
Greendale, WI



"Super" White Glue

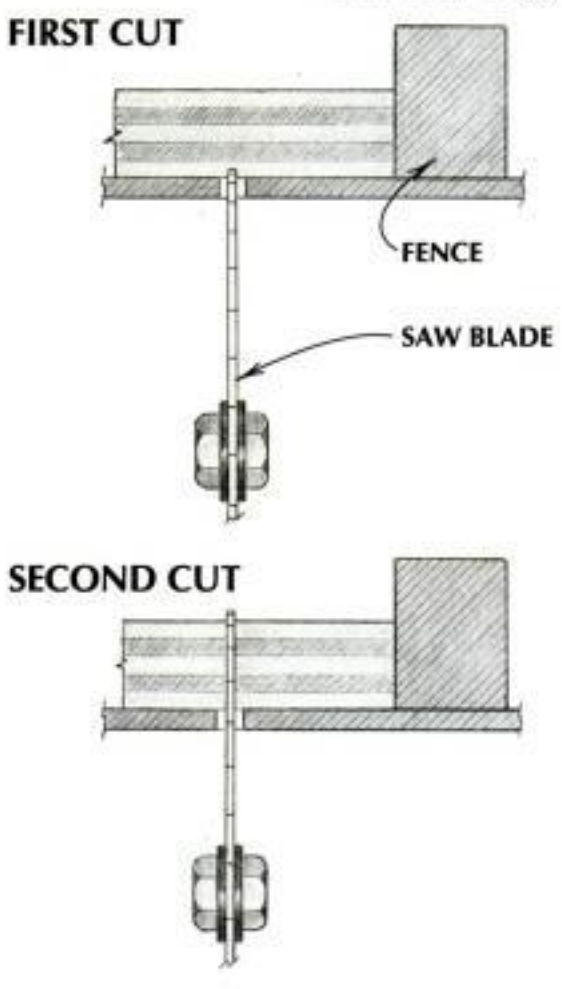
For small veneering jobs you can make white glue set in seconds. Warm up an old-fashioned iron (no steam), apply glue to the substrate and position the veneer. Then place a clean cloth over the veneer and run the iron over it. As soon as the moisture in the glue has gone, the veneer will be tight.

Ivor Pelikan
San Francisco, CA

Splinter-Free Cutting

This is a useful trick to avoid tearout when cutting plywood or other splintery woods. Set the fence and adjust the blade until only 1/32 in. projects above the table, and make the first cut. Then, with the same fence setting, raise the blade and finish the cut. To further reduce the risk of splinters, make sure that the blade is clean and sharp and that the table insert has a slot no wider than the blade.

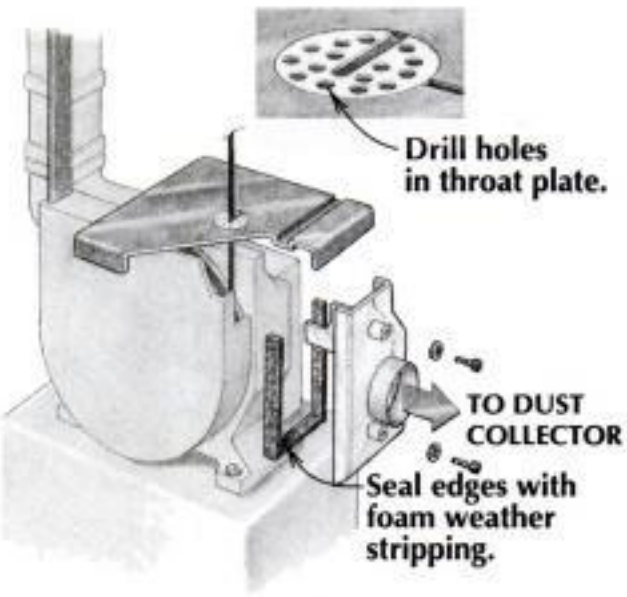
Ping Sing Li
Redwood City, CA



Bandsaw Dust Collector

Of all my machines, the bandsaw was the most troublesome when it came to picking up dust. My solution was to drill holes in the aluminum throat plate and attach a sheet-metal collector box as shown in the drawing. If sheet metal presents difficulties, you can make a collector box from 1/8-in. plywood or hardboard and tape the corners with 2-in.-wide duct tape.

Bill White
Williston, VT



Salvaged Glue Spreaders

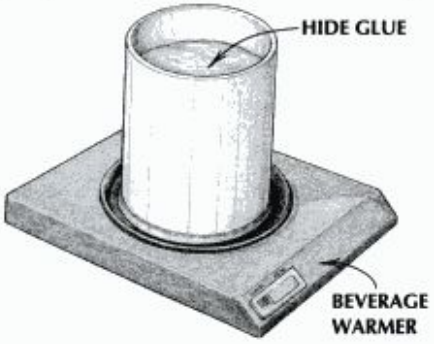
To spread glue rapidly and uniformly over a large area, it's tough to beat a windshield wiper. You'll find a shopful at any auto salvage yard. Another good spreading tool is an old hacksaw blade—the teeth work like a notched trowel.

Arthur Elson
Troy, OH

ILLUSTRATIONS BY HEATHER BRINE LAMBERT

Hide-Glue Warmer

If you plan to use hide glue but don't want to invest $70 for an electric glue pot, here's what to do: Get a Dazey™



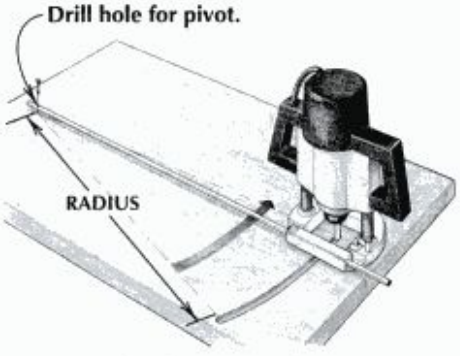
model #1400 beverage warmer—$8 at your local Wal-Mart store. These units maintain a constant temperature of 150° F and come with an on-off switch. Soak the glue flakes in a jar with water for 10 minutes, put the jar on the warmer, and 10 minutes later you have hot glue.

Jeff Jewitt
North Royalton, OH

Routing Arcs and Circles

To rout a circle or an arc you need to be able to swing a router about a radius. A quick and convenient method is to insert a metal rod into one of the edge guide holes in the router base. Select a rod whose diameter matches that of your guide holes. Drill a small hole at one end of the rod for a pivot pin. Adjust the length to the radius you want, and tighten the locking screw.

Michael Stevenson
San Francisco, CA

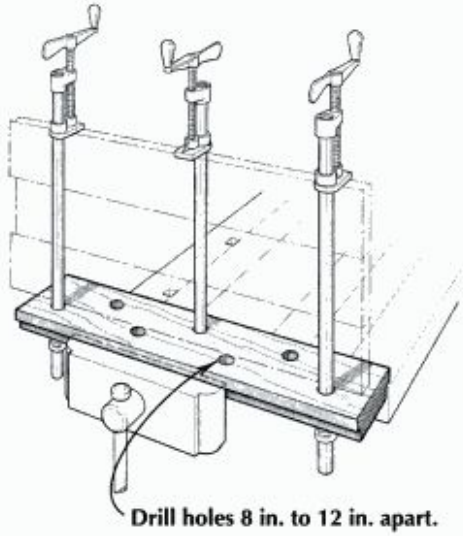


Vertical Glue-Up Jig

Some jobs—such as edge-joint glue-up and frame-and-panel assembly—are best done with the work positioned vertically. The glue doesn't run as you apply it, and any squeeze-out is readily wiped off from either side. The jig shown in the drawing below makes vertical gluing easy.

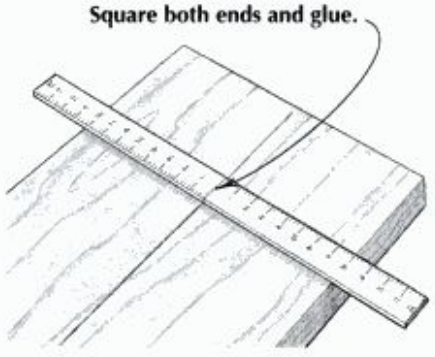
Cut a piece of solid wood into a T-section so it can be clamped in a bench vise. Then drill holes a fraction larger than the outside diameter of your pipe. Stagger the holes so the clamps can be positioned on both sides of the assembly.

Yeung Chan
Millbrae, CA



A Rule for Centers

With this device you can find the center of a board up to 2 ft. wide with no mental gymnastics. Glue two, 12-in. wooden



rulers end to end as shown. (I like those giveaway rulers at my local hardware store.) Lay the new rule across the board and adjust it until both sides read the same at the edges of the board. The ruler's glue line is then at the center.

Philip Taverna
Rome, NY

Cutter Cleaner

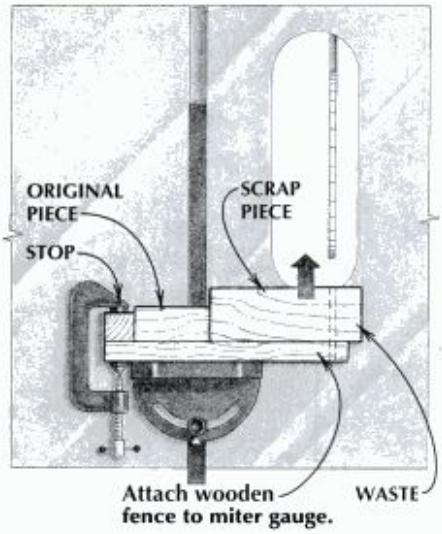
When saw blades and router bits accumulate gum and pitch, they overheat and can even burn the work. Soaking them in Fantastik™ cleaner loosens even baked-on deposits. You can easily make a shallow container by trimming down the sides of a five-gallon plastic pail.

Lawrence Heinonen
Union City, MI

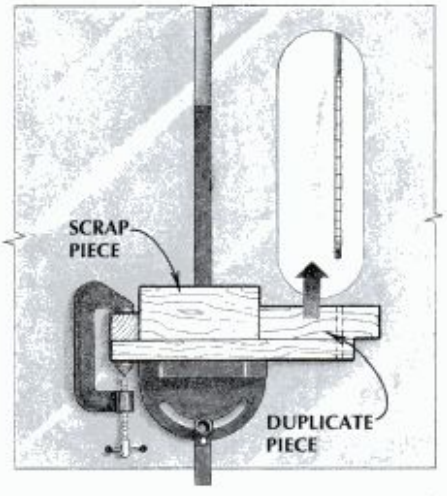
No-Measure Duplicates

This is a quick, accurate way to cut small pieces to identical length on the tablesaw. Clamp a stop to the miter gauge and position your original piece and a scrap piece against the stop, as shown in Step 1. Cut the scrap, then

STEP 1



STEP 2



remove the original piece and move the scrap over against the stop, as shown in Step 2. Each piece you cut will now be identical to the original. No measurement necessary!

George Passwaters
Mt. Laurel, NJ

Colonial Hutch

How to make a piece that looks 200 years old

by Mathew Burak

It's a thrill when someone walks into my showroom and exclaims, "Where do you get all these great antiques?" They look at the Colonial hutch pictured here and ask, "Got any idea when it was built?" When I tell them that the hutch was built just a few weeks ago, they wonder how it could look so old, yet be so new.

I've found several secrets to making a new piece of furniture look like a 17th- or 18th-century antique. Furniture from this era had wonderful proportions, hand-tooled surfaces, and hand-crafted wooden joinery. In contrast, furniture after 1820 was primarily mass-produced on machines, leaving it bereft of the maker's mark.

In this article, I'll explain how I use good materials, authentic proportions, special moldings and antique finishing techniques to turn back the clock on my hutch.

Studying the Originals

When I set out to build a Colonial-style hutch or antique table (see AW #45), I never start designing the piece from scratch. Instead, I look to museums or private antique collections for authentic pieces built by Colonial craftsmen.

Antique furniture is full of important information that I try to use in my reproduction work. What type of wood and hardware were used? What proportions and joinery details need to be brought to the new piece? If you take an even closer look, you'll see where years of use have caused the finish to be worn or discolored in certain areas. All of this information is important to consider if you want to build something new that looks authentically old.

The hutch shown here is typical of many antique hutches built in northern New England during Colonial times. It consists of two major assemblies: a lower cabinet, or case, with two drawers and two doors, and an upper case of fixed shelves. The upper case is joined to the lower by a pair of rear brackets screwed to both assemblies. It's aligned by a mitered, three-piece cove molding attached to the counter of the lower case. (See Fig. 1.)

Choosing the Right Wood and Hardware

Proper wood selection and layout is important for reproduction work. Like many of the antiques built in my area of northern New England, my hutch is made from local woods. I use yellow birch for the primary or exposed surfaces, and I use eastern white pine as the secondary wood.

As you study antiques, you notice that early craftsmen had access to much wider boards than we see today. I scour the countryside looking for the widest stock available, but sometimes I have to glue up narrower boards to make a wide panel. In this case, to imitate the look of a one-board panel, I select boards with as close a grain match as possible. And I keep the grain continuous wherever possible. For example, I usually make the upper and lower case sides from the same boards, so the grain runs continuously up the sides of the hutch.

Surface texture is also important. Furniture built before the Industrial Revolution was surfaced with hand tools, and the effect of all those small ripples and irregularities left by the tools is a distinctive mark that no machine can imitate. Although I use modern machines like the jointer, planer and shaper to mill and cut the stock, I still take the time to hand-tool all the surfaces. On this hutch, I scrape the harder birch, and hand-plane the pine. These tooling marks are a subtle but integral part of handmade furniture, whether antique or new.

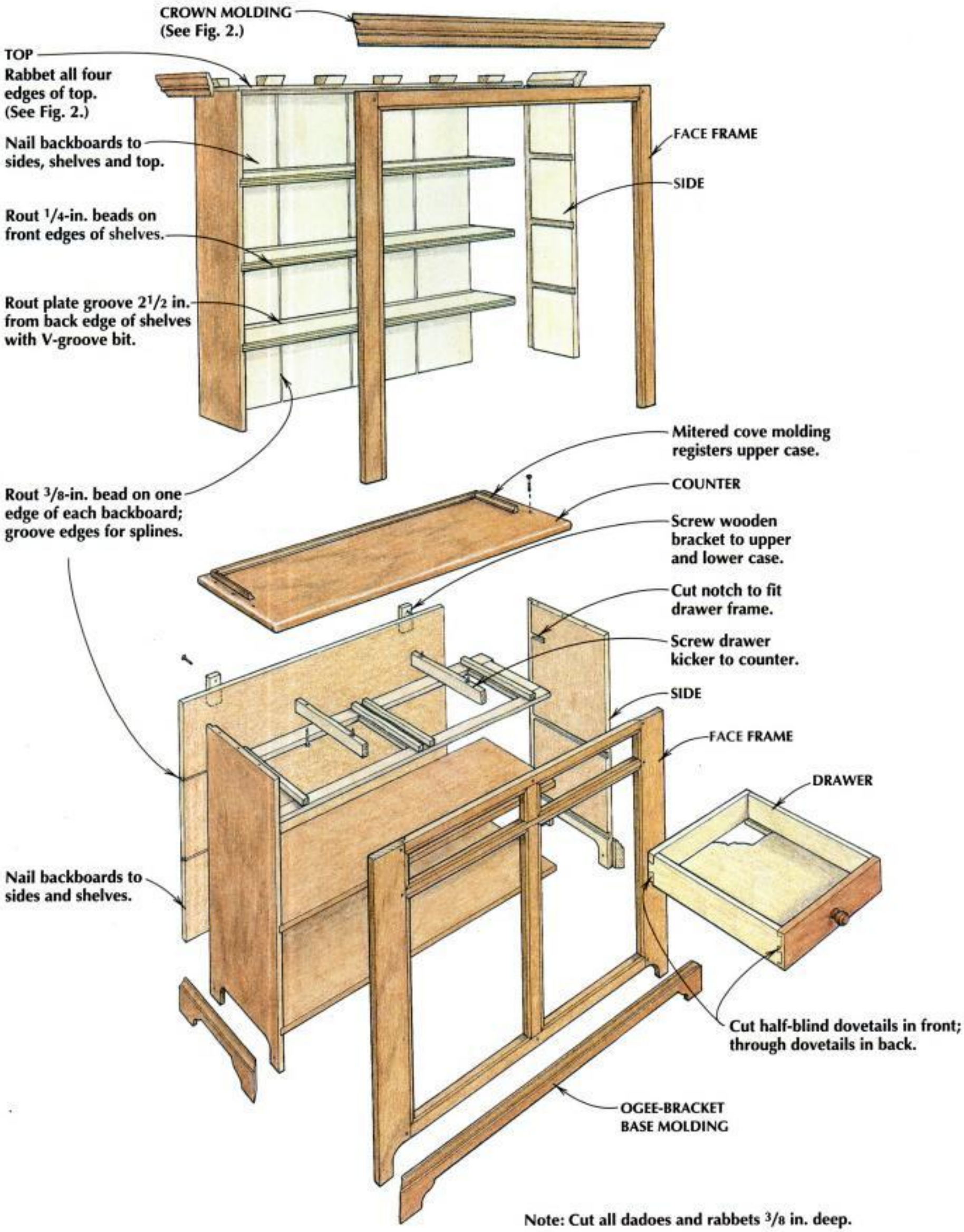
Quality hardware and fasteners will help make your furniture appear as authentic as possible. (See Sources, page 40.) I recommend using old-fashioned cut nails to secure the back boards. To complement the aged finish on this hutch, I used solid brass hinges and antique-looking knobs.

Finding Good Proportions

Pleasing proportions are essential to achieving the unified look of a fine piece of furniture. There are many propor-

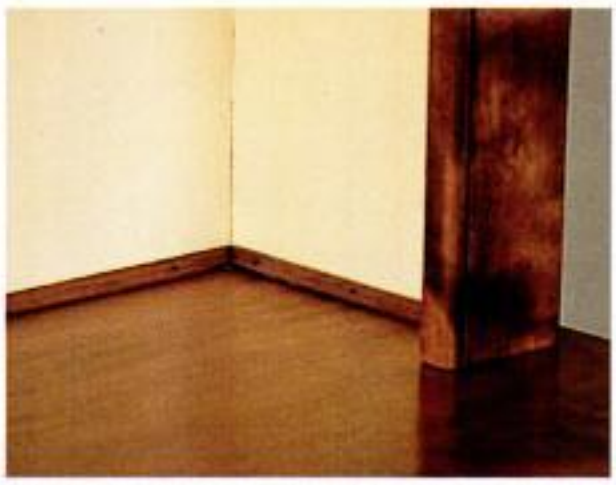
Authentic look. *Burak's Colonial-style hutch is proportioned, detailed and finished to imitate an 18th-century original.*

FIG. 1: HUTCH

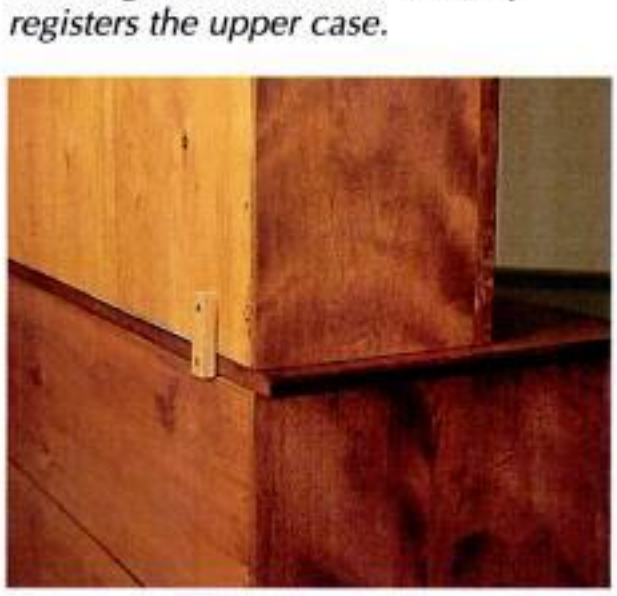


Note: Cut all dadoes and rabbets 3/8 in. deep.

Top it off in style. *The large crown molding visually completes the top of the hutch.*



Simple alignment. *A mitered cove molding nailed to the countertop registers the upper case.*



Simple connections. *Two wooden brackets screwed to the back keep the upper case from shifting.*

Beads and thumbnails. *The thumbnail on the inside edge of the door frame complements the beaded face frame.*

tional relationships in this hutch that make it look genuine: the overall height of the cabinet compared to its width, the relative sizes of door and drawer openings in the base, and even the countertop thickness and overhang.

You can experiment with different dimensions and discover which proportions look pleasing to the eye. But I tend to start by looking at antique examples, asking myself where a part might be thickened or widened to improve upon the proportions.

Making Authentic Moldings

Seventeenth- and 18th-century craftsmen used a variety of moldings to dress up their work. Unfortunately, most stock moldings today only hint at what the originals looked like, so I make a point of copying historic ones.

I've found that almost all early moldings had elliptical curves rather than circular ones. The difference seems small until you dress out an entire cabinet with moldings: Then you get a sense of the fluidity that these elliptical curves provide. (See Fig. 2.) To get these shapes, I use custom-ground, high-speed-steel router bits and shaper cutters. Standard commercial bits and cutters are ground with circular arcs.

Proportions also come into play when you're choosing and applying moldings. The overall size of a molding is important, as well as its relationship to the surrounding components. For example, the large crown molding on this hutch gives visual weight to the top of the cabinet, making the overall proportion complete. (See top left photo.) I cut the crown on the shaper (see Fig. 2), but all the other moldings—coves, beads, thumbnails and ogees—are made on the router table.

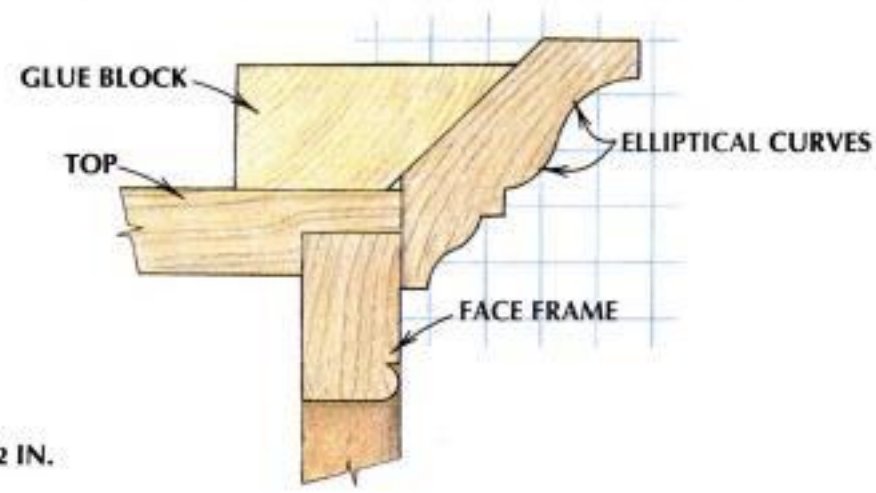
The beaded face frames, the thumbnail-edged door frames and the ogee-bracket base are all carefully proportioned. (See Figs. 2, 4 and 5.) These details work together to decorate the front of the cabinet without competing for attention.

To cut the bead on the face frames, I use a custom-ground beading bit. (See left photo, page 39.) I had a local sharpening service grind a stock bit to shape by giving them a scale drawing of the

FIG. 2: CROWN AND BASE MOLDING

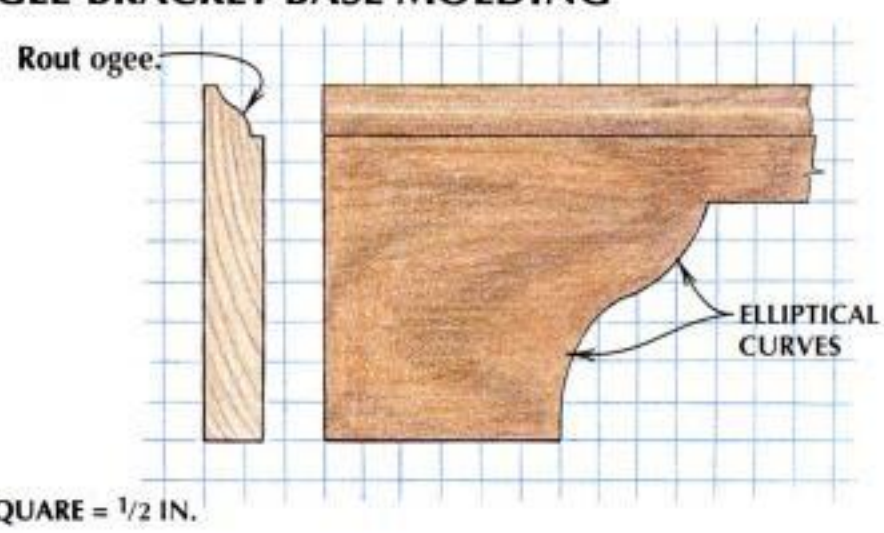
By using elliptical curves instead of circular ones, Colonial craftsmen created moldings that looked especially graceful.

SECTION THROUGH FRONT CROWN MOLDING



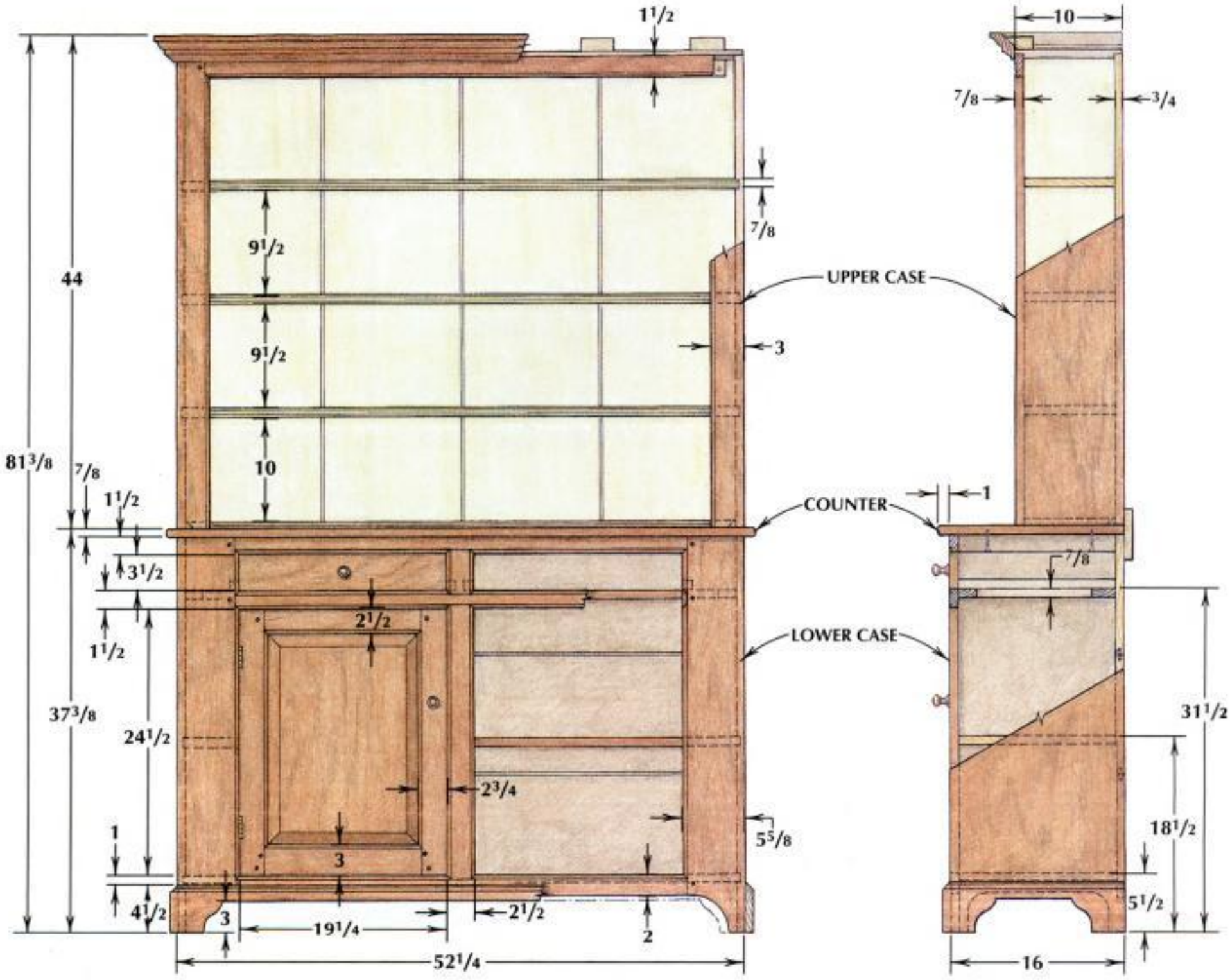
1 SQUARE = 1/2 IN.

OGEE-BRACKET BASE MOLDING



1 SQUARE = 1/2 IN.

FIG. 3: HUTCH ELEVATIONS



desired profile. (See Fig. 4.) A standard beading bit will work, but you won't get the elliptical curve.

To make the bead "flow" around the face frames, I miter the bead at each intersection using a simple 45° layout block and a sharp chisel. (See center and right photos, opposite page.) I also miter the corners of the thumbnail profile on the door frames.

The ogee-bracket base completes the cabinet molding. (See Fig. 2.) I rout the small ogee profile on the top edge of the base boards, miter them to fit, then bandsaw the ogee cutout for the feet.

An Old-Looking Finish

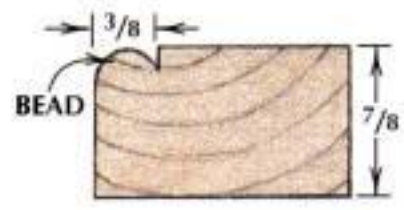
Look at any piece of old furniture and you'll see a history of wear and tear. Part of this history is the warmth and color that develops on the wood from years of exposure to air, light and normal use. To create a similar look and feel in a new piece of furniture, I've developed a multi-step finish that you can create over the course of two or three days.

For easier handling during finishing, I break the hutch into three parts: the upper case, the lower case and the countertop. Since I use a water-based stain, I prepare the wood by raising the grain with water. When the wood is dry, I sand the raised fibers with 180-grit paper.

Distressing—I distress the edges and surfaces to give the appearance of wear. This can be heavy or light, depending on the amount of wear you want to impart. I use several distressing "tools." Edges are rounded over with sandpaper. Keys make random nicks and dings when aimed with a flick of the wrist and a turning motion. And an awl leaves slight scratches if you hook your wrist in random patterns across the surfaces.

FIG. 4: BEAD & THUMBNAIL

SECTION THROUGH FACE FRAME



SECTION THROUGH DOOR

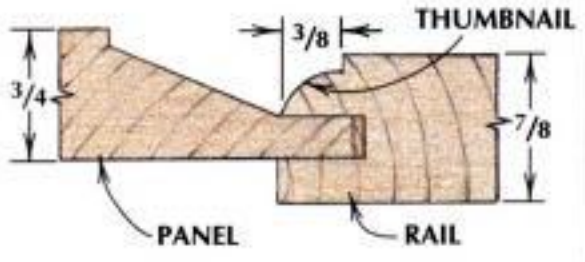
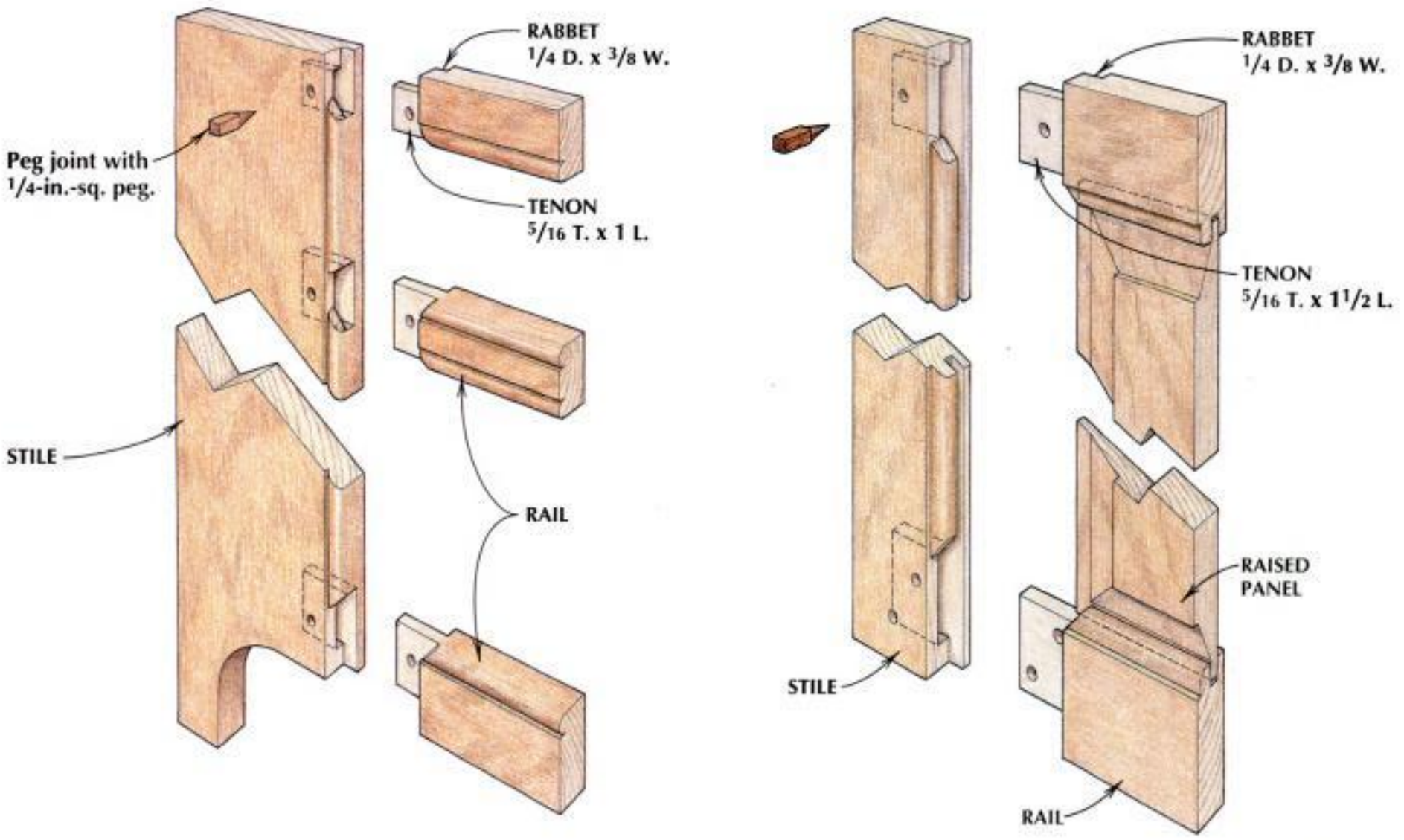
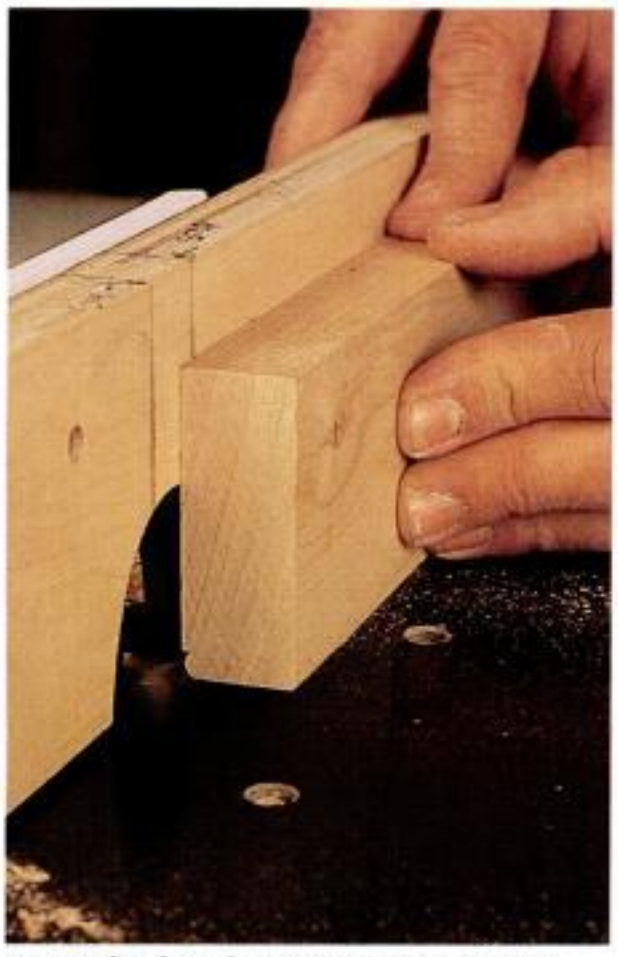


FIG. 5: BASE CABINET JOINERY DETAILS

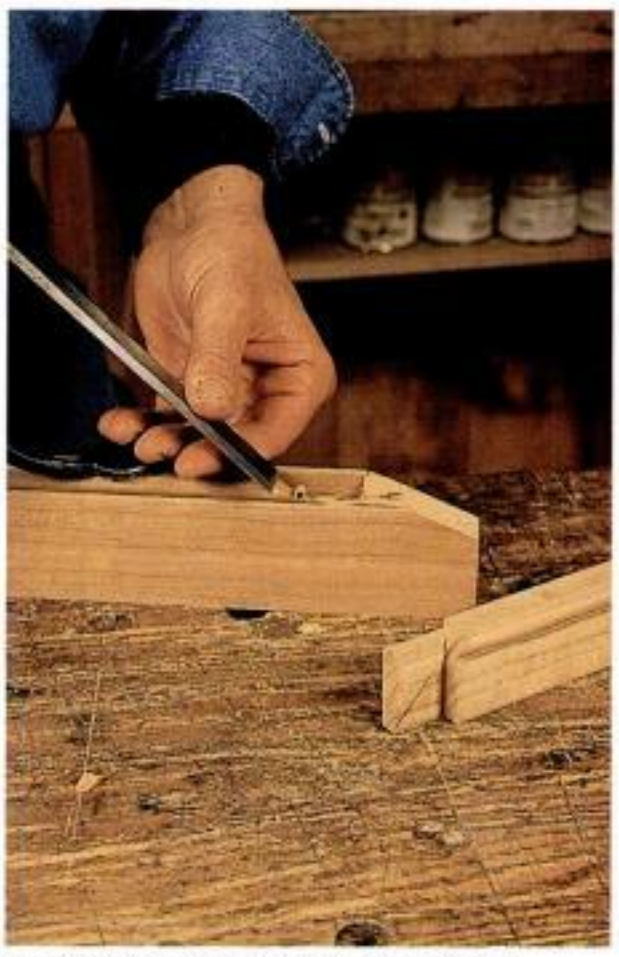


JOINING A BEADED FRAME



Rout the bead. *Bead the stiles and rails on the router table, guiding each frame member against the fence.*

Lay out the miter. *After cutting the mortises and tenons, mark the miter with a 45° angle block and a chisel.*



Chisel the miter. *With the stock on edge, cut the miter by hand, paring to the layout line.*

Wipe on some history. *Burak's multi-step finish mimics the look of a well-worn antique. Here, he uses a rag to control the effect of a glazing coat.*

Staining—I use a custom mix of water-based aniline dye stain to color the raw wood. I like the clarity you get with water-based dye stains. The two stains I use come in powder form. (See Sources.) To make the stain, I add three tablespoons of each dye powder to one gallon of warm water.

I spray the dye on all the surfaces except the upper case's interior, which gets painted. Then I wipe off the excess with clean rags before it dries.

Sealing—I spray on two coats of 2-lb.-cut orange shellac once the dye is dry (about four hours). Brushing it on works fine, too. I let the shellac dry for about four hours, then I sand very lightly with 400-grit paper, taking care not to cut through the sealer and into the stain. If you do cut through the color, touch up the bare spot with a little dye.

Glazing—Glaze adds another layer of color to the wood, creating a rich, deep look similar to the patina on an old piece of furniture. To make up the glaze for this piece, I mix together equal parts of two glazes (see Sources), and thin this solution 50% with mineral spirits.

I apply my custom glaze with a rag, paying close attention to inside corners so as not to miss any areas. I wipe off the glaze with a clean rag, being sure to wipe with the grain on large, flat areas. (See photo, left.) Small deposits of the glaze remain in the corners and cracks, creating dark shadows that age the piece. Let the glaze dry for 12 hours, or overnight.

Topcoating—I cover the stained and glazed surfaces with another coat of sprayed-on shellac. I like the warmth that shellac gives to a reproduction piece like this one. But shellac has poor resistance to water and alcohol, so I don't use it on the countertop. Instead, I give this part a coat of satin polyurethane. I spray on the poly, but you could also brush it on.

Staining revisited—After the finish has dried overnight, I rub out everything but the painted areas with a nylon abrasive pad. The final step is to rub on a coat of oil stain (see Sources) with a 0000 steel wool pad and then wipe off the excess with a clean rag. Rubbing on the stain smooths the surface and evens out the sheen. It also adds just enough color to create a nice patina.

Painting the inside upper case—I brush on one coat of white pigmented shellac to seal the surface. Available at hardware stores and home centers, this white-colored shellac is commonly sold as an undercoat and stain-killer for painted finishes.

Once the shellac is dry, I sand the surface with 220-grit sandpaper and brush on two coats of a creamy-white, satin-finish latex paint. The light-colored paint creates a backdrop for the items displayed on the shelves and contrasts nicely with the dark wood on the rest of the hutch.

When the paint has dried, I wipe it with a mixture of one part of my custom glaze to 12 parts mineral spirits. This thinner mixture imparts a subtle patina to the painted surfaces. I wipe off the excess with a rag dampened with mineral spirits. Almost all of the glaze comes off the paint, but some remains in the cracks and corners—just where I want it. ▲

SOURCES

Ready-made crown molding is available from Classic Designs, Box 279, Rte. 2, Danville, VT 05828, (802) 684-2156. *Circle #619*

Old-fashioned cut nails are available from Tremont Nail, (508) 295-0038. *Circle #620*

Solid brass hinges (item #H229-055) are available from Ball and Ball, (610) 363-7330. *Circle #621*

Drawer knobs (#K-12-652) and cupboard turn door knobs (#H-97-659) are available from Horton Brasses, (860) 635-4400. *Circle #622*

Water-based aniline dye stains are available from Lockwood, (212) 966-4046. Ask for Early American maple honey-toned amber #145, and Early American light golden oak #78. *Circle #623*

Custom glaze ingredients are available from Woodworker's Supply, (800) 231-2748. Ask for Heavy-Bodied Glazing Stain #B504-0006, and Burnt Umber #B500-0085. *Circle #624*

Oil stain is available from Old Village Paint, (800) 498-7687. Ask for Paste Wood Stain and Glaze, in Black Walnut. *Circle #628*

MATHEW BURAK *builds traditional furniture and runs a woodworking business in northeastern Vermont.*

Self-Centering MORTISING JIG

No measurement necessary—just clamp the workpiece and rout

by Andy Rae

Mention a method that makes mortising easier and you're sure to capture a woodworker's attention. So, when Barry Wood, a woodworker in southern California, showed us his mortising jig, we saw the possibilities right away.

We took Wood's prototype jig to the workshop, tweaked the design just a bit, and came up with the version shown here. Mortising has never been easier. With this jig and a plunge router, you can cut precisely centered or offset mortises in both edges and end grain without a lot of fussy setup work. When you clamp your workpiece between the jig's clamping beams, your mortise is automatically centered in line with the router bit—all in one step! (See Fig. 1.) ▶

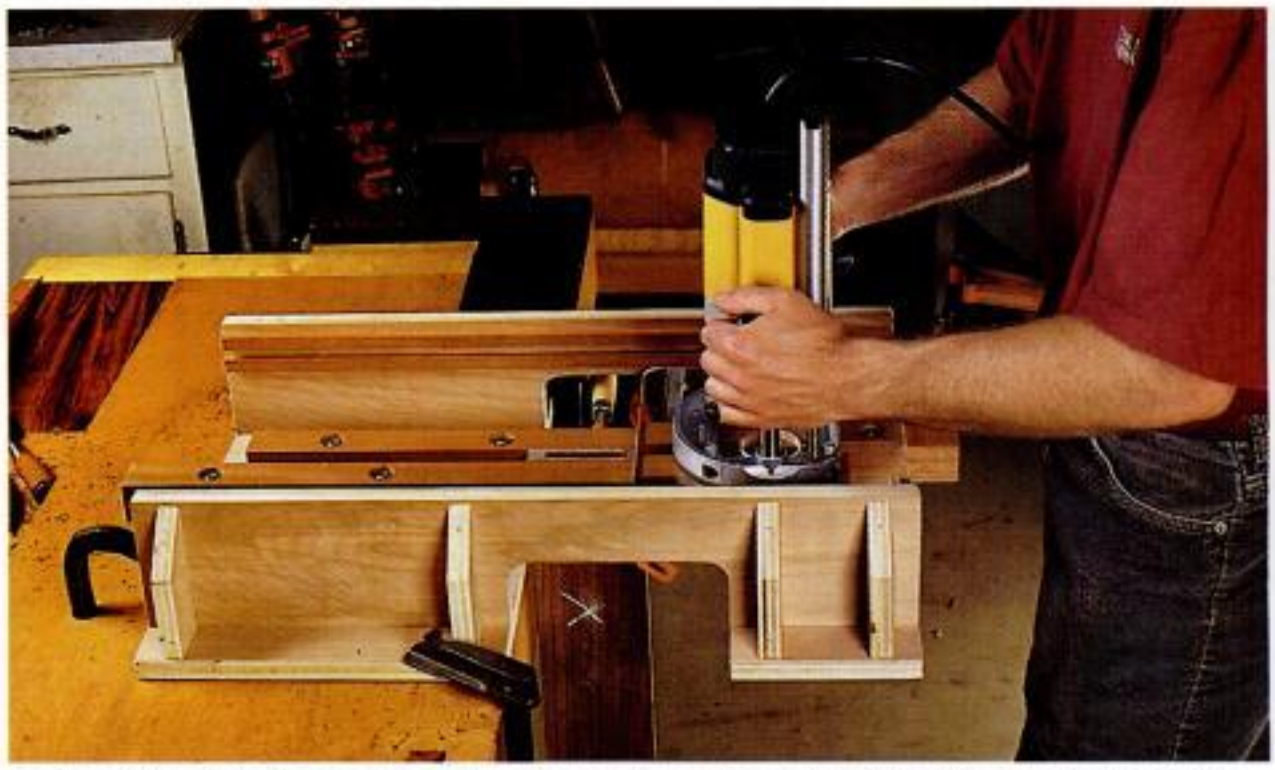
Just clamp and cut. *Clamping the workpiece between the jig's parallel beams automatically centers the mortise. The router base rides on ledger strips attached to the jig's two fences.*

PHOTOS BY JOHN HAMEL

You can rout edge mortises in stock up to 3 in. thick and 3¼ in. wide, and you can make end mortises in pieces up to 5 in. wide. With both edge- and end-mortising capability, this jig is ideal for loose-tenon joinery.

The key to the jig's self-centering capability is a pair of clamping beams, mounted on pivoting blocks that are attached to the base and centered between the two fences. (See Figs. 1 and 2.) The fences are fitted with ledger strips that support the router baseplate, so you can move the router back and forth over the work.

This jig is easy to make. We sized it to to fit a 9¼-in. by 11¾-in. aftermarket router baseplate (item #151, available from Woodhaven, 800-344-6657). But you can adjust the dimensions to fit any rectangular baseplate.



End cutting. *Rout a mortise for a loose tenon by clamping the stock vertically.*

Construction Tips

Use ¾-in. hardwood plywood for the base pieces, fences and support blocks. Make the pivot blocks, clamping beams and ledger strips from clear hardwood.

For the base pieces, start with an 18-in.-square plywood panel, cut the grooves for the fence, then cut the panel apart. The fences can also start out as a single length of plywood. Cut the two grooves for the ledger strips and rabbet the bottom edge so it will fit in the base grooves.

Bore the three holes in the base for the center machine bolts before you glue and screw the fences on. (See Fig. 2.) These holes must be dead-center between the two fences.

It's also important to bore accurate and identically spaced holes in the pivot blocks. The holes should be precisely centered on the centerlines of the blocks, with the center holes exactly halfway between the outer holes. This ensures that the clamping beams will stay parallel and centered.

For the jig to work, the router bit must be centered on the length of the baseplate. If your router is already mounted on an aftermarket baseplate, make sure the bit is centered on the length of the plate. If not, adjust it.

If you decide to use a Woodhaven baseplate, you can order one of their template kits, matched to your router.

Using the Jig

This jig is wonderfully simple to use. Clamp it securely over the edge of your bench. Slide your router base into one of the three tracks on the jig, to fit your workpiece height. Square lines across the workpiece at the beginning and end of each mortise, and place the workpiece between the clamping beams—vertically through the gap in the base for end mortises, or resting horizontally on the pivot blocks for edge mortises. Raise the work to the underside of the router baseplate, and clamp it securely between the beams.

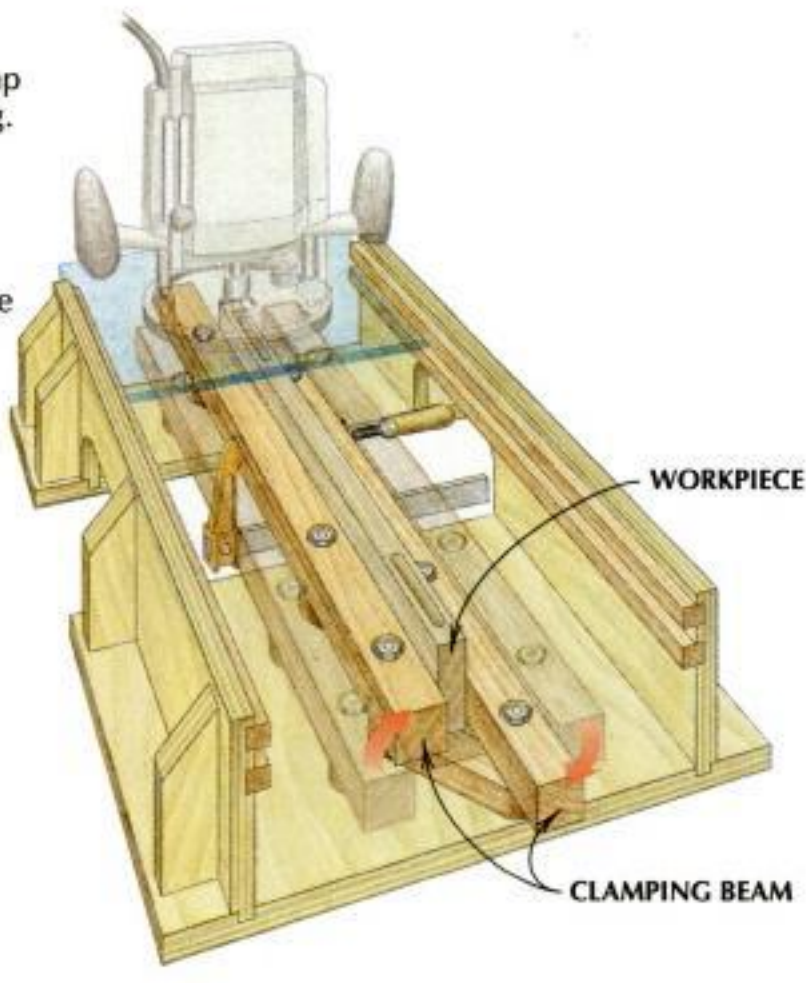
For offset mortises, insert a spacer strip twice as thick as the desired offset, between the work and one of the beams.

Now, set the depth of your plunge cut, and rout. Don't take too deep a bite in one pass; make successive cuts at deeper and deeper settings until you reach the bottom of the mortise. ▲

FIG. 1: HOW THE JIG WORKS

1. Clamp the workpiece.
Pivoting clamping beams center the workpiece automatically. A single clamp holds the piece for mortising.

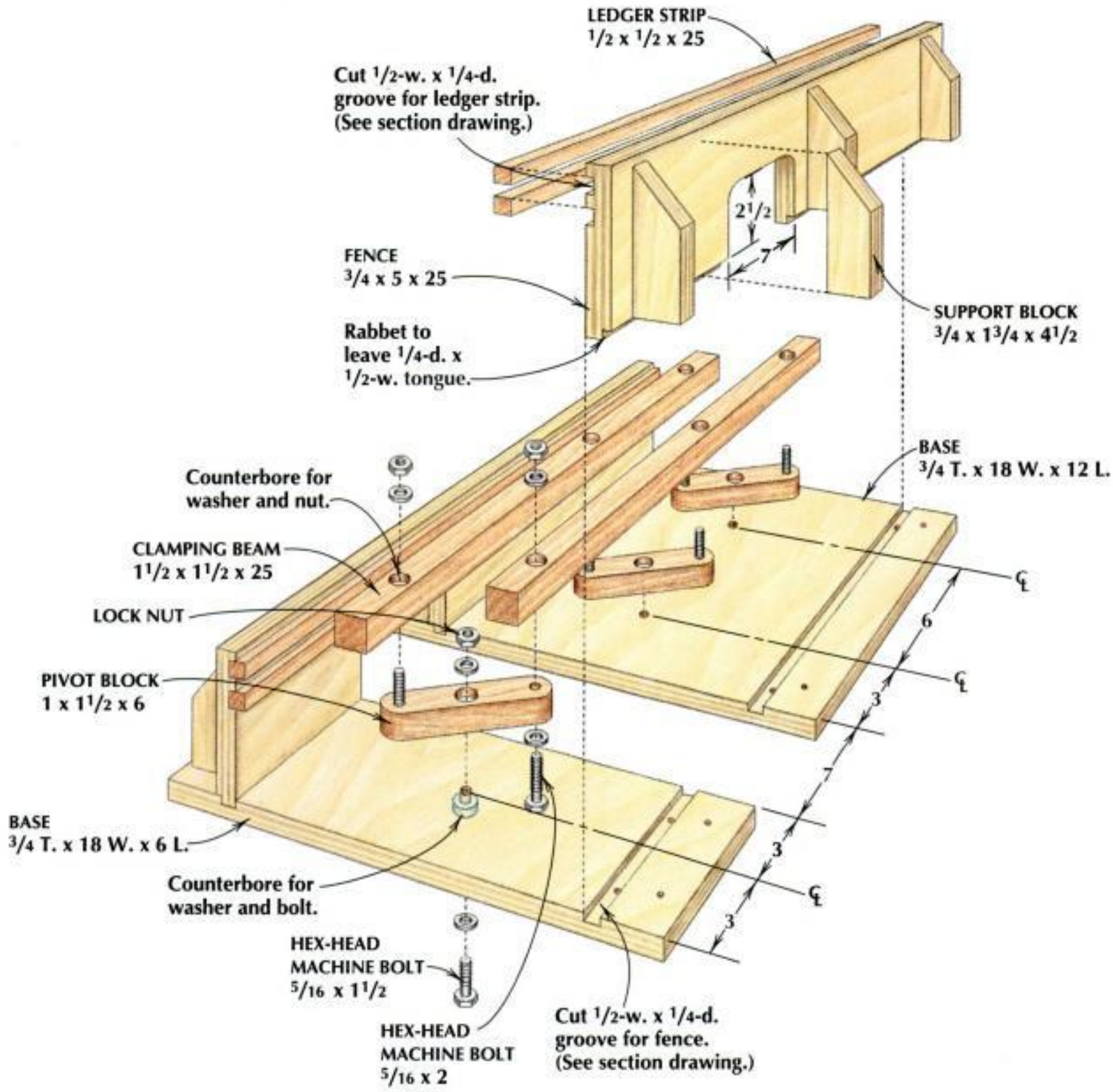
2. Rout the mortise.
The router baseplate rides on ledger strips attached to the fences. Cut the mortise by plunging the bit in increments and sliding the router back and forth.



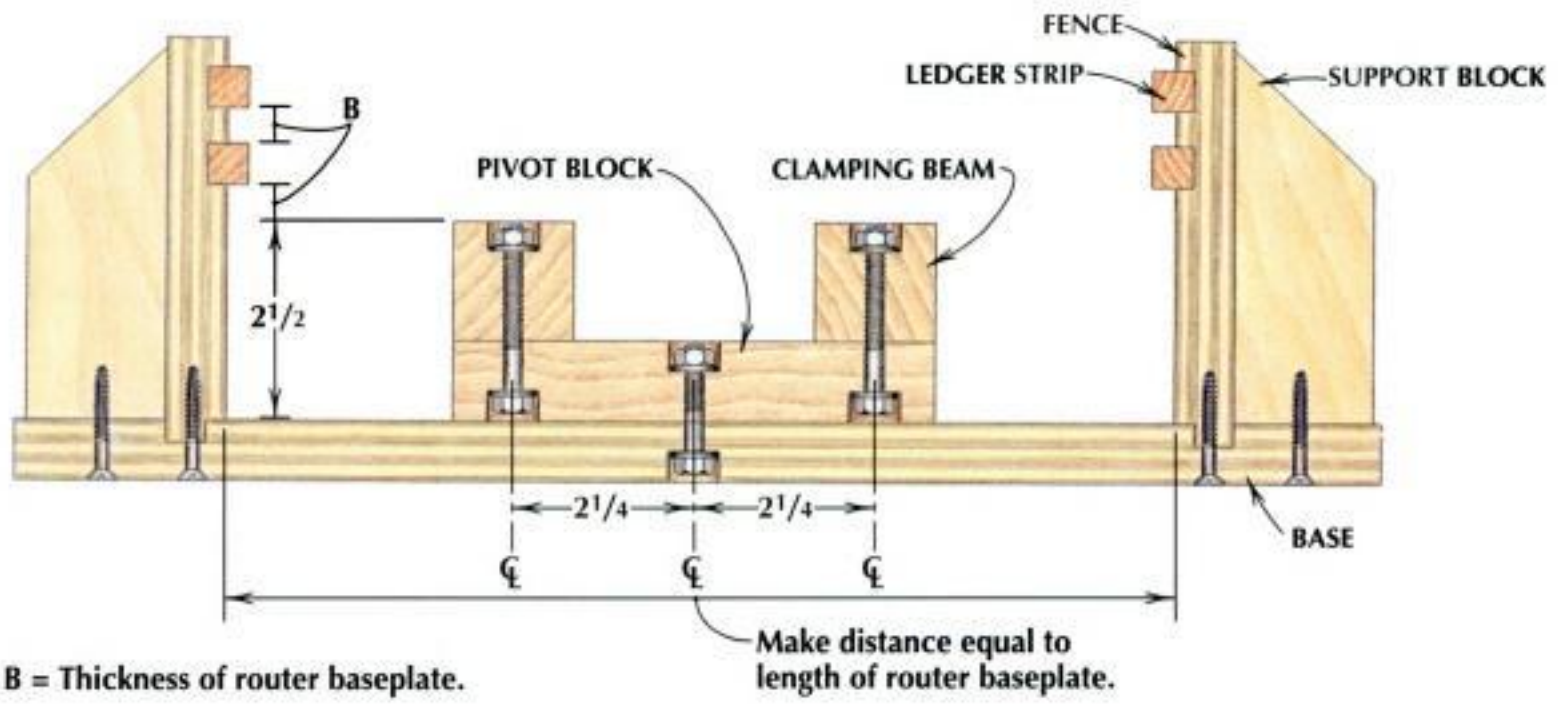
ANDY RAE
is an associate editor of AW.

ILLUSTRATIONS BY FRANK ROHRBACH

FIG. 2: MORTISING JIG



SECTION THROUGH JIG



B = Thickness of router baseplate.

Harvest Your Own

The best wood for bowl turning is right in your backyard

by Doug Newlove

Turning treasures. *Spectacular bowl-turning stock awaits you in the woodpile or the forest—and best of all, it's free. Author Doug Newlove tells you how to select, store and turn bowls from green wood.*

FIG. 1: WHERE TURNING BLANKS COME FROM

A *Crotch*—Highly figured; tends to check.

B *Trunk*—Normal figure and color; straight grain.

C *Buttress*—Often yields curly or figured wood.

D *Roots*—Highly figured. Take extra care to check for dirt and rocks.

E *Burl*—Spectacular grain; highly susceptible to checking and cracking. (See AW #39.)

REACTION WOOD
Occasionally figured, especially compression wood; pith off-center; distorts unevenly.

F *Tension wood*

G *Compression wood*

Two-step turning. *Newlove will turn this red oak bowl to final thickness after the wood dries.* *(See sidebar, page 46.)*

Burl bowls. *The author turned both of these bowls from one blank, preserving the natural edge.*

When I began woodturning, I assumed that you had to work with store-bought, kiln-dried blanks. Although this introduced me to the joys of turning, it had some drawbacks. Turning dried wood was hard and dusty work. And whenever I wanted a larger blank, I had to glue pieces together or try to find heavier stock. The worst thing was, I was afraid to practice my turning skills because I didn't want to risk ruining my expensive stock.

Eventually, I learned that I wasn't limited to kiln-dried lumber. Better turning stock—in every shape and size imaginable—was waiting for me in my own backyard. In this article, I'll explain how you can select, prepare and store locally harvested wood for turning.

The Virtues of Turning Green

"Green" wood—wood that hasn't lost any of its natural moisture—has some real advantages for turners. For starters, it turns beautifully. I love the gentle hissing sound my gouge makes as long, ribbonlike shavings sail through the air. And green wood is easier to turn, so chisels and gouges stay sharp longer. That means you'll spend less time sharpening.

Since you harvest it yourself, you can select for surprising figure and color not found in kiln-dried wood. Further, cutting a green wood blank down to size with a chainsaw or bandsaw is much easier than gluing one up.

But the best part about green wood is that it's free for the asking. You can practice new techniques, or try new designs, without worrying about wasting a costly store-bought blank. If the vessel doesn't come out well, so what? Throw it in the fire and start again. The experience you've earned makes the time well spent.

There are a couple of drawbacks to turning green wood. Besides finding a suitable wood supply, you'll need a chainsaw and related safety equipment, some way to transport your finds (wet wood can be heavy!) and a place to store your blanks. Also, expect that you and your lathe will get a little wet.

Green wood is very likely to distort or split if you try to turn it all the way to finished form. It's much safer to turn the rough form while the wood is green, then let it dry thoroughly before finish-turning. (See sidebar, page 46.)

Diamonds in the Rough

Finding green wood can be as much fun as turning it. I enjoy my adventures going into the woods, through a neighbor's firewood pile or even the town dump to seek out hidden treasure. It's the unknown that I find most exciting. Although I select the wood, I never know quite what to expect—no two blanks are ever the same.

Once you've found a promising log or stump, what do you do with it? First, examine it for embedded rocks, nails, or any other debris which can wreak havoc with your chainsaw or turning tools. I use a garden hose and wire brush to clean off the surface. If you have access to one, a metal detector is great for locating screws and nails. Once your find is deemed "safe," you can begin sectioning it into blanks for turning.

Many experienced turners look for choice cuts such as burls, crotch sections and spalted areas that can make for stunning turnings. However, these choice areas are also the most difficult to turn and dry successfully. I've found that the best practice stock comes from the trunk—and the larger the tree, the better. Look for straight, consistent grain. If you're just starting out, avoid wood that contains the *pith*—the center of the trunk. It's almost guaranteed to crack.

Preparing Logs and Blanks for Turning

Green logs, and the turning blanks you cut from them, can start to crack and check within hours. Unless you're going to turn your blanks that same day, they'll need to be carefully cut, sealed and stored. Keep in mind that the grain pattern in your finished turning will depend on how you orient the blank in the log. (See Fig. 2.)

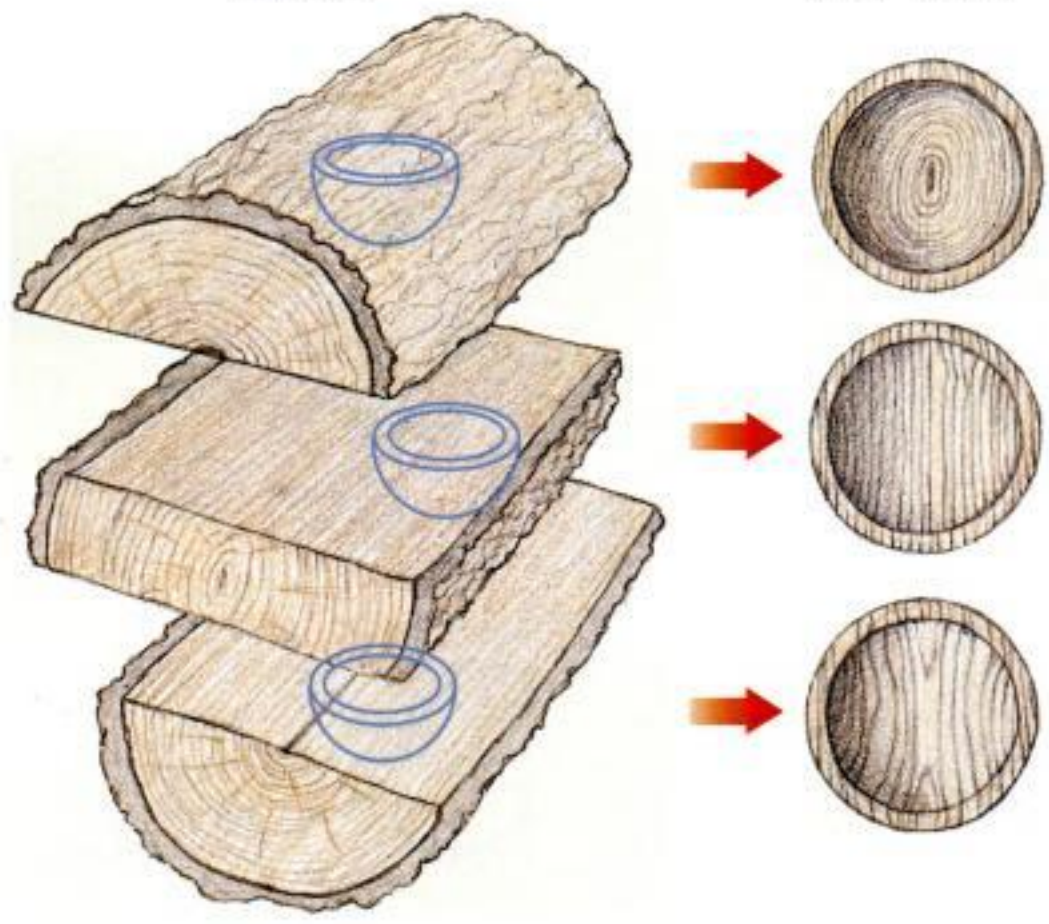
Unless I plan to use the pith in my finished vessel, I like to split my logs in half as early as possible. Beyond that, there are a couple different ways to prepare logs and turning blanks before you store them or turn them.

The "lazy method" is to simply bandsaw or chainsaw your split log a little over length (2 in. to 3 in. on each end) to allow for some inevitable checking, then seal the ends and 2 inches up the sides with white PVA glue, oil-based paint or a proprietary sealer. (See Sources, page 47.) For smaller pieces, you can melt paraffin in a double boiler and dip the ends into the melted wax. This method is best for long-term stock storage, but it also means you're delaying the inevitable work of cutting the log into blanks.

The other method, which I prefer, is to take my stock to a point where it's ready for turning. With a few cardboard

FIG. 2: WHERE'S THE BOWL?

Changing the orientation of the piece within the blank gives you very different—and dramatic—grain patterns. Several options are shown here.



templates, a compass and a chainsaw, I can prepare a dozen turning blanks in an afternoon.

First, I draw the vessel shape on the log with some chalk or a permanent marker. To do this, I've made several cardboard templates that help me estimate a blank's turning potential. After deciding on the size, I use a large shop-made compass to sketch out the circumference of the vessel on the outside surface. (See top photo, opposite page.)

Next, I remove as much of the waste as possible with my chainsaw. (See center photo, opposite page.) You can often use a bandsaw instead. This step helps the blank dry out at a slightly faster rate and helps keep the lathe from running out of balance when I'm turning.

If I'm not planning to turn the blank right away, I'll seal the cut surfaces to prevent it from cracking or splitting. (See bottom photo, opposite page.) Once sealed, the log is ready for storage.

Storing Prepared Stock

For short-term storage—up to a week or two—I'll simply wrap the blank in a plastic bag, without sealing. However, I don't leave a wrapped blank unattended

A TWO-STAGE TECHNIQUE FOR SUCCESSFUL GREEN WOODTURNING

Compared to dried stock, green wood is a joy to turn—but it requires a little careful handling to avoid splitting and warpage. With this method, I can do most of my turning when the wood is green and still have about an 85% success rate. I turn the blank only to its rough form while green, then I seal it and let it dry completely before turning it to its final form.

The key to this method's success is the wall thickness of the rough-turned object. Bowls that are rough-turned while green will shrink as they dry, but they usually don't split—instead, they warp and become somewhat oval. If you leave the walls thick, you can true the sides after the piece has had time to dry. As a rule of thumb, I rough turn the sides to about one-tenth of the bowl's diameter. (See left photo, page 45.) For example, on a 10-in.-dia. bowl, I leave the walls 1 in. thick. On bowls smaller than 6 in. dia., I leave the walls slightly thicker than the rule; walls of small bowls seem to warp more than larger ones.

After turning the green wood to these rough dimensions, I let the bowl dry. To slow down the drying process and reduce the chance of checking, I paint the piece with sealer (see main article) and then place it in a cool area of my shop or in a paper bag with a pile of wet shavings. I monitor the drying process by weighing the piece every few weeks. When it has stopped losing weight, I know it's dry, and I remount it and finish turning. The secret is not to rush things—an average rough-turned bowl takes about three to six months before it's dry enough for final turning and finishing. —*D.N.*

Wet and dry work. *Newlove rough-turns his bowls when the wood is still green. He seals the rough bowls or packs them in wet shavings and sets them aside to dry before final turning.*

for too long: Molds and fungi will start attacking the wood within a week or two, beginning the spalting process. Although spalting can produce spectacular figure and color, it requires special care when turning, and the spores that are released into the air when you turn spalted wood have been known to create breathing problems.

For longer-term storage, I seal the cut ends and store the pieces in my utility shed. Make sure that your storage spot is unheated and away from rain and direct sunlight.

From this point, the blanks will slowly lose moisture to the surrounding air until they reach *equilibrium moisture content* (EMC). This can take more than a year per inch of thickness, so you don't have to worry about your blanks drying out in a hurry. The simplest way to check the drying progress of your blanks is by weight. Wood will lose weight until it reaches EMC.

Turn, Turn, Turn...

Careful preparation and storage don't guarantee perfect turning specimens. I've had good success with box elder and willow, but some woods—ash, maple and beech, and fruitwoods such as apple and cherry—can crack even when you've done everything right. If they do crack, it's rarely a total loss; you can always make a smaller bowl from a larger, cracked blank. ▲

DOUG NEWLOVE
is an avid amateur woodturner living in Ontario, Canada.

SOURCES

Anchorseal™ brand sealer is available from UC Coatings Corp., Box 1066, Buffalo, NY 14125, (716) 833-0120. *Circle #625*

Waterproof turners' aprons are available from The Woodturners Catalog, (800) 551-8876. *Circle #626*

End sealer is available (in Canada only) from Lee Valley Tools, 12 E. River St., Ogdensburg, NY 13669, (800) 267-8767. *Circle #627*

PREPARING A BLANK

Laying out blanks. *Cardboard templates make a quick size reference for laying out blanks in a log. Newlove uses a shop-made compass to establish the blank's rough diameter.*

Sawing down to size. *Newlove saws to a chalkline to remove excess stock. The stump makes a handy bench for trimming bowl blanks.*

Sealing before storage. *To control moisture loss and prevent checking, Newlove seals the cut surfaces before long-term storage.*

Glass Light Doors

Make them easily with these new router bits

by Bill McCarthy

As a child, I remember being fascinated by the glass light doors of antique corner cabinets and Dutch cupboards. I loved the way the wavy old glass contrasted with the precise joinery of the doors.

Panes of glass, called "lights" in cabinet doors, invite inspection. We're naturally drawn to examine the cabinet's contents. And in the process, we can't help but admire the delicate contours and finely made joints of the door itself.

Cabinetmakers have been crafting glass light doors for hundreds of years. Some of these door designs have been simple, while others have been quite ornate (see sidebar, page 50), but they've all been difficult to make. Early cabinetmakers used matched sets of sash planes to "stick" the edges and "cope" the mating ends—a laborious process. Eventually, sash planes gave way to shapers, tenoners and molders—but while these heavy machines made the job easier, they were still too expensive and too large for many small shops.

Now there's a better way. Freud has recently introduced a pair of router bits (see top photo, opposite page) designed to cope and stick the parts of a glass light cabinet door in just a couple quick operations. The only additional joinery work required is mortising for the short tenons on the rails and muntins. In this article, I'll show you how these new bits make a difficult job much easier.

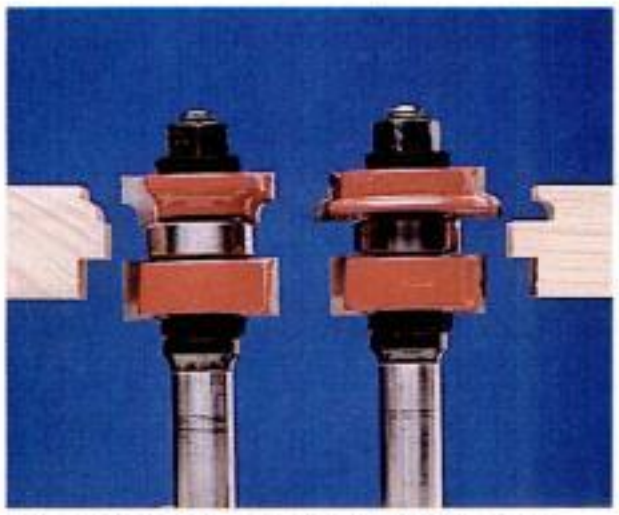
The Importance of Patterns

Precise layout of various parts is the key to a door that fits together perfectly. Parts must be sized exactly and spaced correctly, because even the smallest discrepancies in muntin alignment will be noticeable in the finished door.

I always draw full-size layout patterns of the height and width sections of the door before beginning construction. (See Fig. 1.) With these I can measure the dimensions and spacings of all the parts directly and accurately.

To draw your patterns accurately, you'll first need to make a sample muntin. To do this, plane a piece of stock to the same thickness as your door and joint one edge straight and square. Leave the stock wide for now; you'll rip it to width after routing the sticking profile on one edge.

Delicate work. *Glass light doors lend a classic look to any cabinet and let you display favorite objects inside.*



The bits that make it easy. *Freud's stick bit (left) cuts the stick profile and the glass rabbet. The matching cope bit (right) copes the ends of rails and muntins and makes a 3/16-in. tenon.*

Chuck the stick bit in your router table. For a 7/8-in.-thick door, set the bit height to cut a rabbet 5/16 in. deep, as shown in the Fig. 2 detail. For thicker doors, add washers between the cutters to increase the space between them by the amount of the additional stock thickness. Set the router-table fence so the bit's bearing protrudes about 1/64 in. This ensures that the workpiece will make full contact with the bearing.

Rout the stick profile on the jointed edge of your workpiece. Then, rip the routed piece slightly wider than your muntin and joint it down to finished width. Use a hold-down-style push stick to guide this delicate part safely.

You'll need a special push stick to rout the remaining profile on your sample muntin. (See right photo, below.) I made mine by cutting grooves in the edge of a scrap on the tablesaw, to create a contour that would register firmly against the routed profile. I screwed a simple bandsawn handle to the push stick and attached an overhanging tab to the back to push the workpiece.

Trace the outline of this sample muntin on your full-size patterns. Measure carefully and use a knife or an extremely sharp, hard lead pencil. Once you've completed the two patterns, you're ready to build the door.

Door Construction

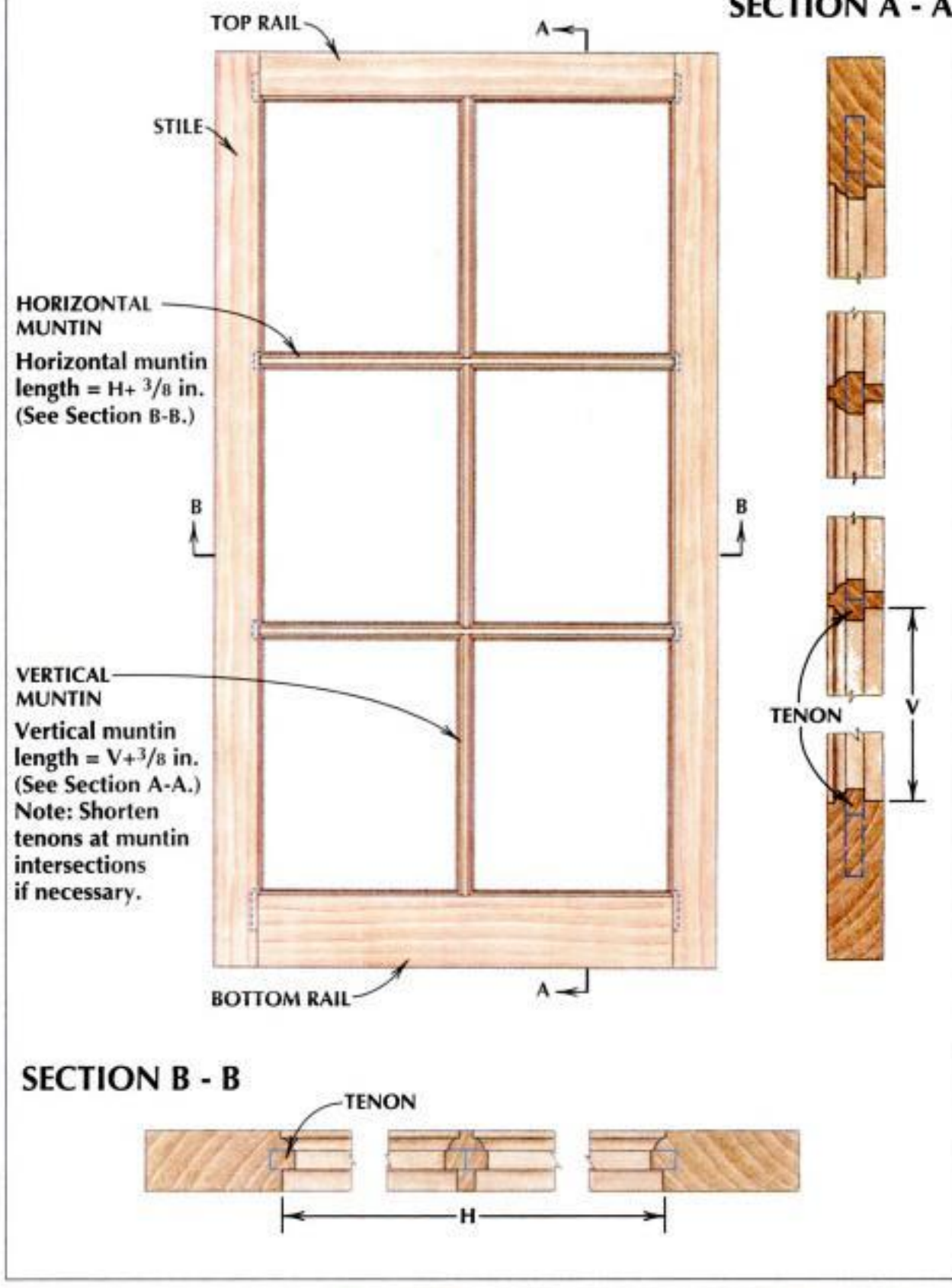
There are six main steps involved in building a glass light door.

Step 1: Prepare the stock. Select the widest, straightest-grained stock you have available. Plane the stock to your finished door thickness.

Rip the stiles to their finished width, leaving them about 1/4 in. over length

FIG. 1: TYPICAL DOOR ANATOMY

On a typical glass light door, the horizontal muntins run from stile to stile and are the same length as the rails. The top rail is usually the same width as the stiles, and the bottom rail is about a third wider than the top rail. Muntins are typically 1/2 in. to 5/8 in. wide.



Coping multiple muntins. *Cope the ends of a wide muntin blank before ripping the individual muntins free.*

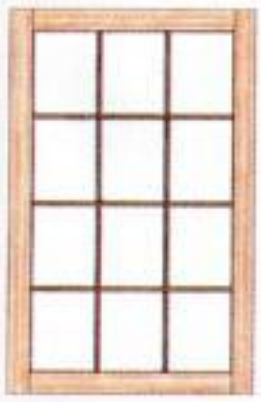
Sticking delicate parts. *Use a shop-made push stick to safely stick the second edge of a muntin.*

DOOR DESIGN

In traditional glass light doors, a 4:5 width-to-height ratio is the usual proportion for the lights. Square lights are better suited to contemporary furniture, but virtually anything—asymmetrical lights, leaded glass, etc.—is acceptable if it complements the overall design. —*B.McC.*

Six- or nine-light. *Often used in pairs on Dutch cupboards.*

Twelve-light. *Commonly used on Pennsylvania corner cabinets.*



Tombstone. *Single or multiple arches used on High-style period furniture.*

Gothic. *Curved muntins make this the most difficult door. Found on High-style period furniture.*

Asymmetrical. *Geometric patterns popularized by architect Frank Lloyd Wright and used widely on contemporary cabinetry.*

for now. You'll trim them to their finished length after assembling the door.

Next, crosscut blanks to the exact length of the rails and muntins—as shown on your layout patterns—making sure to account for the 3/16-in. tenons at each end. Don't rip the rails and muntins yet; it's easier to cope them when they're still together in a single blank. Make extra blanks in case of a mistake.

Step 2: Cope the ends of the rails and muntins. Chuck the cope bit in your router table and set its height to match the sample muntin profile. Set the router-table fence with the bit's bearing protruding about 1/64 in.

Cope the ends of your rail and muntin blanks, keeping the work pressed flat to the router table and flush to the fence. (See bottom left photo, page 49.) If narrower blanks are too awkward to feed square to the fence, use a square panel as a backup block.

Step 3: Stick the edges of all the parts. Switch to the stick bit, setting its height to match your cope cuts. Stick the stiles and rails first, remembering that these parts receive the profile on only the inside edge.

Make the muntins the same way you made your sample muntin earlier: Joint one edge of the coped muntin blank, rout the stick profile along the jointed edge, then rip a single muntin free. Use your special push stick to hold the muntin as you rout the remaining stick profile. Repeat this sequence to make the remaining muntins. (See bottom right photo, page 49.)

Trimming a tenon. *The author chisels a rail tenon to finished width.*

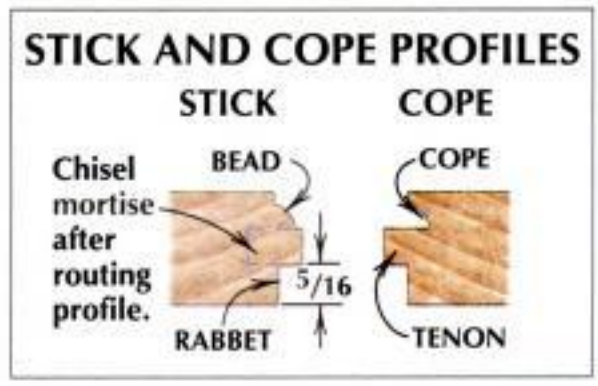
Step 4: Cut the mortises. Lay out all the mortises according to your height and width patterns. Notice in Fig. 2 that the mortises for the rail tenons are set in from the ends of the stiles.

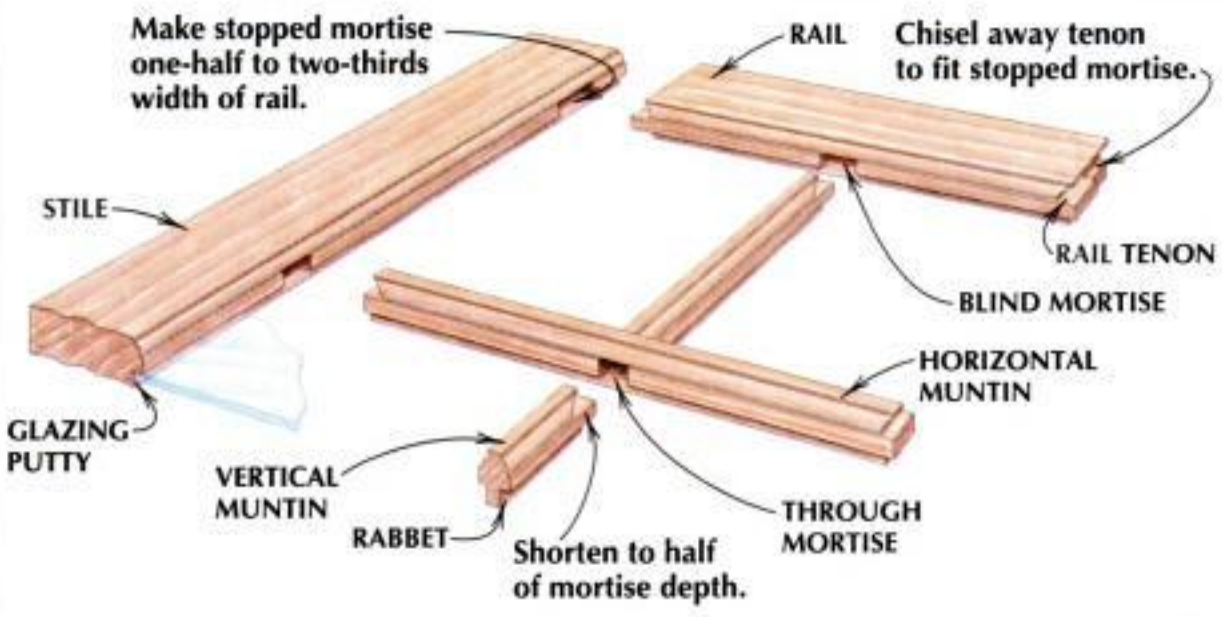
You could chop the mortises by hand, but I use a drill press or hollow-chisel mortiser. On the drill press, drill a series of holes with a brad-point or Forstner bit before chiseling out the rest of the waste. I use a shop-made registration jig to expedite the drilling and to make the mortises line up. (See sidebar, opposite page.) When cutting the through mortises in the muntins, it's cleaner to drill and chisel in halfway from each side.

FIG. 2: JOINERY

ORDER OF WORK

1. Use cope bit to cope ends of rail and muntin blanks.
2. Use stick bit to rout stick profile on stiles and rails, then on muntins.
3. Cut mortises.
4. Shorten muntin tenons at intersections.





Now, fit the tenons to the mortises. You'll have to chisel away the waste on the rail tenons. (See photo, opposite.) Unless your muntins are unusually wide, you'll have to shorten the stub tenons at the muntin intersections before assembly.

Step 5: Assemble the door. Do a dry run. Pre-assemble the muntins and rails first, clamping them lightly while you maneuver the stiles into place.

Glue the whole door in a single session, working quickly. Chisel off any squeeze-out before it hardens. After the glue dries, sand, scrape or plane the parts flush.

Step 6: Install the glass. To get the dimensions of your glass panes, subtract 3/16 in. from the height and width of each recess. I install the glass with push points, and fill in rabbets with Durham rock hard putty (available at most hardware stores). I mix a water-soluble dye stain into the putty to approximate the finished wood color. Mix just a small batch of the putty; it sets up quickly.

Call Freud at (800) 334-4107 for a local dealer. Ask for Divided Light Cabinet Door Router Bits, part #99-270. ▲

BILL McCARTHY *runs his own architectural woodworking firm in southeastern Pennsylvania.*

MAKE A MORTISE-SPACING JIG

Precise, repeatable mortises on the drill press or hollow-chisel mortiser

Accurate mortise spacing is crucial when you're making glass light doors. This easy-to-make jig, which can be used on a drill press or hollow-chisel mortiser, indexes your workpiece for foolproof spacing every time.

The jig consists of a carriage that slides against a fixed fence. You'll need separate carriages for each different mortise pattern—one for the stiles and another for the rails and horizontal muntins. The mortise spacing is determined by stops nailed to the carriage, which register against a plywood or metal fork attached to the fixed fence. (See photo, right.) If you're using a hollow-chisel mortiser, make the fork from 1/4-in.-thick metal, so it will also serve as a hold-down.

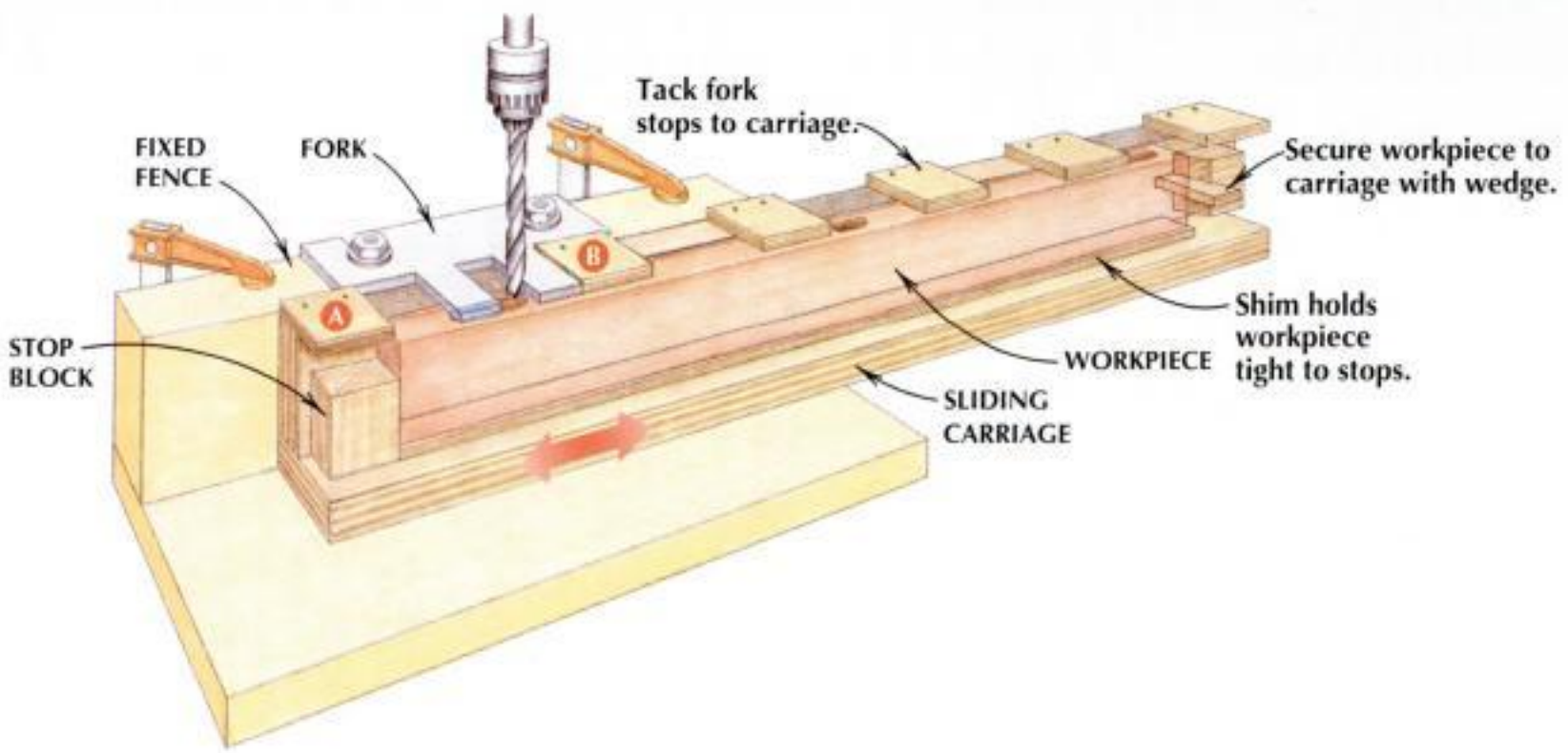
To locate the stops on the carriage, first mark the precise mortise locations on your first workpiece. Wedge the workpiece in the carriage as shown in the drawing, and position the carriage so the bit is lined up with the left end of the mortise. Tack a plywood stop to the carriage against the left side of the fork. Reposition the carriage so the bit lines up with the right end of the same mortise, and tack a stop against the right side of the fork. Repeat this process for each mortise location.

Foolproof mortise spacing. *McCarthy's jig guarantees accurate mortises, time after time. You can use the jig on a drill press or a hollow-chisel mortiser.*

Make your mortises first in one stile, then in the opposite stile, with the same end of each stile butted against the stop block. Readjust the fixed fence in or out, if necessary, to align the centerline of your holes with the drill bit. —*B.McC.*

USING THE JIG

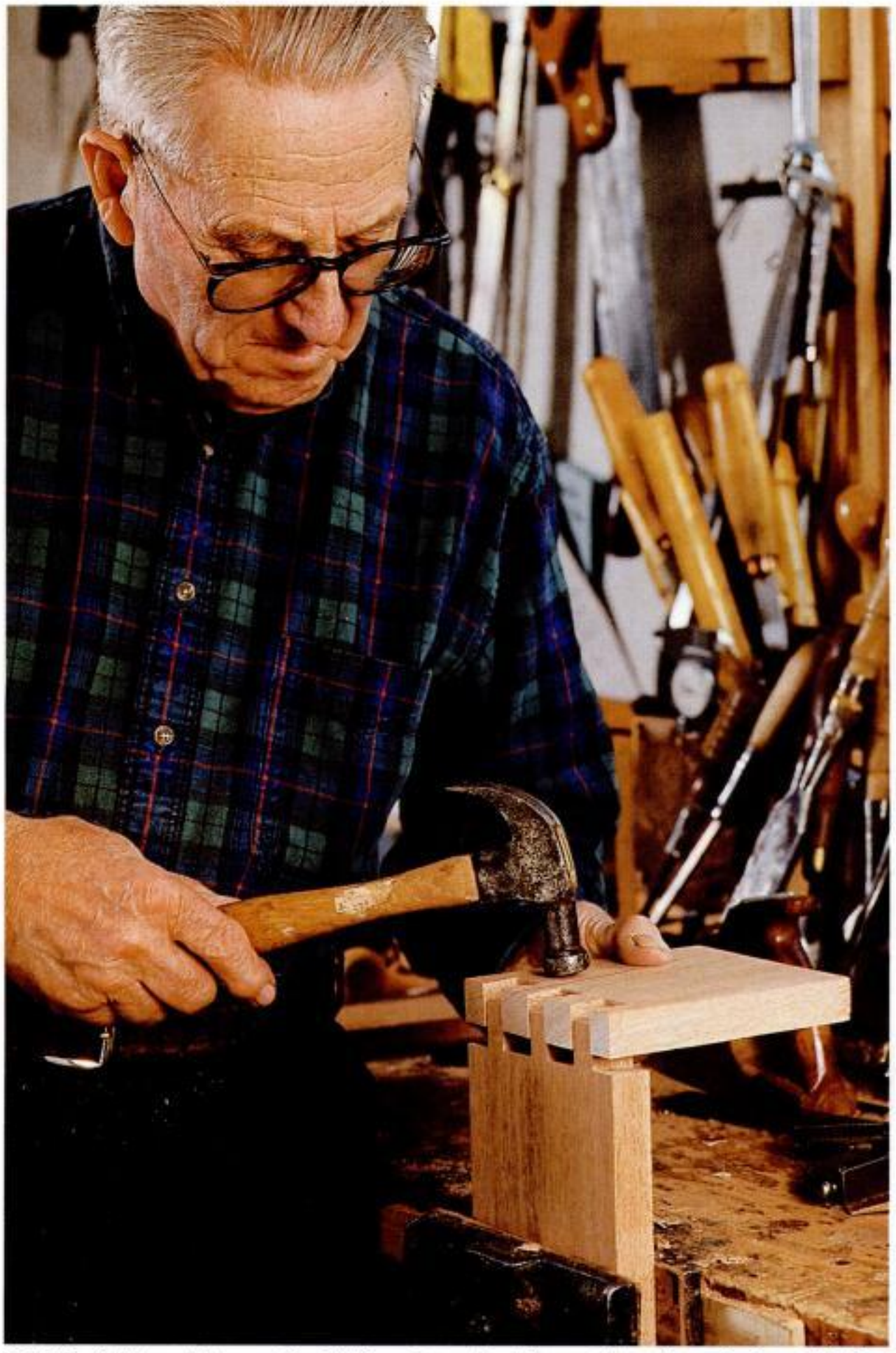
To use the jig, butt stop A against the fork and drill a hole. Then, butt stop B against the other side of the fork and drill the opposite hole. Last, drill out the waste between the holes and straighten the mortise walls with a chisel.



Through Dovetails Made Easy

First-time fits are certain when you know the secrets

by Cecil Pierce



Quick, tight and strong. *Cecil Pierce's method for cutting through dovetails by hand is easy to master, and produces joints that go together precisely.*

The march of technology has brought many benefits to woodworkers, including the power tools and jigs to cut dovetails with bits that spin at 22,000 rpm. But I still like to cut dovetails by hand. The reasons aren't difficult to understand. In this age of machines and electronics, working with hand tools is like eating an old-fashioned, home-cooked meal after numerous trips to fast-food restaurants—very nourishing. When I cut dovetails by hand, I make a connection with many generations of woodworkers who came before me, honoring their work and improving my own skills at the same time.

If you use the techniques explained in this article, you'll be able to make dovetail joints quickly, easily and effectively. It's just a matter of scribing, sawing, chopping and paring with some basic tools. Tolerances can be met to within thousandths of an inch, rivaling any results you'd hope to achieve by machine. And you're free to lay out pins and tails using any spacing or angle setting you like.

While the techniques covered here apply to through dovetails, they could easily be adapted for cutting half-blind dovetails as well. So put away your router, sharpen up your chisels, and let's get started.

Simple Tools

Cutting dovetails by hand doesn't require anything complicated in the way of tools. I use a marking gauge and a square for laying out the tails and pins. I scribe with a plane iron. The single bevel of a plane iron (or chisel) enables you to scribe a line exactly along the edge of your square, template, or straightedge. Never use a pencil or a marking knife for dovetail layout. The pencil leaves a line that's far too wide, and the knife is inaccurate because of its double-bevel edge. (See Fig. 1.)

Editor's Note

Well-known for his handmade wooden planes and his love of woodworking, Cecil Pierce passed away in January of 1996, at the age of 89. (See AW #52, page 16.) This article is adapted from Pierce's book, The Precision Handcutting of Dovetails (1995, The Monmouth Press, 207-933-4922), and from notes taken during a visit to Pierce's home and workshop on Southport Island, ME.

PHOTOS BY RANDY O'RY

It takes a good deal of courage for me to admit that I don't use a dovetail saw to make the tail and pin cuts. Instead, I use an old hacksaw frame and a hacksaw blade with 14 teeth per inch. The hacksaw blade cuts much faster than any dovetail saw, and the saw's open frame makes it easier for me to steer the blade with my left hand. (Note: Pierce lost the fingers of his left hand in a planer accident many years ago.)

Finally, you need a couple of sharp chisels to remove the waste between tails and pins. One chisel should be narrow enough to fit between the tails and pins you're planning to cut.

Before you begin laying out the joinery, it's important to check and mark up your tail and pin pieces. Make sure that all the parts you're planning to join are square and cut to the proper widths. Match up the tail and pin pieces that will be joined, and give them reference marks so you'll be able to match them up later. Decide what sides you want to show in the finished assembly, and give the outside faces a reference mark.

The Baseline

The baseline is sacred when you're cutting dovetails. If you allow a tool to leave its imprint below the baseline, this infraction will show up in the finished joint. The challenge when cutting dovetails is to cut exactly up to the baseline, but not beyond it. My approach enables you to do just that.

To adjust my marking gauge for scribing the baselines on tail and pin pieces, I add 1/16 in. to the thickness of these pieces. In other words, if the pin piece is 3/4 in. thick, I want the height of the tails to be 13/16 in. (See Fig. 2.) The objective is to create a finished joint with pins and tails that stand a bit proud of the surface. This excess can then be planed or sanded flush.

Make sure the scriber in your gauge is sharp, and don't set it to cut any deeper than 0.006 in.—the thickness of three sheets of newspaper. Scribe all the way around the pin piece. On the tail piece, just scribe the faces.

Tails First

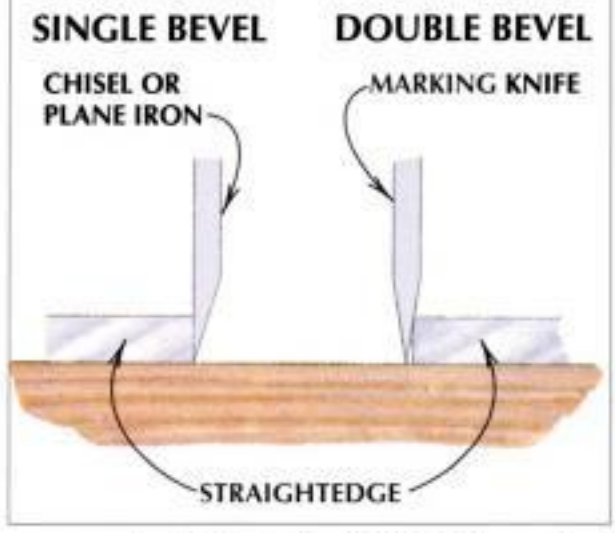
I always cut the tails first because I can then use the completed tailpiece as a template for scribing the pin layout. Much has been written about recommended angles for dovetails, based on the type of wood being used and the joint's intended purpose. I don't get very excited about all of this. The angle I use most often when laying out through dovetails is 9°. Another preference of mine is to use half-tails at the ends of a dovetailed joint, rather than half-pins. (See Fig. 2.) If you're a half-pin person, you can still use my technique for cutting dovetails by hand.

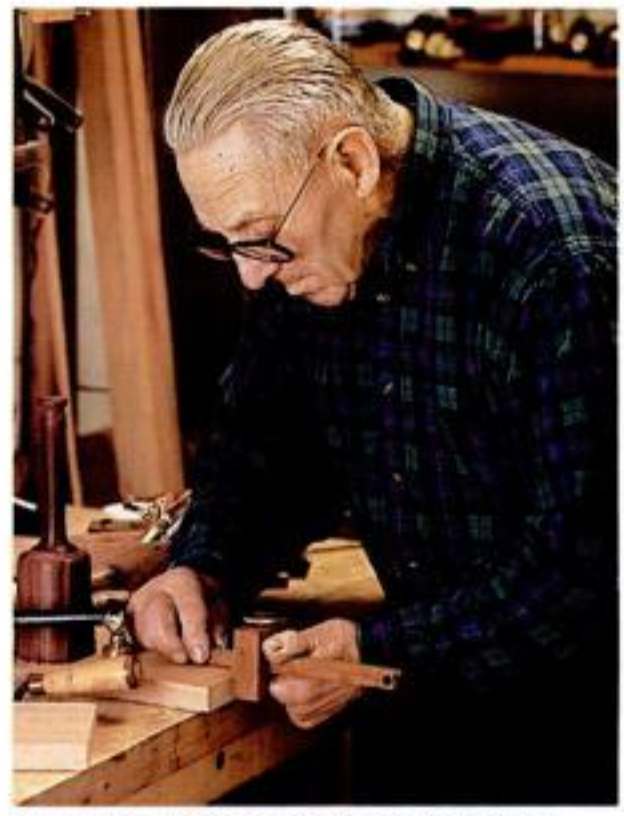
When laying out the tails, I like to work from templates cut from hardboard or 1/8-in. plywood. I often end up making more than one of just about anything I build, and templates cut down on layout time anytime you're making duplicates. But it's also easy to do your layout right on the tail piece, using a bevel gauge and a square.

Either way, I lay out the half-tail at each end of the tail piece first. For appearance and strength, you don't want the half-tails to be too narrow. My rule of thumb is to make them at least half as wide as a full tail.

FIG. 1: SCRIBING DETAILS

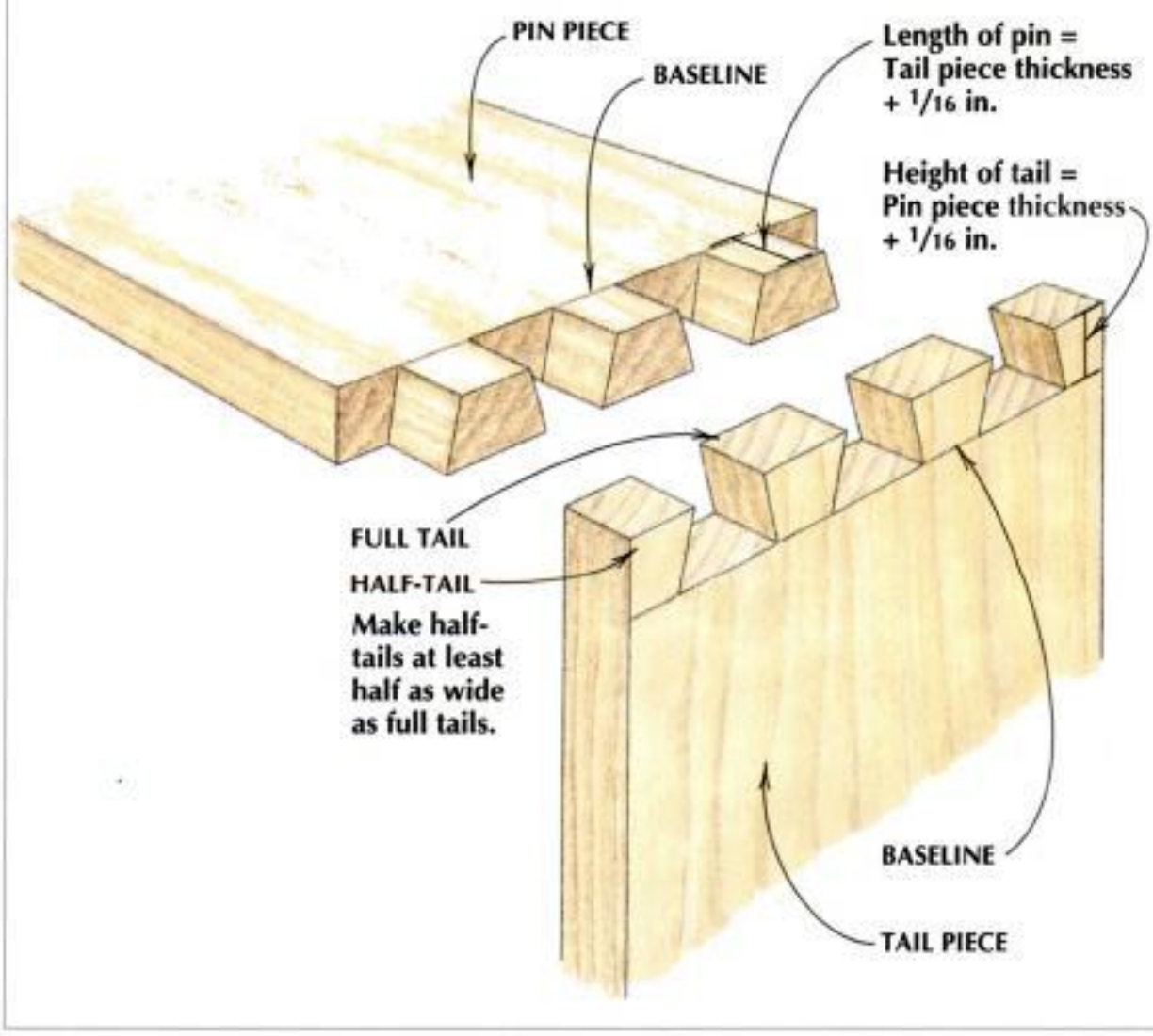
A single-bevel tool, like a chisel or plane iron, will scribe more accurately than a knife or other double-bevel tool.



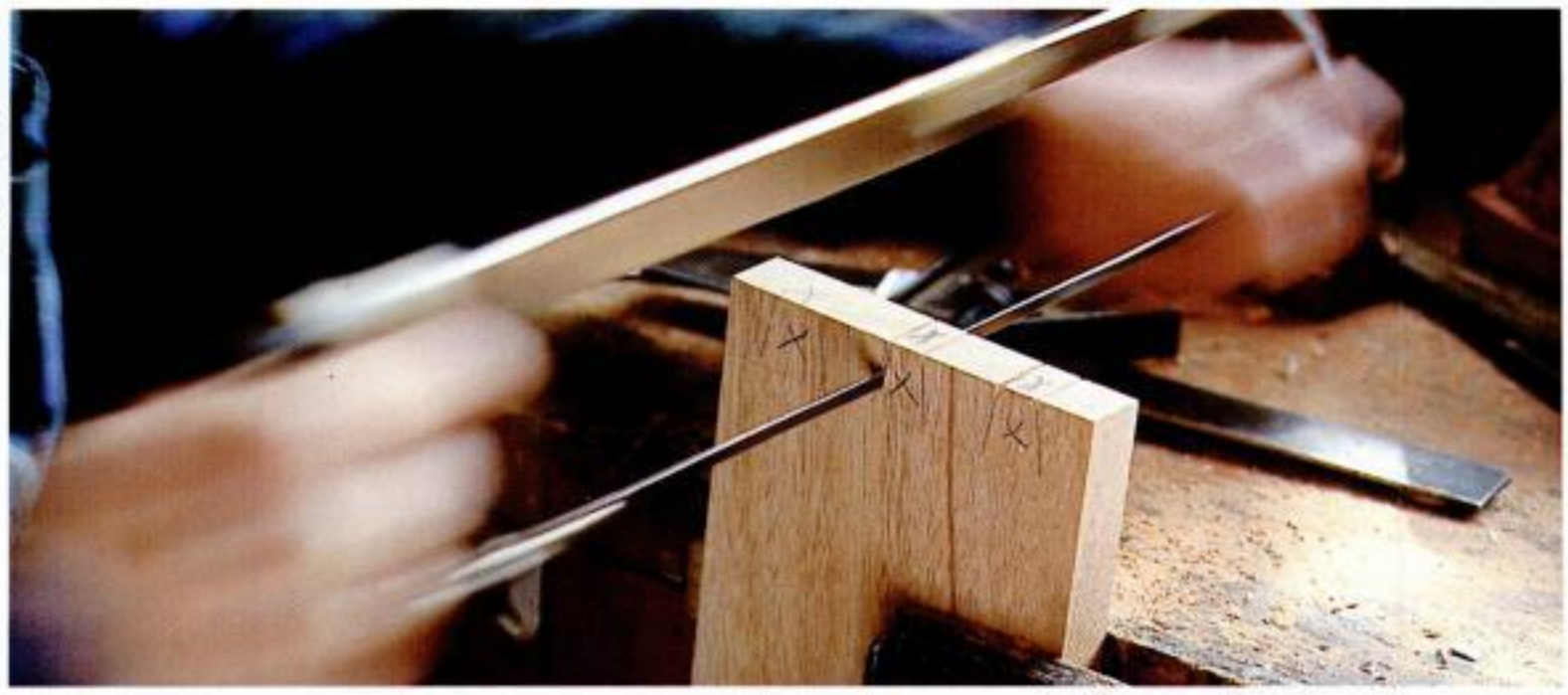


Baselines are sacred. *Pierce uses a marking gauge to scribe baselines on both pin and tail pieces.*

FIG. 2: BASIC THROUGH DOVETAIL LAYOUT

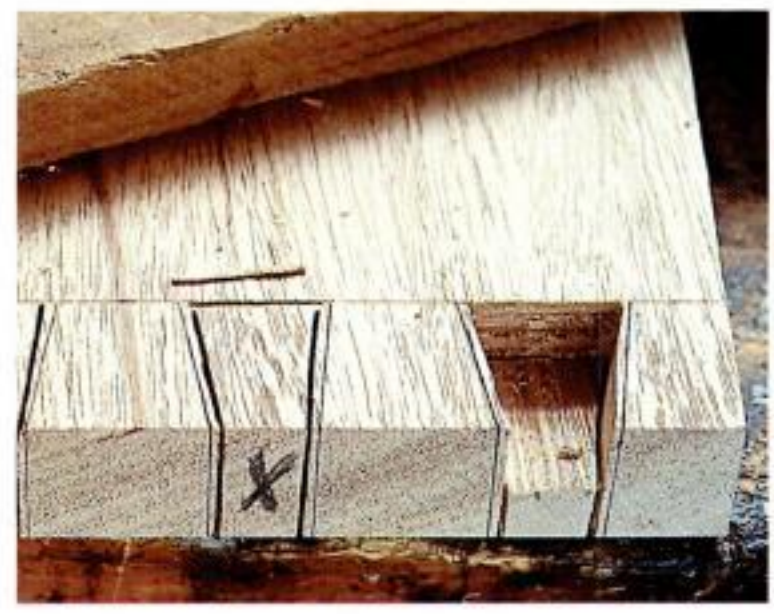


CUTTING THE TAILS



Saw the tails. *Staying 1/16 in. away from the layout lines, Pierce uses a hacksaw to make the angled tail cuts.*

Create a shoulder. *Pierce positions the chisel's cutting edge about 1/16 in. from the scribed baseline (left) and gently taps with a mallet to remove a sliver of wood (below). This produces a shoulder to guide his chopping cuts.*



Remove the waste. *After chopping down at the baseline, the author chops in from the end and pries out the waste.*

Pare to the lines. *Pierce removes the small amount of waste outside of each scribed layout line.*

LAYING OUT THE PINS

Transfer the tails. *Pierce uses the tail piece as a template when laying out the pins. He presses down with a sharp chisel or plane iron.*

Square down. *He completes the pin layout by extending his end-grain marks down to the baseline, using a square and a chisel.*

Clamp the tail piece in a vise with the end grain facing up. Use a sharp plane blade or chisel to scribe the angled tail lines. Now scribe across the top edge of the joint, using a small square to take the layout lines across to the opposite side. Flip the piece around in the vise and scribe the remaining angled lines. Pencil an "X" in each waste area.

When it comes to sawing out the tails, resist the temptation to be overly precise. All you need to do is stay about 1/16 in. on the waste side of each angled line, while sawing down to the baseline. (See top photo, opposite.) This is the only sawing required to complete the tails.

Now we chop out the waste. The first thing to do is to make good use of the scribed baseline. Clamp the tail piece flat on the bench. Now, place the edge of your chisel about 1/16 in. from the baseline, with its bevel facing down and its cutting edge aimed toward the bottom of the scribed line. With a gentle tap of the mallet, remove a tiny wedge of waste to create a minute shoulder along the baseline, between adjacent tails. (See middle photos, opposite.)

Despite its tiny size, this baseline shoulder is strong enough to chop against as you remove the waste from between the tails in chip-by-chip fashion. With the flat side of the chisel fast against the baseline shoulder, give the tool a sharp rap with your mallet. Then reach for a narrower chisel (one that can fit between the tails) and tap it to make a horizontal cut—one that will free up a chip of waste from between the tails. A few more vertical and horizontal cuts and you will have removed enough chips to get about halfway through the waste. Stop and proceed to the next waste piece, and repeat the same steps. When you're done on this side of the joint, flip the tail piece over, reclamp it on the bench, and chisel away the remaining waste as before.

Paring the sides is all that remains to complete the tails. Here's where a razor-sharp chisel can really make a difference. I pare to each scribed layout line by guiding the chisel blade with one hand and pushing forward into the wood with the other. (See bottom right photo, opposite.) Don't pare all the way across the full width of the tail. Instead, pare about halfway across, then flip the board and pare from the opposite side.

Pin Work

If you've gotten this far, the rest of the job shouldn't present any problems. Clamp the pin piece in your vise with the end grain facing up. Now align and clamp the completed tail piece over the pin piece. (See left photo, above.) The outside faces of both pieces should be facing out, and the baseline between the tails needs to be even with the inside of the pin piece.

When you've got the two pieces aligned and clamped in this way, it's easy work to scribe for the pins. Keep the flat side of your chisel or plane iron fast against the sides of each tail, and press or tap the tool to leave a scribe line. Unclamp the tail piece and mark waste areas with an "X". Once I've marked the pin locations on the end grain, I remove the tail piece and use a square and chisel to scribe my marks down the faces to the baseline. (See right photo, above.) Just to be safe, I "X" out the waste sections on the faces as well.

Sawing out the pins isn't much different from sawing out the tails. Keep 1/16 in. on the waste side of each scribe line as you make each cut down to the baseline. To cut out the top corners of the pin piece (where the half-tails will fit), I clamp the pin piece horizontally in the vise and saw parallel to the baseline, but 1/16 in. above it. I'll pare these shoulders to the baseline later.

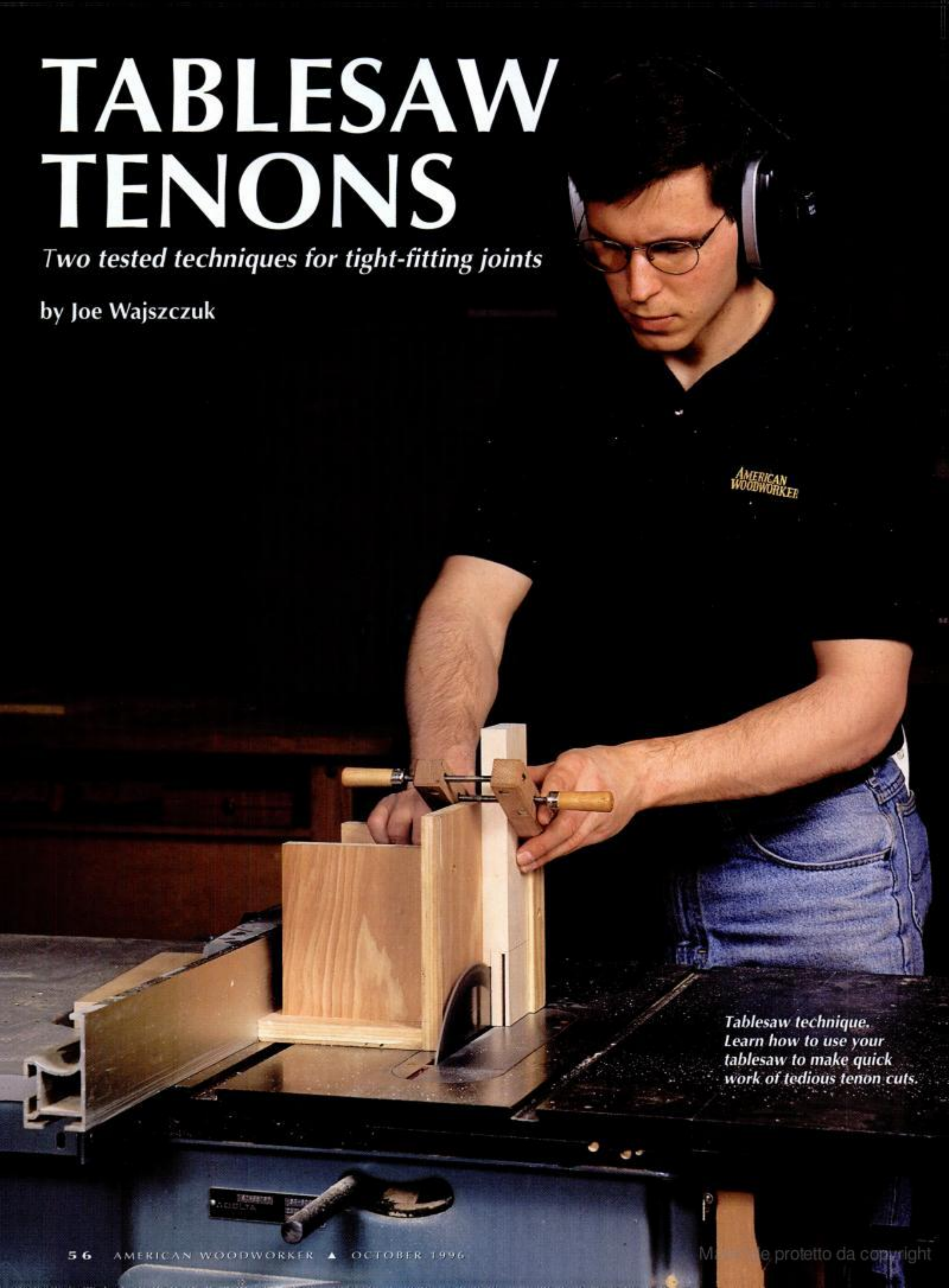
To remove the waste between the pins, repeat the technique used for the tails—again creating the small shoulder along the baseline, between each pin. This gives you a final edge to work against. Chop down, across the grain, then chop in, with the grain, to remove each waste chip. Work halfway through the joint, then flip the piece and repeat the steps. Pare away the 1/16 in. of waste on the sides of each pin.

Pare the corner cutouts and you're ready to enjoy the fruits of your labor. With practice, you'll find that this approach to cutting through dovetails eliminates the need to test-fit. With a few taps, you'll knit the pins and tails together to create a joint that's strong and beautiful. ▲

TABLESAW TENONS

Two tested techniques for tight-fitting joints

by Joe Wajszczuk



Tablesaw technique. Learn how to use your tablesaw to make quick work of tedious tenon cuts.

Not just tenons. *You can cut tenons (right) and both halves of a bridle joint (left) with the author's jig.*

Drill, chop, pry and pare—for centuries, the mortise was the most difficult half of the mortise-and-tenon joint. Today the tables have turned. Thanks to plunge routers and hollow-chisel mortisers, mortising has become a quick, one-step operation. The tenon, however, still requires eight separate cuts: two cheek cuts, two edges and four shoulders. Here are two ways to get the job done quickly and accurately on your tablesaw—with a dado cutter or with a tenoning jig.

A few tips before you begin: Remember to make the mortise first. It's easier to fit a tenon to a mortise than the other way around. If you're making many tenons of the same size, be sure to dimension your stock uniformly. Finally, make a few extra pieces to test your setup, so you don't risk ruining good stock.

Lay Down the Lines

Tight-fitting tenons begin with a careful layout. For this you'll need a square, a marking gauge, and a knife or pencil.

Lay out the shoulders first. Use a square to establish the shoulder on one face and to transfer the line around all four sides of the joint. Lay out the cheeks next. The easiest way to do this is with a two-pin marking gauge. Set the pins to the mortise width, then scribe both tenon cheeks on the edges and end grain of your stock. (A single-pin gauge requires two passes.) For centered tenons, you can measure and mark the cheek cuts from either face, but for offset tenons, it's important to choose one face of the workpiece (outside or inside) as the reference face.

The strength of a mortise-and-tenon joint depends on the fit. A well-fitting joint should come together with firm hand pressure but shouldn't require the clamp or mallet approach. ▲

JOE WAJSZCZUK *is an assistant editor of AW.*

PHOTOS BY DAVE SELLERS. ILLUSTRATION BY MELANIE POWELL

CUTTING TENONS WITH A DADO CUTTER

With a dado cutter, you can cut the shoulders and cheeks in a single setup. Use your rip fence to establish the shoulder height, and nibble away the waste. If your tenon is centered, flip the stock over to cut the other cheek. For offset tenons, reset the blade height, make your test cuts, and then cut the other cheek.

The downside to dado cutters is that they take some time to set up. And the tenon faces may need to be cleaned up afterward for a smooth fit.

Multiple passes. *Using a dado cutter, you cut tenon cheeks and shoulders with a series of overlapping cuts.*

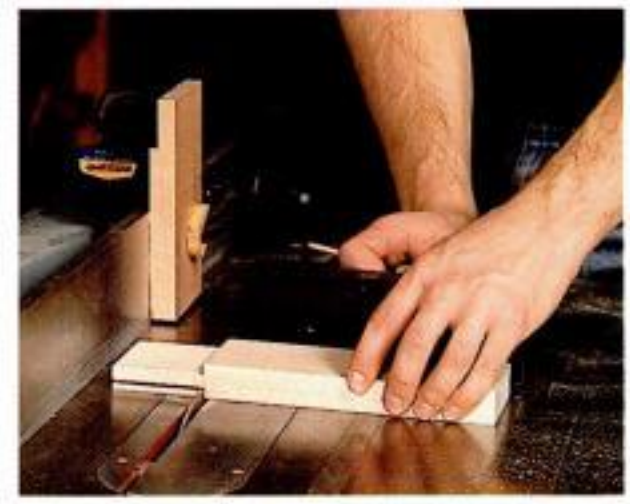
CUTTING TENONS WITH A JIG

A tenoning jig works best with a combination rip/crosscut blade. The jig shown here is easy to make and use, and it can cut bridle joints in addition to tenons. (For a more advanced jig, see AW #45, page 96.)

To cut the cheeks, clamp the workpiece to the fence, set the blade height just shy of the shoulder line, then push the jig and workpiece past the blade. After each cut, lift the jig and bring it back. Don't pull it backward through the blade. To cut the second cheek, I prefer to reposition the jig—not the workpiece. If you flip the stock, you'll double any layout or stock-dimensioning errors.

Next, cut the shoulders. Use a stop block to align the cut and a miter gauge to guide the workpiece.

Cheek cuts. *This jig cuts clean cheeks in a single pass. Set the blade height just below the shoulder line.*



Shoulder cuts. *Use a stop block to align the shoulder cuts. Guide the stock with your miter gauge.*

FIVE-BOARD TENONING JIG

This jig's wide base supports the work and runs against the rip fence. The replaceable stop block prevents tearout. To adjust the cut, simply move the rip fence.

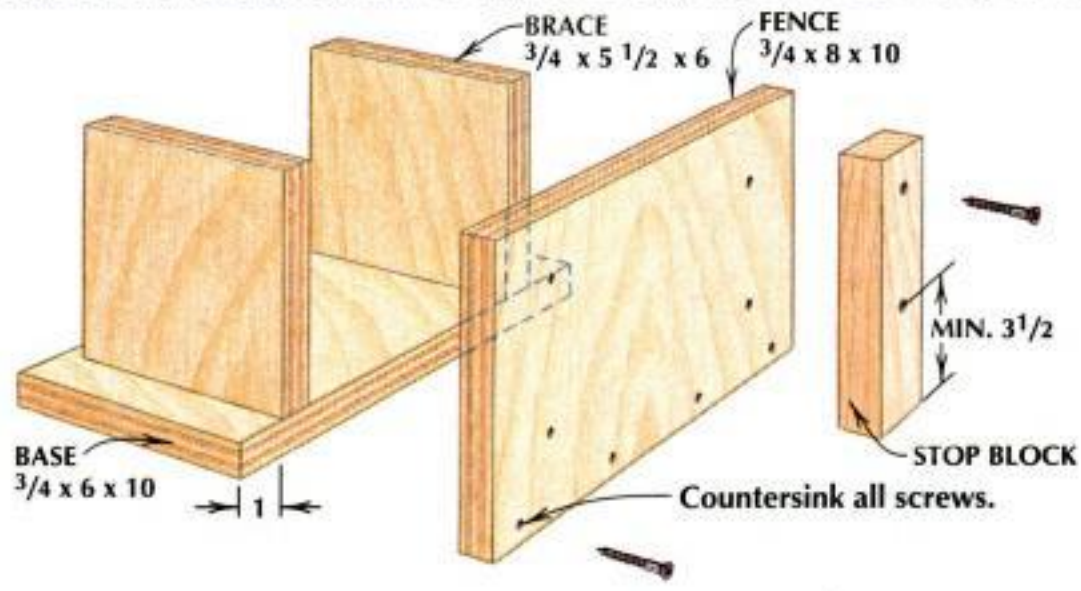


PHOTO BY JOHN HAMEL

Double-purpose, double-sided storage. *Anthony's freestanding rack, above, holds hundreds of feet of lumber and up to nine sheets of 3/4-in. plywood.*

Wood Storage Racks

Five great ways to keep your stock flat, dry and accessible

by Paul Anthony

FREESTANDING LUMBER AND PLYWOOD RACK

I cobbled this rack together from 2x4s and plywood offcuts. Strong and inexpensive to make, it holds hundreds of board feet of lumber and as many as nine sheets of 3/4-in.-thick plywood.

I use two of these modules (see drawing) to provide uniform support for lumber up to about 10 ft. long. You can add another module or two to extend the rack's length.

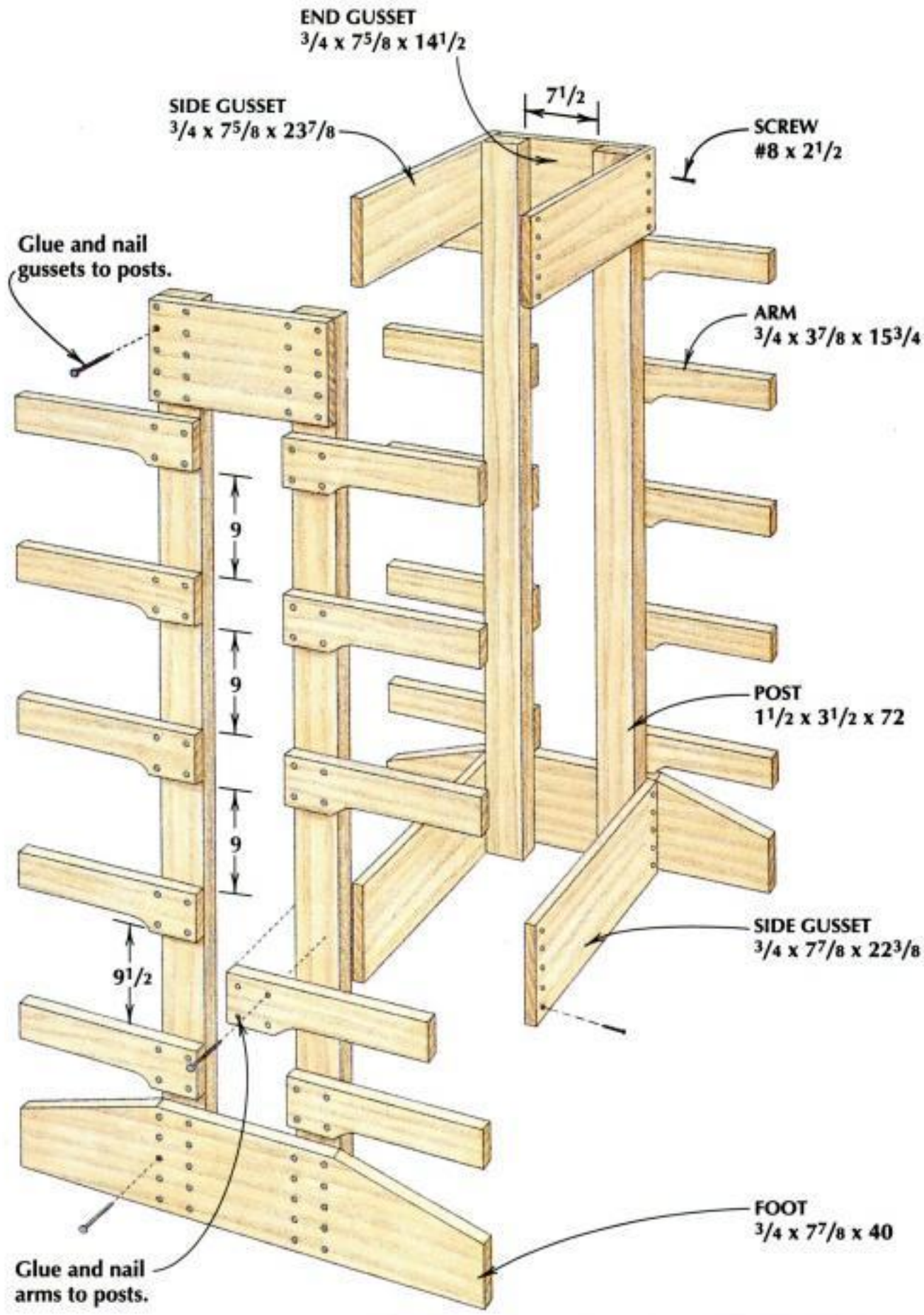
To fully access the back side, you have to set the rack a couple of feet away from the wall. If you don't have that much room, you can just put the rack against the wall and use the back side for long stock—loading and unloading it from the end.

I place a strip of plywood across the top arms to hold short pieces. A 1x8 through the center of the rack forms a floor for sliding sheet goods in and out.

Choose kiln-dried, straight-grained 2x4s for your posts. A rack that twists as it dries won't keep your lumber flat. And wet lumber doesn't glue well either.

I glued and nailed the arms, end gussets and feet to the posts, but you could glue and screw them instead. I relieved the underside of each arm to provide maximum stacking room.

Screwing rather than nailing the side gussets makes module assembly easier. The number of fasteners may look excessive, but I can't risk hundreds of pounds of wood crashing at my feet because my rack racked.—*P.A.*



ILLUSTRATIONS BY FRANK ROHRBACH

If there is one problem common to all woodshops, it's lumber storage. If you're not careful, the volume of raw materials for your projects can grow to epidemic proportions.

We treasure our accumulated wood, but it can become a monster, usurping shop space and getting in our way. Haphazard wood storage can create safety problems and frustrate your search for that special piece of stock you're sure you stashed somewhere.

Lumber and sheet goods demand ingenuity. They need to be out of the way yet accessible, and they need to be protected from warping caused by careless stacking and uneven support. If you want to keep your lumber flat and straight, you have to stack it that way and keep it off of cold, moist floors. Sheet goods are especially prone to warping if they're not kept flat, and they also present special space problems because of their size.

Every shop presents its own particular wood storage puzzle, but fortunately there are a number of solutions. This article provides a peek into the shops of a few woodworkers who have come up with some clever racks to bridle their burgeoning collections of wood. You can adapt these ideas to suit your own needs. The measurements in the drawings provide general guidelines.

Whatever type of rack you build, try to provide support at least every few feet to prevent lumber from sagging. ▶

PAUL ANTHONY
is an associate editor of AW.

WALL-MOUNTED LUMBER RACK

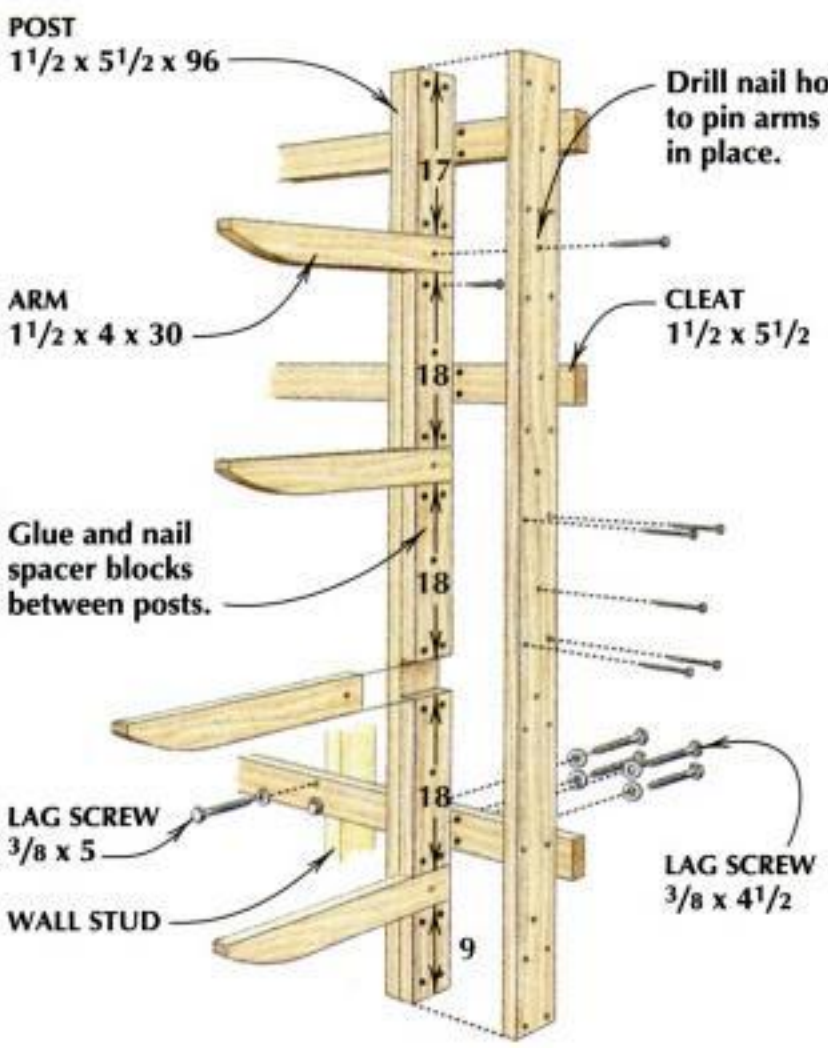
Strong, simple support. *On Peter Korn's rack, support arms are held in posts made from 2x6s. Horizontal cleats are fastened to posts and to wall framing.*

PHOTO BY TIM SNYDER

Peter Korn designed this rack to mount on a wall at the Center for Furniture Craftsmanship in Rockport, ME.

The poplar arms and 2x6 spruce posts will support heavy loads. The posts, spaced about 40 in. apart, attach to horizontal cleats screwed to the wall studs. Korn recommends using three cleats, as shown in the drawing below.

Korn glued and nailed the posts and spacer blocks together, leaving notches for the arms. He screwed the cleats to the posts, and attached the assembly to the wall. The arms can easily be removed or replaced.



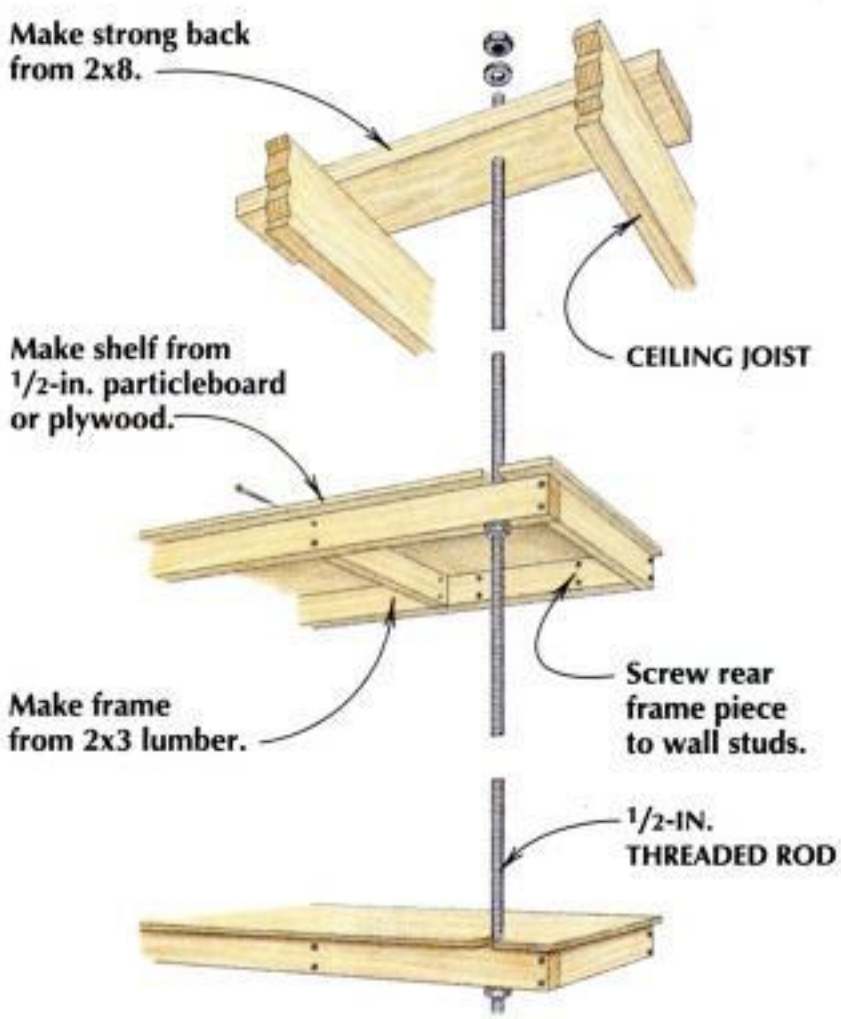
SUSPENDED SHELF RACKS

Overhead and out of the way. *Jeff Lohr's wood storage shelves are suspended from the ceiling joists above his workbench.*

PHOTO BY PAUL ANTHONY

Jeff Lohr, a furniture maker in Pennsylvania, uses the space above his workbench to store wood and furniture parts. Staggered shelves give him great storage flexibility. Because he mounted his shelf racks to the ceiling and wall, the area underneath is unimpeded by support posts.

Lohr often stores flitches of veneer on these shelves, weighing them down with a heavy plank. Being near the ceiling helps keep the veneer dry. If there is access from the end, you can also store long lumber on the shelves. Lohr hangs clamps on the front edge of the lower shelf.



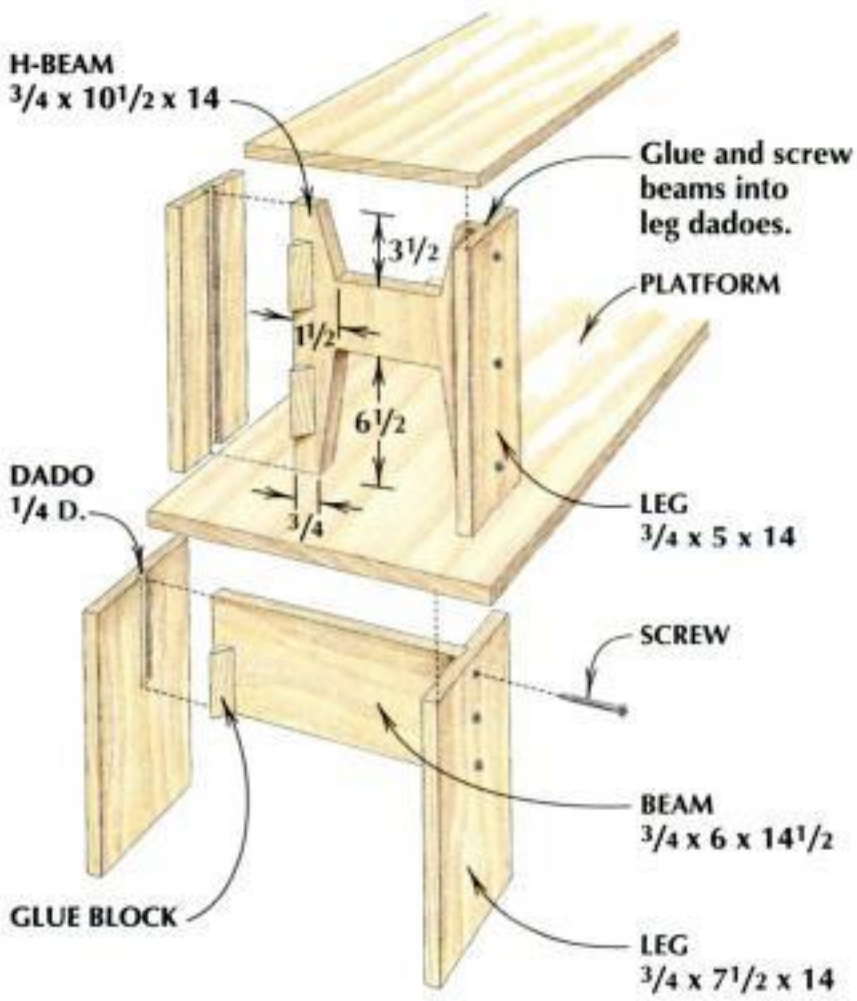
MODULAR STACKED RACKS

Storage modules that stack. *Yeung Chan uses leg-and-beam assemblies to create platforms for storing lumber.*

PHOTO BY PAUL ANTHONY

Yeung Chan's shop in northern California is compact, and space is at a premium. He designed these small particleboard modules for stacking lumber wherever he finds room. The modules are topped with 3/4-in.-thick plywood or particleboard, creating table-like platforms.

The lower modules bridge a stack of lumber on the floor. The wide beams solidly carry the weight of the loaded upper modules. The H-beams on the upper modules provide two sections for organizing lumber. For added stability on high stacks, the legs of the modules can be screwed to wall studs.



PLYWOOD OFFCUT RACK

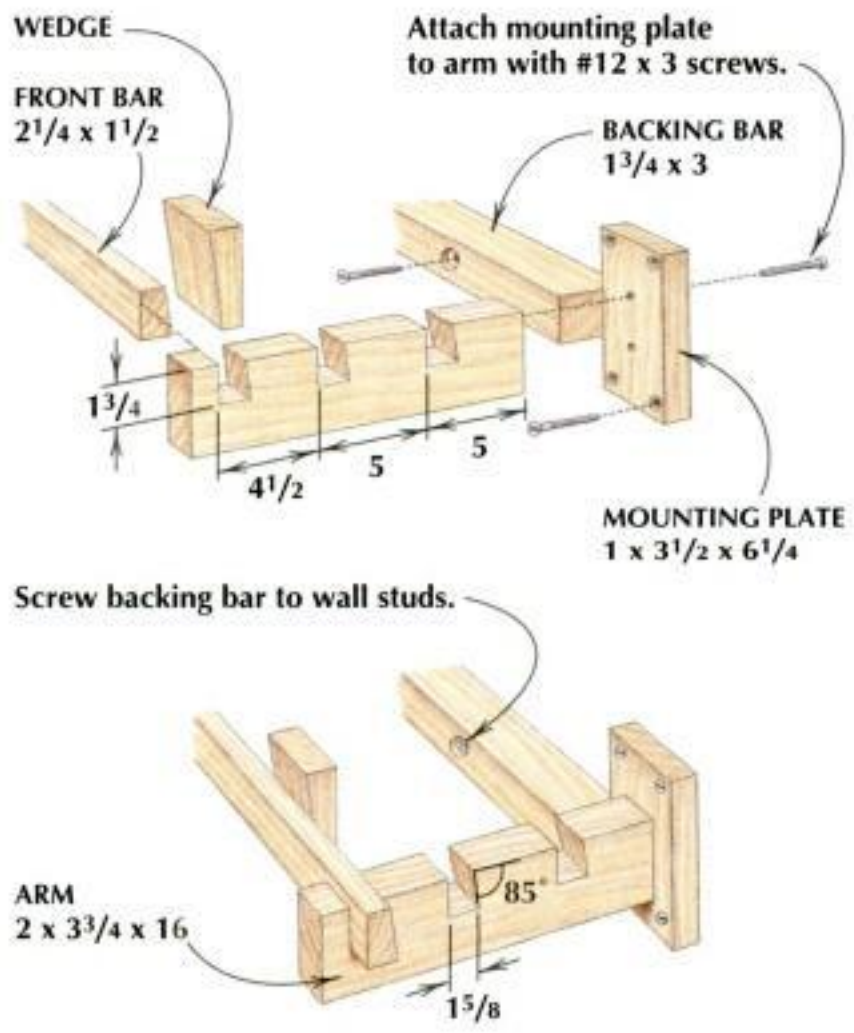
Flat storage for panel offcuts. *This rack wedges plywood offcuts tightly together to keep them from warping.*

PHOTO BY DAVID WELTER

At the College of the Redwoods in Fort Bragg, CA, this space-saving rack prevents panels from warping while standing vertically.

The rack wedges panels between two backing bars and two front bars that sit in notched arms extending from the wall. Scrapwood takes up the space between the wedges and the panels. Use hard wood like maple or birch for the arms.

Since getting to pieces in the back requires moving small pieces in front, store your infrequently used stock in back and keep small offcuts in front to a minimum. ▲



Wood on wood. *With a hardwood body and a metal mechanism, a well-tuned transitional plane offers great feel, top-notch performance, and a sole that's easy to keep flat.*

Transitional Planes

Wood-and-metal hybrids perform with the best of 'em

by Tom Stevens

I would have a hard time picking a favorite hand plane from the many that I've collected in the last 20 years, but my Bailey transitional planes would be high on the list. A transitional plane has a wooden body and a metal mechanism for holding and adjusting the plane iron. Manufactured at the same time that mass-produced iron planes were being introduced, these planes were made to fill a niche between traditional all-wood planes and modern planes in cast-iron form—hence the name "transitional."

Perhaps it's this hybrid nature that has led many woodworkers to overlook transitional planes. But I appreciate these planes for the same reasons our grandfathers did. Transitionals combine the feel of traditional wooden planes with the sure and easy adjustability of modern metal planes. Price is another plus. As a rule, antique transitional planes are comparable in cost to their metal counterparts, and much more affordable than the wooden-bodied planes made in Europe today. With a modest investment and a little repair and tuning work, you can add a nice set of "user" transitional planes to your tool collection. In this article I'll go over some historical details about these planes, then explain how you can find and fix up one or more of these fine tools.

Way Back When

Transitionals hold an interesting spot in the history of hand planes. Over hundreds of years that woodworkers made and used wooden hand planes, little was done to improve the method for adjusting the plane iron. You had to tap the wooden wedge and metal iron carefully to attain and hold the right setting. This trial-and-error process was a necessary skill of woodworking.

The Industrial Revolution, combined with a little Yankee ingenuity, fueled a tremendous surge in planemaking activity. Starting in the mid-1800s, dozens of inventors in the U.S. manufactured a variety of "improved" bench planes with mechanical cutter-adjustment mechanisms. While most of the marketing energy was devoted to all-metal planes, many companies offered wooden-bodied versions to appeal to more traditional woodworkers. These hybrid planes came to be called "transitionals" by modern tool collectors because they bridged the gap between all-wood and all-metal planes. Transitional planes were also transitional in price when they emerged:

PHOTOS BY PETER DAMROTH

TUNING A TRANSITIONAL

Tuning up a transitional plane is not all that difficult. To put a "user" plane back in good working condition, I usually start by disassembling the plane. Then I clean all the metal parts, using old toothbrushes, steel wool and mineral spirits to loosen accumulated dirt and debris. A fine wire wheel on a mandrel in a portable drill will also do a good job of removing debris, but I try not to take off any of the original paint. To loosen rust, I soak parts in some household vinegar for a few hours. Once they're clean, I protect the parts with a coat of light oil or WD-40™.

The plane iron requires some work. The iron's back can be more of a problem than the bevel if it's pitted with rust. I hollow-grind the bevel, hone the edge, and strop on a piece of leather rubbed with jeweler's rouge. I also check the cap iron to make sure it sits evenly across the iron.

I don't strip or sand the wooden parts because I like to preserve the patina and stains that give the plane its character. Instead, I clean the wood with Fuller Panel Cleaner (available where Fuller Brush products are sold) and fine steel wool. Other household furniture cleaners will also work well. I use mineral spirits to remove pitch and paint.

When reassembling a transitional plane, I make sure that the frog is seated firmly and evenly to support the iron. Frog adjustment is similar to what you find on an all-metal plane. Two screws hold the frog in place, and it's possible to slide the frog forward or backward slightly to fine-tune the clearance space between the cutting edge and the mouth of the plane.

Take it apart. *Clean the metal parts with an old toothbrush and some mineral spirits. Take care not to remove any original enamel. Parts of the plane include:* **1** *knob;* **2** *cap iron;* **3** *cutter or iron;* **4** *top casting;* **5** *frog, with thumbscrew and adjustment lever; and* **6** *lever cap.*

Mouth and Sole Work

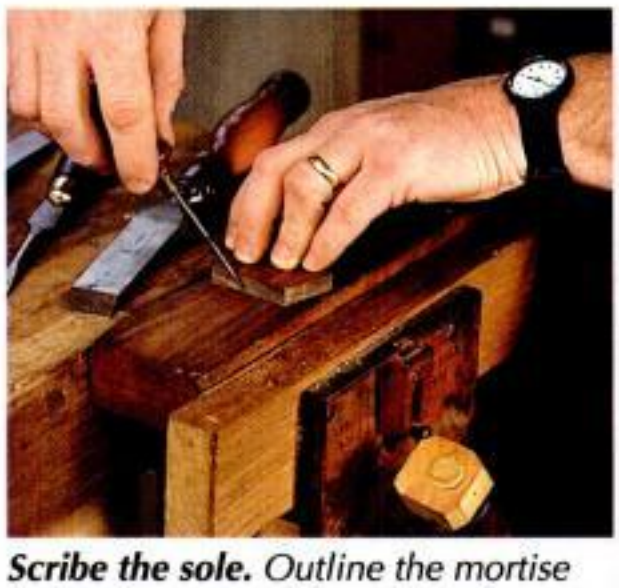
It's not uncommon to find a transitional plane with a sole that's worn out of flat or a mouth opening that's too wide. Both of these conditions need correcting if the plane is to work properly. Since I don't have a motorized jointer in my shop, I flatten the soles of transitional planes with another plane. If the plane to be trued is short, I usually clamp a jointer plane upside down and run the untrue sole against the true one. (See photo, right.) Remember to take off only as much wood as you need to, since with each pass the mouth will get a little wider.

To make the mouth repair, I cut a rectangular patch piece from beech or another hardwood. I make the piece about 3/8 in. thick, 1 1/4 in. wide, and as long as the mouth opening.

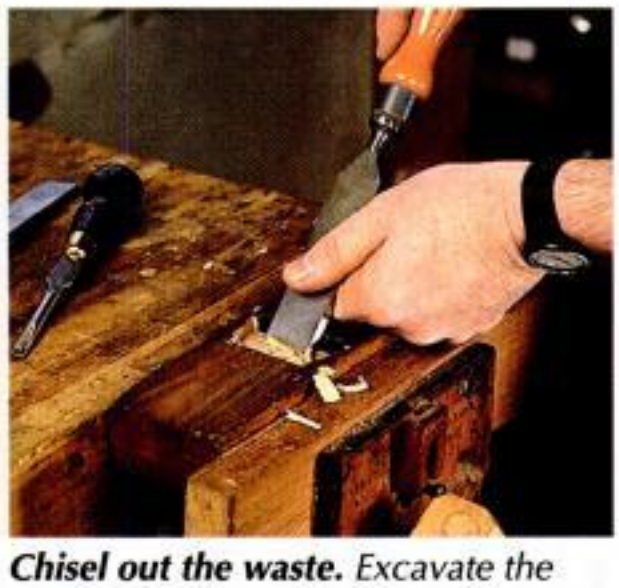
Flattening the sole. *Stevens clamps a metal jointer plane upside down in his bench vise, to flatten the wooden sole of a transitional plane.*

Make sure the grain of the patch piece runs parallel to the length of the plane, so later you can plane the sole flat without tearout. I transfer the patch shape to the sole with a marking knife, then carefully chisel out the waste. It's a good idea to make this mortise about 1/16 in. shallower than the patch thickness. This will leave some excess to trim flush after the patch is glued into place. —*T.S.*

PATCHING THE MOUTH



Scribe the sole. *Outline the mortise by tracing around the patch piece with a sharp knife.*



Chisel out the waste. *Excavate the area inside the scribe lines with a sharp chisel.*

Tap in the patch. *The installed patch should stand proud of the sole so it can be planed or scraped flush.*

Benchful of beauties. *The author's transitional collection includes (from left): a Bailey-type smooth plane made by the Ohio Tool Co., a Stanley Bailey No. 26 jack plane, and a No. 129 "Liberty Bell" fore plane.*

higher in cost than old-fashioned all-wooden planes, but not as expensive as "newfangled" all-metal models. Though interest in transitional planes waned with the acceptance of iron planes, these planes stayed in production through the Depression. They finally disappeared from the Stanley catalog around 1943.

The Bailey Plane

Leonard Bailey (1825-1905) was a master craftsman and a true star among planemakers. In 1858 he patented a metal lever cap with a cam at the top to secure the plane iron in a new line of all-metal planes he manufactured. Almost a decade later, in 1867, he patented the wheel and forked lever mechanism that is still used today to adjust the plane iron's cutting depth.

Leonard Bailey was very successful in manufacturing both transitional and all-metal planes, but in 1869 he was bought out by his chief competitor: The Stanley Rule & Level Company. Stanley aggressively marketed both lines of Bailey planes—and as soon as the patents expired, other companies followed suit with Bailey knockoffs. By 1900, Bailey-style planes were the industry standard.

Today, you can find Bailey-type transitionals with brand names like Stanley, Sargent, Union, Ohio Tool Company, Sigley, Winchester, Keen Kutter, and others. In 1909, Stanley started casting "Bailey" in the frame of its transitional planes in honor of the plane's inventor.

Bailey-type transitionals have bodies and handles made of beech, the wood of choice for American planes in the 19th century. They were made in a variety of sizes to take on different types of work:

Jointer planes. The longest planes, at 22 in. or more, these are used to flatten stock and joint edges.

Fore planes. Sized between jack and jointer planes, they're often used first or "'fore" a jointer. Using a fore plane enables you to keep your jointer plane tuned and sharp for the final flattening.

Jack planes. These are long enough (about 15 in. to 18 in.) to flatten and joint edges. But they're easier to maneuver than fores and jointers, so they can do general smoothing, too. Jack is short for "jack-of-all-trades."

Smooth planes. These smaller models (6 in. to 12 in. long) are best for general smoothing work. With its short body, a smooth plane can quickly take out high spots, rough areas and other surface defects.

Other Transitionals

If you happen across a transitional plane with adjustments that differ from the Bailey design, it was probably made in the late 19th or early 20th century, to compete against the Baileys.

"Liberty Bell" planes are among the most common of the non-Bailey transitionals. They are easy to spot: Just look for a "76" cast into the lever cap, to commemorate the 1876 Declaration of Independence centennial celebration. Instead of the Bailey-style adjustment wheel behind the iron, a Liberty Bell plane has a lever. The Stanley Rule & Level Company manufactured Liberty Bell planes as an economy line, starting in 1877 and continuing through 1918. Competitors made similar planes, but without the bell logo. Liberty Bell planes are not quite up to the standard of the Bailey transitionals, but they're still fine working tools if you find one in good condition.

Finding an Antique Transitional Plane

Transitional planes aren't hard to find. You can expect to pay $25 to $45 for a "user" plane in good shape. The longer jointers are likely to cost a bit more. Like many antique tools, transitionals in mint condition command a premium; they can sell for up to double the cost of a "user" tool. You'll find the best deals at flea markets, auctions and yard sales. If you don't want to test your luck and patience, you can shop among antique tool dealers or at tool club meetings and shows. (See AW #45, page 45.) Prices will be higher, but you'll have the benefit of expert advice, and you'll find a much broader selection.

When you're buying a transitional plane, check out the metal parts to make sure they're in working order. You can expect to find surface rust, but watch out for deep pitting. Severe rust on the back of a plane iron can make it difficult or impossible to sharpen. On other parts, severe rust can weaken the metal. A word of caution: Some transitionals have irons in odd widths that would be hard to replace. Almost all transitionals have cap irons that are not interchangeable with those on metal planes.

It's preferable to find a plane with its wooden parts in good condition, but don't be scared off by a wooden body that needs some work. After all, we're woodworkers. It's much easier to repair or flatten a wooden plane body than a metal one. (See sidebar, page 63.) And once you've returned a transitional plane to good working condition, you'll have a friend for life—and a hard-working friend at that. ▲

TOM STEVENS
is a tool collector and amateur woodworker in central North Carolina.

Jewelry Chest

Simple joinery and spectacular stock make this chest a treasure in itself

by Michael Sage

Of all the boxes I've designed and built, this chest—which I call the "Emperor"—is one of my favorites. Its bold lines and majestic styling make it perfect for housing jewelry or mementos. Small rubber feet not only provide necessary clearance for the bottom drawer, they also give the illusion that the case is floating on air.

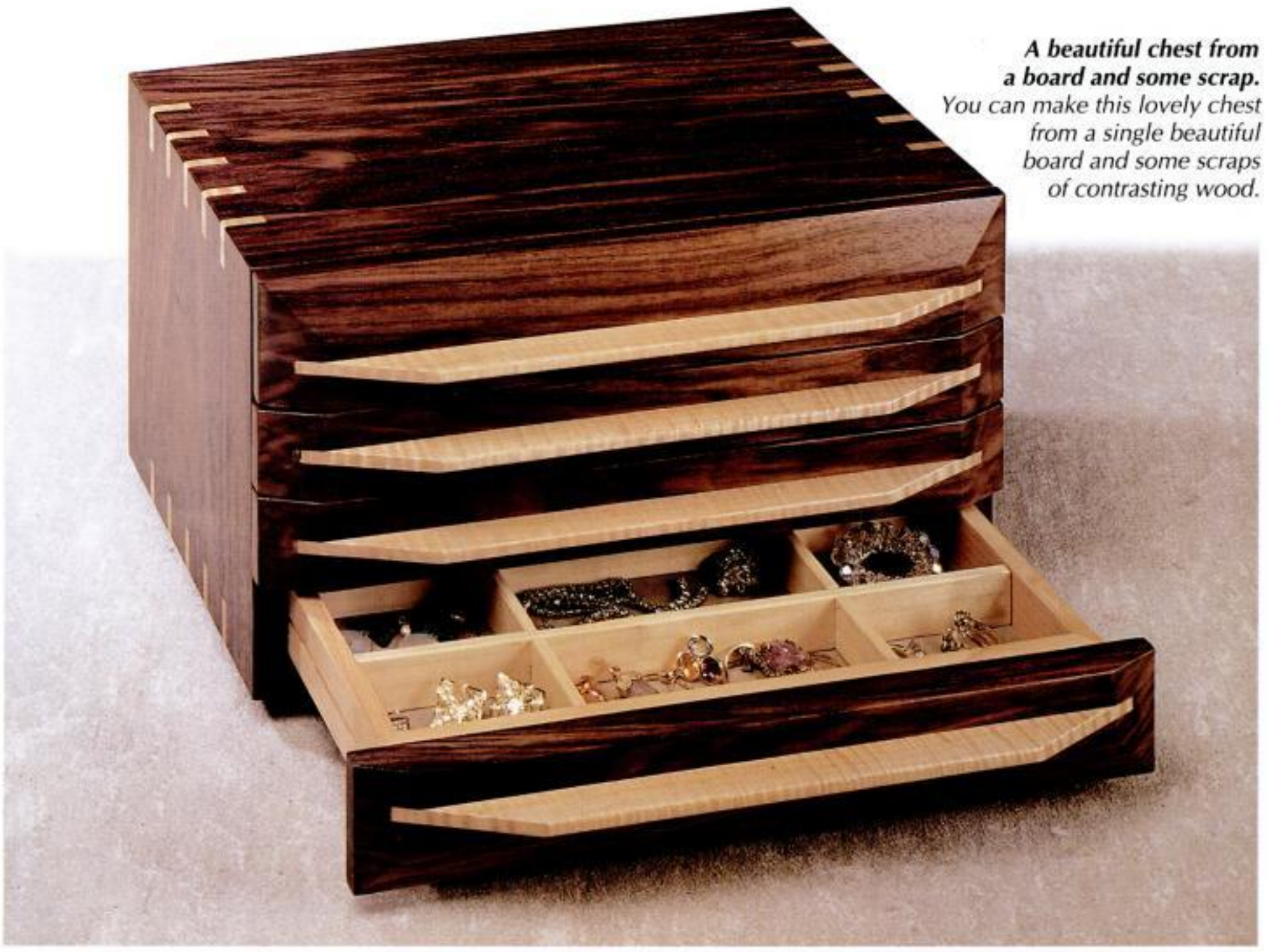
Another reason I like this chest is that it's surprisingly easy to build. The case and drawers are both assembled with keyed or "feathered" miter joints. The applied drawer fronts are made from a single wide panel and then simply cut apart. Most of the work can be done on the tablesaw and router table.

The chest is a perfect opportunity to showcase a beautiful board, so pick the best plank you can find. For this box, I used a piece of Claro walnut. The contrasting drawer pulls and feathers are made from curly maple.

Making the Case

To build the top, bottom, sides and applied drawer fronts, you'll need a board that measures about 8 1/2 in. wide by about 62 in. long. Thickness your board to 3/4 in. and cut a 16-in. piece off one end. You'll use this piece later to make the applied fronts. Thickness the rest of the plank to 5/8 in. and rip it to 8 in. wide. Then rout the groove for the back panel: 3/16 in. wide, 5/16 in. deep, and 3/16 in. from the back edge of your box. (See Fig. 1.)

Mitering comes next. The goal is to have the grain of your board wrap around the finished chest. To do this, cut the miters sequentially, starting with the bottom piece, and work around the box. At this point, it's a good idea to test fit your box by taping it together. Make any necessary adjustments before you move on.



A beautiful chest from a board and some scrap. *You can make this lovely chest from a single beautiful board and some scraps of contrasting wood.*

PHOTO BY JOHN HAMEL

MAKING THE CASE

Grooves for runners. *Groove the sides and install the drawer runners before assembling the case.*

Grooves for keys. *Use a carriage jig to hold the case corners at 45° when you're cutting grooves for keys.*

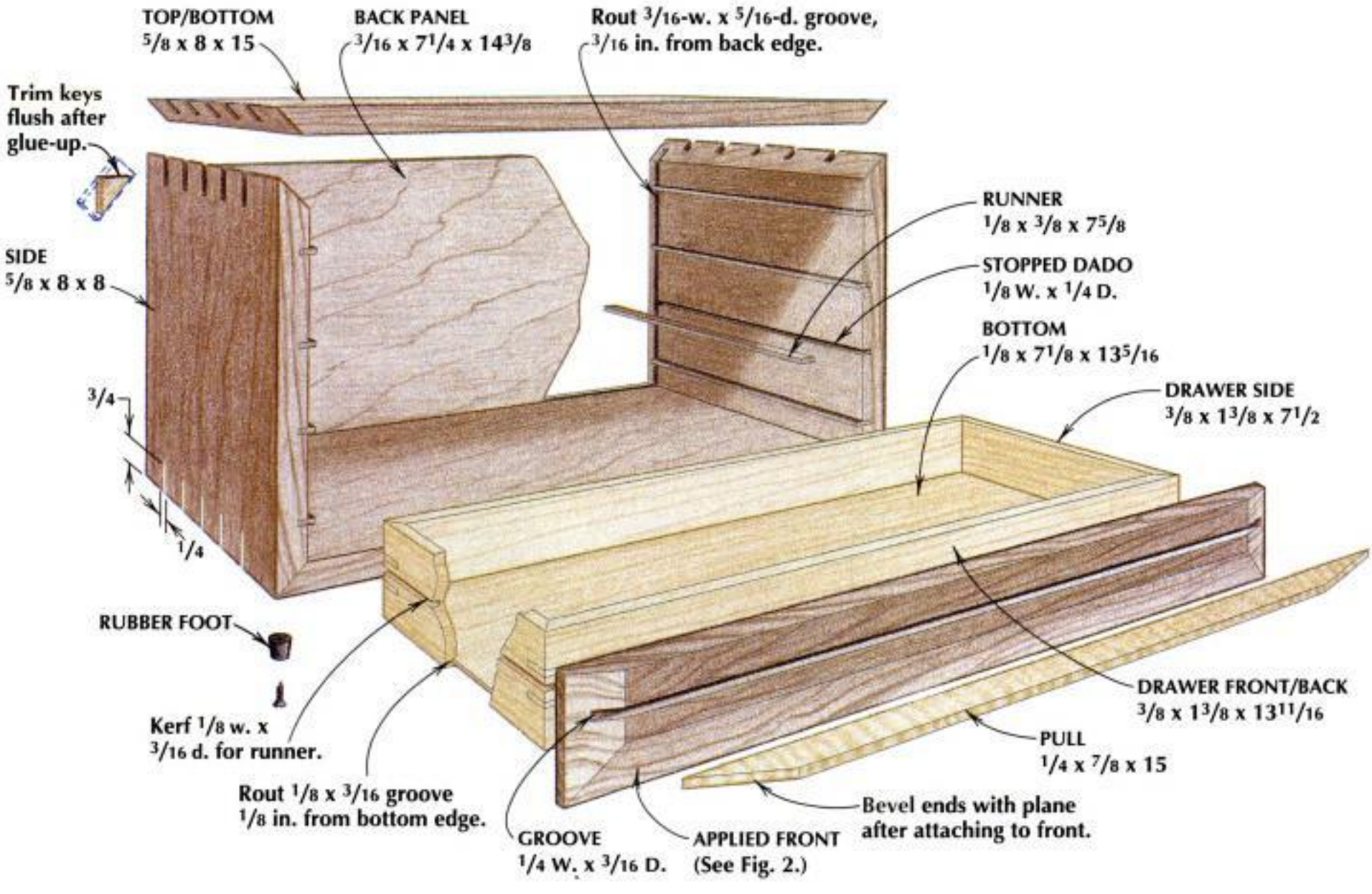
Now make and install the drawer runners. (See Fig. 2 for the runner layout.) Note that the runner grooves stop at the groove you made for the back panel. Cut the grooves, then cut the runners to fit and glue them into the grooves. (See left photo, above.)

Make the back panel before assembly, and thickness the panel to fit in the back panel groove.

Now you're ready to glue up the case. I use band clamps for this part: They're easy to work with, and they apply even pressure on all four corners.

Keyed miters strengthen the corner joints and add a nice visual detail. To cut the key slots, I built a simple 45° carriage jig for my tablesaw. (See right photo, above.) After cutting the key slots, cut and install the keys. Make the keys oversize; you can trim them flush later.

FIG. 1: JEWELRY CHEST



PHOTOS BY MICHAEL SAGE. ILLUSTRATIONS BY MELANIE POWELL

Making the Applied Fronts

Each drawer has an applied front with a long horizontal pull. I make the fronts from a single 8-in.-wide board, then saw the individual fronts apart.

Rout the grooves for the drawer pulls first. Each pull is centered on its drawer, just like the runner grooves. (See Fig. 2.) Place the front panel on the front of the case and transfer the drawer runner layout to the edge of the board. (See left photo, below.) Center the grooves for the pulls on these marks with a 1/4-in. straight bit in the router table. Next, cut the bevels on the front panel. Tilt your tablesaw blade to 20°, mount your rip fence to the left of the blade (assuming your blade tilts to the right) and set it 5/16 in. from the blade. Guide the panel against the fence to make the cuts.

Finish-sand before adding the pulls. Attach the front to the case with hot-melt glue, and finish-sand everything but the beveled ends of the front panel to 220 grit. Pop the front off and finish-sand the front edge of the chest.

Now attach the pulls. Mill them a little tight and sand them to fit, then glue and clamp them in place. Once the glue is dry, cut and hand-plane the ends of the pulls to match the bevel angle. Then finish-sand the end bevels.

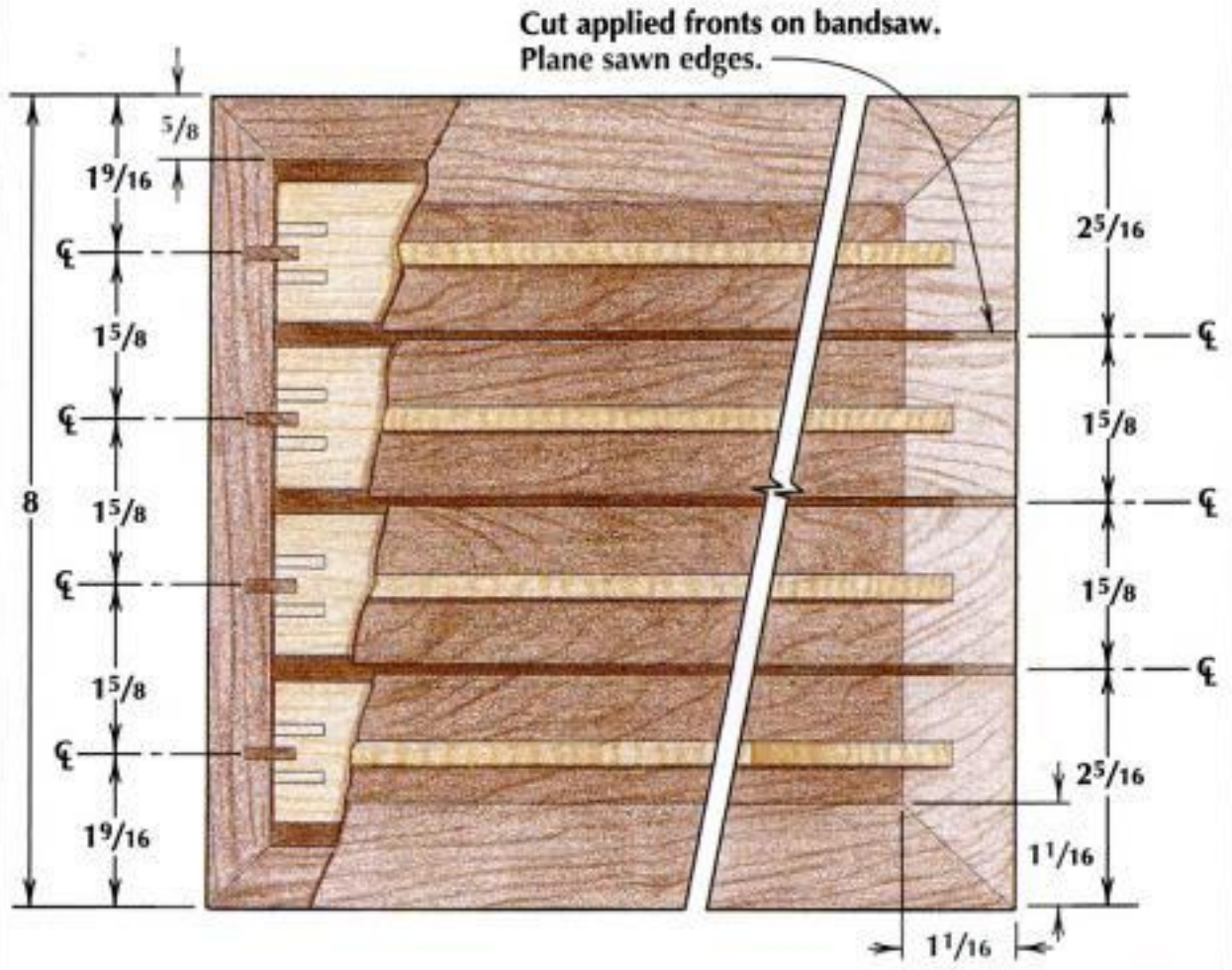
To separate the four applied fronts, I use my bandsaw and a 3/4-in. blade—it leaves a narrower kerf than a tablesaw. (See center photo, below.) Smooth the sawn edges with a plane.

Making the Drawers

Cut the drawer sides, fronts and backs from 3/8-in.-thick, 1 3/8-in.-wide stock. Miter these parts as shown in Fig. 1, and groove each part for a 1/8-in.-thick plywood bottom. Each finished drawer should be 1/16 in. narrower than the width of the opening and 1/8 in. shallower than the box's inside depth. Reinforce the mitered drawer corners with keys. Then cut a 1/8-in.-wide by 3/16-in.-deep groove along the center of each side to fit the drawer runners. (See Fig. 2.)

To attach the applied front to the drawers, lay the chest on its back and shim the backs of the drawers so they stand about 1/8 in. proud of the case front. Next, apply a very thin film of yellow glue onto each drawer front. (See right photo, below.) Align the applied fronts so their outside edges are flush and the spaces between them are even.

FIG. 2: DRAWER DETAIL



Finishing Touches

I soften any sharp edges and sand to 320 grit. Then I wipe on two or three coats of Sam Maloof's poly/oil finish (available from The Woodworker's Store, 800-279-4441). I let the last coat dry for two days, rub it out with a fine Scotch-Brite™ pad, and apply a coat of wax. ▲

MICHAEL SAGE
lives in northern California. He won a 1996 NICHE Award for fine American craftsmanship, for this jewelry chest.

DRAWER FRONTS FROM A SINGLE BOARD

Pencil in the pulls. *Position the front panel on the glued-up case to lay out the pull locations.*

Separate the fronts. *With the pulls installed, cut the applied drawer fronts free, one at a time.*

Front alignment. *Glue the fronts to the drawers so edges align and spacing is even.*

Pedal power. *Turning chair parts is good exercise when you have a foot-powered lathe. On Weber's lathe, a bungee cord keeps the drive cord taut.*

Bungee Lathe

Build a foot-powered, spindle-turning machine—for $40

by Don Weber

Spindle turning is one of the most enjoyable and productive of woodworking techniques. You can quickly turn all kinds of projects, ranging from candlestick holders and baseball bats to balusters and chair parts.

Spindle turning doesn't require an expensive lathe. In fact, it doesn't even require electricity. I've been making chairs professionally for years, turning the legs and spindles on foot-powered lathes built from common construction lumber and hardware.

How It Works

My lathe design is based on the traditional "spring pole" lathe used by British *bodgers*—itinerant turners who often set up their lathes right in the forest. The basic operating principle is simple: The work is spun by a drive cord that is wrapped around it. (See drawing, opposite page.) The cord is tied above the lathe to a spring mechanism. Below the lathe, the cord is attached to to a kick-treadle. Pushing the treadle up and down causes the workpiece to spin back and forth.

Bodgers often tied the drive cord to the top of a sapling to provide spring tension. On my lathe, a bungee cord does the job.

My bungee lathe is easy to build and a lot of fun to operate. (See sidebar, opposite page.) It's inexpensive, too. I paid about $40 for all the wood and hardware I needed to build the one shown here.

Lathe Anatomy

The lathe frame consists of two leg assemblies that are connected by a pair of 2x6s, which form the *ways*. (See Fig. 1.) The ways support the *poppets*, which in turn support the workpiece. Above the leg assemblies, a pair of 2x2 posts connected by a beam provide mounting points for the bungee cord.

Legs, Ways, and Posts

Make the leg assemblies to suit your height. The turning centers should sit just above your elbows, and the lengths of all the leg parts follow from this dimension. (See Fig. 1.)

I find it easiest to assemble the legs "on the flat." Temporarily tack the beveled tops of the legs to the upright, 5½ in. down from the top. Then center the bottom of the upright between the legs. Attach the stretchers, then bolt the tops of the legs to the upright.

HOW TO USE A FOOT-POWERED LATHE

The workpiece on this lathe spins back and forth as you raise and lower the treadle. (See drawing, below.) Pushing down on the treadle spins the work toward you, and this is when to cut and shape it. Retract your tool as the treadle returns to its upward position and the work starts to spin away from you.

Before mounting a workpiece, shape it to rough cylindrical form with a drawknife. Then, use a gimlet or centerpunch to create a hole in each end of the spindle blank. These will engage the lag-screw centers. (See photo A.) Rub some beeswax into the holes to reduce the friction when you're turning.

Adjust the poppets and wrap the drive cord around the workpiece twice, as shown in photo B. Mount the workpiece between the lag-screw centers, tightening them with a wrench until the work spins freely without clattering. (See photo C.) Push the treadle several times, then reseat the centers if necessary.

Orient the treadle so that your right foot is standing on the cross arm and your left foot rests comfortably on the short arm. (Reverse these directions if you're left-handed.)

To adjust the working length of the drive cord, wrap its excess around the treadle until the short arm sits as high as you can comfortably raise your leg. The higher the treadle, the more rotation you'll get.

It takes a little while to get the technique down. (See photo D.) Begin by rounding the entire workpiece, cutting from each end toward the center. Use a wide gouge for this. After rounding all but the section covered by the drive cord, kick the treadle sideways and pump it a few times to move the cord. Then finish rounding the spindle.

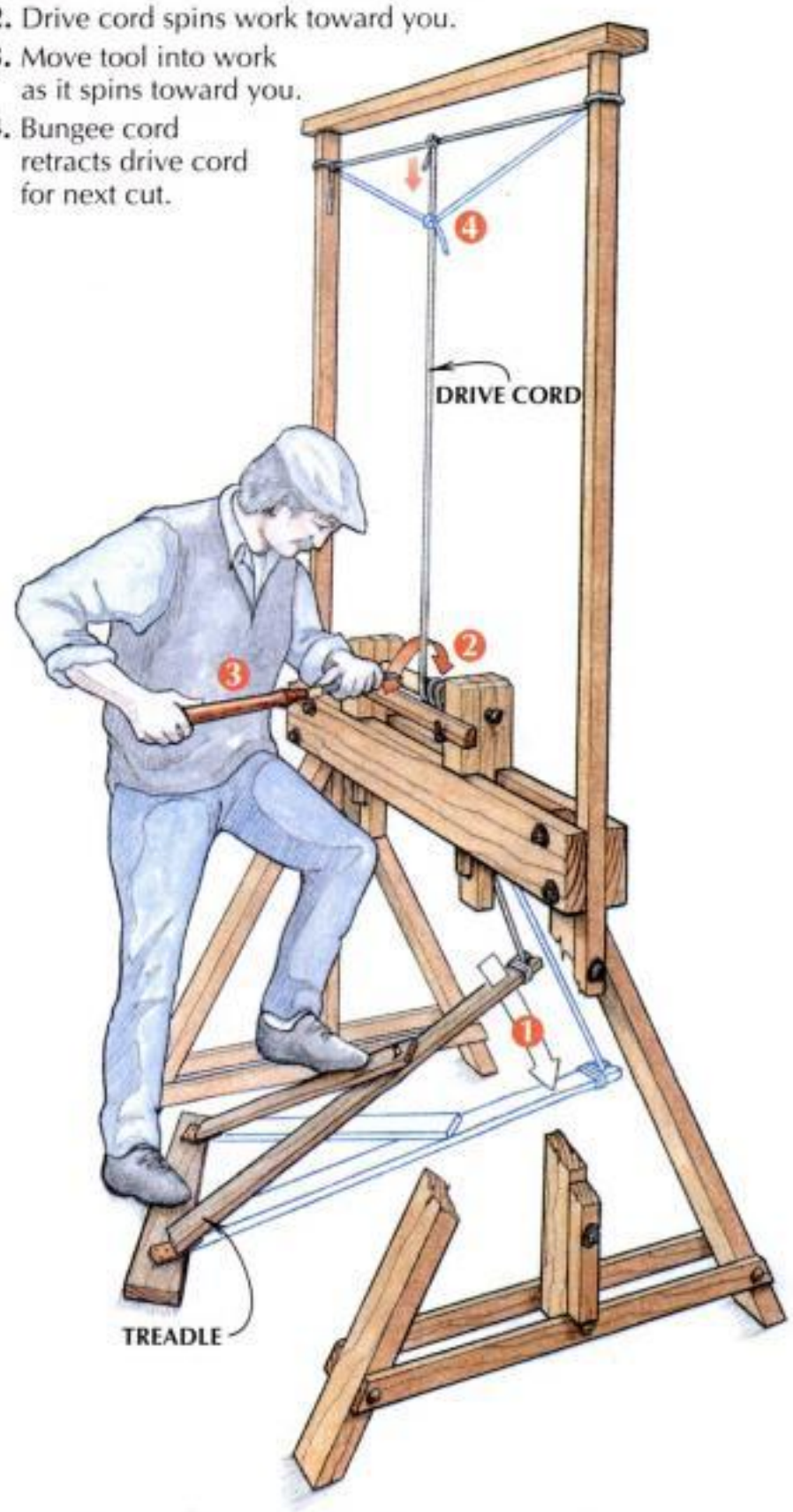
Next, mark the workpiece for whatever beads, coves, etc. you want to turn. Make your deepest cuts first, using a gouge or skew. If the drive cord starts slipping on the work, give it another wrap.

Use a wide chisel to smooth any broad, flat surfaces. Always cut "downhill" from the fattest to the thinnest section of the workpiece. —*D.W.*

To learn more about working with a foot-powered lathe, read Green Woodworking, by Mike Abbott ($16.95 U.S.; 1989, Guild of Master Craftsmen Publications Ltd., 166 High St., Lewes, East Sussex, BN7 1XU, 800-225-9262).

HOW IT WORKS

1. Press treadle down to pull drive cord.
2. Drive cord spins work toward you.
3. Move tool into work as it spins toward you.
4. Bungee cord retracts drive cord for next cut.



ILLUSTRATIONS BY HEATHER BRINE LAMBERT

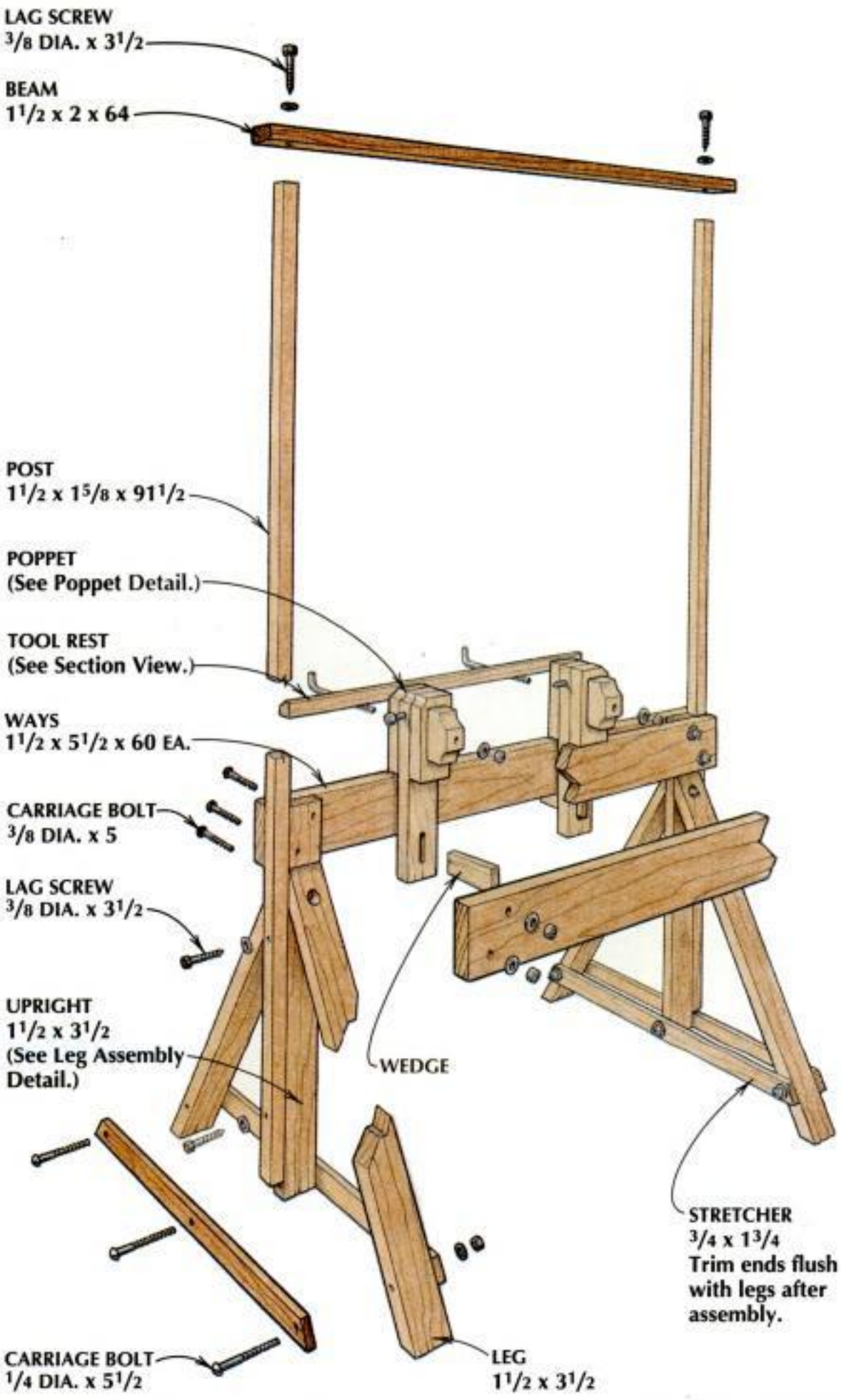
A: Making center holes. *Weber uses a gimlet to poke holes for the lag-screw centers.*

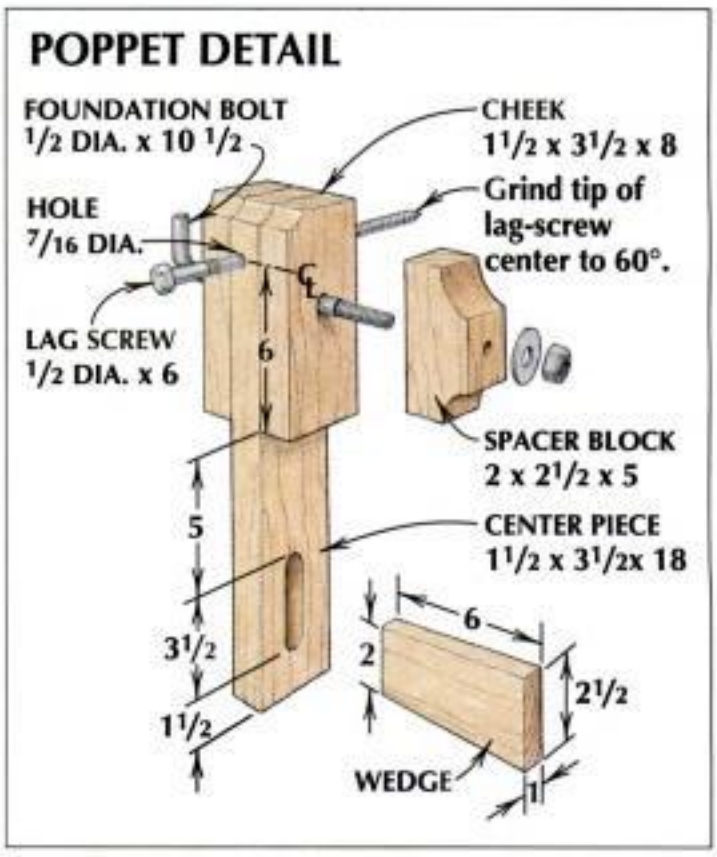
B: Wrapping the spindle. *He wraps a spindle twice with the drive cord.*

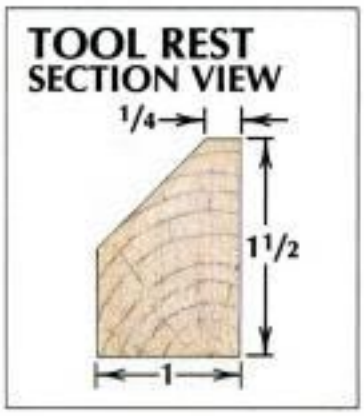
C: Adjusting the centers. *Weber holds the spindle in place while screwing in the centers.*

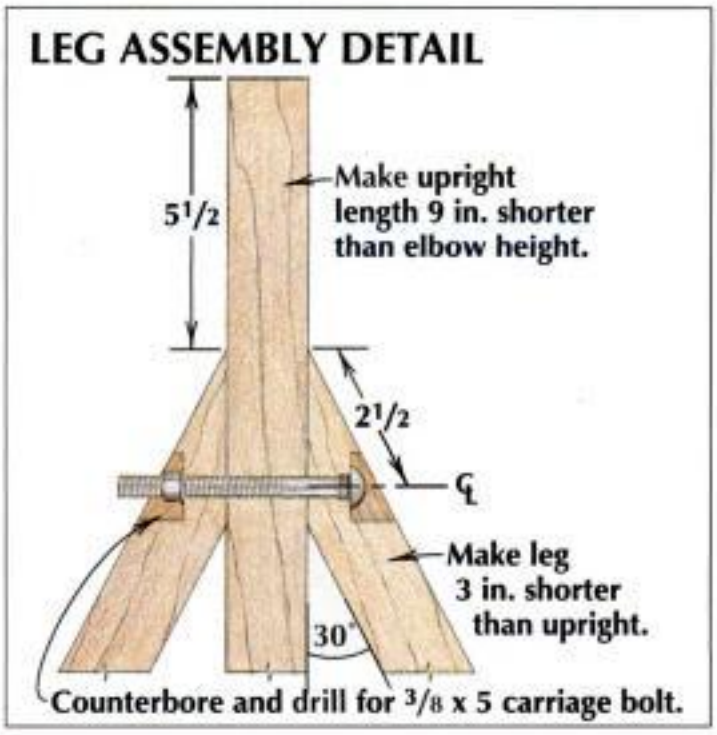
D: Making the cut. *He moves the blade into the work each time he presses the foot treadle.*

FIG. 1: BUNGEE LATHE









Clamp the ways to the leg frames with the uprights inset 1 5/8 in. from the ends of the ways. Bore two staggered holes at each upright location, and secure the uprights with 3/8-in.-dia. carriage bolts.

To make the posts for the upper frame, rip a straight-grained, 8-ft. 2x4 in half. Attach the posts to the leg frames with lag screws as shown in Fig. 1. Cut the beam to size from another 2x4, and fasten it to the tops of the posts with lag screws.

The Poppets and Tool Rest

The poppets serve as the headstock and tailstock on this lathe. (See Fig. 1.) To mount or remove a workpiece, you screw the lag-screw "centers" in the poppet heads in or out. A wedge inserted into a through mortise at the bottom of each poppet holds it down against the ways. You can release the wedges with the tap of a mallet to move the poppets for work of different lengths.

Make the mortises for the wedges first. (See Poppet Detail, above.) To do this, drill two holes on each poppet's center piece and chisel out the waste between them.

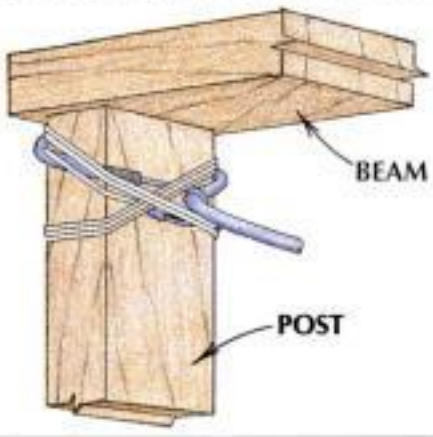
Next, glue the two outer "cheeks" onto each center piece. Make sure the bottoms of the cheeks line up evenly, for good bearing on the ways. Note: Don't glue your spacer blocks to the cheeks. (See Poppet Detail.) You may want to remove them later, to shim out the tool rest for wider-diameter work.

I like to dress my poppets with a block plane after glue-up and cove their tops

FIG. 2: CORD ATTACHMENTS

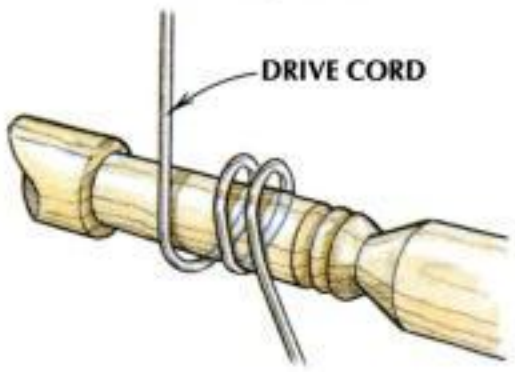
BUNGEE CORD TO POST

Hook the 4-ft. bungee cord around itself and lash it to the post to prevent sliding.



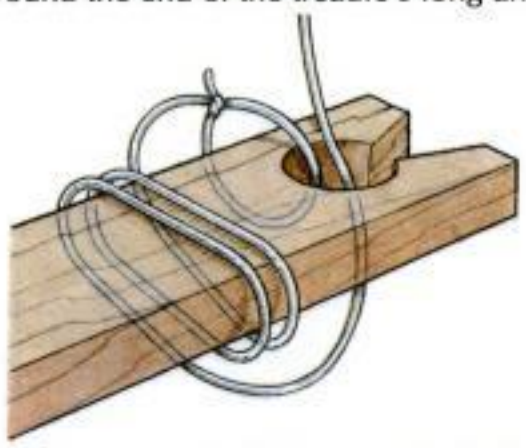
DRIVE CORD TO WORKPIECE

Before mounting the spindle between centers, pull it toward you against the drive cord, and wrap twice.



DRIVE CORD TO TREADLE

Tie off the drive cord and wrap the excess around the end of the treadle's long arm.



on a bandsaw, for a less blocky look.

Grind the tips of the lag-screw centers so they won't thread into your workpiece. (See Fig. 1.) I grind the tips freehand, but you can use a V-block clamped at an angle to your grinder rest to center the points.

Make the tool rest from the offcut of the beam. Shape it as shown in Fig. 1, and clamp it to each poppet with an L-shaped foundation bolt (available at building supply centers) and a spacer block. (The spacer block makes up for the unthreaded section of each bolt.)

The Treadle

Leather hinges and an adjustable dowel joint simplify the treadle's construction—there are no angles to measure—and they let you position the treadle to suit your working stance. (See Fig. 3.)

The cross arm is hinged to the short and long arms with thick leather or inner-tube scraps. The treadle on my lathe is made for a right-handed person. If you're left-handed, reverse the position of the long and short arms. Fasten the hinges with nails, clinching over the tips. (See Hinge Detail, Fig. 3.)

The short and long arms are connected to each other by a wooden dowel. The dowel slips through the short arm and into a blind hole in the long arm. Drill several of these blind holes in the long arm, so you can reposition the short arm for a comfortable working stance. (Keep the short arm on top, even if you're left-handed.) A notch in the end of the long arm receives the drive cord.

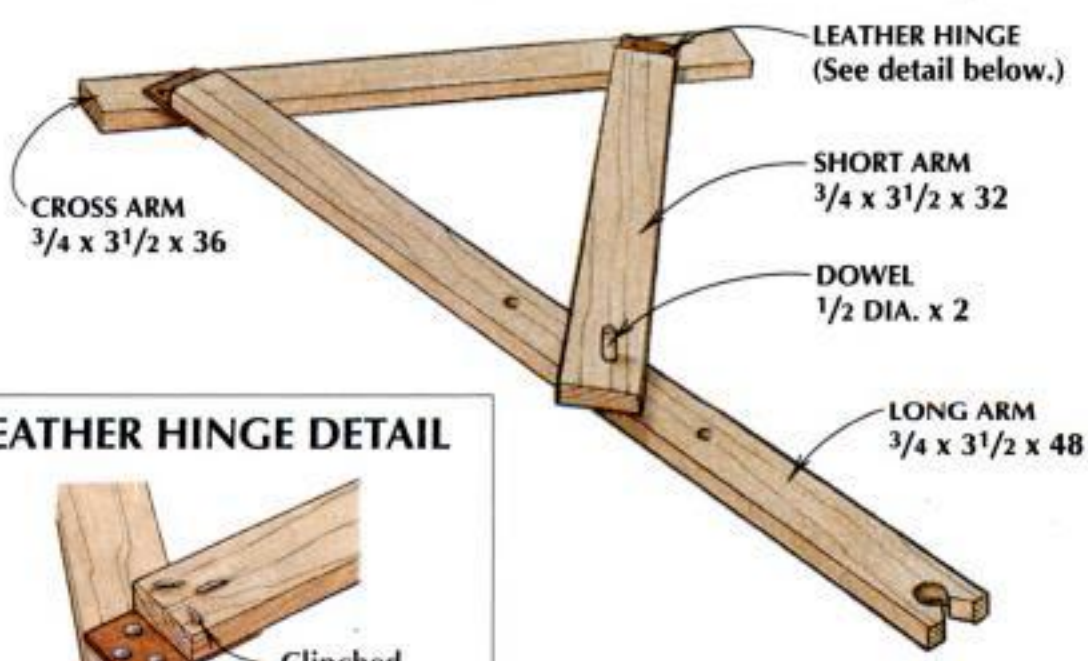
The Cords

A 4-ft. length of bungee cord provides the right amount of spring. Wrap the ends of the cord around the posts as shown in Fig. 2, and lash the bungee cord to the posts to keep them from sliding down.

For a drive cord, I use 1/8-in.-dia. braided nylon cord. Tie one end of a 25-ft. length to the center of the bungee cord and the other end to the treadle, as shown in Fig. 2. Wrap the excess around the treadle, so it can be easily uncoiled and tied to the bungee cord when the drive cord finally wears through or is accidentally cut. (This happens more often than I care to admit.) ▲

DON WEBER
is a transplanted Welsh bodger and chairmaker who lives in northern California.

FIG. 3: TREADLE CONSTRUCTION



LEATHER HINGE DETAIL

MATERIALS

Construction Lumber
All lumber is given in nominal sizes.
6 - 2x4 x 91 1/2 in.
2 - 2x6 x 5 ft.
2 - 1x4 x 8 ft.

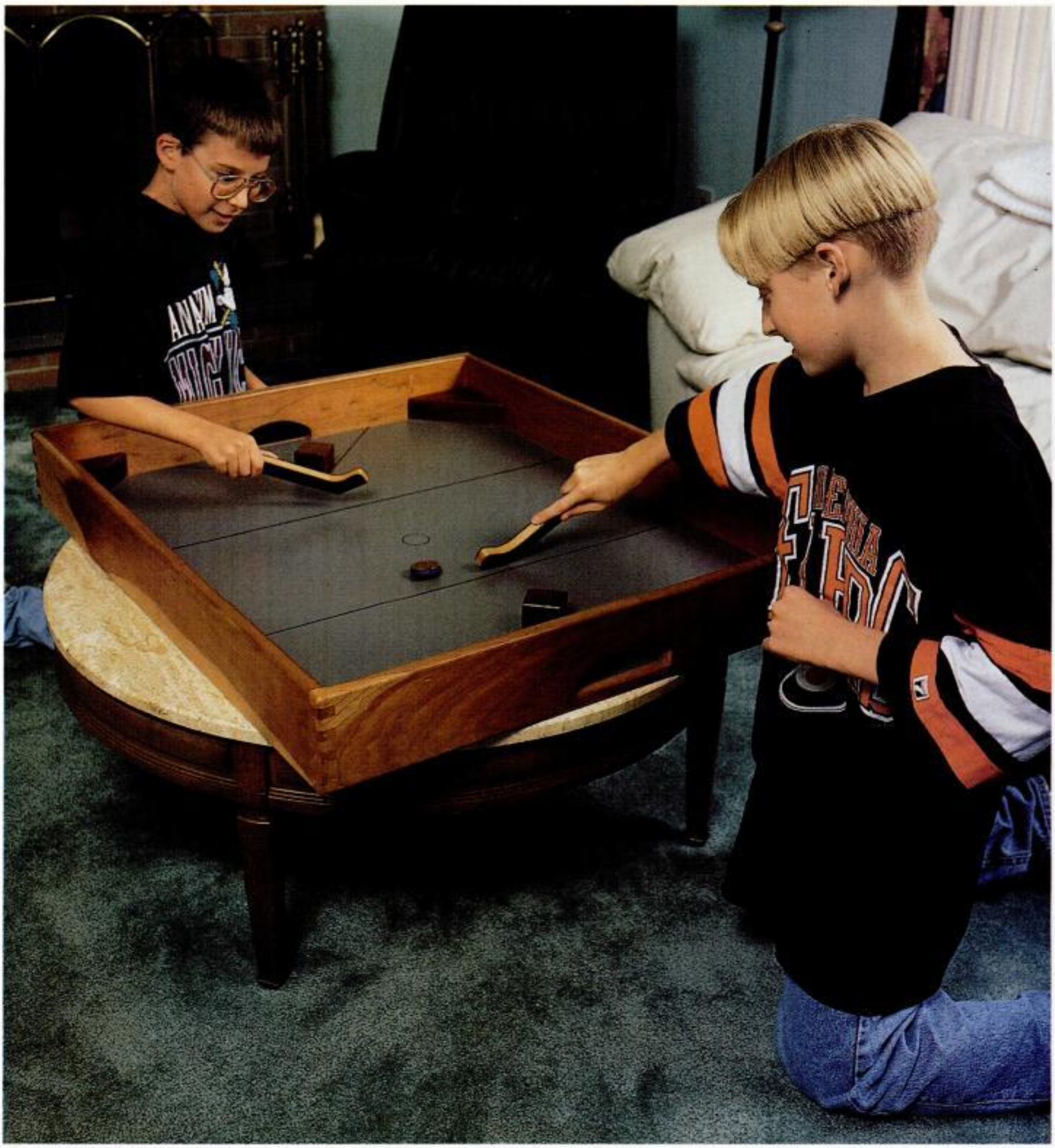
Hardware
6 - 3/8 x 3 1/2 lag screws and washers
2 - 1/2 x 6 lag screws and washers
6 - 3/8 x 5 carriage bolts, nuts and washers
6 - 1/4 x 5 1/2 carriage bolts, nuts and washers
2 - 1/2-dia. foundation bolts, nuts and washers

Cord
- 4-ft. length of 3/8-in.-dia. bungee cord with hooked ends
- 25-ft. length of 1/8-in.-dia. braided nylon cord

Table Hockey

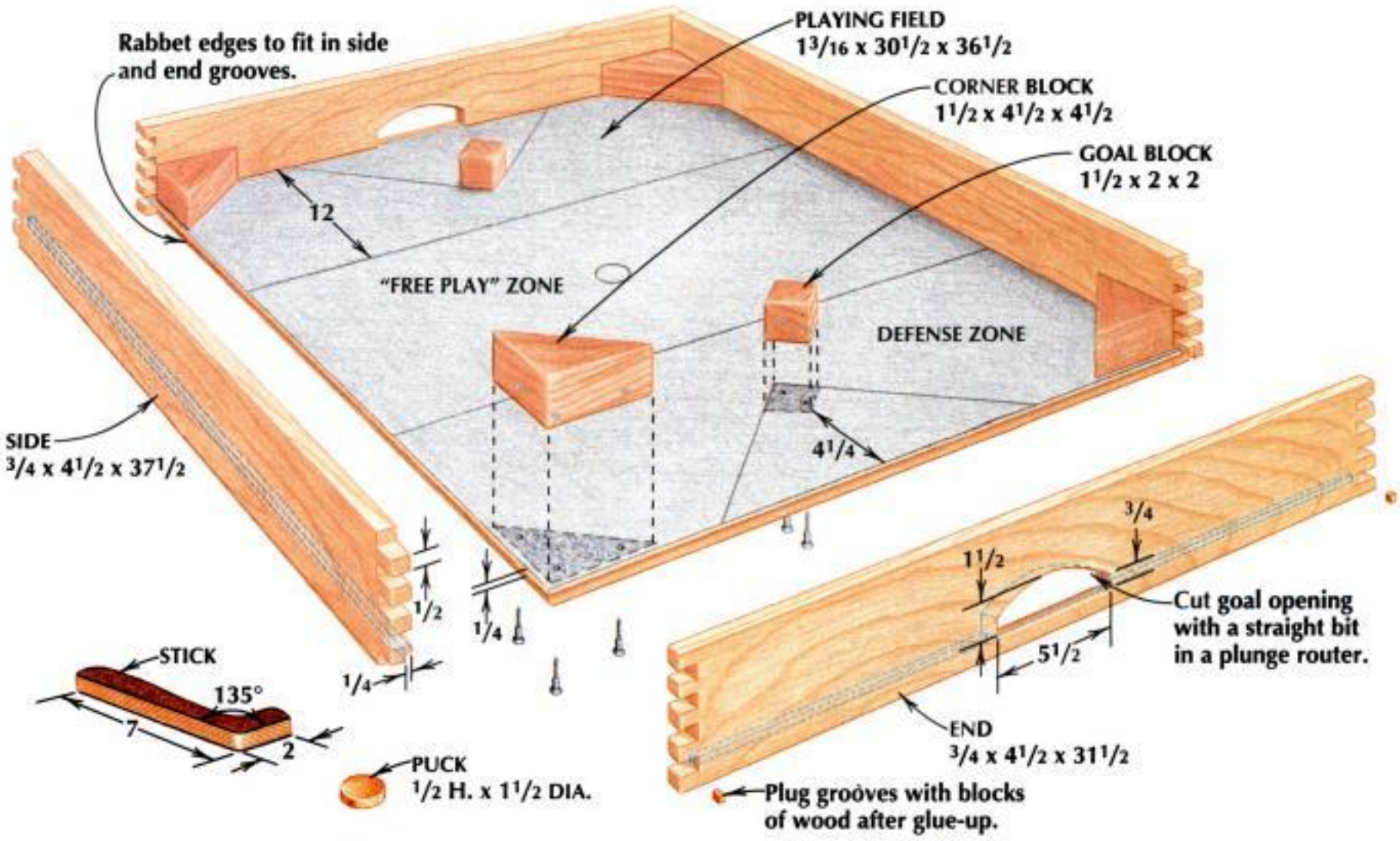
A classic kids' game you can build in a day

by Smiley LeMieux



A game of wits and skill. *This table hockey set, made of wood and plastic laminate, will delight your family with hours of fun.*

TABLE HOCKEY SET



Goal! I felt a surge of adrenaline as the puck sailed through my son's goal. He was still winning, but hey, I can savor my small triumphs, can't I? Even dads enjoy this game.

Whatever you call it—table hockey, box hockey, knock hockey—here's a game that never goes out of style. It combines skill and speed and—if you're inclined—a fair amount of thinking. It can teach you a lot about geometry, but in spite of that, it's a lot of fun.

Making the Game

As you can see, this isn't a complicated project. As far as I know, there aren't any standard sizes for any of the parts. If you change a dimension here or there, it won't affect your [kids'] appreciation of the game. Geometry buffs might want to calculate the sizes and locations of the corner blocks to optimize the possibilities for bank shots.

The main requirement is durability. Hockey players, big or small, aren't known for their calm temperaments. If you want this toy to be around for a long time, use materials that will stand up to hard use.

I made the playing field out of plywood, with plastic laminate on both sides. The sides are cherry, but in a pinch I'd settle for any other moderate-to-dense hardwood. The corner and goal blocks and the puck should also be hard and resilient. I used padauk for the blocks and lignum vitae for the puck. (See drawing.) The sticks are 1/2-in. plywood faced on both sides with 1/8-in.-thick rosewood.

The trickiest part of building the table-hockey board is joining the corners. I cut box joints on my tablesaw, but any reinforced corner joint—biscuit-joined miters, rabbets reinforced with screws, router dovetails—will work fine.

Dry fit all the board components before gluing up. If the playing field is a tad too big, trim it until the corner joints close nicely.

A coat or two of your favorite finish will make your game look great.

How to Play

If there are any "official" rules for table hockey, I couldn't find them. You'll want to devise your own "house" rules anyhow. Here's a way to play that's popular in my house:

To begin the game, one of the two players drops the puck into the face-off circle in the center of the playing field. As long as the puck is in the center section of the field ("free play" zone), either player may hit it. When the puck is in a defense zone, only that player may hit it. *Tip: Bank shots and caroms off the corner and goal blocks are not only more intriguing to make, they're also harder to block.*

If the puck is knocked out of the box, the other player brings it back, shooting from anywhere in his defense zone.

Each shot that passes completely through a goal counts as one point. You can play to any agreeable number of points, typically 15 or 21, and you must win by two points.

Above all, learn to lose gracefully. Kids master this game quickly. ▲

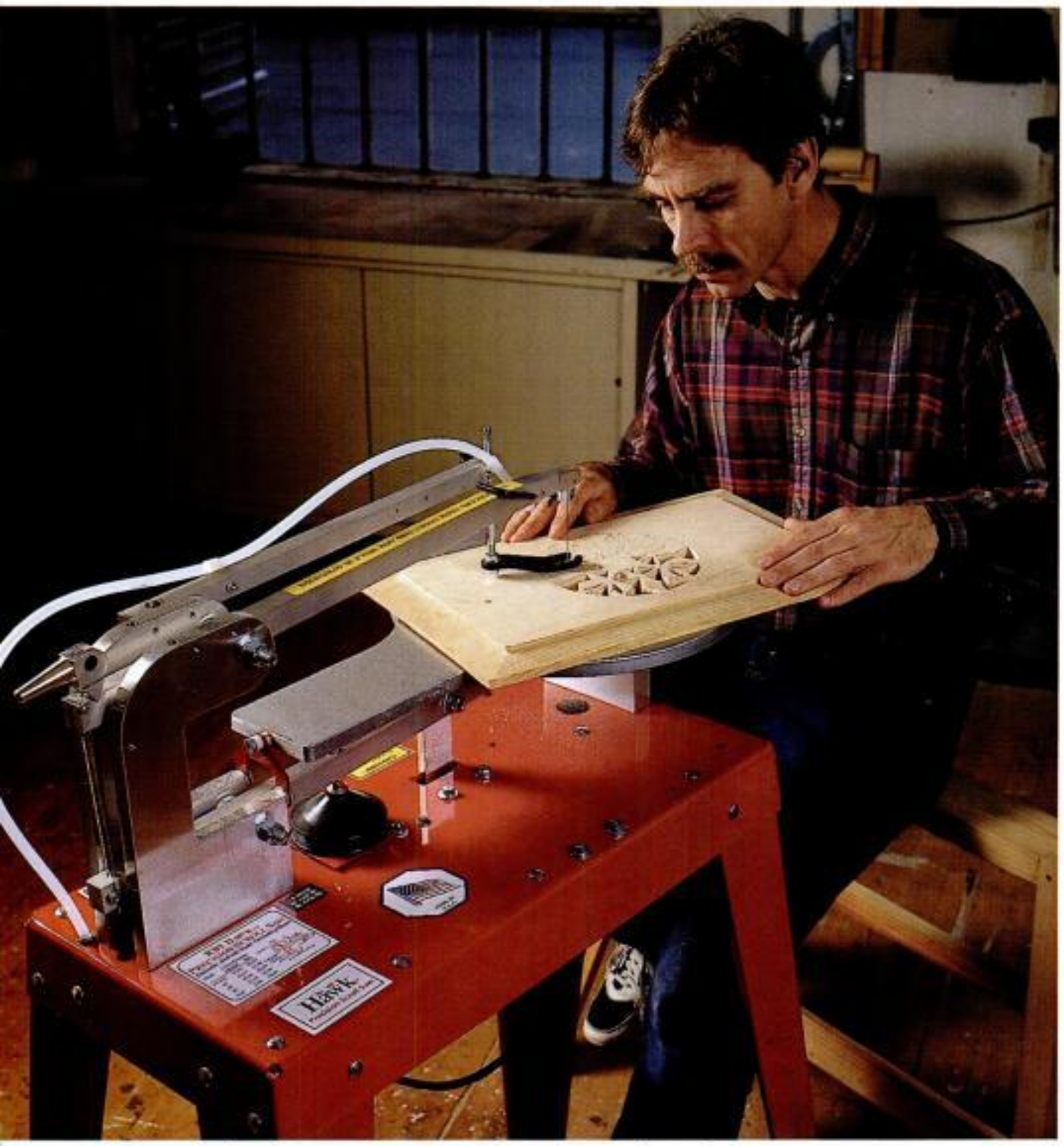
SMILEY LEMIEUX
is a good dad and a mediocre goalie.

SHOP TESTED

Floor-Model Scrollsaws

We rate 8 top-of-the-line models

Ask a woodworker about their first power tool, and you're likely to hear about a scrollsaw. It's no surprise that a youngster's first introduction to power-tool woodworking is often a lesson on this machine. Scrollsaws are quiet, safe, simple, and fun to use—just a few of the reasons why an astounding 5 million woodworkers in the U.S. own one, according to AMERICAN WOODWORKER's Woodworking in America™ study.



Smooth, intricate cuts. *No saw beats a scrollsaw for cutting intricate patterns in wood and other materials. In this article, we rate eight premium floor models.*

PHOTO BY JOHN HAWEI

Scrollsaw Abilities

The delicate blade on a scrollsaw moves up and down between two arms. This reciprocating action lets you saw intricate curves in stock of different thicknesses. The kerf is less than 1/32 in. wide, and cuts are so smooth that there's no need for sanding on most work. You can make pierced or inside cuts, or you can saw interlocking pieces to make puzzles. Scrollsaws can also cut paper, leather, metal, glass and cloth.

Two Basic Types

Scrollsaws have come a long way since your dad's machine. Unlike older, rigid-arm designs where the blade moves up and down via a plunger-and-spring mechanism, today's saws have pivoting arms that keep blades under constant tension. The result: less tendency to pull the workpiece upward during cutting, less blade breakage, and more accurate cuts.

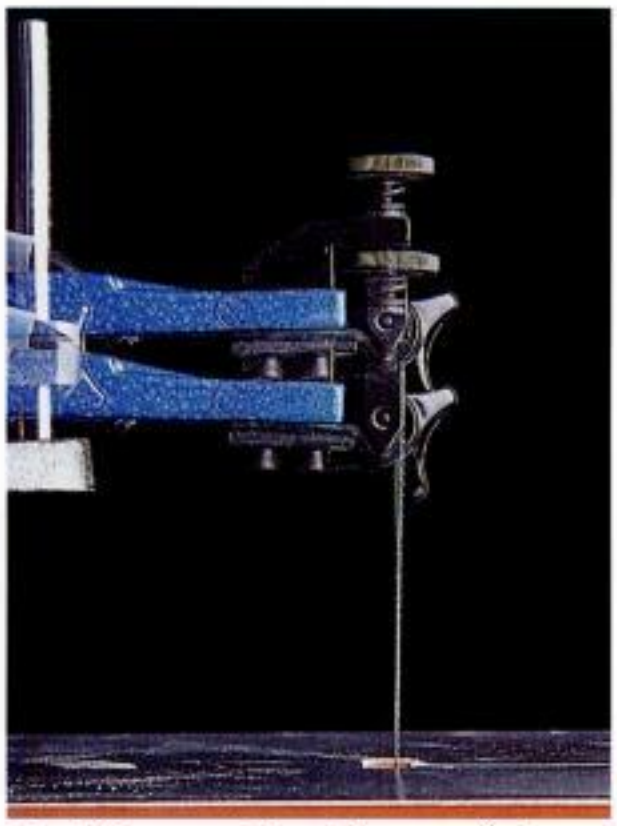
There are two types of scrollsaws: parallel-arm and C-arm. On a parallel-arm saw—and on Excalibur's "parallel-link" models—the blade moves almost straight up and down, producing a near-perfect vertical cut. On a C-arm machine, the blade moves in a slight arc. (See top photos, opposite page.) C-arm cutting action makes for a faster, more aggressive cut, but it's harder to make turns of 1/4-in. radius or less—especially in thick stock. And if you're sawing interlocking puzzle parts in stock more than 3/4 in. thick, a C-arm machine can bevel the cuts just enough to make it difficult to get pieces apart. Gaps between mating parts will be also be slightly larger than those made by a parallel-arm saw.

For this buyer's guide, we rounded up eight floor-model scrollsaws costing from $400 to $1,000. These top-of-the-line machines come with stands and have throat capacities between 18 in. and 21 in.—a popular size range for most scrollsaw work. Two saws, the Delta and the Craftsman, are C-arm models. The rest are parallel-arm models. The Excalibur has parallel-link arms—a variation of the parallel-arm design.

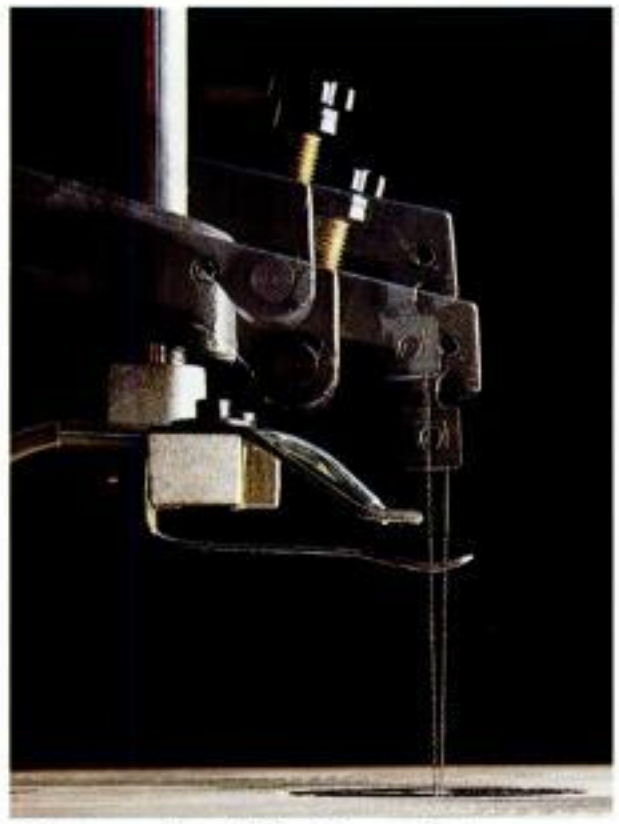
Why Buy a Premium Saw?

Why spend so much money on a premium saw when benchtop scrollsaws are available for $200 or less? We discovered that these high-end machines offer

ARM TYPE AND CUTTING ACTION



Parallel arm action. *The parallel-arm design on the Hegner saw moves the blade straight up and down, which results in a square cut.*



C-arm action. *The C-arm design on the Craftsman moves the blade in a small arc, beveling the edge of the workpiece slightly.*

much more than just a floor stand for the price difference. The scrollsaws in this buyer's guide are true "trade-up" models that can take serious scrollsaw users to higher levels of precision, convenience and workmanship. Read on to learn what features are important when choosing a top-notch scrollsaw.

What's Important?

Quality of cut—With these premium saws, you can expect smoother, more accurate cuts than you'd get with lower-priced models. While all of the saws cut beautifully, the Hegner saw got top billing for its smooth-as-silk cuts that were easy to control. (See chart, page 76.) Both the Hegner and the RBI led the pack in thickness capacity, cutting stock up to 2 5/8 in. thick. The Delta saw was notable for its ability to make fast cuts with a high degree of control. And the RBI saw was the only model with a dual-position blade holder. For a more aggressive cut, you can move the RBI's bottom blade holder to angle the blade slightly, providing more aggressive cutting action.

Blade changing—Scrollsaw blades can break often if you're "pushing" a blade—making tight turns in thick material, for example. So, quick and easy blade changing is important. And if you'll be making many inside cuts—such as in fretwork—you'll really appreciate a mechanism that lets you easily remove and reinstall blades through the workpiece.

To come up with ratings for blade changing, we changed blades over and over again on each saw, and also fitted blades through workpiece openings. The Excalibur got the highest rating for blade-changing convenience. No tools are needed to release the blade, and a cam-type tensioning lever lets you reinstall the blade at the same tension—a nice time-saving feature. We also liked the optional foot pedal for raising the upper arm—it frees up both hands when you need to thread the blade through a hole in the workpiece. (See second photo at right.)

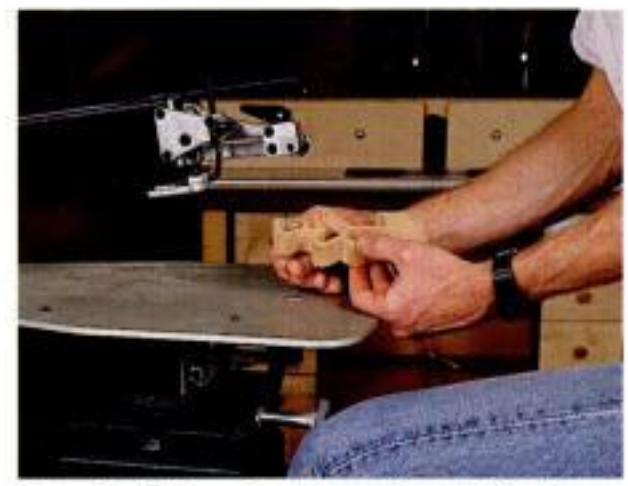
Noise and vibration—Start a scrollsaw project and you could easily spend an hour or more at your machine. That's long enough to make excessive noise and vibration rattle your nerves.

We measured noise using a decibel meter, and we noted vibration as we cut pieces of varying size and complexity. All the saws produced minimal vibration. The Hegner stood quietly as the winner for low noise and low vibration at all speeds, with the Excalibur a close second. Three saws—the RBI, the PS Wood and the Woodtek—produced enough vibration to make sawing delicate work more difficult, but this occurred only at the saws' highest

TOP THREE PHOTOS BY JOHN HAMEL; OTHER PHOTOS BY ANDY RAE

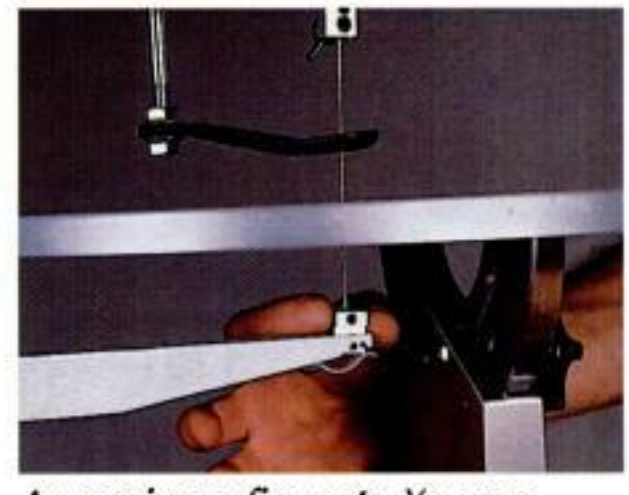
FAVORITE FEATURES

Fast blade tension. *The RBI's quick-release device lets you tighten the blade with the flip of a lever.*



Easy inside cuts. *An optional foot pedal on the Excalibur raises the upper arm for easier blade insertion.*

Convenient controls. *On the Delta, the on-off switch, speed dial and light are all close to the sawing action.*



Aggressive or fine cuts. *You can position the blade holder two ways on the RBI, for fine or aggressive cuts.*

speeds. The Craftsman saw produced a slight vibration at its lower speed settings. We were able to reduce vibration to comfortable levels by bolting the saws to the wooden shop floor or by moving them to a concrete floor.

Speed control—All of these saws have variable speeds, a feature you won't find on many low-priced scrollsaws. With speed control, you can tailor the strokes per minute to the type of cut. We prefer saws with electronic variable speed (EVS) because a simple turn of a dial adjusts the speed, even while the saw is running. All but two of the saws in our test have EVS. The PS Wood and the Woodtek saws change speeds using step pulleys and drive belts. You have to stop the saw and move the belt on the pulleys to change speeds.

Controls—For comfort and convenience, controls should be up front and accessible. We checked the location and operation of controls like the on-off switch, the speed-control dial (on machines with EVS) and the table-tilt mechanism.

The Delta and Excalibur ranked highest in the control category. We especially liked the Delta's top-mounted controls—right there where you can see and use them without any guesswork. And Delta is the only saw that comes with a standard worklight, which is mounted just beneath the speed-control dial. (See third photo in right column, previous page.) The Excalibur saw had the most accurate table-tilt mechanism and the easiest-reading bevel scale.

Dust control—Keeping the dust off your cutlines is crucial when you're trying to follow a pattern. And keeping dust out of your face (and lungs) is important, too. On all the saws except the Excalibur, air is pumped by a bellows mounted on the machine, and a tube directs the air on the cutline. The Excalibur saw uses a piston concealed inside its saw frame to pump air.

While all the saws cleared dust efficiently from the cutline, the best blowers moved the dust away from our faces as well. Here, there were three leaders: the Delta, the Excalibur and the RBI machines.

Blade guards and hold-downs—All the scrollsaws in our tests came with blade guards, and some saws had hold-downs for keeping the workpiece firmly on the table. We found the hold-downs unnecessary—they're holdovers from earlier models. Also, both hold-downs and blade guards tended to obstruct the line of sight; we found them to be more of a nuisance than a help.

Recommendations

There are plenty of features to compare and a broad range of prices to consider in this group of eight machines. Even though the Woodtek saw carries the lowest price, Delta's Q3 is the real bargain in this group. The Q3's strong, lightweight C-arm delivers smooth, aggressive cutting action with minimal vibration. And this machine had the most accessible on-off switch and speed-control dial. The Q3 was an easy pick for the Best Buy award winner—the best value for the price.

We picked two Editors' Choice award winners: Hegner's Multimax 18V and the Excalibur EX19VS. Both machines came out ahead of the pack for smooth cuts and quiet operation—two factors that scrollsaw users value highly. If you're planning on spending hours at a time making tricky, intricate cuts that have to be super-smooth, these machines won't let you down. ▲

FLOOR-MODEL SCROLLSAWS

	PERFORMANCE RATINGS			SPECIFICATIONS								
Brand & Model/ Street Price	Quality of Cut	Blade Changing	Controls	Throat Depth (in.)	Max. Cut Thickness (in.) @ 90°	Arm Type*	Speed Control, Strokes per Min.	Stroke Length (in.)	Arm/ Table Material**	Table Size (in.) & Tilt (° L - R)	Motor Amps	Weight with Stand (lbs.)
Craftsman 23640 $450	3.5	3	4	20	2	CA	EVS 300 - 2,000	7/8	AL/CI	16 x 16 35 - 45	1.3	137
Delta Q3 $500	4	3.5	4.5	18	2	CA	EVS 300 - 2,000	7/8	GC/CI	16 Dia. 9 - 45	1.3	90
Excalibur EX19VS $995	4.5	5	4.5	19	2	PL	EVS 60 - 1,500	3/4	AL/AL	12 x 17 1/4 45 - 45	1.5	75
Hegner Multimax 18V $999	5	4	4	18	2 5/8	PA	EVS 400 - 1,700	13/16	AL/AL	10 x 17 45 - 15	2.8	80
PS Wood 21 $699	3	2.5	2	21	2 1/2	PA	Step pulleys: 170, 450, 790, 1,140, 1,370	1	AL/AL	14 x 22 1/2 45 - 35	2.2	85
RBI Hawk 220 Ultra $989	4.5	4.5	3.5	20	2 5/8	PA	EVS 300 - 1,725	7/8	AL/AL	14 1/2 Dia. 45 - 45	1.4	93
Shopsmith 555272 $850	3.5	4	3.5	20	2	PA	EVS 500 - 1,450	7/8	AL/AL	16 x 23 1/2 45 - 45	1.7	79
Woodtek 826398 $399	3	2	2	21	2	PA	Step pulleys: 170, 450, 790, 1,140, 1,370	1	AL/AL	14 x 22 1/2 45 - 15	2.2	85

KEY
5 = Excellent, **4** = Good, **3** = Fair, **2** = Poor, **1** = Unacceptable. ***Arm type:** CA = C-arm; PL = Parallel-link; PA = Parallel-arm.
****Arm/table material:** AL = Aluminum; CI = Cast iron; GC = Graphite composite. **EVS** = Electronic variable speed.

Craftsman 23640

Street price: $450

Available at local Sears stores. *Circle #605*

PROS: A hefty and stable saw. Easy-to-use controls. Lock-out safety switch.

CONS: Slow cutting action and blade changing. Vibrates at lower speeds. Weak table-locking mechanism.

FINAL CUT: An affordable high-end machine that's just a bit slow.

At 137 lbs., Craftsman's saw is the heaviest of the bunch. This extra weight gives the saw a solid, stable sawing platform. The saw cuts nicely—but not as aggressively as other C-arm machines, which are typically fast cutters. Since this is a C-arm machine, blade stroke is slightly angled rather than vertical. This can limit the saw's usefulness for interlocking cuts in thick stock. (See main text.) We noticed some extra vibration at lower speeds, but this disappeared when we bolted the saw to the floor.

The controls are up front and accessible, and a removable throat insert makes it easy to see the bottom blade holder when changing blades. We like the handy on-board toolbox for stowing blades, tools etc., and the lock-out on-off switch. Old-timers will appreciate blade mounts that accept both standard and older "pin-style" blades.

You need a wrench and a locking bar to change blades and to set up pierced cuts. These tools are easy to use above the table but not below it, on the lower blade holder. The heavily textured table surface created a bit more friction that we liked when maneuvering large work. And the table-tilt lock mechanism could be stronger. Heavy or large workpieces can cause the table to shift slightly.

A nice price of $450, solid construction and accessible controls give the Craftsman a good mix of sawing performance and value.

Delta Q3

Street price: $500

(800) 438-2486 *Circle #606*

PROS: Innovative graphite C-arm keeps vibration down, even at high speeds. Solid construction and excellent controls. Only saw with standard worklight.

CONS: Blade holders are fussy to use when changing blade thickness.

FINAL CUT: Delta delivers a winner among C-arm saws. The Q3 provides smooth, fast, accurate cuts at a very nice price. An easy winner in the Best Buy category.

Delta's new Q3 sports an arm made from strong, lightweight graphite, a material that Delta says transmits less vibration and has enough "give" to extend blade life. This saw has the fastest, most aggressive cutting action of all the saws we tested, and we had no problem sawing tight curves or following a pattern line, even in 1-in.-thick stock.

Our testers loved the accessible top-mounted controls. The worklight is a great idea, but its segmented knuckle arm was difficult to adjust, and the light often blocked our view of the cutline. Delta is working on a revised design for this feature. No tools are required for blade changing, and the quick-release clamps make the job a snap. Changing to a different blade thickness takes more time—you have to use a special wrench to adjust the holders. Setting up for pierced cuts was difficult. The upper arm doesn't lift free of the blade, making it trickier to thread a blade through a workpiece. Minor shortcomings aside, this fast-cutting saw will handle most jobs beautifully.

The Q-3 comes with a three-legged stand that's inherently more stable than four-legged versions. And its sticker price of $500 makes the Q3 was an easy winner in our Best Buy category—best value for the price.

Excalibur EX19VS

Street price: $995

Sommerville Design, (800) 357-4118 *Circle #607*

PROS: Easiest blade changing of all the saws. Good controls and nice cuts.

CONS: Optional foot switch required for convenient on-off operation. Broken blade can stab the top of the workpiece.

FINAL CUT: An easy-to-use machine with top-quality cuts in all kinds of work. An Editors' Choice award winner.

It's easy to make precise, super-smooth cuts with this saw. The Excalibur handled large, sweeping curves and small, intricate turns with equal precision. Handling thick and thin stock was no problem, and the machine was wonderfully quiet.

The blade-changing system on this saw is our favorite. We liked the large, knurled knobs that hold the blade in place. A quick-release blade-tension device contributes to the quick change, and it helps you reset the blade tension accurately.

We tested the saw with two optional features: a foot pedal ($45) that lifts the upper arm for inserting the blade in pierced work, and a foot switch ($30) for turning the machine on and off. The foot pedal is worthwhile if you make a lot of inside cuts. We definitely recommend the foot switch: It stops the blade instantly. The standard switch forces you to dial your way down to zero strokes per minute to stop the saw. The upper arm on the Excalibur powers the blade, so a broken blade will stab the work until you turn off the machine—another reason to opt for the foot switch.

This top-of-the-line saw offers a high level of precision and comfort. Its only significant shortcoming—the standard on-off switch—isn't an issue if you order the optional foot switch. A definite Editors' Choice award winner.

Hegner Multimax 18V

Street price: $999

Advanced Machinery Imports, (800) 220-4264 *Circle #608*

PROS: Smoothest, quietest-cutting saw of all the models tested. Most powerful motor. Cuts stock up to 2 5/8 in. thick. Longest warranty.

CONS: Smallest table of all the models tested. On-off switch is difficult to locate. Small knobs can be difficult to turn.

FINAL CUT: Smooth-as-silk cuts and low vibration make sawing accurate and pleasurable. An Editors' Choice award winner.

Hegner's Multimax 18V is the strong, silent type. No other saw in our test cut smoother or quieter. Vibration was also minimal.

Like other saws that scored high in blade-changing ease, the Hegner has a quick-release tension device. Our test model didn't come with this device, but all new models of the Multimax 18V will have it as standard equipment. We tested the quick release on another Hegner model, and it worked well. The three-leg stand deserves mention for its stability. And you can convert it for wheelchair access if you buy an accessory package.

On the minus side, the Hegner's table is the smallest of the bunch (10 in. by 17 in.), so this isn't the saw to buy if you work on large pieces. Switches were a minor concern, too. The Hegner's on-off switch is small and difficult to find—it's located under the table. An optional foot switch really improves this saw. We also found that the small knobs for adjusting blade tension and table tilt tended to dig into our hands.

But these minor shortcomings didn't dim our enthusiasm for this saw. And the manufacturer must have confidence in its product: The Multimax comes with a six-year warranty—the longest of any scrollsaw. This saw earns our Editors' Choice award.

PS Wood 21

Street price: $699

(800) 939-4414 *Circle #609*

PROS: Aggressive cutting action. Large table and largest throat capacity of tested saws. Excellent instructional video available.

CONS: Blade changing and speed changing are slow. Saw vibrates at highest speed. Cuts are not as smooth as on other saws.

FINAL CUT: A ruggedly built, large-capacity saw with aggressive cutting ability. Good for large-scale work where a super-smooth cut isn't crucial.

The PS Wood cuts very aggressively for a parallel-arm machine. We liked the accessible location of the on-off switch, the large table (14 in. by 22 1/2 in.), and the 21-in. throat depth. This saw looks similar to the Woodtek machine, but costs $300 more. The extra dollars get you a quick-release blade-tension device and the ability to handle stock 1/2 in. thicker than the Woodtek. (See chart.) For beginners, PS Wood has an excellent instructional video ($20). It not only explains setting up the saw but also gives you sound advice on scrollsaw work in general.

This saw exhibited excessive vibration at its highest speed. This resulted in a rougher cut and made it difficult to follow intricate curves. We reduced the vibration to a manageable level by bolting the saw to the floor. Another drawback is slow blade changing. To release the blade you have to mount both holders in a hole at the back of the saw, and the lower blade holder requires an Allen wrench. The belt-and-pulley drive system is simple and foolproof, but it's inconvenient compared to EVS control.

If you favor low-tech design over electronics and you plan to work on large-scale scrollsaw projects, this saw is worth considering. It has the large table, deep throat and aggressive cutting action to take on the tough stuff.

RBI Hawk 220 Ultra

Street price: $989

(800) 487-2623 *Circle #610*

PROS: Easy blade changing. A choice of fine or aggressive cutting action. Locking on-off switch. Cuts stock up to 2 5/8 in. thick.

CONS: Locking table-tilt mechanism was loose. Annoying vibration at highest speeds.

FINAL CUT: A versatile saw with easy blade changing.

The RBI Hawk is a smooth-cutting machine at most speeds, and it ties with Hegner's entry for the thickest cutting capacity—2 5/8 in. We liked the two-position blade setting on the bottom blade holder: One position keeps the blade vertical for fine cuts. The second position tilts the blade forward for a more aggressive cutting action—just the ticket when you need speed but not accuracy or smoothness.

Blade changing can be done without tools, and the saw has a quick-release blade-tension device. RBI provides a handy blade tension chart right on the machine to eliminate the guesswork.

A lock-out on the Hawk's on-off switch keeps kids safe from the saw, and the machine is available in a wheelchair-accessible model.

We encountered enough vibration at the highest speeds to affect precision when making delicate cuts. Placing the saw on concrete reduced the vibration to a comfortable level; bolting the saw to the floor is another fix. We also found the locking table-tilt mechanism ineffective, but RBI provided a redesigned mechanism that solved the problem. This upgrade will be used on all new models.

Versatility is the big attraction with this saw. You can choose between smooth, controlled cuts and quick, rough ones. Plus, you've got the capacity to handle extra-thick stock along with the usual thin stuff.

Shopsmith 555272

Street price: $850

(800) 543-7486 *Circle #611*

PROS: Biggest table of the bunch. An aggressive cut for a parallel-arm machine.

CONS: Locking table-tilt mechanism is loose. Stiff on-off switch and small, hard-to-turn blade-holder knobs.

FINAL CUT: Fast, controllable cuts on straightaways, but there are better machines for sawing intricate work.

Shopsmith fans will be happy to add this cousin to their line of woodworking tools. With the biggest table of the bunch (16 in. by 23 1/2 in.), the Shopsmith saw gives you plenty of room to handle large workpieces. The cutting action is plenty aggressive, too. But we had some difficulty following tight curves and switchbacks.

The Shopsmith saw has a quick-release blade tension device and "tool-less" blade holders, but unfortunately these features didn't translate into fast blade changes. The bottom blade holder is difficult to see and reach. And the wing-nut-type knobs on the blade holders are too small to turn comfortably. We liked the built-in storage trays on the stand and the see-through, flip-down blade guard.

The lock-out on the on-off switch will keep curious children from starting the saw, but the switch was stiff and aggravating to operate. And the locking table-tilt mechanism didn't lock tightly—which means the table could shift when you're cutting heavy, wide workpieces.

All told, the Shopsmith is an easy-to-use saw with accurate cuts in all but the tightest of turns. The large table and aggressive cut makes this machine a good choice for wide workpieces and work that's not super intricate.

Woodtek 826398

Street price: $399

Woodworker's Supply, (800) 645-9292 *Circle #612*

PROS: Aggressive cutting action. Large table. Largest throat capacity of tested saws. Lowest-priced saw in the test group.

CONS: Blade changing and speed changing are slow. Saw vibrates at highest speed. Cuts are not as smooth as on other saws.

FINAL CUT: Very similar to the PS Wood saw, but priced $300 less.

The Woodtek is very similar to the PS Wood saw, but takes much less of a bite out of your wallet—$399 as opposed to $699. The Woodtek's main differences are the lack of a quick-release blade-tension device and a 1/2-in.-thinner cutting capacity.

The saw cuts aggressively compared to most of the other parallel-arm machines we tested, making for fast work in thick or thin stock. We liked the accessible location of the on-off switch. We also liked the large table for handling wide workpieces.

Excessive vibration at the Woodtek's highest speed made it difficult to follow intricate patterns. We dampened vibration to a manageable level by bolting the saw to the floor. Blade changing on the Woodtek is the slowest of all the saws we tested. You need an Allen wrench to operate both upper and lower blade holders, and there's no quick-release blade-tension device. Each holder must be secured in a hole at the back of the saw, adding to the inconvenience. Another feature that slows you down is the belt-and-pulley drive system—you have to turn the saw off and move the drive belt to change speeds. The locking table-tilt mechanism didn't lock the table tightly.

All told, the Woodtek's low price makes it an attractive choice for the budget-minded woodworker who's willing to live with fussy blade changes and mechanical variable speed.

Cypress

by Paul McClure

The year is 1896. A hurricane builds in the dark sky over a remote Gulf Coast swamp. A 150-ft.-high cypress with featherlike leaves dances wildly in the 90-mile-an-hour wind. Then, with a loud crack, it topples and sinks into the soft quagmire where it began its life 2,000 years before. Soon only its roots jut up through the water, like organ pipes being played by the howling wind.

A hundred years later, a logger in an air boat probes the swamp, searching for the cache of "sinker cypress" beneath. With a thud, his pole discovers the tree felled a century ago by Mother Nature. Within days, a helicopter has lifted the prize to solid ground where it is trucked to a mill.

Cypress is the common name for the baldcypress tree. It grows in damp bottomlands in the southeastern U.S. Unrelated to true cypress *(Cupressus)*, it's actually cousin to the redwoods. The tree grows to a height of about 100 ft. and reaches a diameter of 3 to 5 ft. It has a broad, irregular canopy and a buttressed base.

Cypress has many nicknames based on the color of its heartwood. "White" cypress is pale yellow; "red" cypress is reddish brown; and "black" cypress is dark green in color. The densest, old-growth wood—which remains largely submerged—is called tidewater red, sinker or deadhead cypress.

A tunneling fungus sometimes attacks older trees, creating galleries in the wood. The resulting lumber—called pecky cypress—is prized for paneling.

Appearance

Though the heartwood varies in color, the sapwood is narrow and nearly white. This moderately hard wood has closed pores and straight grain. Higher grades have a smooth texture and a waxy feel.

Crotch and buttress wood have a quilted and flamed figure swirling with yellow, tan and brown. The veneer made from this is called "faux satine."

Workability

Cypress works well with both hand and power tools. When cut, the wood gives off a sour odor. It planes easily and resists warping, although it's prone to splitting along the annular rings and checking in the center of boards. Preboring is necessary at the edges of boards to keep screws from splitting the wood. Although cypress is resinous, it glues well, sands easily and accepts finishes without a problem.

Uses

Cypress is very versatile. Architectural uses include paneling, moldings, window frames and doors. It is weather resistant and is often used for decks, siding, shingles and general millwork. ▲

CYPRESS

Species and Common Names
Taxodium distichum—Cypress, baldcypress, red cypress, yellow cypress, white cypress, black cypress

Growing Range
From Delaware south to Florida and from Indiana south to eastern Texas

Specific Gravity
0.35 to 0.60

Density
22 to 37 lbs. per cubic ft.

Wood Movement[1]
Tangential (flatsawn): small (less than 1/4 in. per ft.)
Radial (quartersawn): very small (less than 1/8 in. per ft.)

Durability
Highly resistant to decay

Sustainability
Sustainable at current harvest levels

Availability
Eastern lumberyards and mills. Not commonly available in the western U.S.

Size
Thicknesses: 4/4 through 16/4. Widths: 4 to 12 in. Lengths: 6 to 16 ft.

Cost
Lumber $2.50 to $3 per bd. ft.
Veneer Not commonly available

[1]Indicates wood movement across the grain from 6% to 12% moisture content.

Coloring Wood

Stains, glazes and toners get the job done

by Michael Dresdner

Though purists might disagree, there are plenty of valid reasons to change the natural color of wood—to match an existing decor, to create a particular mood or effect, or simply to make undistinguished wood look richer.

Short of painting, there are really only three common ways to add color to wood: staining, glazing, and shading (or toning). Staining means adding color directly onto raw wood. Glazing involves "floating" stain between coats of finish. If you add the color directly into a clear finish and spray it on, either evenly or in patterns, you are shading or toning.

With a little understanding of the materials and some practice, you can use these three types of products—alone or in combination—to produce rich, professional looking color effects on virtually any wood. In this column I'll review the characteristics and uses of the main coloring products.

Dyes vs. pigments. *Dye stain (top right) colors oak evenly, while pigment stain (top left) collects in the pores, emphasizing the grain. The overlapped section at center shows the combined effect. A coat of finish (bottom half of sample) saturates the color.*

Stains

Wood stains are by far the most common of the coloring products on the market. There are two main types of wood stains: dye stains and pigment stains. While most stain preparations contain either one or the other, some stains contain both pigments and dyes.

Dyes are compounds that dissolve in various solvents, yielding colored solutions that are absorbed into the wood. Because they are translucent, dyes are the best choice when you want to alter the wood color without hiding any of its figure or grain.

Dye stains are available in liquids and gels and as powders ready to dissolve in water, alcohol or oil. Of the three, water dyes are most lightfast and tend to be absorbed most evenly into the wood. Oil-soluble dyes will dissolve in most any oil-compatible solvent, such as mineral spirits, lacquer thinner, etc.

The best way to apply a dye stain is to flood it onto the surface and wipe it off completely before it dries. To make a dye stronger or weaker, vary the amount of solvent. A dye stain usually looks washed out after the solvent evaporates, but it assumes its "wet" color again when the first coat of finish goes on.

Pigment stains are made from ground-up particles of insoluble colored material, suspended in a liquid or gel. The colored particles are much larger than those in dyes, so instead of being absorbed, they tend to sit in the pores and crevices of the wood's surface. Some pigment particles—such as India ink—are so fine that they act like dyes.

Pigment stains intensify the grain lines of open-pore woods by collecting in the coarse pores of the spring wood. They'll also accentuate the crevices of fine carving or coarse sandpaper scratches.

Most pigment stains are actually thin versions of paint, and contain a gluelike "binder" to help the pigment particles stick to the wood. To apply these stains, you flood them on and then wipe off as much or as little as you like. Since the pigment particles are opaque, there's a limit to the amount of pigment stain you can leave on the surface without obscuring the wood beneath.

Most stains are sold as liquids, but they're also available as gel stains—pigment or dye stains thickened to make them drip less. They behave like their liquid counterparts: Dye-based gels act like dye stains; pigment-based gels act like pigmented stains.

Chemical stains are a third, less common, type of stain. They react chemically with wood to change its color. Most of these reactive agents are either caustic or toxic, so you probably won't find them on paint store shelves. Most finishers—including me—avoid using them.

Glazed vs. unglazed. *A coat of glaze (top left) adds depth and richness to this finished cherry panel.*

Glazes

Glazes can be made from either dyes or pigments—usually the latter. Like a pigmented stain, a glaze is essentially a very thin paint modified to make it dry slower. Although you can use water-based paint as a glaze, slower-drying oil-based glazes give you more time to manipulate the mixture on the surface of the wood. They're generally my first choice.

Apply glaze onto a sealed or finished surface using a brush, rag, or spray gun. Then, selectively remove it from some areas with steel wool, rags, brushes or other tools to create highlights and darker recesses. You can mix your glaze thicker or thinner to make it easier to handle.

Glaze is usually applied to surfaces that have some relief—raised-panel doors (see bottom photo, page 86), carvings, fluted turnings, etc.—but it's sometimes used with graining combs and feathers on flat surfaces to suggest wood grain and figure where nature failed to provide it.

Generally, glazes are mixed darker than the surrounding wood to add contrast. When white or very light-colored glaze is applied to darker wood, the process is referred to as "pickling." Glazes can also be manipulated on a smooth, solid-color background to mimic marble, tortoiseshell, leather or stone.

Shading and Toner

Shading and toner are finishes with color mixed directly into them. Although the terms are sometimes used interchangeably, I define *toner* as a thin but highly pigmented, sprayable coating designed to change the color of wood without obscuring its pore structure. A thin coat of toner will make wood all one color, and hide a multitude of sins.

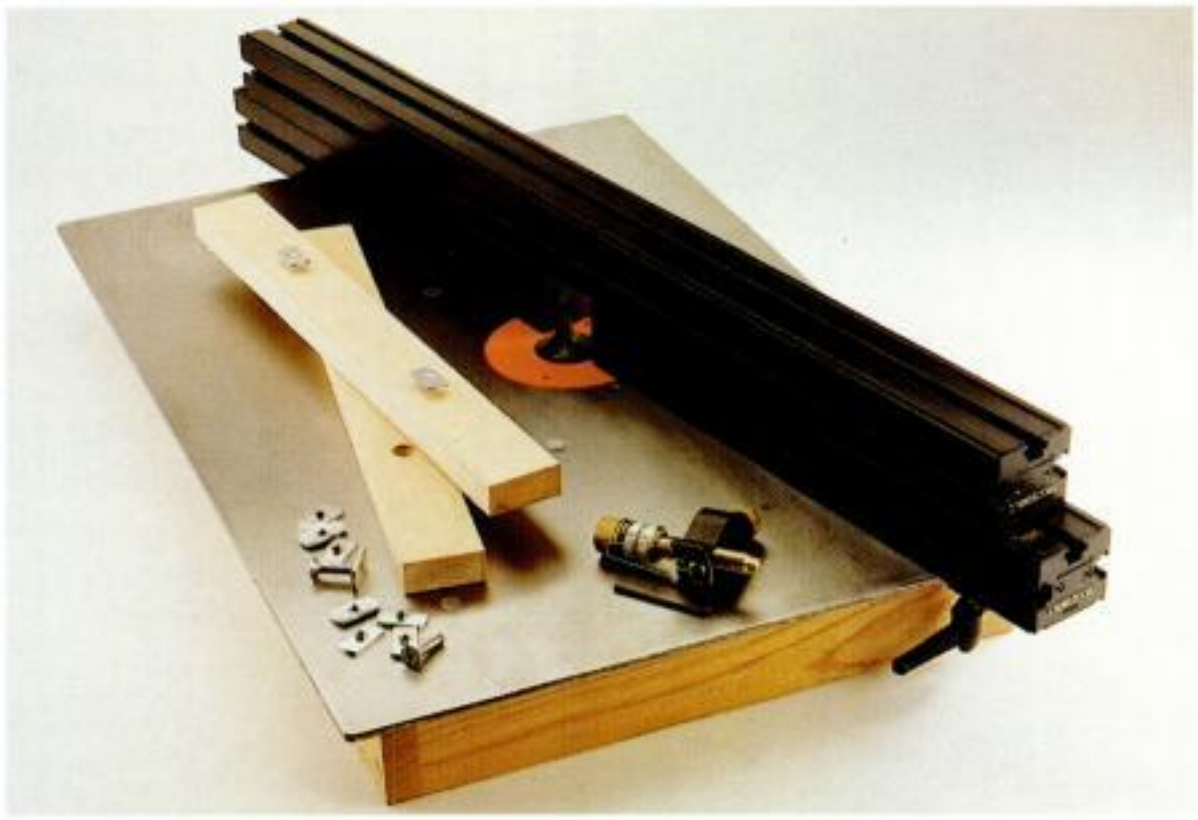
After applying toner, you can bring out the grain and add some contrast by wiping on a pigmented glaze. This demands some patience and practice, though.

Shading is most often made by mixing a dye into clear finish. You can spray it on evenly to add a translucent film of color, or selectively to create a "sunburst" effect, as commonly seen on guitars. Formal tabletops and large wainscot panels are often shaded slightly darker around the edges. The gradual transition to a lighter center makes them almost appear to glow.

I like to apply shading with a small touch-up gun. I use it carefully to tint alternate bands of a drab-looking wood. I'll shoot a light greenish-brown tint on every third or fourth "cathedral" in a wood like walnut or oak, and alternate with a few bands of reddish brown for variety. This technique, when paired with a toner finish, can create a surprisingly realistic version of decent wood on top of bona fide junk. ▲

Join Michael Dresdner live on America Online Sunday nights from 9:30 pm to 10:30 pm eastern time for answers to your finishing questions. Keyword "wood" takes you to AMERICAN WOODWORKER Magazine Online. Click the "Shop Talk" icon to enter the chat room.

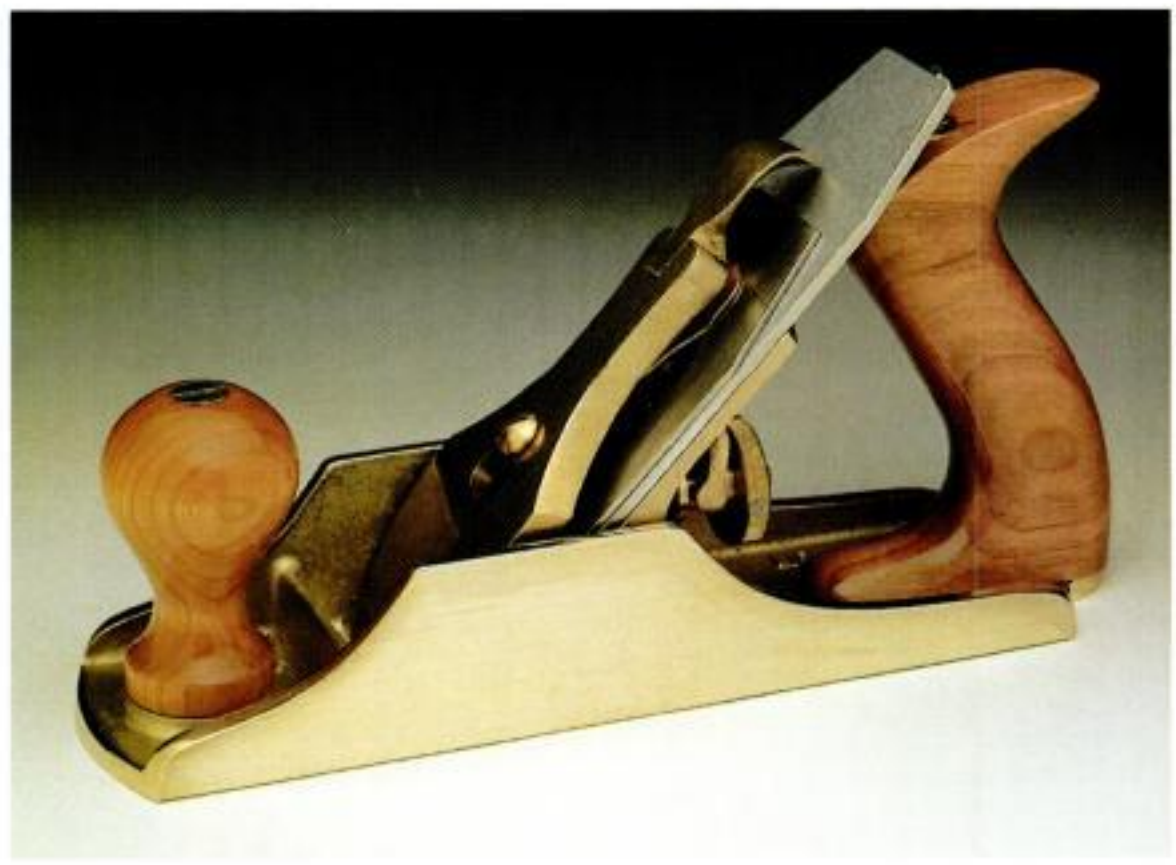
Full-Featured Router-Table Fence



Veritas completes their router-table package (see AW #47) with a new fence that has many innovative features. Made of aluminum extrusions that nest together, the fence has a split bottom rail with wooden subfences that can be formed to fit any bit profile. The fence is equipped with a unique micro-adjuster that registers the fence position relative to the bit. Options include jointing shims, adjustable fence-position stops and a magnetic dust chute that also works on drill presses, lathes and other metal machines. (Price: $125) Lee Valley Tools Ltd., 12 E. River St., Ogdensburg, NY 13669, (800) 871-8158. ***Circle #613***

New Smoothing Plane

■The new No. 4 smoothing plane from Lie-Nielsen Tool Works proves they do make 'em like they used to. Modeled after a Stanley Bed Rock plane, the new No. 4 has plenty of features that make it a pleasure to use: heavy cast-bronze body (also available in cast iron), precision machined parts, and a frog that adjusts without removing the cap and blade. Fitted with a 1/8-in.-thick iron, the plane is ready to use right out of the box. (Price: $225) Lie-Nielsen Toolworks Inc., Dept. AWT, Rte. 1, Warren, ME 04864, (207) 273-2520. ***Circle #614***



Clean Machine

■The integral dust-collection design on DeWalt's new 2-HP plunge router sets a new standard in router dust collection. Dust is extracted through an oversized plunge post and into a shop-vacuum hose attached at the top—a dramatic improvement over add-on dust-collection kits. The mid-sized DW621 router comes with other notable features including a handle-mounted plunge lock and trigger, 1/4-in. and 1/2-in. collets, and a micro depth adjuster. It also has the broadest range of speeds on the market: 8,000 to 24,000 rpm. (Street price: $210) DeWalt Industrial Power Tools, Dept. AWT, Box 158, Hampstead, MD 21074, (800) 433-9258. ***Circle #615***

Cyclone Retrofit

The Blue Tornado Cyclone improves the efficiency of your existing single- or two-stage dust collector by separating out heavy debris and fine dust before it reaches your dust bags. Two cyclone models are available: one sized to fit 2-HP and one to fit 3-HP dust collectors. The cyclone is made of welded 16-gauge steel to resist denting, which can disturb airflow. A connection kit, a 35-gallon drum, and a tripod stand or wall-mount hardware are included. (Price: $378 for 2-HP cyclone; $436 for 3-HP cyclone) Blue Tornado Cyclones, Dept. AWT, Box 156, Buckner, KY 40010, (800) 292-0157.
Circle #616

Drill-Press Turning Kit

Do you ever need to produce a few small-scale turnings, but you don't have access to a lathe? VertiLathe is a low-cost attachment that lets you turn small parts vertically on your drill press. It consists of a baseplate with a live center, a vertical tool rest, and two drive centers. You can turn stock up to 2½ in. dia. and 6 in. long—and if you reverse the workpiece you can turn stock up to 12 in. long. (Price: $46.50) Woodworker's Supply, Dept. AWT, 1108 N. Glenn Rd., Casper, WY 82601, (800) 645-9292.
Circle #617

SHOP TESTED

Kel McNaughton Centre Saving System

Tested by Alan Stirt

As a professional turner, I've always been concerned with the waste from bowl turning—you end up with a bowl and a huge pile of shavings. This is a real loss when you're using rare or highly figured wood. I've tried cutting tools that let you remove the interior of a bowl as a solid block, but they weren't very versatile and had a tendency to dig in—often with dangerous consequences.

Now I've found a tool that lets me turn multiple "nested" bowls from a single block of wood more easily and safely than ever before. The Kel McNaughton Centre Saving System consists of a handle with interchangeable blades (3 curved and 1 straight) and a specially designed tool post that fits into your tool-rest base. The post is the key to the system: It keeps the blade from rolling and absorbs the forces as the blade cuts the blank.

With this New Zealand-made system, you can get four or five bowls from a single blank, and you can cut bowls up to about 14 in. dia. It's best to start with wet wood and small-diameter bowls.

Center saver. *Using this system of interchangeable blades and a specially designed tool rest, you can turn multiple nested bowls from a single blank.*

For less friction on deep cuts, I widen the kerf as I advance the tool by just swinging the tool handle back and forth a bit. It also helps to wax the blade and stop the lathe periodically to remove shavings. Although I've had the tool jam and stop the lathe on deep cuts, I've not had any sudden catches when everything was properly adjusted. The only wood I had trouble with was wet butternut—it was so soft and fibrous, it just clogged and jammed the cutter.

Kel McNaughton System recommends using a lathe with at least a 1-HP motor. And it's crucial to position the cutter at or slightly higher than the center. To achieve this, I had to grind about 3/16 in. off my tool-rest base.

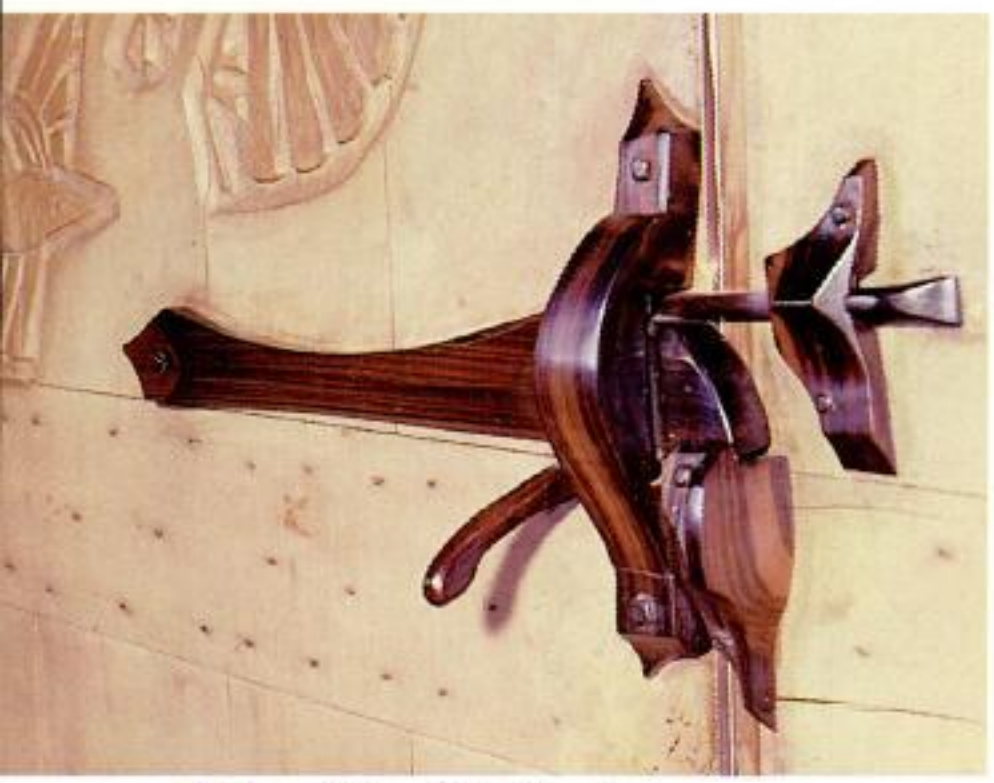
The blades have cobalt-alloy cutting tips that hold an edge well. Sharpening is tricky, since the face of each cutter is curved. The manufacturer recommends using a round diamond file, but I've had good results with a diamond-coated chainsaw sharpener mounted in a Dremel tool.

I recommend this system for anyone who regularly turns bowls with diameters of 9 in. or more. You'll save material, improve safety, and work quickly to boot. (Price: $266 U.S. includes shipping; pay by credit card or bank-certified check) Busy Bee Packaging Ltd., Box 58870, Greenmount, Auckland, New Zealand, 011-649-273-9170. ***Circle #618***

ALAN STIRT *is a professional bowl turner based in Vermont.*

Handling Your Work

When it comes to opening a drawer or a door, woodworkers are faced with the choice of either buying pulls or making their own. While the selection of store-bought pulls is plentiful, most can't compare to those crafted by hand. Making your own handle puts a finishing touch on a project and gives it a unique look. Here's a selection of inventive openers.

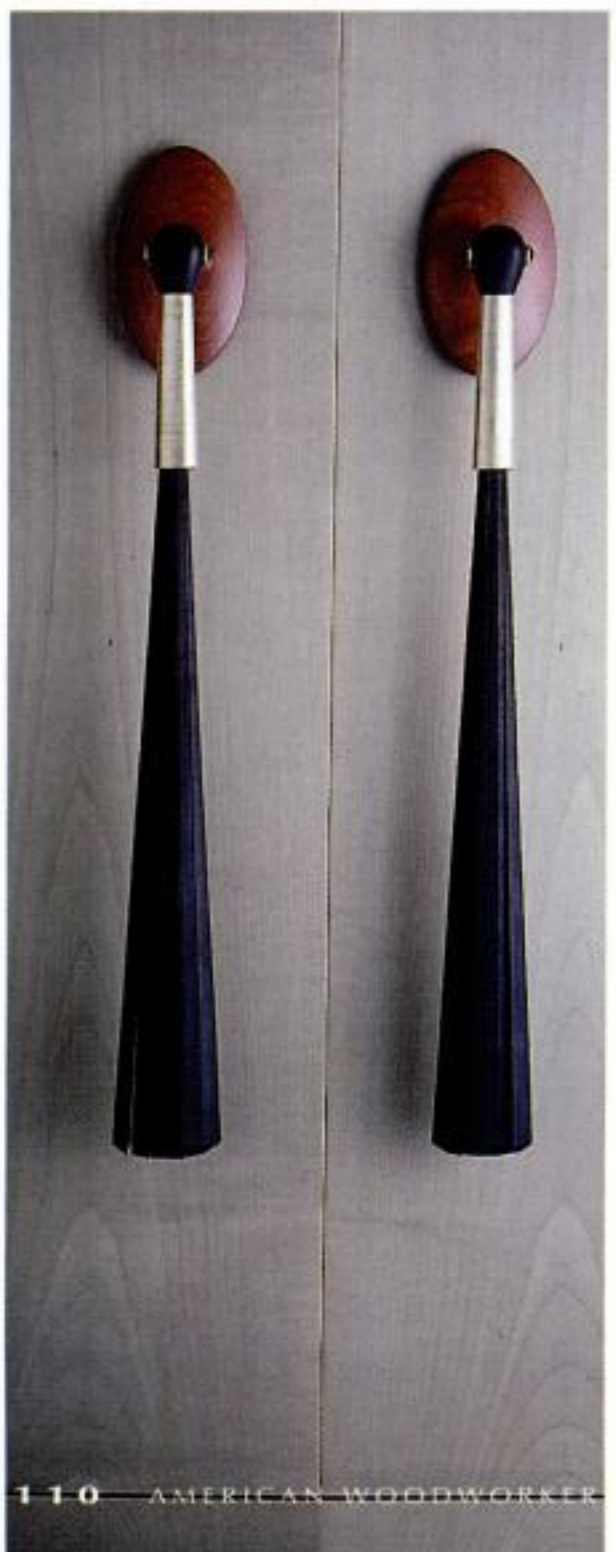


▲ Door latch with locking bar
by Wharton Esherick (1887-1970), Paoli, PA.
Macassar ebony latch and bar; black-iron lag screws.

PHOTO BY MANSFIELD BASCOM

▼ Drawer handles
by Yuko Shimizu, Oakland, CA.
Mahogany and poplar,
with acrylic paint.

PHOTO BY KOICHIRO HAYA



◀ Door pulls
for an armoire
by Larry Wood,
Brooklyn, NY,
and Frank Klausz,
Pluckemin, NJ.
Ebony slivers
wrapped with
silver wire;
purpleheart
back plate.

PHOTO BY BRYAN ALLEN

Want to see your work in "Gallery"? Send color slides or larger transparencies to: "Gallery," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. Please include a title, a brief description of techniques used, materials, dimensions, name of photographer, your name, address, and phone number. We'll pay you $35 per entry published. If you want your photos returned, enclose a self-addressed stamped envelope.

Cabinet door pull
by George Nakashima (1905-1990),
New Hope, PA.
English oak burl.

PHOTO BY GEORGE ERML

▲ Drawer pulls for a toolbox by Peter S. Kent, Philadelphia, PA. Found objects.

PHOTO BY JULIE MARQUART

Sliding dovetail drawer pulls
for a tool chest
by Luis Molina,
North Bennet Street School,
Boston, MA. Mahogany.

PHOTO BY LANCE PATTERSON