TAUNTON'S

Fine WoodWorking

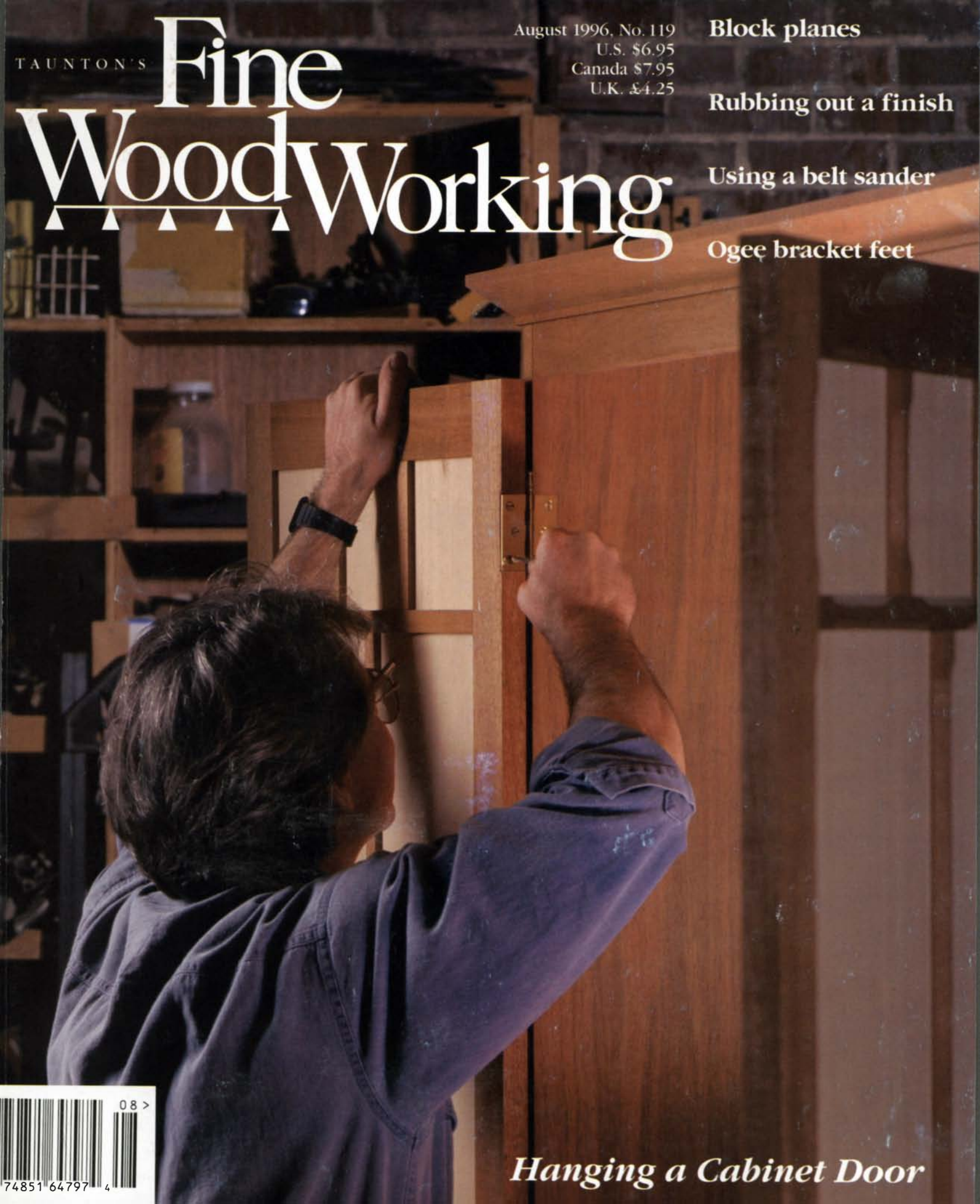
August 1996, No. 119
U.S. $6.95
Canada $7.95
U.K. £4.25

Block planes

Rubbing out a finish

Using a belt sander

Ogee bracket feet



Hanging a Cabinet Door

08 >
74851 64797 4

THE THINGS YOU BUILD WILL BE STANDING LONG AFTER YOU DIE. LEAVE A GOOD MARK.

Artists sign the bottom of the canvas. Athletes set records. Yours is a more subtle signature. But if you do it right, your legacy won't fade. And it will never be broken.

BOSCH
Power Tools
ENGINEERED FOR PERFORMANCE™

READER SERVICE NO. 140

Fine WoodWorking®

DEPARTMENTS

Ogee bracket feet, p. 78

Comparing block planes, p. 36

Table for a portable planer, p. 42

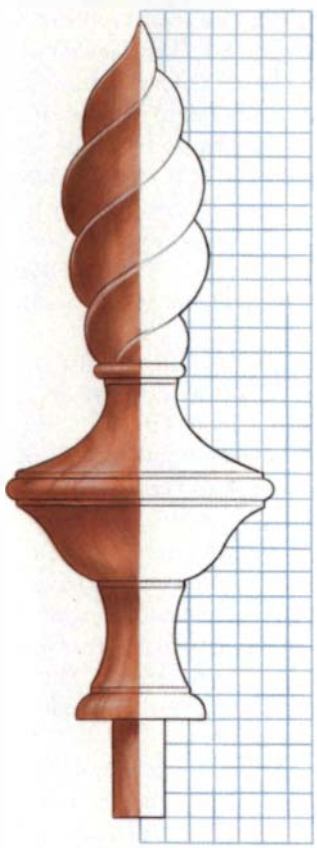
On the Cover:
Getting a cabinet door to hang correctly and operate smoothly starts with the careful installation of hinges. Phil Lowe explains how to put in a set of butt hinges on p. 68. Photo: Boyd Hagen

Fine Woodworking (ISSN 0361-3453) is published bimonthly, January, March, May, July, September and November, by The Taunton Press, Inc., Newtown, CT 06470-5506. Telephone (203) 426-8171. Second-class postage paid at Newtown, CT 06470-5506, and additional mailing offices. United States newsstand distribution by Curtis Circulation Co., 433 Hackensack Ave., Hackensack, NJ 07601 and Eastern News Distributors, Inc., 1130 Cleveland Road, Sandusky, OH 44870. GST #123210981.

July/August 1996 No. 119

ARTICLES

Using a belt sander, p. 59



Finials for a highboy, p. 52

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

God must not have had a tablesaw— In reference to Peter Korn's answer on whether a radial-arm saw or tablesaw is the best choice for the woodshop (*FWW* #117, p. 24), I am reminded of an old woodworker's comment:

"If God had used a tablesaw to make the world, all the coastlines would be straight, and he would have finished in three days."

—Jerry Lambden, Honolulu, Hawaii

In defense of the radial-arm saw—I usually leave it to others to write letters to editors, but it doesn't appear that anyone else is going to come to the defense of the radial-arm saw. Kent Fitzgerald pointed out the proper direction to feed material when ripping (*FWW* #118, p. 6), but there's more.

With guides and auxiliary tables, a radial-arm saw will do just about anything you want. I built an entire house, including bath and kitchen cabinets, with a radial-arm saw and a 6-in. jointer. I resawed rough stock and slabs for trim and molding. I also make small jewelry boxes and other small items with it.

I now have a router, but in the past, I have used my radial-arm as a shaper, router and planer. The only mishap I have had with it was when I very carelessly left a framing square lying on the saw table.

—Jim Fuller, White Sulphur Springs, Mont.

I am appalled that you would choose someone as obviously biased as Peter Korn to provide a response that is supposed to be an even-handed discussion of the pros and cons of the radial-arm saw.

The blade is there; you can see it. You know where it is. Over the years, I have met three people who have lost fingers while woodworking. Two accidents were on tablesaws and one on a shaper. The accidents occurred because the operators could not see the blade.

Someday, when I win the lottery, I may buy a tablesaw. Then again, maybe not.

—Michael Meacham, Phoenix, Ariz.

A folding ruler for the new guy—In the "Letters" column, Orv Dunlap warns of the "hidden danger" of using a folding ruler (*FWW* #117, p. 8) and describes an incident where a cabinetmaker had used one only to discover his cabinets were 6 in. short because a section of the rule had fallen off.

I have a hard time believing that in all the time he was building a set of cabinets he never noticed the missing section. But it is possible he fell prey to an old trick that was often played on apprentices before the tape rule became king: The journeyman would remove two sections from the center of the rule, reassemble it and proudly award the new ruler to the apprentice. The journeyman would then wait to see how long it took for him to discover the missing piece.

Apprenticeship is a hard life at first.

—Geoff Dunn, Greeley, Colo.

What about a broom?—The intense concentration on improving indoor air quality with home-shop dust collectors has, no doubt, been a boon to new-equipment suppliers. I have visited several home shops that are so encumbered with dust-collection equipment that every operation is severely hindered.

I recall my grandfather's shop and my father's shop where the bench brush, oiled floor sweep, dustpan and broom took care of the shavings from truly major projects quite nicely.

Don't get me wrong. I appreciate my shop vacuum and quickly replaced the last one when it gave up. But on many evenings, it's relaxing to end the work day by simply brooming the shavings into a box.

On another point, the oft-mentioned method of work that suggests we tap our holes for soft brass screws with a drywall screw totally ignores the varying number of threads per inch between the two. Most vintage items will be found with proper steel screws. The workers of yesteryear knew well the weaknesses of soft brass.

Tapping done improperly can

Writing an article

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

Fine WoodWorking

Editor Scott Gibson
Art Director Bob Goodfellow
Associate Editors Vincent Laurence, Alec Waters, William Duckworth
Assistant Editors Dennis Preston, Aimé Fraser
Copy/Production Editor Deborah Surprenant
Associate Art Director Matthew Wells
Editorial Secretary Lee Anne Candito
Contributing Editors Tage Frid, R. Bruce Hoadley, Christian Becksvoort, Robert M. Vaughan, Mario Rodriguez, Chris Minick
Methods of Work Jim Richey
Indexer Harriet Hodges

Publisher James P. Chiavelli
Corporate Circulation Director Douglas Newton
Administrative Secretary Susan M. Clark

Advertising Sales Manager Dick West
National Accounts Managers Barney Barrett, Tom Brancato, David Gray
Sr. Advertising Coordinator Kathryn Simonds
Advertising Secretary Hilda Fernandes

Woodworking Books & Videos
Acquisitions Editor Rick Peters
Publishing Coordinator Joanne Renna

How to contact Fine Woodworking:
Telephone: (800) 283-7252, (203) 426-8171
Fax: (203) 270-6751

Subscriptions:
Orders: (800) 888-8286
Customer Service: (800) 477-8727

Advertising Sales: (800) 283-7252 x 829

Taunton Trade Company:
Retail Sales: (800) 283-7252 x 265

Member Audit Bureau of Circulation

Subscription rates: United States and possessions, $32 for one year, $56 for two years, $82 for three years; Canada and other countries, $38 for one year, $67 for two years, $95 for three years (in U.S. dollars, please). Single copy, $6.95. Single copies outside the U.S. and possessions: U.K., £4.25; other countries and possessions, $7.95. Address all correspondence to the appropriate department (Subscription, Editorial, or Advertising), The Taunton Press, 63 South Main Street, PO Box 5506, Newtown, CT 06470-5506. List management: The Kleid Co., 530 5th Ave. New York, NY 10036-5101.

significantly reduce the load-carrying capacity of the final assembly. If the application absolutely demands a brass screw, look carefully for a supplier of bronze screws. Or dare I suggest using a virgin brass-plated steel screw at final assembly time?

–John Adams, Maumelle, Ark.

Capture dust at the source—*Fine Woodworking* adds to the body of dust-collection rumor and myth while spreading dangerous misinformation in the article "Small-Shop Dust Collectors" (*FWW* #117). The article incorrectly explains that any small particulates that sneak through the dust collector can be controlled with an air-filtration device.

Successful dust collection is accomplished when dust is captured at the source of the grinding operation and then filtered down to the finest particle. Many bag-style collectors pump as much as 30 times more dust into the air than permissible by the Occupational Safety and Health Administration (OSHA). Trying to capture fine particulates after they have become airborne is like trying to find a needle in a haystack. It defies common sense. *–Robert Witter, Oneida Air Systems, Syracuse, N.Y.*

Sharpening on a belt sander—I was very interested in the article on job-site sharpening (*FWW* #117, pp. 64-65). I have been doing the same thing with my Makita sander for several years.

But I think the picture showing the operator holding the wood chisel with the sharp edge directed into the oncoming belt is a safety hazard. A slight misalignment of the blade could cause it to cut into the belt. And at that speed, a very serious accident could happen.

I've found that by holding the work so that the belt is going away from the sharp edge gives very satisfactory results and keeps the operator's hands out of danger.

–John McInerney, Middletown, Conn.

I read with concern Stephen Winchester's article on sharpening on a portable belt sander. The article fails to suggest that the sander be clamped to a bench surface or held upside down by a helper. Any sander that I have used would tend to wander if just placed upside down.

As a professional, Mr. Winchester may get away with the suggested procedure of sharpening with the belt rotating toward the chisel, but I shudder to think of what a weekend amateur might do to himself.

–Douglas Niblock, Maberly, Ont., Canada

With waterbornes, just avoid oil—I agree with Chris Minick's wariness about selecting a new finish based on manufacturer's claims (*FWW* #115, pp. 48-53). But I can't understand why he expected adhesion over oil-based stains.

I have finished and refinished hundreds of pieces of residential and commercial furniture and millwork over the last three years using only waterborne topcoats. The switch from solvent-based topcoats was not as simple as buying a waterborne product and then finishing as usual.

After many months of trials, it became clear that the single greatest insurance for adhesion and appearance was not to use any oily product anywhere in the system. Period.*–James H. Conklin, Woodbury, N.J.*

Nice bench, but too pricey—I was really interested in Bill Nyberg's workbench (*FWW* #118, p. 42-43). That was until I went to two different hardware stores to check on the price of double clamps. They were $30 apiece. With $120 for clamps and another $50 for the 2x4s, you have a $200 bench.

I am retired and living on a pension. Two hundred dollars for that bench is just too much for me.

–Fred Brunie, Sebring, Ohio

Isn't there a cheaper way?—I read with great interest your article on making the bonnet top to a cherry highboy (*FWW* #118, pp. 34-41). My excitement waned when I read the author describe how he made the gooseneck molding with router bits he ordered specially fabricated.

Seriously, guys, how many woodworkers can or will have router bits specially made for a project? Maybe my relative inexperience is showing through here, but isn't there a creative alternative that would accomplish essentially the same thing? If so, I wish you'd have described it. If not, I'll resign myself to joining the great masses of woodworkers for whom your articles have esoteric interest but limited utility.

–Martin Zucker, St. Louis, Mo.

Surely you've noticed there's no shortage of simple weekend or country projects in all the woodworking magazines each month. *Fine Woodworking* is just about the only one that sometimes deals with antique reproductions. This is exactly why I bought *FWW* #117, which featured the spectacular highboy on the cover.

Still, I hesitated. The reason is the lack of detailed instructions for so many of your advanced projects like this highboy. This isn't necessarily a complaint. I just

Taunton PUBLICATIONS
for fellow enthusiasts

The Taunton Press: Paul Roman, chairman; Janice A. Roman, president; Peter Chidsey, executive vice president; Carolyn Kovaleski, administrative secretary. **Corporate Editorial:** John Lively, editor in chief & vice president; Linda Wesley. *Books:* Carolyn Mandarano, managing editor; Ruth Dobsevage, Peter Chapman, Thomas C. McKenna, Diane Sinitsky. *New Products:* Suzanne Roman, editor; Jefferson Kolle, Jennifer Renjilian, Marc Vassallo. **Personnel:** Carol Marotti, manager; Linda Ballerini, Christine Lincoln. **Accounting:** Wayne Reynolds, controller; Jennifer Glass, Patrick Lamontagne, asst. controller; Keith Chapman, Mary Sullivan, Andrea Henchcliffe, Carol Diehm, Margaret Bafundo, Dorothy Blasko, Susan Burke, Lawrence Rice, Gayle Hammond, Karen Lewis, Lydia Krikorian, Elaine Yamin. **Corporate Design:** Susan Edelman, director; Laura Bergeron. *Corporate Art:* Mary Terrizzi, manager; Robert Olah, Henry Roth, Amy Bernard, Christopher Casey, Jodie Delohery, Jody Hankinson, Joan Lockhart, Lynne Phillips, Carol Singer. *Photography:* Boyd Hagen, director; Anthony Phillips. *Promotion:* Philip Allard, manager; D. J. Arneson, Michael Ray, Wendy Bowes, Kerstin Heiden, Julia Brine, Mary Beth Cleary, Francesca Arminio. **Manufacturing:** Kathleen Davis, director; Joanne Bisson. *Prepress:* Austin Starbird, manager; John Garofalo, Stephen Roma, Patricia Sigetti, Deborah Cooper, William Bivona, David Blasko, Richard Booth, James Chappuis, Mark Coleman, Lisa DeFeo, Tina Foster, William Godfrey, Joseph Petrahai, Linda Reddington, Martha Stammer, Chansam Thammavongsa, David Kenney, W. Kathy Martin, Monica Murphy. *Print Production:* Dee Flanagan, Lynda Morris, promotion; Thomas Greco, Deborah Baldwin, books; Philip VanKirk, Tracie Pavlik, magazines. *Video:* Craig Umanoff, Thomas Menard. **Corporate Marketing:** Diane Patterson, Sarah Roman. **Fulfillment & Operations:** Thomas Luxeder, director; Jane Torrence. *Client Services:* Patricia Williamson, manager; Carolyn Ameth, Kathryn Dolson, Holly Obenhoff, Eileen Swirsky. *Order Processing:* John Comerford, manager; Nancy Brown, Barbara Lowe, Dawn Teixeira, Marylou Thompson. *Subscriber Services:* Patricia Malouff, manager; Donna Weinstein, Penny Lefferts, Jennifer Severino, Mary Ellen Silk, Barbara Smith, Siri Wheeler. *Data Entry:* Carole Ando, manager; Bonnie Beardsley, Margaret Fainer, Madelaine Frengs, Tracy LeBrun, Debra McCormack, Gina Pabis, Andrea Shorrock. *Distribution:* Paul Seipold, manager; Mary Ann Costagliola, Maureen Flynn, Deborah Greene, Linnea Ingram, Brian Leavitt, Aaron Lund, Frederick Monnes, Elsie Rodriguez, Alice Saxton, Eileen Sheehan. *Purchasing & Facilities:* William Schappert, manager; Christopher Myers, Lois Beck, Cynthia Carroll, Beatrix Vangor, Charles Hollis, Steven Beleznay, Michael Capalbo, Robert Weinstein, Arthur Williams, Susan Nerich, Oscar Carranza, Alvin Jack, Lincoln Peters. *Cafeteria:* Donna Freeman, manager; Geraldine Benno, Isabel Kaplan, Nortna-Jean Taylor. **Data Processing:** Robert Peters, MIS director; Brendan Bowe, Arthur Caron, James Courtright, Maurice Downey, Gabriel Dunn, J. Larry Kinnear, Marjorie Omalyev, Roger Seliga. *PC Applications:* Heidi Waldkirch, manager; Barbara Daignault, Robert Nielsen. *PC Systems:* Margaret Archer, manager; Cristina DeLucia, Lisa Northrop. **New Media:** Roy Swanson, director. **Taunton Direct:** Claudia Allen, Pamela Dunaway, Brenda Hamilton, Megan Sangster, Jeanne Todaro. **Taunton Trade Company:** Dale Brown, president; Thomas Johnson, sales manager; Frances Allen, John Bacigalupi, Peter Bill, Barbara Buckalew, Linda Yurchishin.

want to let you know there are some of us out here in our little garage woodworking shops (no telling how many) who would like to build quality antique reproduction furniture. We could benefit from more extensive and thorough instructions, especially on difficult projects.

Take us by the hand, and lead us from the land of a shelf with a heart routed in the middle to the land of "dancing" highboys. *–David Michael Powell, San Antonio, Texas*

Too much advertising—You had better cut back on the amount of advertising in your magazines. I subscribe to *Fine Woodworking* and *Fine Homebuilding*. These magazines *were fine* publications with more articles than ads, but this has changed over the years to half ads and half articles. You are becoming just like all the other magazines. If this trend continues, I'll drop my subscriptions to both magazines.

–V. Wayne Batton, Stanwood, Wash.

Using alternative hardwoods—Thanks for the timely and interesting articles about possible substitutes for Honduras mahogany and teak (*FWW* #118, pp. 62-68). For the past 10 years, my company has been involved in buying, selling and replanting more than a dozen species of secondary tropical hardwoods.

The truth is that for some uses, such as mahogany for musical instruments, casting patterns and high-quality furniture and teak for blue-water boat decks, there are no acceptable substitutes.

Andiroba (*Carapa guianensis*), sometimes called mountain mahogany, is the most practical substitute for Honduras mahogany (it's in the same family). Andiroba is plentiful, inexpensive, durable, machinable and close enough in appearance to confuse many experts. It lacks only the inner glow and extreme stability of Honduras mahogany.

Billy Webb (*Sweetia panamensis*) is an excellent substitute for teak. Billy Webb is virtually indistinguishable from teak in appearance, and it's very durable. The wood is slightly harder and heavier than teak. Billy Webb lacks the oily, waxy feel of teak as well as the high silica content that makes teak so difficult to work.

Our experience has shown that there are no solid guarantees for sustainability. We believe the best way for people in the United States to help save the rain forest is to provide a stable market for as many types of tropical hardwoods as possible.

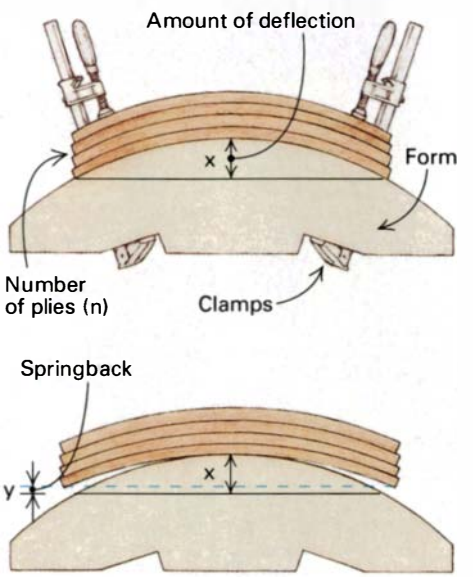
–W.T. Hibdon, president, Hibdon Hardwood, St. Louis, Mo.

An easy way of determining springback—Following your recent article on bent laminations (*FWW* #115, pp. 70-75), I'm offering a way of determining the degree of springback after the lamination is removed from the form.

I became interested in this problem when I made a pair of chairs from reclaimed teak. The curved members of the seat and back were laminated from stock about ¼ in. thick. I needed to determine in advance the amount the lamination would spring back when the clamps were released.

Predicting springback

Plies glued into a curved lamination tend to straighten out slightly when the finished piece is removed from the form. In the example below, the finished lamination will springback one-sixteenth of the original deflection.



I discovered that for many situations, a delightfully simple solution followed from the application of beam-bending theory, as illustrated in the drawing.

A number of plies of similar wood (n) are glued and clamped to a curved form, which is shaped to give the lamination a deflection of "x." When the clamps are removed, the lamination springs away from the form by an amount "y." Exactly how much springback can be predicted with the formula $y = x/n^2$.

The ratio of springback to the original deflection depends only on the number of laminations. The ratio does not depend on the properties or thickness of the wood or the geometry of the curved form. Thus, for two plies, the springback is one-quarter of the initial deflection, or one-ninth for three plies and one-sixteenth for four plies.

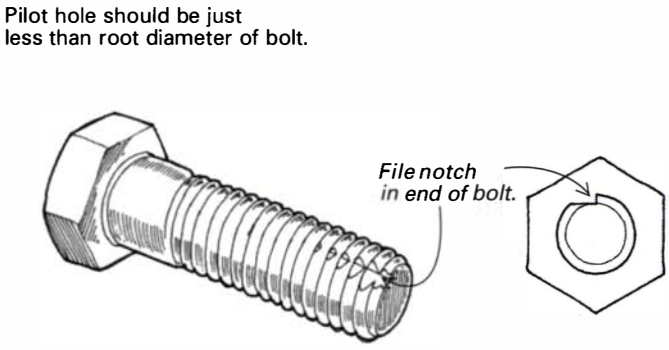
–Bill Clayden, Isle of Wight, England

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

–Scott Gibson, editor

edited and drawn by Jim Richey

Threading wood without taps



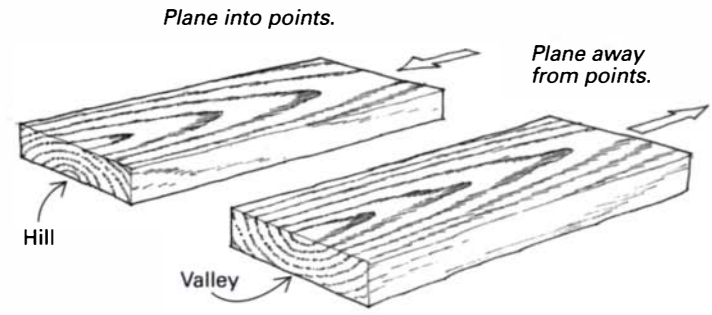
Use bolt to cut threads in wood.

I agree fully with Clyde Seitz's comments (*FWW* #113, p. 20) that T-nuts are not always needed. Threads tapped right into the wood are acceptably strong for most purposes. And you don't really need a tap to cut the threads. In softer woods like pine and spruce, just drill a pilot hole, and screw the bolt into it. The bolt threads will compress the wood. In hardwoods, simply file a notch into the end of the bolt, as shown. File the notch slightly into the threads, and drill the pilot hole a little smaller than the bolt diameter so that some compression occurs. I have done this for many years in jigs and fixtures without any failed threads.

—Fred Reeves, Cambridge, Ont., Canada

Quick tip: A hot-melt glue gun is useful for making temporary attachments, such as workpieces to templates. But then these pieces must be separated. A few drops of acetone will make the glue loosen the glue's grip. *—Hilliard Stone, Irving, Texas*

Determining grain direction for handplaning



When handplaning boards, it is sometimes hard to know which direction to choose to avoid tearout. Checking the grain on the side of the board is a help, but that doesn't always tell the whole story. Here is an additional method that works very well.

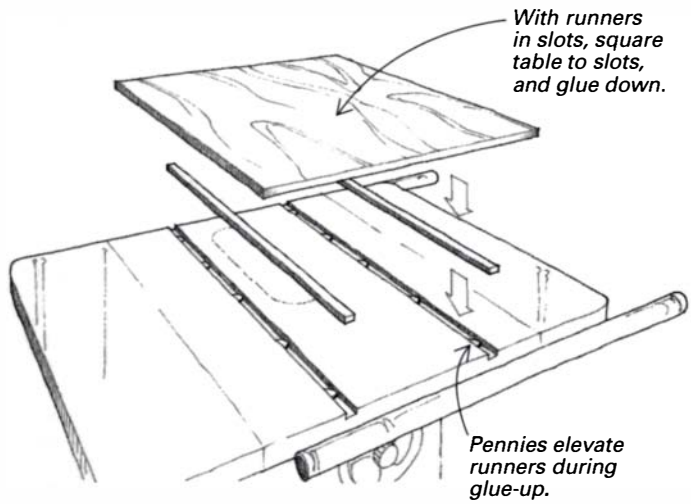
Look at the end grain of the board. With flatsawn lumber, you get one of two patterns: hills or valleys. Then look at the surface of the wood to see where the grain forms rounded points (called cathedrals). If the end grain is a hill, plane into the points. If the end grain is a valley, plane away from the points.

To help me remember the somewhat complicated directions, I think of an imaginary battle where a band of warriors charge up the hill and into the points of their enemy. The warriors retreat and run back into the valley with the enemy's points at their backs.

—Billy King, Oldhams, Va.

Quick tip: To hold oddly shaped items while drilling, put several handfuls of small dry beans in a heavy-duty resealable plastic bag. Put the bean bag on the drill-press table, and place the part to be drilled on top of it. Press down so the beans conform around and support the part. When the bag wears out, just drop the beans into a new bag, and you're back in business.*—R.B. Himes, Vienna, Ohio*

Improved miter-slot runners



As anyone who has ever tried to make a sliding table for a tablesaw knows, aligning the runners to the sliding table correctly can be frustrating. The trick is to do it in place. This drastically simplifies the process and virtually ensures a perfect fit and smooth sliding action.

First cut and fit runners for the miter-gauge slots. Make the runners a little shorter than the total length of the slot and slightly thinner than the depth of the slot. The runners should be hardwood (red oak or hard maple is a good choice). Sand or plane the runners until they move freely but snugly. The runner size typically will be ¾ in. wide by a little less than ⅜ in. thick. The runners should not touch the bottom of the slots when the table is finished.

Attach the sliding table to the runners. The runners should be elevated until they are just proud of the table surface. I use pennies. I evenly distribute four or five stacks of two pennies along the bottom of each slot to raise the runners.

Align the ends of the runners with the front ends of the slots, and shim or wedge the runners to force them to the edge of the miter slot closest to the blade. This removes any remaining slop. Apply glue to the top of the runners, and carefully set the sliding table on top, aligning the front edge of the table at 90° to the miter slots. Finally, add weight to the top of the table over the runners for a good glue bond. I generally use a good stack of bricks.

After the glue has cured, remove the sliding table, pennies and shims from the saw. For insurance, screw the runners to the table

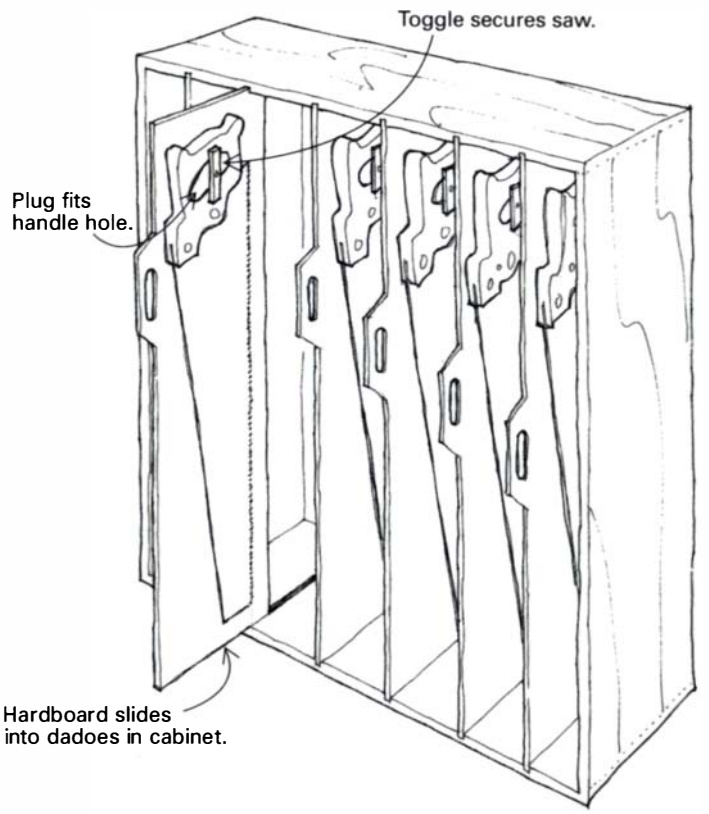
from below, countersinking the heads. Apply a coat or two of paste wax to the table bottom and runners, and you'll be in sliding heaven. *—Mike Smith, Smyrna, Ga.*

Erasable pattern material

Sign shops have a product very useful to woodworkers—a rigid plastic board made from expanded PVC foam. The board is excellent for drawing patterns and making full-sized layouts. You can shape it easily with woodworking tools, trace around it repeatedly without wear, draw and erase pencil lines on it, and even use it for a router guide. You can glue directly on it because glue does not stick to it. The brand of board I use is Trovicel. A ⅛-in.-thick, 4x8 sheet costs approximately $40.

—Peter LaMontagne, New Britain, Pa.

Handsaw cabinet

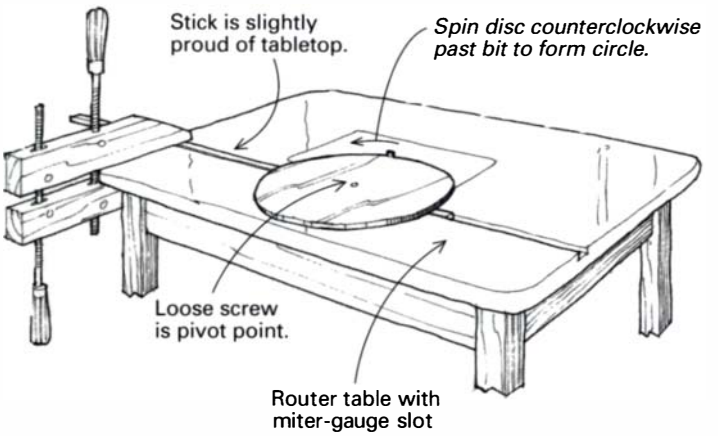


Storage of handsaws is always a problem, especially when your shop is as small as mine. So I designed this space-saving cabinet that has hardboard slides to hold the saws. I constructed the carcase of the cabinet from ⅝-in. plywood and the back and saw slides from 3/16-in. hardboard. Each saw rests on a custom-shaped 1¼-in.-thick plywood block that fits the space inside the saw handle. I added a small hardwood toggle to hold the saw in place.

The dimensions of the cabinet vary according to the number of saws you have and their length and width. In my case, I sized the cabinet about 32 in. tall, 8 in. deep and 14 in. wide, which gives space for six saw slides, each spaced about 2 in. apart.

—Adam van Sertima, Montreal, Que., Canada

Making discs on the router table

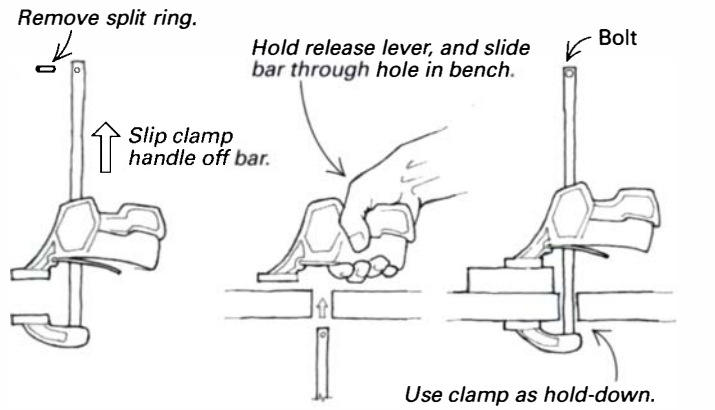


To cut smooth, accurate circles, make a sliding wooden strip to fit in the miter-gauge slot of your router table. The strip should protrude just slightly above the surface of the table so a clamp will hold it in place. Put a screw through the center of the workpiece into the wood strip. The screw should be just loose enough so the work will rotate. The screw can be driven up through the strip and into the bottom of the work if you don't want a visible hole. Turn the piece counterclockwise to make the cut. Slide the strip right or left to adjust the radius. The size of the disc can range from 8 in. or so to about 24 in., depending on the router table.

—Tom Rausenberg, Dayton, Ohio

Quick tip: I use a towel under my waterstones to pick up all the muck and slurry generated by the sharpening process. One day, I used this muck-permeated rag to wipe a rusty square and was amazed to find that it polished the blade with very little effort. Now whenever rust appears on my metal tools, I remove it with a few quick rubs of my muddy rag. *—Ben Thompson, Montezuma, N.M.*

Using Quick-Grip bar clamps as hold-downs

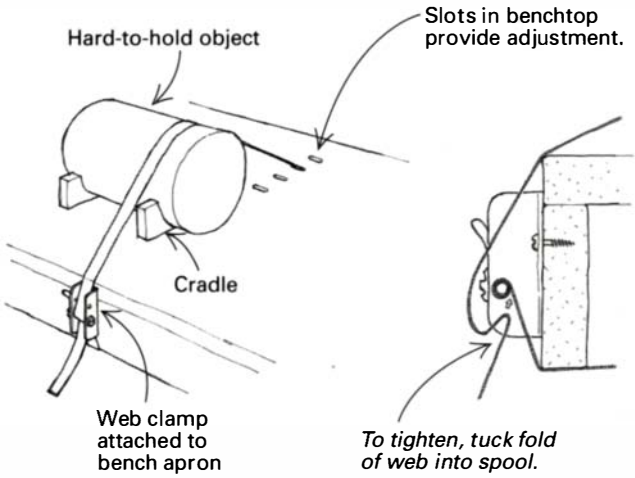


Here's how to use a Quick-Grip bar clamp as a hold-down: Locate the bench-dog hole where you want to position the hold-down, or drill a ¾-in. hole through the benchtop. Now punch out the split ring on the end of the bar, hold down the release lever of the pis-

tol grip and slide the grip assembly off the bar. Don't let go of the release lever, or you will have to realign the retention washers and spring inside the grip. Guide the bar through the hole in the bench, and slide the grip assembly back onto the bar. Replace the split ring with a ¼-in. bolt and wing nut to facilitate future changeovers.

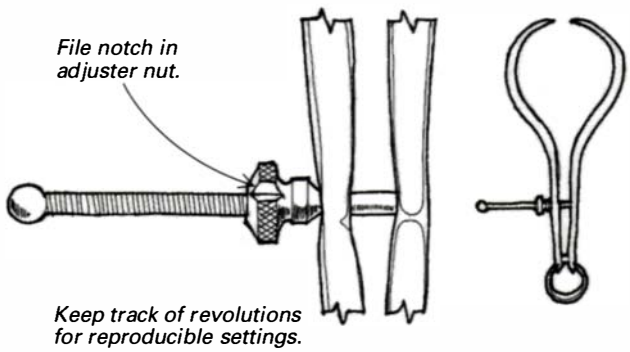
—Matt Valikoski, Campbell River, B.C., Canada

Web-clamp work holder



Because of their size and shape, the musical instruments I build are difficult to hold securely on the workbench for carving and routing. So I use this simple web-clamp system to hold instruments, or any other oddly shaped object, quite securely. Screw two or more web clamps to the apron of your workbench, as shown in the sketch. When you need to secure a workpiece, grab the loose end of the web strap, thread it from below through one of several precut slots in your bench, bring the strap up over the workpiece and back to the clamp. Now stick a fold of the web into the spool so that it is caught by the wrap around the tightening axle. Then tighten the clamp to secure the workpiece. If necessary, make a cradle, as shown, to hold the object. *—Jeffrey Lee Gaynor, Rootstown, Ohio*

Repeatable divider settings



Calipers and dividers are great when you want to gauge a thickness, such as the wall of a turned bowl. But because there are no calibrations on many of these tools, it's difficult to repeat settings. You have to transfer distances to wood or read the measurement against a scale. A simple solution is to file a notch into the adjuster nut so that you can keep track of the number of turns. Because the threads are fine, returning the nut to an exact position will reset the calipers to a previous position with great precision.

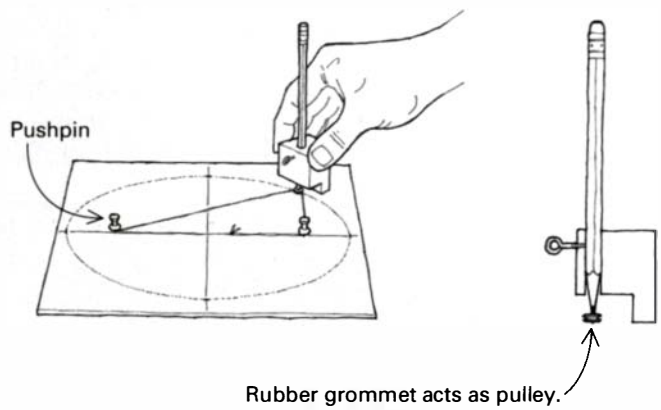
Put the dividers in place, and tighten the nut until the tips of the dividers touch the material you're gauging. Now back off the dividers. Count the number of revolutions by watching the notch. Remove the dividers from the work, and return the dividers to their original position by counting revolutions of the nut.

—George R. Estano, Braintree, Mass.

Quick tip: While cleaning my shop, I happened upon a hardened tube of silicon caulk. I removed the rubbery plug from the tube and discovered, after pressing the silicon against the running belt of my sander, that it cleans the belt every bit as well as the commercial rubber bar made for that purpose.

—Dwayne Roeder, Skamania, Wash.

Ellipse drawing aid



Here's a simple little device that makes drawing an ellipse easier and more accurate. To lay out the ellipse, first draw the vertical and horizontal dimensions of the ellipse on a pattern board. Now drive two pushpins into the pattern material along the long axis of the ellipse. Tie a loop of string loosely around the pins, as shown. After some trial and error, you should be able to vary the position of the pushpins and the length of the loop so that the string, when taut, touches the vertical and horizontal dimensions of the ellipse.

Now you're ready to use the drawing device. Mount a pencil in the device, catch the pencil in the loop and, keeping the loop taut, trace the circumference to draw the ellipse. The device will keep the pencil perpendicular to the paper, which is hard to do without assistance. Use a screw eye to lock the pencil at the right height. To keep the string taut and down near the surface, place a small rubber grommet, available from auto-parts stores, on the tip of the pencil. The string will ride in the groove of the grommet as you move the pencil. *—Robert J. Gabor, Pittsboro, N.C.*

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

PRECISELY

B E T T E R

Cast Aluminum 6 Position Depth Setting Gauge

Large, comfortable Top Handle

Easy to reach Cam Locks

Externally Accessible Brushes for easy changing

Rack and Pinion Vertical Adjustment of Angle Guide for simple fine adjustments

One Touch Blade Cover requires no special tool

Cast Aluminum Fence with Positive Stops at 0°,45° and 90°

Non-marring Rubber Strip Insert prevents slipping of material

Easy to turn Adjusting Knob

Model 3901

THE MOST ACCURATE AND EFFICIENT PLATE JOINER AROUND

Makita's Model 3901 offers more of the high quality features you want in a plate joiner.

Like a cast aluminum fence and base that's precision machined for accuracy. Rack and pinion vertical adjustment for exact cutting depths. Spiral cut bevel gears for smooth and efficient transmission of power.

Accurate, Efficient and Powerful. Makita's model 3901 is precisely the tool to get the job done right.

For more information, call 1-800-4-MAKITA

READER SERVICE NO. 3

makita

IT'S ALL THE POWER YOU NEED.®

Before you cut your first piece of wood...

turn to *Home Furniture* magazine for design information and inspiration.

If you want to make furniture that's both practical and beautiful, you'll be happy to hear about *Home Furniture*. It's a bimonthly magazine from The Taunton Press about the whys of design, not the hows of construction.

"I cannot recommend this magazine strongly enough to anyone concerned with fine furniture."

—Jack Warner, Atlanta Journal-Constitution

Regardless of your skill level, you'll:

- ***Enjoy a full-color showcase of great furniture.*** Each issue gives you over 25 inspiring pieces.
- ***Solve difficult design challenges.*** Articles and departments provide you with real-world advice.
- ***Explore options and choices.*** Through better planning, all your projects will go more smoothly.

Try our Risk-Free Offer

Subscribe now and receive the next six issues for just $32.
(If you're not satisfied, we'll refund your payment in full.)

To order, use the attached card, call our toll-free number, 1-800-888-8286 and ask for operator 305, or write to Taunton Direct, Inc., 63 South Main Street, P.O. Box 5507, Newtown, CT 06470-5507.

Taunton
MAGAZINES
for fellow enthusiasts

ORDER 1-800-328-0457 MAIL ORDER HOURS M-F 7:00-5:30 C.S.T. SAT 8:00-1:00

DELTA BENCH TOP TOOLS

Model	Description	List	Sale
23-700	Wet/Dry Grinder	206	159
23-680	6" Bench Grinder 1/4 HP	80	69
23-880	8" Bench Grinder 1/2 HP	134	115
11-950	8" Drill Press	176	128
28-160	10" Hobby Band Saw	210	145
31-050	1" Belt Sander 2.0 amp	95	78
31-460	4" Belt/6" Disc Sander	198	129
31-340	1" Belt/8" Disc Sander	270	209
31-080	1" Belt/5" Disc Sander	113	89
40-560	16" 2 speed Scroll Saw	230	175
11-990	12" Bench Drill Press	255	184
11-090	32" Radial Bench Drill Press	405	315
43-505	1/2" Bench Router/Shaper	398	305
22-540	12" Bench Top Planer with extra knives	557	385
36-220	10" Compound Mitre Saw	294	219
14-650	Hollow Chisel Mortiser	380	285
33-060	"Side kick" Miter saw	541	399
14-070	14" Floor Drill Press	405	359
28-190	12" Band Saw w/ stand	497	399
20-150	14" Cut-off Saw	299	229
36-090	10" Sidekick Miter Saw	310	235
37-070	6" var. speed Bench Jointer	351	259
36-275	8-1/4" Builders Saw	358	268
36-210	10" Compound Mitre Saw	344	249
36-070	10" Mitre Saw	217	165
36-630	10" Contractors Saw II	721	579
34-555	Sliding Table	487	289
36-230	12" Compound Mitre Saw	480	359

NEW TOOLS BY DELTA

31-780	NEW Oscillating Spindle Sander	253	188
23-710	NEW Sharpening Center	217	169
11-980	NEW 10" Bench Drill Press	195	154
28-185	NEW Bench Band Saw	213	185
37-190	NEW 6" Deluxe jointer	603	499
36-250	NEW 10" Slide Compound Saw	Sale	489
31-695	NEW 6" Belt/9" Disc Sander	441	330
40-650	NEW Q3 18" Scroll Saw	600	479

DELTA STATIONARY

17-900	16-1/2" Floor Drill Press	490	415
34-080	10" Mitre Box	Xtra Special	198
33-990	10" Radial Arm Saw	981	769
37-280	6" Motorized Jointer	450	389
50-179	3/4 HP 2 stage Dust Collector	523	399
43-355	3/4" Shaper 1-1/2 HP	1025	849
46-700	12" Wood Lathe	575	479
33-055	8-1/4" Sawbuck comp with legs	846	665
36-540	10" Table saw	229	175
34-670	10" Motorized Table Saw	492	395
32-100	Stationary Plate Jointer	351	269
36-040	8-1/4" Compound Mitre Saw	190	149
36-905	30" Unifence	346	249
36-906	50" Delta Unifence	444	305
36-755	10" Tilt Arbor Saw	Sale	1095
33-890	12" Radial Arm Saw	Sale	1595
34-444	Table Saw with 1-1/2 HP motor & stand	Sale	649
34-445	34-444 Saw with 30" unifence	Sale	839
28-280V	14" Band Saw w/enc stand 1 HP	Sale	798
28-275	14" Band Saw with open stand 3/4 HP	Sale	659
22-675	NEW DC380 15" Planer	Sale	1175
37-154	DJ15 6"Jointer	Sale	1299

DEWALT TOOLS

DW364	7-1/4" Circ. Saw w/brake, 13 amp	294	158
DW306K	8.0 amp Recip Saw w/cs v/spd	291	164
DW610	1-1/2 HP 2 handle Router	266	152
DW411	1/4 sheet Palm Sander, 1.7 amp	88	58
DW705	12" Compound Mitre Saw	734	359
DW704	12" Mitre Saw	570	325
DW100	3/8" Drill, 4 amp, 0-2500 rpm,rev	118	68
DW250	4.5A Drywall Gun, 0-4000 rpm,rev	158	88
DW254	4.5A Drywall Gun, 0-2500 rpm,rev	162	88
DW280K	NEW Screwdriver kit complete.	222	124
DW402	4-1/2" Grinder 6 amp	166	92
DW682K	Biscuit Joiner with case	448	219
DW625	3 HP Electronic Plge Router	520	275

Above router comes with Free DW6966 Fine depth adjustment !

DW675K	3-1/8" Planer with case	292	164
DW431	3 x 21 var. speed Belt Sander	338	184
DW420	Palmgrip Random Orb Sander	124	69
DW421	above Sander with dust collector	144	79
DW423	NEW Palm Random Orbit Sander variable speed	170	99
DW930K	12 volt 5-3/8" Trim Saw kit	370	199
DW444	6" Random Orbit Sander	266	139
DW443	DW444 with hook & loop pad	266	139
DW935K	NEW 14.4V 5-3/8" Trim Saw kit	444	237

DW935K Saw comes with 2 batteries!

DEWALT CORDLESS DRILLS

DW952K	3/8" v/spd w/ two 9.6V batteries	284	139
DW962K-2	3/8" v/spd w/ two 9.6V XR batt	330	179
DW972K-2	3/8" v/spd w/ two 12V XR batt	362	189
DW904	12 volt flashlight		29.95
DW972K-2 drill & DW904 flashlight		*Sale*	*205*
DW991K	3/8" v/spd w/ one 14.4V XR batt	388	199
DW991K-2	above drill with 2 batteries	415	225
DW994K	1/2" variable speed w/ one 14.4V XR battery	458	235
DW994K-2	DW994K drill kit w/ 2 batt.	Sale	259

Above drill kits come w/charger & steel case !

DW991KS-2 DW991K drill, DW935 saw, &case 349

NEW DeWalt 18 volt Cordless Tools

DW995K	1/2" Drill Kit	428	259
DW997K	1/2" Drill / Hammer Drill Kit	454	269
DW936K	Saw Kit	458	269

WAP VACUUMS

Model	Description	List	Sale
766RDF	10 gallon turbo vacuum	845	465
766RDF-D	"Drywaller" 10 gal turbo vac	915	549
766RDF-DAS	Same as above w/auto start	950	589

CLAYTON OSCILLATING SPINDLE SANDERS

140	Portable sander w/ 4-1/2" spindle.	625	559
146	Portable sander w/ 9" spindle	685	609
100	Floor mount sander w/4-1/2" spnd.	785	709
106	Floor mount sander w/ 9" spindle .	845	759

DREMEL TOOLS

3955	Moto Tool Kit with bits & case	134	79
3956	NEW Super Moto Tool Kit w/ acc.	152	95
1672	16" Scroll Saw - 2 spd "Best buy"	302	174
1695	16" var. speed Scroll Saw	408	229
290	Electric Engraver with point	25	16
1731	5" Disc 1" x 30" Belt Sander	189	114

JORGENSEN ADJUSTABLE HANDSCREWS

Item#	Jaw Length	Opening Capacity	List	Sale	Box of 6
#3/0	6"	3"	17.05	9.90	56.50
#2/0	7"	3-1/2"	18.30	10.70	60.95
#0	8"	4-1/2"	20.35	12.10	66.95
#1	10"	6"	23.30	12.90	71.95
#2	12"	8-1/2"	26.75	14.90	83.95
#3	14"	10"	33.85	18.55	105.75
#4	16"	12"	44.05	24.65	140.95

JORGENSEN STYLE 37 2-1/2" Throat 1/4"x3/4"

Item#	Jaw Length	List	Sale	Box of 6
3706	6"	10.85	6.20	33.50
3712	12"	12.05	6.80	37.25
3718	18"	13.25	7.60	41.05
3724	24"	14.55	8.15	43.95
3730	30"	16.20	9.05	48.85
3736	36"	17.70	10.20	54.95

JORGENSEN STYLE 45 5" Throat 1-3/8" x 5/16"

Item	Jaw Length	List	Sale	Lots of 6
4512	12"	34.50	20.75	114.95
4518	18"	36.35	22.30	122.95
4524	24"	38.50	23.65	129.95

JORGENSEN STEEL "I" BAR CLAMPS

Model	Size	List	Sale	Lots of 6
7224	24"	35.75	20.30	112.95
7236	36"	38.35	22.35	124.75
7248	48"	42.15	24.45	134.95
7272	72"	48.50	29.60	168.75

PONY CLAMP FIXTURES

Model	Description	List	Sale	Lots of 12
50	3/4" Black Pipe Clamps	15.45	8.10	92.50
52	1/2" Black Pipe Clamps	12.65	6.95	74.95

MK TILE SAWS

Model	Description	List	Sale
MK770	1/2 HP - 7" blade	795	579
MK660	3/4 HP - 7" blade	795	589
MK880	1 HP - 8" blade	986	859

We stock all replacement blades for above saws.

Msxe6362	FEIN Triangle Sander v/spd	Sale	205
Msx625	FEIN NEW Air Triangle Sander.	Sale	189
LPN672	PONY Air Palm Nailer w/ glove	Sale	94.99
RTM01	ROTOZIP Drywall cutout unit	Sale	68.95

BLACK & DECKER

1166	3/8" Drill 0-2500 rpm 4 amp	118	68
2600	3/8" Drill 0-1200 rpm 4.5 amp	173	98
79-034	Workmate 400	191	109
1350K	1/2" Timberwolf Drill 2 speed	573	325
1180	3/8" Drill rev. 0-1200 rpm 5 amp	215	119
2037	Drywall Gun 0-4000 5.0 amp	178	95
2038	Drywall Gun 0-2500 rpm 5 amp	178	95
2054	Tek Gun 0-2500 5.0 amp	289	159
2750	4-1/2" Grinder 10,000 rpm 6 amp	159	89
2694	7-1/4" Super Sawcat Circ Saw w/cs	294	158
2695	8-1/4" Super Sawcat Circ Saw w/cs	328	179
3339	Elu 3 HP v/spd Plunge Router	520	269

Piranha Carbide Tooth Saw Blades by B & D

Model #	Diameter	# Teeth	List	Sale
73-715	5-1/2	16	14.39	8.30
73-716	6-1/2	18	14.39	8.30
73-717	7-1/4	18	14.60	7.99
73-737	7-1/4	24	18.06	9.50
73-757	7-1/4	40	32.87	17.49
73-718	8	22	20.95	11.25
73-759	8-1/4	40	46.88	26.95
73-719	8-1/4	22	20.63	12.45
73-740	10	32	34.63	18.85
73-770	10	60	70.37	36.95
73-711	10	50	68.33	36.95

DURA III- ADJUSTABLE STILTS

Model	Description	List	Sale
D1422	14"-22" extension	270	205
D1830	18"-30" extension	288	222
D2440	24"-40" extension	304	239

Above models include strap adapter kits

SIOUX TOOLS

8030	3/8" variable speed Drill	263	145
8000	3/8" variable speed close quarter Drill 0-1300rpm	211	125
8005	Same as 8000 but is 0-2500 rpm	221	139
690	5" Air Random Orbit Sander	228	132
658	5" Air Random Sander-dual action	269	155

1996 TOOL CATALOG AVAILABLE
Call Toll-Free 1-800-328-0457 In Minnesota Call (612)224-4859
FAX: (612)224-8263
CHECK • MONEY ORDER • VISA • MASTERCARD • DISCOVER

SEVEN CORNERS ACE HDW. Inc.
216 West 7th St. • St. Paul, MN 55102 • Est. 1933

Most Tools Shipped 2 day Federal Express for $9.00 !!

FedEx® Federal Express

TOOLS ON SALE™
AMERICA'S LOWEST PRICED TOOLS
FREE FREIGHT TO THE
48 CONTINENTAL STATES ON EVERY ITEM
PRICES SUBJECT TO CHANGE WITHOUT NOTICE

Introducing a full range of Werner brand ladders at discounted prices! Werner quality. Werner ladders - A name you can stand on.®

ALUMINUM LADDER JACKS

Must be installed on Type 1 or Type 1A ladders only

Model	Accepts Stage Width	Spans	Attaches to Rung	Sale
10-14-02	14"	2 rung	2 rungs	83.95
10-20-02	20"	3 rung	2 rungs	92.95
10-20-03	20"	3 rung	3 rungs	101.95

ALUMINUM ARTICULATED LADDERS TYPE IA -300 # RATING

Model	Length	Weight(lbs.)	Sale
M7-14	7'	43#	159.95
M8-16	8'	46#	189.95

FIBERGLASS STEP - TYPE 1- 250# RATING

6004	4'	13#	57.95
6005	5'	16#	68.95
6006	6'	18#	72.95

FIBERGLASS STEP - TYPE 1- 250# RATING

6004-S w/pail shelf	4'	15#	63.95
6005-S w/pail shelf	5'	18#	73.95
6006-S w/pail shelf	6'	20#	80.95

FIBERGLASS STEP - TYPE 1A- 300# RATING

6204	4'	14#	65.95
6205	5'	18#	76.95
6206	6'	20#	89.95

ALUMINUM FLAT STEP TYPE 11- 225# RATED EXTENSION

Model	Size	Working Length	Weight(lbs)	Sale
D1224-2	24'	21'	33#	179.95
D1228-2	28'	25'	42#	209.95
D1232-2	32'	29'	53#	239.95
D1236-2	36'	32'	62#	266.95

ALUMINUM FLAT STEP TYPE 1- 250# RATED EXTENSION

D1324-2	24'	21'	39#	195.95
D1328-2	28'	25'	50#	226.95
D1332-2	32'	29'	62#	257.95
D1336-2	36'	32'	77#	318.95
D1340-2	40'	35'	85#	359.95

ALUMINUM FLAT STEP TYPE 1A- 300# RATED EXTENSION

D1520-2	20'	17'	37#	189.95
D1524-2	24'	21'	45#	220.95
D1528-2	28'	25'	56#	246.95
D1532-2	32'	29'	66#	289.95
D1536-2	36'	32'(250# rating)	79#	339.95
D1540-2	40'	35'(250# rating)	89#	369.95

FIBERGLASS FLAT STEP TYPE 1A- 300# RATING EXTENSION

D6116-2	16'	13'	34#	199.95
D6120-2	20'	17'	40#	219.95
D6124-2	24'	21'	53#	254.95
D6128-2	28'	25'	60#	298.95
D6132-2	32'	29'	74#	379.95

FIBERGLASS FLAT STEP TYPE 1A- 300# XTRA HEAVY DUTY EXTENSION

D7116-2	16'	13'	37#	249.95
D7120-2	20'	17'	43#	269.95
D7124-2	24'	21'	58#	309.95
D7128-2	28'	25'	66#	344.95
D7132-2	32'	29'	79#	398.95

Buy any 3 ladders (can be asst) deduct additional 5% Prepaid freight and best prices too!

STABILA LEVELS

Model	Description	List	Sale
24640	24" Level w/ hand holes	62.20	43
24670	48" Level w/ Free case	79.70	55
24680	72" Level w/ hand holes	145.45	100
28340	24" Magnetic level	66.64	46
28390	48" Magnetic level w/ Free case	88	59
28410	72" Magnetic level	135	94

RECORD WOODWORKING VISES

Model	Jaw\Width	Opening	List	Sale
53E	10-1/2"\15"	Quick release	248	119
52D	7"\8"	Quick release w/dog	169	89
52-1/2D	9"\13"	Quick release w/dog	231	105

KRAUSE MULTIMATIC LADDERS

Model	Description	List	Sale
121482	12' Aluminum Multi Purpose	264	128
121499	16' Aluminum Multi Purpose	286	148

AEG POWER TOOLS

Model	Description	List	Sale
HBSE75S	3 x 21 v/ speed Belt Sander	329	184
FSPE100X	Barrel Grip v/spd Jig Saw	298	164
BSPE100X	Top Hdle v/sp Jig Saw w/cs	298	164
TXE150	6" var/spd Rand Orb Sander	253	145

HITACHI TOOLS

C8FB2	8-1/2" Slide Compound Saw	1169	489
998862	8-1/2" Carbide blade - 60 tooth	Sale	44.95
C10FS	10" Slide Compound Saw	1627	739
C7BD	7-1/4" Circular Saw with brake	281	139
M12V	3 HP variable speed Router	541	249
TR12	Plunge Router 3 HP	377	189
SB-75	3 x 21 Belt Sander w/ bag 2 spd	315	158
DH24VBK	15/16" SDS Rotary Hammer	298	179
P12R	12-9/32" Planer	1688	795
P12RA	Planer/Joiner	2203	995
C10FC	10" Mitre Saw	533	209
C15FB	15" Mitre Saw	1346	675
DN10DYK	9.6V Right Angle Drill Kit	370	159
G12SA	4-1/2" Grinder 6.9 amp	177	79
DS10DVAK	12V Cordless Drill Kit w/ 2 batt	417	199
DV14V	3/8" Hammer Drill with case	230	115
NR83A	Framing Nailer 2 - 3-1/2 Full Head		399
NR83AA	Framing Nailer 2- 3-1/2 Clip Head		425
NT65A	16 ga. Brad Nailer 1 - 2-1/2	749	345
NV45AB	Coil Roofing Nailer 7/8 - 1-3/4	935	399
N5008AB	7/16" Stapler-16 ga. 1 - 2 lgth.	679	325
EC6B	1 HP Oil Compressor	540	279
EC6C	1 HP Oil-less Compressor	580	289

WAGNER PAINT & SPRAYER PRODUCTS

959	Power Roller	140	109
255	Airless Kit	180	135
375E	Airless System	195	164
404	Airless Painter & Roller	320	265
505	High performance Airless Painter	440	369
HVLP	Fine coat finishing HVLP System	195	159
CS2000	Profine finish HVLP System	339	278

DAVID WHITE INSTRUMENTS

LP6-20	Sight Level package - 20x	329	215
LP6-20XL	LP6-20 with 9056 tripod & 7620 rod	409	275
L6-20	Meridian Level - 20x	309	199
LT8-300	Level Transit - 26x	739	489
LT8-300P	above Level with optical plum.	869	565
LT6-900	Level Transit - 20x	419	269
LTP6-900	Above Level with tripod & rod	615	389
ALT6-900	Automatic Level - Transit - 18x	666	429
ALTP6-900	above Level with tripod & rod	799	499
ALP6-18HD	Auto. Level-18x with tripod & rod	599	395
AL8-22	Automatic Level - 22x	583	385
AL8-26	Automatic Level - 26x	854	549
ALP8-26	above Level with 9075 tripod and 7620 rod	977	639
ML100I	Laser Level	1099	945
ML100	Laser Level w/detector	12491	1075
LL100	NEW Finish Line Laser Level.	199	135

QUAL-CRAFT JACKS

2200	Pump Jack	79	58
2201	Pump Jack Brace	30	20
2203	Pump Jack guard rail holder	31	23
2204	Work Bench & rail holder combo	53	39

Buy any 6 (can be assorted) deduct additional 10%

2601	Wall Jack	167	108

Lots of 4 deduct additional 10%

PASLODE IMPULSE GUNS

Model	Description	List	Sale
IM250	Trimpulse Finish Nailer Kit complete drives 3/4" - 2-1/2" brads	1130	548
IM325	Impulse Framing Nailer Kit complete drives 2" - 3-1/4" nails	1130	548

SENCO AIR NAILERS

SFN1+	Finishing Nailer 1" - 2" w/ case	448	345
SFN40	Finish Nailer w/case 1-1/4"-2-1/2"	569	389
SN325	Nailer 1-7/8" - 3-1/4"	665	419
SLP20	New Pinner w/cs 5/8" - 1-5/8"	422	278
SKS	Stapler 5/8" - 1-1/2"	390	275
M2	Stapler 1-3/8" - 2" length	535	365
SN70	Framing - Clip Hd 2" - 3-1/2"	725	459
SN60	Framing - Full Hd 2" - 3-1/2"	708	449
SN65	15% more power than SN60	709	469

AIRY AIR NAILERS

0241SK	Brad Nailer 3/8" - 1-9/16" Same as Senco SLP-20	180	98
0250SK	Brad Nailer 3/4" - 2"	296	164
0626SK	1/4" Crown Stapler 3/8" - 1"	194	104
0645	1/4" Crown Stapler 3/4" - 1-9/16" Same as Senco SKS	310	175
EZ-1	Multi-purpose nailer & stapler. **Above nailers come w/case, fasteners, oil & wrenches**	180	98
0565T	Angle Finish Nailer 1" - 2-1/2"	386	205
8290	Framing Nailer 2" - 3-1/2"	475	319

Airy nailers use Senco brand fasteners

DUO-FAST AIR NAILERS

LFN-764	Finish Nailer 1" - 2"	611	349
HFN-880C	Finish Nailer 1-1/2" - 2-1/2"	793	459
RCN-60\225	Coil Roofing Nailer	710	425
CN-350	Framing Nailer - Full Head	702	419
CN-325	Framing Nailer - Clip Head	682	409

EXCALIBUR Fences & Tables

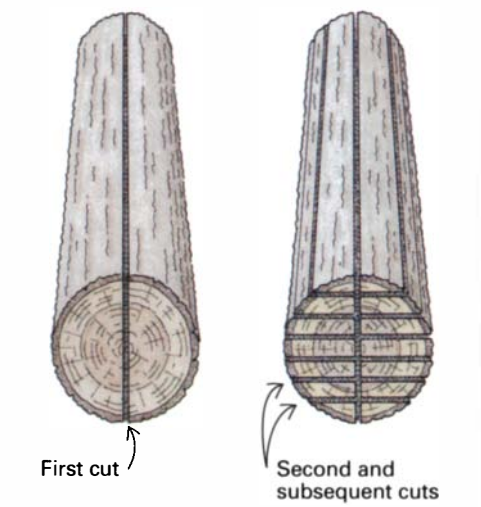
Model	Description	List	Sale
TT45R24L9	24" Fence	415	355
TT45R50L12	50" Fence	455	385
EXSLT40	Sliding Table	679	559
EXSLT60	Sliding Table	790	669

FREE FREIGHT TO THE CONTINENTAL STATES ON EVERY ITEM • GIFT CERTIFICATES NOW AVAILABLE

READER SERVICE NO. 24

A better way to saw orchard woods?

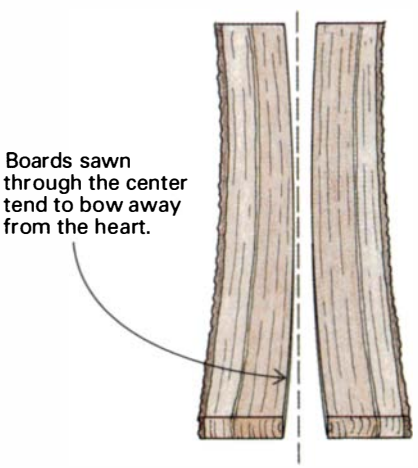
*The article on orchard woods (*FWW *#115, pp. 66-69) was interesting but didn't go far enough. I'd like to know more about how these small trees should be cut. Simply cutting the wood into thick slabs for resawing and planing can lead to cupping due to drying differences between sapwood and heartwood.*



I'd like to improve the yield from these small trees, so I've considered cutting a log down the center and cutting boards perpendicular to this first cut (see the drawing above). I could join the mating boards from the two half-logs later.

—Paul G. Yaskanin, Grand Blanc, Mich.

Redmond Manierre replies: As a sawyer, I generally try to avoid yard trees, not only because of the nails, hammock



hooks, clothesline pulleys and other fascinating objects that I've found in them, but also because of the way they grow. They tend to have a much higher proportion of sapwood to heartwood and significantly wider growth rings than forest-grown trees, so they are inherently less stable.

Splitting the log and then sawing it, as you propose, would theoretically prevent some of the cupping. But would that really be practical with logs under, say, 6 in. dia.? Additionally, boards sawn in this fashion tend to bow away from the heart, as shown in the bottom drawing.

When I process apple wood (the closest thing to a yard tree that I will deal with), I saw the logs through-and-through (flitchsawn) in 5/4-in. boards, place the drying sticks about 1 ft. apart, and weight the stack with everything that I have. Despite all these precautions, there is still more drying degrade than I would like.

[Redmond Manierre is the proprietor of Landmark Logworks, a sawmill catering to custom woodworkers, in The Plains, Va. He is a former professional woodworker.]

Parts for a Crescent bandsaw

I bought a large bandsaw at an auction, and I'd like to restore it. It was built by The Crescent Machine Co. and has a patent date cast into it that reads, "Patent January 3, 1905." Do you know where I might find parts? The cast-iron wheels (32 in. dia. by 1 13/16 in. wide) need tires. The tires that are on it now are made of glued-on, 6-in. by 1 1/2-in. flat rubber strips. Could you suggest motor size, speed and pulley diameters?

—Rex Chamberlain, Oklahoma City, Okla.

Robert Vaughan replies: The Crescent parts franchise is now operated by Jefco Industries, Inc. (P.O. Box 5, Columbiana, OH 44408; 216-482-5533). They may be able to help, but that's an awfully old machine you bought.

For a motor, I'd go with a 5-hp single-phase, 184T frame, 1,750 rpm, with a high-quality magnetic starter. A 3-hp repulsion-induction motor might also work well if you can find one.

The blade speed should be between 3,600 and 4,000 ft. per minute. You can do the pulley arithmetic from there. And many pulley combinations will give the same blade speed.

I'd replace the existing pieced-together tires with new ones (you can get them from Pennsylvania Saw Co. Inc., P.O. Box 533, Emigsville, PA 17318; 800-233-9381). Be sure to grind a good crown on the tires once they're installed so the blade will track well.

[Robert Vaughan is a contributing editor to *Fine Woodworking*. He restores woodworking machinery in Roanoke, Va.]

Staining cherry, blotch-free

In FWW *#112 (p. 32), Chris Minick describes a pre-stain wood conditioner that reduces stain blotching on cherry. I like to use Danish oil as a finish, including the pigmented versions, but I have had some disappointing results on cherry.*

Does the wood conditioner described by Mr. Minick work effectively as a pre-stain under Danish oil, either natural or colored, to reduce blotching?

—James Ransom, San Diego, Calif.

Chris Minick replies: I have a love-hate relationship with cherry—I love the way it machines, hate the way it finishes. As you have already noticed, cherry has a nasty tendency to blotch when stained. Even clear (natural) Danish oil finish will blotch on some cherry boards.

To answer your question, though, my home-brewed pre-stain conditioner (one cup boiled linseed oil in one quart mineral spirits) will minimize the blotching problem on cherry but won't completely eliminate it.

I flood the cherry with my pre-stain conditioner, keeping the surface wet for five to ten minutes. Then I wipe off the excess conditioner (lay the rags out flat to dry before disposing of them). I'm careful to stain within an hour or two after this treatment. Otherwise, the conditioning step will need to be repeated. Once the stain has dried, I continue with my normal finishing routine.

A completely blotch-free finish can be achieved on cherry, but it requires a different finishing technique. First I sand the raw wood to 220-grit, and then I seal the entire piece with a coat of superblond shellac (a 2-lb. cut, or 2 lbs. of shellac flakes dissolved in a gallon of denatured alcohol).

Once this first coat is dry and scuff-sanded, I spray on a few coats of a 3-lb.

cut of garnetlac (a darker, less-refined version of shellac) to produce that nut-brown look of aged cherry. Another sealer coat of dewaxed superblond shellac followed by two coats of waterborne lacquer complete the job.

Substituting buttonlac (the least-refined of the generally available forms of shellac) for garnetlac will produce a darker walnut-brown. In-between shades can be made by blending the two and controlling the amount sprayed on the wood surface. Superblond shellac, garnetlac and buttonlac are all available from Woodworker's Supply (1108 N. Glenn Road, Casper, WY 82601; 800-645-9292). [Chris Minick is a finishing chemist and woodworker in Stillwater, Minn. He is a contributing editor to *Fine Woodworking*.]

Good woods for turning

I am a relatively new woodturner. Where can I find a complete discussion and comparative scale of the ease or difficulty of turning various woods?

—Peter Rohr, Hilton Head Island, S.C.

Dale Ross replies: Coming up with a chart rating the difficulty of turning different species of woods would be virtually impossible. To provide a foundation, I recommend *Understanding Wood* by R. Bruce Hoadley (The Taunton Press, 1980). This book is not turning-specific, but it is the definitive text for anyone who uses wood.

How hard a wood is to turn depends on the turning's design, the technique used to execute that design, the equipment and tools on hand, one's ability and standards, and each individual piece of wood. In general, turning wood that is green is easier than turning seasoned wood. Roughing out a bowl from a chunk of green wood, ribbons of shavings sailing over your shoulder, is a joy. Drying the roughed-out blank, however, is an altogether different matter. Some woods—apple and beech, for example—are quite prone to distortion and checking as they dry.

Woods with curly (or tiger) figure, burls, crotch or interlocking grained woods are harder to turn, but the results can be worth the effort. Teak and ebony have a high silica content that's abrasive to a tool's cutting edge.

The dust of many woods—spalted maple, some cedars, walnut, mahogany and ebony—can be irritating. Woodworkers who have allergies or chemical sensitivities have been known to have more severe reactions to some tropical woods, ranging from skin rashes to respiratory failure—and death.

Splintering can be an issue in woods such as fir and redwood. Fuzzy, tough-to-sand grain is annoying in woods like butternut.

As for positive characteristics, uniformity and firmness top my list. For straightforward functional bowls, maple and cherry are hard to beat. The best way to answer your question is for you to seek out woods you're interested in and take them for a spin. You'll become increasingly adept, diminishing each wood's difficulty factor, and you'll

Free Catalog

The Free Garrett Wade Catalog is 176 color pages of the best woodworking supplies and tools in the business.

We are the exclusive American importer of ***Multico Square Hole Mortisers.***

For a Free Woodworking Catalog call Toll-Free or write to:

Garrett Wade
161 6th. Avenue Dept. 1075
NewYork, NY 10013

800-221-2942
Call Toll-Free

The ½HP Model PM12 bench mounted, $389. Other models are available.

READER SERVICE NO. 95

NEW VIDEO TAPE

AMERICAN MADE, ***HEAVY DUTY!***

DRUM SANDER

THE BEST DRUM SANDER IN THE WORLD!

MODELS UP TO 37 INCH CAPACITY

It has quality features not found on other brands. Sand boards, frames, doors, veneer, knots, wild grain perfectly flat and smooth every time!

Reduce sanding time from hours to minutes!

Delivers sanding precision equal to large wide belt sanders at an affordable price!

EXCALIBUR MACHINE CORP.
P.O. Box 82
Anderson, MO 64831
☐ PLEASE SEND ME A FREE BROCHURE 1-417-223-4031

ROSS

READER SERVICE NO. 32

At Osborne Wood Products, our specialty is turnings!

We are willing to go the extra mile to make sure you get what you want. Because of our specialized process we can satisfy your turning needs.

- Stock items
- Custom items
- Turnings from your drawings or photos

Size is no problem either. From tiny chair spindles to massive table legs -we turn them with care.

Osborne Wood Products, Inc.

1-800-849-8876
Fax: 706-886-8526

READER SERVICE NO. 4

Cabinet Hinges

simply the best & always in stock

Horton Brasses Inc.

Nooks Hill Rd.
PO Box 120, dept F
Cromwell CT 06416

860-635-4400 catalog: $4.00

brand new 1996 catalog now available!

READER SERVICE NO. 402

JoinTECH

Presents the
CabinetMaker's System®

JoinTECH
P.O. Box 790727
San Antonio, TX 78279

TOLL FREE
(800) 619-1288
TEL: (210) 377-1288
FAX: (210) 377-1282

Call, Write or Fax for a FREE BROCHURE and Special Introductory Offer Details.

SEND, OR CHARGE BY PHONE, $5.00 FOR A COMPLETE DEMONSTRATON 35 MINUTE VHS VIDEO BROCHURE

This one can do it all. The CabinetMaker's System invented by JOINTECH, whose Dovetail Machine has already been recognized as the Best and Easiest to use, can perform all operations in Cabinet and Furniture making.

With the Cabinet Maker's System, you can make raised panels, rails and stiles, tongue and groove, do face frame construction, drawers, edgework and much, much more. It includes everything you need to make 48 beautiful dovetail and box joints.

JOINTECH's Cabinet Maker's System can do it all! It is simply the *best* investment in high quality performance and at a very affordable price.

One of 12 new Jointech projects built using the Cabinet Maker's System

READER SERVICE NO. 96

Franklin ACE Hardware

TOLL FREE 800-662-0004

FAX 804-562-2577 Visa, MasterCard, Discover, American Express, Free Freight in Continental USA, Error Subject to Correction. Mail Order Hours: M-F 8-6 EST, Sat. 8-5 EST

PORTER-CABLE
PROFESSIONAL POWER TOOLS

333 R/O Sander	$73
352VS 3x21 Belt Sander	$169
690 1-1/2 HP Router	$134
693 1-1/2 HP Plunge Router	$169
556 Plate Joiner	$135
7310 Laminate Trimmer	$95
7700 10" Laser Loc Miter Saw	$338
340 1/4 Sheet Finish Sander	$49
7333S Dust Collection Kit	Sale $19
347 2-1/4 Circular Saw w/Case	$129
7839 3-1/4 HP VS Plunge Router	$269
9444 New Profile Sander Kit	$109
97366 6" R/O Sander Kit	$144
550 Pocket Cutter	$178
New 8N125 18 Ga. Brad Nailer 5/8"-1-1/4"	$95
New BN200 18 Ga. 3/4"-2" Brad Nailer	$145
New DA250 15Ga. 1-1/4"-2-1/2" Finish Nailer	$225

SUNGOLD
PREMIUM QUALITY ABRASIVES

5" No Hole PSA 80-120 Grit	$12.95/roll
6" No Hole PSA 80-120 Grit	$15.50/roll
3x21 Belts Mixed Grit	$14.30/box
3x24 Belts Mixed Grit	$14.75/box
4x24 Belts Mixed Grit	$21.50/box

RYOBI

BT3000 10" Table Saw	$529
SC162VS Scroll Saw	$149
OSS450 Oscillating Spindle Sander	$159
TSS200 8-1/2" Sliding Compound Miter	$399
AP12 12-5/16" Surface Planer	$389
New JM80K Biscuit Cutter Kit	$95
New BE600 6" Bench Grinder	$59

BOSCH

1655 7-1/4 Circular Saw	$120
1657 7-1/4 Circular Saw w/brake	$134
1604A 1-3/4 HP Router	$134
1613 EVS 2 HP Plunge Router	$194
1615 EVS 3-1/4 HP Plunge Router	$285
1608 Laminate Trimmer	$94
1608U Underscribe Trimmer	$145
1608KX Deluxe Installers Kit	$229
1584VS Jig Saw	$149
1587VS Top Handle Jig Saw	$149
3725DVS 5" R/O Sander *New*	$144
3727 DVS 6" R/O Sander *New*	$149
1273DVS 4x24 Belt Sander	$219
3270D 3x21 Belt Sander	$158
1003VSR 3/8" Drill	$95
3054VSRK 12V 3/8" Cordless Drill	$176
3310K 12V T-Handle Cordless Drill	$176
3300K 12V Cordless Drill	$189
B4050 In Line Grip Saw	$113
B7001 VS Corner Detail Sander	$91

AIRY

0241SK 18GA Brad Nailer Kit	$99
0250SK18GA Brad Nailer Kit (5/8"-2" Brads)	$164
0565T Angle Finish Nailer (1"-2-1/2" Finish Nails)	$204
8290 Framing Nailer 80-160 (Uses Full Round Head Nails)	$319
AT 550P 4 Gal. Air Compressor	$285
AT 550T 2K2 4 Gal. Air Compressor	$285

JET
EQUIPMENT & TOOLS

JWTS-101F 10" Table Saw	$549
HTC MOBILE BASE	$84.95
New JTAS 10 Tilting Arbor Saw	$1,399
Your Choice of Fence System Biesemeyer (Commercial Model 50), Vega (Promodel 50), Excalibur (TT4BRL50L12)	
HTC MOBILE BASE	$189
New JPM-13 Planer/Molder	$799
DC-650 Dust Collector	$229
DC-1200 Dust Collector	$449
JW1054 Dust Collector ACC Kit	$25
JW1055 Dust Collector ACC Kit	$76
WBS14CS 14" Band Saw	$669
HTC MOBILE BASE	$84.95
JJ6CS 6" Joiner	$449
HTC MOBILE BASE	$84.95
JDP14MF 14" Drill Press	$429
JMA-581 Mortising Attachment	$34
JMA-582 Mortising Attachment	$34
JWS-18HO Shaper	$499
HTC MOBILE BASE	$84.99
DHC15T4 Direct Drive Compressor	$299

SENCO

SLP20 Brad Nailer 5/8"-1-5/8"	$278
SN70 Framing Nailer 2"-3-1/2"	$479
M2 + Rugged Duty Stapler	$385
SM325 + Framing Nailer	$419
SFN1 Finish Nailer 1"-2" Nails	$309
SKS Medium Duty Stapler	$275
SPS Roofing Stapler	$349
SLS20 Narrow Crown Stapler	$245

READER SERVICE NO. 126

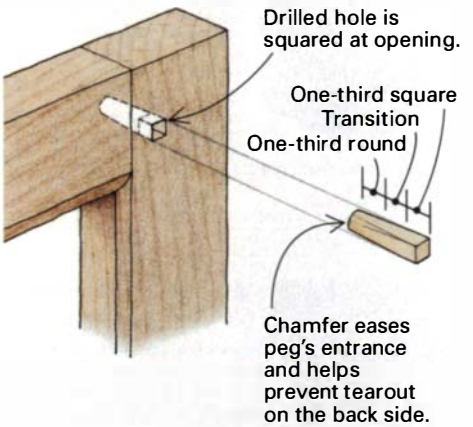
develop your own preferences.
[Dale Ross is a professional woodturner in North Yarmouth, Maine.]

Square pegs in round holes

I have always admired the square pegs used in some Shaker furniture. How were these done? Are they square their entire length or just the last bit? How much, if any, of the hole is chiseled square? —Don Stephan, Cincinnati, Ohio

Garrett Hack replies: Square pegs that pin together mortise-and-tenon joints are a nice design feature, and they're simple to do. I wait to peg the joint until it has been assembled and the glue is dry. I drill a hole slightly smaller than the width of the peg all the way through the joint, though you could stop the hole and peg just short of the back side. To prevent the drill bit from tearing out the face of the furniture piece, I apply a piece of masking tape over the spot where I'm going to drill. I burnish it down well with the end of a round handle, like the one on a chisel, to make sure the tape is in good contact with the wood. Then I lay out the hole right on the tape. Supporting the back of the joint with a scrap of wood prevents the exit hole from splintering.

Pegging a mortise-and-tenon joint



Once the hole is bored, I chop the first third of the entry roughly square. I always use a harder wood (usually maple, ash, elm or rosewood) for the peg than for the carcase or frame whose joints I'm pegging. The surrounding wood is forced to conform to the peg's shape, so very little squaring is necessary.

In harder woods (maple, for example), I square the entry hole closer to the dimension of the peg and to about one-third its depth. Before pegging any real joints, though, you should try driving a few test pegs into scraps of the same wood you'll be using for the joinery. This will give you a feel for the best fit.

I crosscut the pegs from square strips ripped on the tablesaw. I run the blade up through a properly secured wooden throat plate, so there's no gap beside the blade into which the thin strips might jam. This lets me cut the strips accurately and safely. Each peg is shaped with a small knife to conform to the shape of the hole: The third whose end will show is left square, the third that enters the hole is roughly round and the center third makes the transition between the two ends (see the drawing at left). I chamfer the round end of the peg in a hand-held pencil

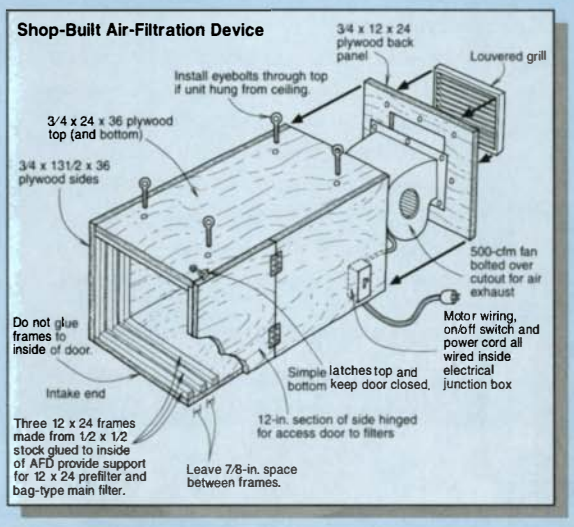
FROM THE PUBLISHERS OF *FINE WOODWORKING*

Control woodshop dust... and breathe easy again!

The only complete guide to small-shop dust control shows you how...

Put clean air back into your shop. Professional woodworker Sandor Nagyszalanczy gives you practical, shop-tested solutions to total dust control so you can build the right system for your shop—without complex calculations.

Woodshop Dust Control covers all major strategies, systems and equipment, from inexpensive, small-shop set-ups to complete professional systems—including where to find materials and supplies.



You'll examine all the new technology from local and central collection systems to permanent and portable filtration units. And it's all in non-technical language so you can choose the method, equipment and ducting to make your shop environment safe and dust-free. For total dust control in your shop... on your budget—order *Woodshop Dust Control* today!

SOFTCOVER, 192 PAGES, ISBN: 1-56158-116-X, ITEM 070246, **$19.95**

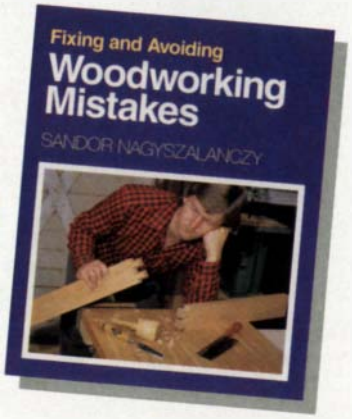
Taunton
BOOKS & VIDEOS
for fellow enthusiasts

All books are fully illustrated with photos, diagrams and drawings.

MORE shop-tested woodshop strategies and woodworking ingenuity by Sandor Nagyszalanczy...

Fixing and Avoiding Woodworking Mistakes

Project-saving solutions let you tackle any woodworking with confidence.



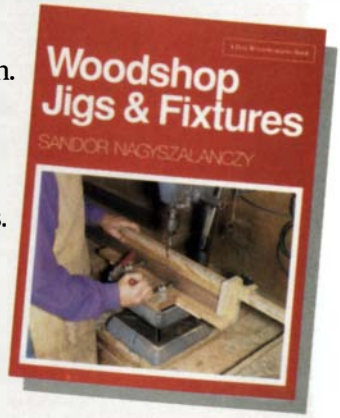
- Make invisible repairs.
- Tighten loose joinery.
- Banish surface blemishes.
- Flatten warped parts.
- ...and more.

SOFTCOVER, 208 PAGES,
ISBN: 1-56158-097-X, ITEM 070229, **$19.95**

A limited number of the hardcover edition is available while supplies last.
ISBN: 1-56158-115-1, Item 070248, **$24.95**

Woodshop Jigs & Fixtures

How to design and build jigs and fixtures in your shop for *any* application.



- Increase woodworking precision.
- Create devices to fit *your* tools.
- Build fences, carriages, tables, stops and templates.
- Modify existing jigs and fixtures.
- Design simple jigs or complex, multi-function assemblies.

SOFTCOVER, 240 PAGES,
ISBN: 1-56158-073-2, ITEM 070202, **$22.95**

To order, use the order form in this issue or call 1-800-888-8286 and ask for operator 303—today!

sharpener. This makes it easier to get the peg into the hole and helps to avoid splitting out the exit hole.

I drive the peg into the hole with a small hammer, using an adjustable wrench loosely tightened on the square end of the peg to keep it aligned. I use a modest amount of force to seat the peg nearly flush but not too much that it will split. I saw or chisel off any excess from the front and back and plane both surfaces smooth with a finely set block plane. [Garrett Hack designs and builds furniture in Thetford Center, Vt.]

Parts for a Yates-American machine

Do you have any information as to the whereabouts of the Yates-American Machine Co. of Beloit, Wis.? I have a combination tablesaw, jointer and disc sander, and I need parts to make the jointer and disc sander operable.

—Robert Betit, Dalton, Mass.

Robert Vaughan replies: Yates-American is still in business and still in Beloit. Its address is Yates-American Machine Co., Woodworking Division, 2880 Kennedy Drive, Beloit, WI 53511; (608) 364-0333. Good luck with your combination machine.

Air-drying time for red oak

I am thinking of buying some air-dried, roughsawn oak because of the savings over buying surfaced, kiln-dried stock. How long will I need to let it dry to reduce the moisture to a useable level if I store it indoors? Also, to dry this wood, can I use strips of plywood between the wood for air circulation?

—Herbert Sloan, Norwalk, Conn.

Redmond Manierre replies: If the oak has been air-dried outside for at least six months, you can safely move it into a dry, well-heated room in your house and stack it using ¾-in. by 1-in. by 2-ft. plywood strips. (Don't use these strips to sticker green, wet lumber, or you'll have trouble with sticker stain.) Leave the wood through the winter while the heat is on, and by the time the weather warms up enough to turn off the furnace, 4/4 boards of lumber should be fine to use.

Continue drying thicker stock by moving it into the attic and carefully re-stickering it. Leave it through the heat of the summer until late September. For anything thicker than 2 in., you may have to repeat the whole process another year. By then, kiln-dried lumber might not sound so expensive.

Table design details: how much overhang, what kind of pulls?

I am making two end tables out of mesquite and want them to be perfect. How much overhang should the top have to look balanced? Is there a general rule?

Normally, I would attach the top with one screw in the middle of each end and two screws on each side with elongated holes to accommodate seasonal wood movement. But many of the masters seem to abhor the use of metal fasteners. Is there a better way to attach the top? And what about drawer pulls? When I

designed the pieces, I envisioned round, brass drawer pulls, but James Krenov and others seem to go for wooden drawer pulls. Which one is more appropriate for my tables?

—Robert V. Ratts, Bedford, Texas

Peter Korn replies: One of the most wonderful things about furniture design is that there are no correct answers or foolproof formulas. Whether you prefer to copy existing styles or to exercise your own creativity, there will be those who admire your aesthetics and those who disdain them.

If your end tables are closely patterned on an existing style, such as Shaker, you might try to maintain consistency by working from measurements of original pieces. If you can't find an actual piece to measure or a measured drawing, you can approximate the overhang by scaling measurements from a photograph.

If your tables are more interpretive and you are willing to cultivate your eye, an excellent way to determine the overhang is to mock up different-sized tops (with expendable material such as cardboard or plywood) until you find a proportion and overhang that please you.

The same advice applies to drawer pulls. If you are working close to a historical style, you'll probably want to research the original pulls. If you're winging it, a good approach would be to attach sample pulls to the completed table using double-faced tape. Try brass knobs, and then try carving your own wooden pulls. See what they look like in place, how they feel when you grasp them and what placement you prefer. This testing may seem like extra work, but isn't taking the time to achieve excellence the point of making our own furniture?

Although there are no absolute aesthetic rules in design, there are relationships to be aware of. Formally, these rules are broken down into artificial categories such as visual weight, symmetry and texture. Practically, you should consider that the more the top overhangs, the less you'll see of the aprons. Seeing less of the aprons, in turn, makes the base appear less substantial in relationship to the top. But the visual, or perceived, weight of the top can be adjusted by making its edges look thicker or thinner. Finally, attaching a tabletop is the one application for which screws are universally accepted, even in the finest furniture.

There is much to be learned from James Krenov and other inspiring furnituremakers who have given a lifetime to the craft. But they became great not by obeying established criteria but rather by cultivating an inner voice that has led them in new directions. And each of us has that voice.

[Peter Korn teaches at the Center for Furniture Craftsmanship in Rockport, Maine, and is the author of *Working with Wood: The Basics of Craftsmanship* (The Taunton Press, 1993).]

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

READER SERVICE NO. 118

READER SERVICE NO. 119

READER SERVICE NO. 33

READER SERVICE NO. 53

Tool Crib for

FREE FREIGHT! SAME DAY SHIPPING

Serving You For 48 Years

Telpro Inc.

PANELLIFT™ Drywall Lift $579

SIOUX

790 Air Palm Finish Sander $134

790VV air sander with vacuum 179
8000 3/8" vsr 0-1300 drill 129
80201300 rpm electric scrdrvr 199
8030 kls 3/8" R.A. drill 0-1500 149

DELTA

36-820 3 HP Unisaw w/52" Unifence & Motor Cover $1699

Optional Table Board

36-830 3hp unisaw w/30"unif 1599
36-821 3hp unisaw w/50" Bies1699
36-831 3hp unisaw w/26" Bies1599
34-778 5hp unisaw w/52" uni1949

34-445 10" Contractor's Saw w/30" Unifence $849

Optional Table Board

34-444 10" contractor's saw 669
34-555 sliding table attach 329
36-2758-1/4" bench table saw 269
33-890 12" radial arm saw1599
33-990 10" radial arm saw 799

28-280 14" 1 HP Bandsaw $799

New! 1 HP Motor

33-055 8-1/4" sawbuck w/legs 659
37-154 6" jointer w/stand1299
17-90016-1/2" floor drill press 429
34-080 10" mitre saw 219
23-710 **New** sharpening center 174

37-350A 8" Jointer, w/Stand $1649

43-379 3 hp hd 2 spd shaper 1699
31-730 6"belt/12"disc sander 1349

36-220 10" Compound Mitre Saw $209

50-180 1 hp dust collector 499
50-179 3/4 hp dust collector 399
36-906 52" Delta unifence 329
36-905 30" Delta unifence 249
32-100 plate jointer 269

22-675 15" Wood Planer $1199

Includes Stand

37-190 6" jointer w/stand 499
36-851 1 phase stock feeder 849
36-850 1 phase stock feeder 499
32-325 13 spindle boring mach999

31-280 Sanding Center With Stand $799

36-755 10" cabinet saw 1149
36-751 10" cab w/30" unif 1299
36-752 10" cab w/50" unif 1399

50-901 3 HP, 230V Cyclone 2 Stage Dust Collector $1849

50-902 5 hp3ph cycln collectr1899
50-903 5hp230v cycln collectr2149

BLACK & DECKER

2694 7-1/4" Super Sawcat With Brake $159

26958-1/4" super sawcat w/br. 189
79-034 #400 workmate 109

Emglo

AM78-HC4V 1-1/2 HP Vertical Twin Tank $309

AM79-HC4V **New** 1-1/2hp vert 329
AMDOL78-HC4V 1-1/2hp oilss 279
AM99-HC4V 2 hp ver twin tnk 399
AM39-HC4V 3/4hp v twin tank 299
K15A8P 1.5 hp wheelbarrow 619
K2A8P 2 hp wheelbarrow 689
K5HGA-8P 5hp Honda whlbrw 769
045 3/8" x 50' Goodyear hose 20

Nikon

AX-1 Auto Level Package $499

Includes Tripod & Rod

AZ-2 24X auto level package 699

PONY AIR

LPN672 Air Palm Nailer With Glove $94

Drives 6d-50d nails!

JET EQUIPMENT & TOOLS

JTAS-10X NEW! 10" Jet Saw 3 HP w/50" Xacta Fence Motor Cover $1399

Includes Table & Legs

JWCS-10JF 2 hp sw w/Jet fnc 999
JPM-13 13" planer/moulder 799
JWP-12 12" portable planer 379
JWS-18HO 1hp wood shaper 499

JWTS-10JF 10" Saw w/Jet Fence $589

JWBS-14CS14"1 hp wd bdaw 599
JWBS-140S14"3/4hp w bdsw 499
JDP-17MF 17"fl 16 sp dr pr 429

JJ-6CS 6" Long Bed Jointer $499

JJ-8CS 8" long bed jointer 1149
JWL-1236 12" vs wood lathe 569
JWP-15HO 15"3hp w planer 1249
JWP-208-1 20",3hp w planer 1999

DC-650 1 HP, 650 CFM Dust Collector $229

DC-1200 2hp1200cfm collectr 449
DC-1900 3hp1900 cfm collectr 619
JSG-6 6" belt/12" disc sander 599

JDPN-607.2 18 ga 3/8"-1-1/4" Nailer w/Case $109

JDPN-671.4 16ga stplr w/cs 219
JDPN-6013.2A 18ga stplr w/cs 109
DHC15T4 1-1/2hp pncake cmp 299

Panasonic

EY6100EQKWL NEW! 12 V, 3/8 21 Position Clutch Kit $209

Includes Oil Lube plus 2 Ironman Batteries

RYOBI

BT3000 10" Sliding Table Saw w/Stand $549

Includes Router Jig Kit

DS2000 **New**2 spd detail sander64
DC500**New** detail wood carver 64
RE-600 3 hp vs plunge router 229
JP-155 6-1/8" jointer/planer 329
TSS200 8-1/2"slide cmpnd saw399

AP12 12" Portable Planer $409

Includes Extra Knives

OSS450 osc. spindle sander 169
TR30U laminate trimmer 89
BE321 3x21 vs belt sander 149
RE175 1-3/4hp vs plunge routr 124
WDS1600 16-32"w drm sndr 599
WDP1850 18-1/2"wood drl prs 449

POWERMATIC mi

1660760 66 Saw 3 HP w/50" Biesemeyer $1999

Acc'y Pkg.

1120001 belsaw 12" plnr/midr1499
1270100#27 shaper 3 hp 1 ph2099
1000099 #100 planer/12"/2hp2799
1800205 5hp18" pl w/knife gr 5799
1500040 6" jointer 3/4hp 1 ph1399
1610050 8" jointer 1.5hp 1 ph1699
13100016x48 belt/12"disc sdr1399
1410040 14" bndsw 3/4hp1ph1499

1791210 NEW 64 Artisan Saw w/Bies. Fence $749

179121164 Artisan w/50" Bies 849
1791208 oscil. spndle sndr 299
1791209 **New** 15" planer1329
1791040 14" floor drill press 379
1791051**New** 6" jointr w/stand 549
1791070 1-1/2 hp dust coll 399
1791200 6x48belt/10"disc sndr449
1791100 6"x89" edge sander 649

freud

FT-2000E 3.25 HP VS Router $209

Includes Edge Guide

JS102 joining sys cs & adfnc 179
JS100 plate jner, cs & dst bag 169
UC-900 5 pc shapr cabinet set 349
94-100 5 pc router cabinet set 159
91-10013pc 1/2" router bit set 189
SD508 8" super dado set 179

HITACHI

C8FB2 8-1/2" Compound Mitre Saw $489

C10FS**New**10"slide compound 739
P12RA 12" planer/6" jointer 999
P12R 12" portableplaner 799
C10FC 10" cmpnd mitre saw 219
C7BD 7-1/4"circular saw w/brk 139
DN10DYK vs 9.6v R.A. drill 159
M12V 3-1/4 hp vs pl. router 239
CB75F resaw bandsaw 2399

PORTER-CABLE The Woodworker's Choice

9444 NEW! Profile Sander Kit $119

333 5" Quicksand dstls sander 79
332 5" Quicksand PSA sander 74
334 5" dustless PSA sander 79
97355 5" vs sander w/case 154
97366 6" vs sander w/case 159

DA250 NEW! 1"-2-1/2" Finish Nailer Kit $259

FN250 16g 2-1/2" fnsh nail kt 229
FN200 16g 2" finish nailer kit 169
BN200 18g 2" finish nail kit 149
BN1251 8g1-1/4" finish nail kit 99
NS100 18g1/4" crown stplr kit 99

556 Plate Jointer w/Case & Tilt Fence $139

7810 tool triggered vacuum 269
550 **New** pocket cutter 189
552 prod. pocket cutter 579
360 3x24 sander with bag 204
362 4x24 sander with bag 209

9853 - 12 V, 3/8" VSR, 2 Speed Drill Kit w/Keyless Chuck & 2 Batteries $159

9855 12v, 1/2" kit w/2 bat 179
6611 3/8" VSR 5.5 amp drill 124
6614 1/2" VSR 5.5 amp drill 129
6615 1/2" VSR 5.5 amp, kylss 139
6645 0-2500 VSR 5.5 amp drvr 99
2640 vsr 4.5A drywall driver 89

743K Left Hand 7-1/4" 15 Amp Saw w/Case $129

9743 left hand7-1/4" saw w/cs 144
843 left hand71/4" saw w/brk 139
9347 7-1/4" 15 amp saw w/cs 144
447 7-1/4" 15 amp saw w/brk 139
7310 laminate trimmer 99
9118 porta plane kit w/ct cuttr 249

690 1-1/2 HP Router $144

97310 lamintate trimmer kit 189
511 **New** lock installation kit 159
9345 6" Saw Boss kit 134
5116 16" Omni jig 259
345 6" Saw Boss w/ct blade 114
9314 4-1/2" trim saw kit 169
7700 LaserLoc 10" mitre saw 349

7539 3-1/4 HP 5 Speed Plunge Router $274

7116 **New** 24"Omni jig & video309
691 1-1/2 hp D handle router 159
696 router-shaper table 139
695 router table w/router 229
7518 3-1/4 hp 5 speed router 274
7538 3-1/4 hp plunge router 249
7403 paint remover 179

7800 Drywall Sander $339

7499 ***New*** cut-out tool 69
97549 top hndl jigsaw w/case 144
9737 Quickchabge tiger saw kit164
9647 tiger cub with case 119
693 1-1/2 hp plunge router 179
6931 plunge router base 79
97751 1/2" 2 spd hmr drill kit 159

OCCIDENTAL LEATHER

5080 Pro Framer Tool Belt $134

8080 oxy light pro framer 124

SSC

C4 New! Panel Saw $969

H5 64" capacity panel saw1549

BIESEMEYER DELTA

78-900 50" Commercial w/12" Left $329

78-934 52" homeshop fence 279
78-931 40" homeshop fence 259
78-930 28" homeshop fence 249

Milwaukee

6527 Variable Speed Super Sawzall $189

Includes Extra 11 Pc Blade Set

5377-11/2" kylss hmmr drill kit209
5369-13/4" SDS hmmr drill kit 279
5371-1 1/2" hammer drill kit 199
5365-1 Hawk 1" SDS rty. h. kit 419
5353 Eagle 1-1/2" rty. hmr kit 579

6496-6 10" Slide Compound Saw $599

6497-6 10" cmpd saw w/acc. 659
6491 10" mitr saw,ct bld & bg 329
6494 10" compound saw 319
6507 VS sawzall with case 154
6517 VS sawzall plus 159
5397-1 3/8" hammer drill kit 149
5375-1 1/2" hammer drill kit 189

0408-6 NEW! 12 Volt VSR Cordless Kit w/Keyless Chuck & Extra Battery $174

0436-6 12v 3/8" drl kt w/2 bt. 229
0222-1 3/8" VSR 3.5 amp drill 124
0231-6 3/8" vsr keyless drill 99
0234-1 1/2"vsr 0-850 mag. 144
0236-1 1/2" drill w/case 164
1676-1 2 sp. hole hawg kit 299

6368 7-1/4" Saw w/C.T. Blade, Case & Fence $144

6369 7-1/4" saw w/ct blade 154
6758-1 0-4000vsr screwdriver 104
0380-1 3/8" keyless angle drill 174
0375-1 3/8" close quarter drill 149
6266 **New** orbital top hdl jig s. 179

5682 2 HP Router 26,000 RPM, 1/4" & 1/2" Collets $169

6767-1 5amp hd scrw shootr kt144
3107-1 vs right angle drill kit 234
6142 4-1/2" angle grinder 129
5460 7" vs 0-1750 polisher 179
6010 1/2 sheet finishing sandr 129

TROJAN

MS-2000 New! Mitre Saw Stand $279

TWC-24 work center 99

DELTA

22-540 12" Portable Planer w/Dust Collector Chute & Xtra Knives $389

Includes Hood & Knives

31-780 **New** osc spindle sandr 199
17-960 osc. spindle attach 79
31-695 6x48 belt/9" disc sndr 379
36-250 10" sliding comp. 499
36-210 10" cmpd mtr saw 249
28-190 12" bandsaw w/stand 399
11-990 12" bench drill press 189
46-700 12" vs wood lathe 439
43-505 router/shaper 299
11-090 radial drill press w/std 309
14-650 mortising machine 289
28-275 14" bandsaw w/stand 649

37-070 6" VS Bench Jointer $259

Includes Extra Knives

40-650 Q-3 18" vs scroll saw 479
40-560 16" 2 speed scroll saw 179
31-460 4x36 belt/disc sander 139
28-185 bench bandsaw 179
23-700 wet/dry grinder 159
11-950 8" bench drill press 134
36-540 10" bench saw 169
36-090 10" Sidekick miter saw 219
50-175 kickstnd mitr saw stnd199
34-182 **New** tenoning jig 79
34-976 **New** deluxe uniguard 249

AIRLITE

231-01-14 Air Mate 3 System $369

Paslode

404400 New! Impulse Framing Nailer $499

900105 Trimpulse finish nailer 549

Nailers.

2655 Original Cordura Tool Belt System $99

Tools Not Included

"Jorgensen"

8" Handscrew $12

1 10" handscrew 13
2 12" handscrew 15
3 14" handscrew 19
4 16" handscrew 25
7224 24" I-bar clamp 19
7236 36" I-bar clamp 24
7248 48" I-bar clamp 26
7260 60" I-bar clamp 28

READER SERVICE NO. 134

the Long Run!

OUR PRICES PRICE GUARANTEE WON'T BE BEAT

Hours: M-F 7:00-7:00 CST
Saturday 8:00-4:00 CST

CALCULATED INDUSTRIES INC

4045 NEW! Construction Master IV Calculator $69
44045 bench top Const. Master 79

HONDA Power Equipment

EB2500XK1A NEW! 2500 Watt Construction Generator $1029
EB3500XK1A 3500 watt gen 1499
EB5000XK1A 5000 watt gen 1849
EB6500SXA 6500 watt gen 2479
EW171A88 4000 w gen/weld 2059

EX1000A 1000 Watt Generator $659
EM2500XK1A 2500 watt gen 1069
EM3500SXK1A 3500 elec strt 1629
EM5000SXK1A 5000 elec strt 1999
ES6500K1A 6500 electric strt 2679

GX160K1QX 5 HP Horz. w/Oil Alert $339
GX240K1QA 8 hp horz. engine 499
GX340K1QA11 hp horz. engine 599

For optimum safety & performance we recommend you read the owner's manual before operating your Honda Power Equipment. Connection of generators to house power requires transfer device to avoid possible injury to power company personnel. Consult a qualified electrician.

SKIL

HD77M MAG 77 7-1/4 Worm Drive Saw $169
2 Lbs. Lighter!

AEG

TXE-150 6" EVS Random Sander $144
HBSE-75S 3x21 vs belt sander 189
FSPE-100X brl grip jigsw w/cs 164
BSPE-100X top hndl jigsw w/cs 164

KRAUSE

121482 12' Multimatic Alum. Ladder $129
121499 16 foot ladder 149

FUJI

Three Stage Turbine, High Volume Low Pressure Sprayer $599

Wap

766RDF Turbo Vacuum $479
776RDF-D turbo drywaller vac 579
SQ14AS Turbo Vac, auto start 599

STABILA

24670 4' Level w/Hand Holes & Padded Case $59
$20 Case Value!
02859 **New** 80 LMS laser kit 399
24640 2' level w/hand holes 45
24680 6' level w/hand holes 105
2700078" level wo/hand holes 115
2701096" level wo/hand holes 125

VEGA

U26 Utility 26" Fence $189
U50 utility 50" fence 209
PRO40 professional 40" fence 259
PRO50 professional 50" fence 269
DU-36 utility 36" duplicator 399
D-36 prof. 36" duplicator 569

Elu

3339 3 HP VS Plunge Router $279
2721 1.5 hp fixed base router 149
3379K plate joiner w/case 239
3375 3-1/8" universal planer 169

qual-craft

2200 Pump Jack $58
2201 top brace 20
2203 guard rail holder 21
2204 work bench 38
2601 **New** wall jack 109

CLAYTON

140 Portable Oscillating Spindle Sander $599
135 under table 4-1/2" osc. sdr 519
146 bench 9" osc sdr 649
100 floor 4-1/2" osc. sander 749
106 floor 9" osc. sander 799

STANLEY BOSTITCH

N60FNK 1-1/4"-2-12" Finish Kit $349
N80S-1 16d stick nailer 349
N80C-1 **New** coil nailer 349
BT50-2 1-3/16"-2" brad nlr kit 219
BT35-2 5/8" to 1-3/8"brd tackr 179
RN45B-1 **New** roofing nailer 399
MIIIFS floor stapler 539

Porta-Nailer

401P Hardwood Floor Nailer $214
501 floor face nailer 214
120 universal router table 339

Wein

MSXE-636-2 VS Triangular Oscillating Sander w/Case & Paper $209
MOX-621 pneumatic trian sndr 199

MK®

MK 660 3/4 HP Tile Saw $599 *Complete Line In Stock*

PERFORMAX PRODUCTS, INC.

16-32 PLUSK 16" - 32" Bench Drum Sander $899
Includes Stand
Powerfeed attachment 349
Per-ST100 radial saw srfc sndr 349
ProMax III stationary sander 1799
SuperMax-25 25"dual dr sndr 3199
SuperMax37x2 37" dl dr sndr 3899

JDS COMPANY

AT2000 Air Filtration System $259
8-12 air filtration system 489
10-16 air filtration system 689
18-34 accu miter gauge w/bar 149
24-46 accu miter gauge w/bar 164

Laser Tools Co.

L100 100' Laser Precision Level $199
L100M100' magnum prec level 349
L360 **New** rotary laser 599
L360A rotary laser sweeper 729

David White

LP6-20 20X Sight Level Package $219
LP6-20XL **New** sight level pkg. 279
ML100 visible beam laser 1099
ML200 **New** visible beam laser 899
AEL-300 auto laser level 1299
LTP6-900 level transit pkg. 399
ALTP6-900 18auto lvl trnst pkg 509
LT8-300 26 x transit 499
LT8300P 26 x opt. transit 569
ALT6-900 18x auto level transt 419
ALP6-18HD 18x auto package 399

SENCO

SFN40K 1-1/2 to 2-1/2 Finish Nailer w/Case $389
SN325+ 6d - 12d nailer. 419
SFN-1 Plus 1"-2" finish nailer 349
SN60 full hd stick nailer 449
SLP-20 5/8"-1-5/8" brad nail kit 279
SLS20 finish stapler w/cs 279
SKS 1/4" crown finish stapler 279

BOSCH

1587VS Top Handle Jig Saw w/Case $169
1584VS barrel jigsaw w/case 169
1587VS **New** top handle jigsaw 149
1584VS barrel grip Clic jigsaw 149
1587DVS top hdl dstlss jigsaw 179
1584DVS barrel dustless jigsaw 179
1632VSK vs recip saw kit 159

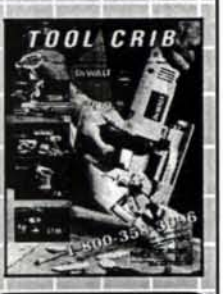
3107DVS Dustless Random Orbital Sander $99
3107DVSK 5" rndm sander kit 119
1348AE 5" elec. mini grinder 139
1608 laminate trimmer 104
1609 offset base laminate trmr 149
1942 heavy duty heat gun 79

3310K New 12 Volt T-Handle w/2 Batteries $179
3610K 14.4 v drill with 2 bat 199
1273DVS 4x24 vs belt sander 229
1273D 4x24 sander with bag 219
1272D 3x24 sander with bag 209
3270DVS 3x21 vs sndr w/bag 169

1615EVS 3-1/4 HP, VS Plunge Router $289
1604 1-3/4 hp router 144
1606 1.75 D-handle router 189
1003VSR 3/8" keylss 0-1100 drl 94
1404VSR 0-4000 drywall driver 94

11224VSR 7/8" Bulldog SDS Rotary Hammer $224
11304 Brute breaker hammer 1249
11305 demolition hmr 10 amp 749
11220EVS 1-1/2" spline hmr 499
11219EVS 1-1/2" spline w/stop 569
1194VSRK 1/2" hmr drill w/cs 159

Call today for our FREE full color 96 page catalog, featuring our most popular selling tools at the lowest prices. 1-800-582-6704



shop-vac

890-11 10 Gallon, 2 Stage, 2 HP By-Pass S. Steel Vac $299
610-50 10 gal. S.S. cont. vac 199

HITACHI

NR83A Full Head Stick Nailer $389
NR83AA clipped head stick nlr 429
NV83A full head coil nailer 429
NV45AB coil roofing nailer 419
N5008AB 5/8"to 2" hd stapler 339

BOSCH

B7000 NEW! Center Detail Sander $69
B7001 vs corner detail sander 94
1370DEVS 6"hd randm sandr 229
1609KX laminate trimmer kit 229
11222EVS 1-1/8"sds rotry hmr 399

1613EVS 2 HP, VS, Microfine Plunge Router $209
Includes Deluxe Edge Guide
1655 **New** 7-1/4" circle saw 129
1289D **New** 1/4 sheet palm sndr 69
B4050 **New** in-line jigsaw 129
3296K **New** 3-1/4" planer kit 169

makita

6095DWE 9.6 V 3/8" VRS Keyless Drill w/2 Batteries $129
6095DWLE 9.6v w/2 bat & lite 139
5007NBK 7-1/4" saw w/case 129
2708W 8-1/4" tbl saw w/blade 319
2012 12" portable planer 489
3612C **New** 3hp plunge router 269

LS1011 10" Compound Mitre Saw $429
Includes Carbide Blade
LS1211 12" cmpnd miter saw 789
6201DWHE 9.6v hi cap kyls2 bt 179
6211DWHE 12v h icap kt ,2 bt 169
9820-2 blade sharpener 214
JR3000V vs recip. saw kit 139
N1900B 3-1/4" planer w/case 134
3901 **New** plate joiner 209

TORMEK

2004-T Wet Grinding Machine $389

DEWALT

DW936K 18 Volt Cdls Saw Kit $249 NEW!
DW935K14.4v cdls saw kt,2 bt 239
DW93514.4 volt cdls saw only 159
DW930K 12 volt cdls saw kit 199
DW930 12 volt cdls saw only 129

DW625 3 HP VS Plunge Router $279
DW670 laminate trimmer 99
DW673K laminate trimmer kit 209
DW615 1-1/4hp vs plng router 164
DW610 1-1/2 hp, 1/2" router 154
DW306K 8 amp, vs, recip saw 164

DW705K 12" Compound Miter Saw $359
Includes Dust Bag
DW364 7-1/4"saw w/brake 159
DW361 7-1/4" saw & case 149
DW318K top hdl vs jig saw kit 159
DW675K 3-1/8" planer w/case 169
DW402 4-1/2" angle grinder 89

DW682K Plate Jointer Kit $219
DW106 3/8" 4 amp keyless dr 74
DW250 0-4000 drywall driver 89
DW254 0-2500 deck driver 89
DW280K all purp scrwdrvr kit 119

DW421 5" Hook & Loop Dustless Random Sander $74
DW423 5" vs random sander 94
DW443 6" RA H&L rdm sndr 139
DW4111/4 sheet sander w/bag 59
DW431 3"x21" vs belt sander 184

DW995K 18 Volt 1/2" VSR Drill Kit $239
KIT BOX INCLUDED
DW991K-2 14.4v3/8"drl kt 2 bt 229
DW991KS-2 14.4v saw/dril pkg 349
DW994KQ 14.4v 1/2"15m d kit 239
DW972K-2 12v 3/8"dr kit/2b 189
DW952K-2 9.6v 3/8"dr kit/2b 139

To Order or for Technical Support, call Toll Free (US or Canada)

1-800-358-3096

Catalog Requests **1-800-582-6704**

FWW #119
July/Aug.

Box 14040 • Grand Forks, ND • 58208-4040

MOST PORTABLE TOOLS SHIPPED FED-EX $10.00 MORE

FedEx Federal Express

FAX US YOUR ORDER! 1-800-343-4205

*Any comparable National ad in this issue. We reserve the right to verify competitors price and stock. Limited to stock on hand.

MasterCard VISA DISCOVER

TOOL CRIB OF THE NORTH

•• FULL LINE DISTRIBUTOR •• FREE FREIGHT IN 48 CONTIGUOUS USA •• FACTORY AUTHORIZED SERVICE •• ERRORS AND PRICES SUBJECT TO CHANGE ••

READER SERVICE NO. 134

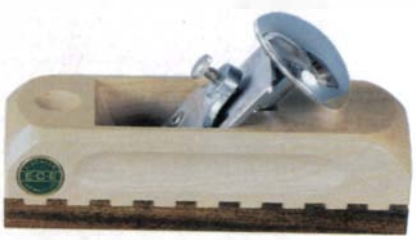
Block Planes

These light, versatile tools vary in price and design

by Mario Rodriguez

Stanley No. 9½

Lie-Nielsen block plane



ECE Pocket plane

Record No. 60½

Rali Swiss

Lie-Nielsen skew block plane

Bristol Design Norris-style plane

I have dozens of specialty planes at my bench, but more often than not, I reach for a block plane. It's small enough for one-handed fitting and finishing tasks like trimming veneer or chamfering an edge. A block plane is compact enough to fit into a drawer opening to trim runners and light and handy enough for repetitive jobs like shaping pegs and small spindles. I choose the block plane whenever I need a delicate and responsive tool that will deliver a clean, tearout-free cut every time (see the photo on the facing page).

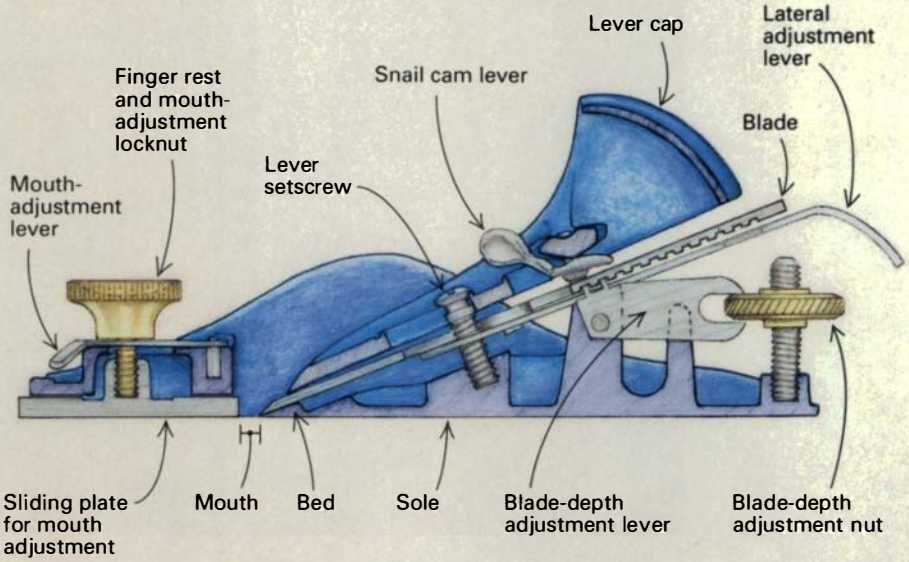
Until about 12 years ago, a woodworker buying a new block plane didn't have many choices. Today, there is an expanding selection: the standard No. 9½ plane, high-tech planes with disposable blades, and fancy retro designs made of bronze and ebony. Prices range from $35 to $235. With such an array of choices, it's natural to wonder how they compare.

To find out, I gathered a selection of block planes and kept them around the shop for a few months. I used them daily and encouraged my students to do likewise. Besides using them for the usual day-to-day tasks, we put them to work trimming

Photos: Aimé Fraser

Block planes handle difficult grain. *This bricklaid arch presents end grain and long grain and everything in between. For more control, use a two-handed grip, and skew the blade as it cuts.*

A look inside a Record No. 9½ block plane



veneered panels, planing down solid edging on plywood shelves, shooting seams on book-matched veneer, tapering slender spindles, chamfering edges and planing the outside curve of a bricklaid pine arch.

Bevel side up and compact design

A block plane is small enough to hold in one hand. The blade is set into the body of the plane with the bevel side up; it has no chipbreaker. The blade is bedded at 20° or less, and the blade and lever cap are incorporated into a comfortable grip. With the bevel up, the cutting angle is 45° (the bedding angle plus the 25° bevel), which is the same as a standard bench plane.

A standard block plane has no cutting-angle advantage over a bench plane in difficult grain situations like end grain or burl. I know plenty of experienced woodworkers who prefer to use a No. 4 or a No. 5 smoothing plane when working end grain. They say that a two-handed grip is essential to control and that the greater weight and momentum of the big plane is important to a clean cut. But there are plenty of times when a full-sized plane and a two-handed grip are impractical.

Classic block plane: the No. 9½

When you think of a block plane, the No. 9½ is probably what comes to mind (see the drawing above). It's the model you fumbled with in high school shop class. Originally manufactured by Stanley, this pattern is now made by several companies and can be purchased from almost any tool dealer, hardware store or mail-order house. Once you follow the simple tuning steps on p. 39, these block planes can take on just about any job.

Stanley No. 9½—This version is made by Stanley in England. It's a solid plane with heavy castings and a good finish. The retail price is about $45. The blade-depth adjustment is direct action by means of a knurled knob. A cast-metal wedge supports the blade, giving the plane some weight. A locknut and lever allow adjustments to the mouth. I had a little trouble making quick blade adjustments and keeping the blade's edge perfectly parallel to the sole (see the top photo on p. 38).

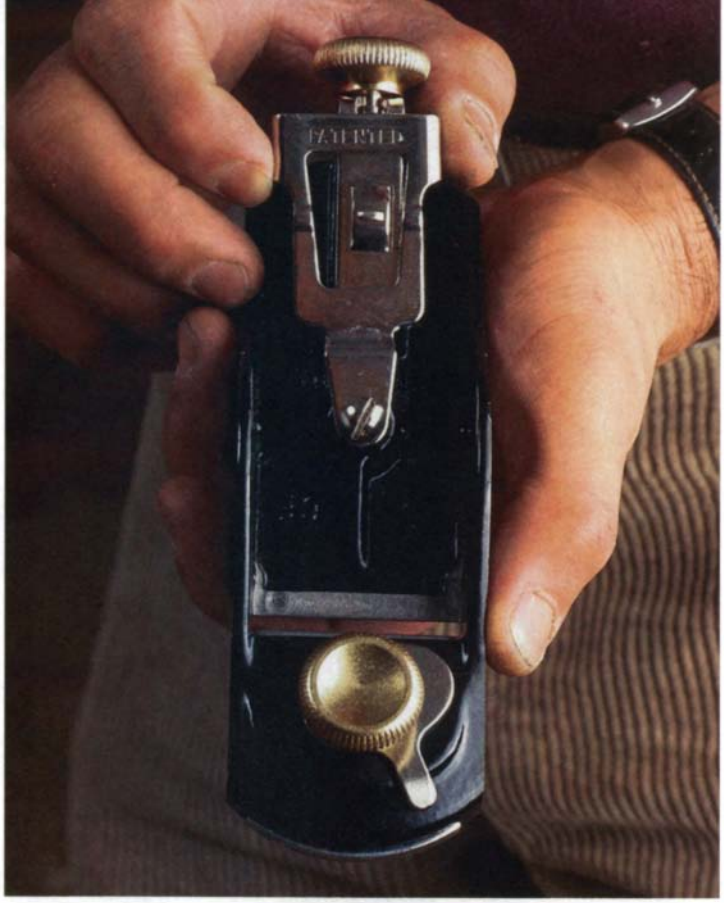
Record No. 9½—This plane is lighter than the Stanley 9½ and has a different blade-depth adjustment but is otherwise similar, including the price. The lever action of the blade-depth adjustment often comes from the factory a little sloppy, but it's easy to fix by following the tune-up instructions. The lateral adjustment is not as smooth as it is on the Stanley. But the control lever isn't in the way, so it's less likely to get bumped.

Footprint No. 9½ and 220B—The No. 9½ is an almost identical copy of the Record No. 9½, and the No. 220B is similar. The biggest difference is in the finish. The Footprint planes we used were rough. I got both planes to work well but not before spending a lot of time cleaning, filing and tuning them.

The mouth of the No. 220B is fixed, which limits its versatility, but it does reduce the price. The sole of the 220B is about ¾ in. longer than the others. It has a wooden knob like the ones found on bench planes. The No. 9½ lists for $54.50 and the No. 220B for $41.50.

Lie-Nielsen standard—This cast-bronze plane is a copy of the Stanley No. 102. It's similar to the No. 9½, but smaller. There is

Drawing: Christopher Clapp



The Stanley method of lateral blade adjustment—*The blade angle is adjusted by pushing a swiveling carriage from side to side. The brass knob at the rear of the plane is the blade-depth adjuster.*

On a Lie-Nielsen block plane, *the lever cap is locked in place by tightening a large knurled-bronze nut.*

Record No. 60½ lever cap is awkward *(left). The cap locks in place by tightening a partially recessed knurled knob. Older Record models (right), and Stanley planes, use the simpler and more common snail cam lever.*

no mechanism for lateral blade adjustment. You can make small corrections in blade position by loosening the lever cap and adjusting the blade by hand. But the blade fits into the plane body snugly, without a lot of extra room. This means you must take some care in keeping the blade square when you sharpen it. Unlike the Record, Stanley and Footprint planes, the Lie-Nielsen does not have an adjustable mouth. Still, it makes a fine cut. The thick blade adjusts precisely by a threaded adjuster tucked beneath the blade (see the center photo). This is my favorite block plane. Its small size makes it a pleasure to use in a variety of situations, and it always delivers a fine, smooth cut. It sells for about $75.

Low-angle planes

Low-angle planes are designed to cut end grain, and they are best used on plywood and man-made materials.

Stanley No. 60½—The low-angle version of the No. 9½ has the blade bedded at 12°. Though it has the same overall length, the sole is a little narrower (1¾ in. as opposed to 2 in.). I generally take this plane on cabinet installations because of its solid feel and versatility. The price is about $44.

Record No. 60½—One of the most obvious differences between this plane and the Stanley version is a tedious screw adjustment for the lever cap (see the bottom photo). It's tucked under the rounded portion of the lever cap and is difficult to use. Older versions of this plane have the snail cam lever.

Lie-Nielsen low-angle—This plane is identical to the Lie-Nielsen described previously, except the blade is bedded at 12°. It costs about $75.

Norris-style planes

Norris-style planes are characterized by massive bronze or cast-iron bodies and dense hardwood infill that supports the blade along its length and dampens vibration. Each of the original Norris planes (made in England between 1860 and World War II) was assembled by a single craftsman. They are some of the finest planes ever made. In the old days, a plane cost a cabinetmaker two weeks' wages.

Today, true Norris planes are difficult to find at any price, but there are a number of small companies that produce something very similar. These planes are not your

Block plane tune-up

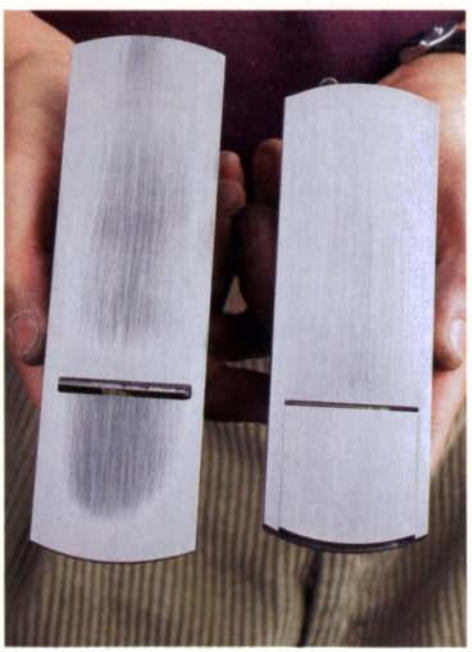
Follow the steps below to tune a Record No. 9½ or No. 60½ block plane. This process easily can be modified to suit other makes and styles of planes.

1. Flatten the sole: It's tedious to flatten the sole of a plane, but the payoff is a smoother, more accurate response to blade and mouth adjustments.

I use a piece of ½-in. plate glass with

coarse emery cloth glued to both sides as my lapping surface, as shown in the photo above. Putting emery cloth on the bottom of the glass keeps it from slipping. I flatten the sole with the blade locked in place but retracted so the plane is under the same tension as it will be in use.

As I run the plane back and forth over



the emery cloth, I periodically check the scratch patterns on the sole (see the photo above). When the pattern is uniform, the sole is flat and true.

I replace the coarse cloth with fine emery cloth and continue working the sole. I progress from emery cloth to 320-grit wet-or-dry sandpaper when the scratches are uniform. Then I move to 400-grit and finally 600-grit. Each change of grit leaves a brighter, slicker sole.

2. File the blade bed: On a block plane, the stability of the blade depends on solid contact between blade and bed. Any

burrs or gobs of paint on the contact surface will cause the blade to vibrate and chatter. I smooth the bed by filing as shown in the photo above.

3. File the lever cap: I check the bottom of the lever cap for burrs or for a rough paint job. I file the cap to remove anything that might prevent a tight fit against the blade.

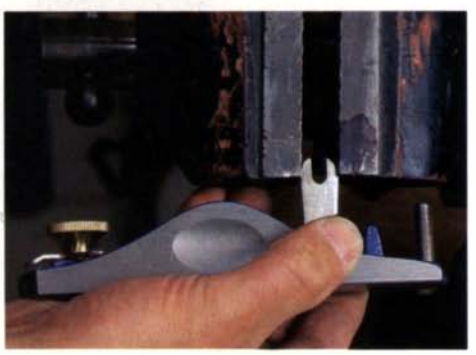
In the next step, I clean up the screw and holes in the lever cap with a round

file as shown in the photo above. I take a moment to check the bottom of the snail cam lever for projections or burrs that will prevent smooth, positive action.

4. Break the sharp edges: I relieve the corners and sharp edges along the sides and ends of the plane, as shown

in the photo above. I make sure that the front edge of the plane is smooth and free of nicks or burrs, which could mar the workpiece.

5. Fine-tune the adjustment lever: A common problem with block planes is sloppy blade adjustment caused by excessive play between the adjustment lever and the blade-adjusting nut. I lightly squeeze the prongs of the adjustment



lever in a vise, as shown in the photo above, until they fit closely on the nut. I go a little at a time, checking the fit. If I overtighten the prongs, I simply open the gap with a file.

6. Square and sharpen the blade: I don't like to rely on the plane's lateral adjustment to set the cutting edge parallel to the sole; I prefer to get the blade perfectly square to begin with. If the blade is out of square, I scribe a true 90° line. Using some machinist's layout dye on the blade before marking makes the scribe line easier to see. Then I grind a 23° to 25° bevel to the line. For the final edge, I hone a 2° to 3° microbevel with my Japanese waterstones. *–M.R.*

Easy blade-depth adjustment on an old-fashioned plane, *the Norris-style block plane from St. James Bay Tool Co. There is very little lateral-blade adjustment on Norris-style planes, so the blades must be ground perfectly square.*

A steel sole wears longer. *Bristol Design's Norris-style block plane has a steel sole for better wear. The ebony infill is pinned in place.*

A convertible block plane. *The Lie-Nielsen low-angle skew block plane converts to a rabbet plane by removing a side plate. Here, the removable fence is being used to start the rabbet square.*

The Rali Swiss plane is almost foolproof. *The disposable blades can't be put in the wrong way. And the blade is held parallel to the sole, so there's no need for a lateral adjuster.*

everyday block planes. They're heavy, expensive and designed for precision work.

St. James Bay Tool Co.—This company offers a variety of Norris-style planes in kit and finished form (off-the-shelf or with customized blade angles). Its standard block plane is modeled after the Norris No. 31 thumb plane (20° bedding angle) and costs $175. It has a cast-bronze body with an ebony or cocobolo infill. For an additional $60, you can get a sensitive blade-depth adjuster (see the top left photo). The plane is completely machined inside and out, and it's beautifully finished. The standard mouth is a little larger than those on the original Norris planes, but the tool is nicely balanced and measures up to the original.

Bristol Design—This British company specializes in antique and reproduction tools. Its version of the Norris No. 31 is an almost exact copy of the original. The body is polished cast bronze, with a steel sole for better wear. The blade bed is well-machined, but noncritical surfaces are left rough and painted burgundy red. The mouth opening is tiny, but it can be widened with a file.

The Bristol plane lacks the precise blade adjuster found on the St. James Bay version, but with about two minutes of practice, I was able to set the blade by hand. Bristol sells these planes with high-quality cast-steel blades recycled from unusable antiques. The price, including shipping from England, is $221.

Specialty block planes

These planes don't fit into the other categories. Strictly speaking, some aren't block planes, but they look like block planes and are used for some of the same jobs.

Lie-Nielsen skew block plane—This hefty plane is a handful for anyone, so its makers gave it a bench-plane knob in front for two-handed use. Because of its weight and a skewed low-angle blade, cuts are smooth, even on stringy plywood. The mouth is not adjustable, but the plane has a sensitive depth adjustment. A steel plate on one side can be removed to convert it into a rabbet plane (see the bottom left photo). And there's an adjustable fence for squaring edges. This plane will cut almost anything

with ease. I'd be tempted to take it on my installations, except that I'm afraid it might disappear. The price is $185.

Rali Swiss—Anyone who has ever had a bad experience with a plane will like the Rali. With a little practice, this plane is easy to use, adjust and reload with a new blade. The reversible blade is hung on two prongs set in the cap iron, so there's no play or slack (see the bottom right photo on the facing page). The blade edge remains perfectly parallel to the sole, eliminating the need for any lateral adjustment. The blade projection is controlled by a small red lever inside the plane body that can be easily adjusted with the right thumb.

The blade is set with the bevel down. The bedding angle is 45°, so technically, it's not a block plane. But its handy size and good performance make it worth considering. The Rali delivered an excellent finish on pine and straight-grained hardwoods but left a slight fuzz on a crotch walnut board. Even though I consider the Rali more of a carpenter's plane, I was pleased and surprised with the results. I could find room for one in my shop.

The Rali is only available in the United States through Woodcraft Supply. There are three models. The Craftsman sells for $29.95, the Professional for $49.95 and the Professional with nickel sides for $59.95.

ECE Pocket plane—This handy and comfortable tool has a wooden body of hornbeam with a finger-jointed lignum vitae sole. The blade is set at a relatively high 50°. Because of this, the distributor likes to call this a one-handed smoothing plane rather than a block plane. True to its billing, the plane left a fine finish on hard woods like white oak, bubinga and hard maple but wasn't at its best on burl. The plane is easy to adjust and sharpen and has a responsive depth-adjustment mechanism controlled by a giant knob that also serves as a comfortable grip. In tight situations, it's a little awkward, but otherwise, I found it handy and well-made. The price is $68.

Pick the plane for the job

For years, I told my students that a No. 9½ is the best block plane for beginners. These planes are inexpensive, readily available and they'll handle just about any job. But one semester, I expressed my personal preference for the Lie-Nielsen copy of the No. 102 for fine joinery. Half the students bought the No. 9½ and half bought the Lie-Nielsen. After watching them and dozens of other students, I now recommend the No. 102 even though it is more expensive. Beginners find it easy to adjust, so they get better results and find planing more fun.

But the No. 102 is not the right block plane if you're making case goods and doing installations. The small mouth may slow you down. You need a versatile tool that can take a beating. If that's your kind of woodworking, I recommend a No. 9½ or a No. 60½, especially if you use a lot of plywood and man-made materials. If you are doing superfine work, you'll need the precision of a Norris-style plane. □

Mario Rodriguez is a contributing editor to Fine Woodworking *magazine.*

The fine points of using a block plane

Block planes are simple tools, but getting a consistently smooth cut takes practice. Here's how to set up and use a block plane for top performance.

The grip: Block planes are designed for one-handed planing, but the best results come from using a firm two-handed grip, especially on end grain (see the photo at left). I hold the plane by seating the butt end of the lever cap in my palm and placing my fingers and thumb in the depressions along the sides. I use the thumb and forefinger of the other hand to apply firm and steady pressure on the front of the plane, being careful not to tip it.

The blade: I make the first pass on a troublesome board with the blade set for the lightest possible cut, giving me the opportunity to read the grain without risking any serious tearout. Once I get a fix on the wood, I can set the blade for a heavier cut.

The mouth: The width of the mouth influences the quality of the cut. A narrow mouth produces a thin shaving and a smooth finish. I begin planing with a narrow mouth, and after I've read the grain, I open the mouth for aggressive cutting. And last, I narrow the mouth again to produce a fine finish.

The angle: If conditions allow, I skew the block plane as I cut (see the photo at left). This lowers the effective cutting angle and lets the blade slice through the work. I think it leaves a smoother surface, but more important, it reduces the resistance to the plane's movement, giving me more control.

Another advantage is that the plane's effective cutting width is narrowed, making it easier to navigate narrow bands of difficult grain. —*M.R.*

Sources of supply

Stanley, Record and Lie-Nielsen block planes: Most local and mail-order suppliers

Footprint tools: Robert Larson Co. Inc.; (415) 920-7068 (for nearest retail dealer)

St. James Bay Tools: (800) 574-2589

Bristol Design (Tools) Ltd.: 14 Perry Road, Bristol BS1 5BG, England; 44-117-929-1740

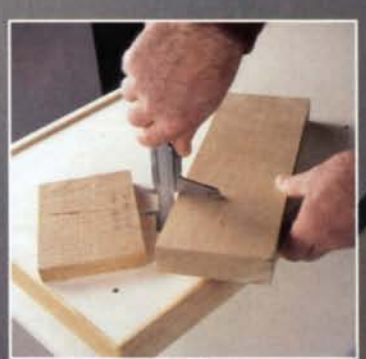
Rali Swiss planes: Woodcraft Supply; (800) 225-1153

ECE Pocket plane: David Warren Direct; (312) 856-1701

Infeed/Outfeed Table for a Portable Planer

Adjustable bed reduces snipe and planing time

by Greg Colegrove



A flat, stable planer bed reduces snipe. The author's height-adjustable feed table and platform, both made of melamine, have practically eliminated the problem. Maple edging prevents boards from wandering off the table.

Portable thickness planers that I've used have an annoying habit of sniping the ends of boards. My 12-in. Delta planer is no exception. I initially accepted that I'd have to scrap 2½ in. on both ends of every board I planed. But soon my conscience, spelled checkbook, convinced me there had to be a better way. Because I really am a rocket scientist, I figured I should be able to cure this otherwise fine machine of its hiccups.

Snipe is a deep cut, like a divot, in one or both ends of a planed board (see the inset photo on the facing page). Snipe occurs when the end of the board tilts upward into the cutterhead. Portable planers are known to be snipers because of their short, rollerless beds. Planers that are adjusted for depth of cut by raising and lowering the head are particularly susceptible.

This problem is hard to correct on many small planers because they don't have large, stable beds. A machinery engineer I spoke with confided that the best I could expect with a planer like mine, without any modifications, was about .005 in. of snipe. I knew I could do better, so I started looking for ways to improve support for the workpiece as it passed through the planer.

Designing a rigid, height-adjustable auxiliary bed

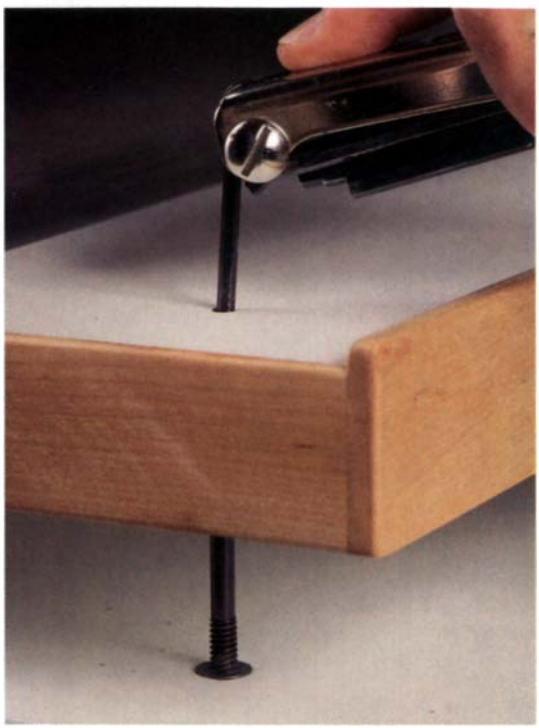
My first effort consisted of extension rollers, which required far too much fiddling, and the rollers had no guides to keep stock moving straight. Then I saw a planer auxiliary bed at a local woodshop that went right through the mouth of the planer. I went back to my shop and adapted the idea, making a table that was stiff but adjustable in height (see the photo at left).

The adjustable bed has reduced my planer's snipe to between .002 in. and .003 in. Such a small discrepancy in thickness is easy to sand or handplane out. And with the long bed, I don't have to feed and retrieve one board at a time. Stock up to about 4½ ft. long is supported at the far end, so I can plane several in a bunch, left to right, or in succession, end to end. Gang-feeding eliminates snipe altogether.

The auxiliary bed reduces my planer's depth-of-cut capacity by ¾ in., but I rarely plane anything thicker than 4 in. anyway. If I'm planing large, heavy planks, I put blocks under both ends of the table to avoid damaging or moving them.

Choose from two different support platforms—I've built two different versions of the auxiliary bed: one in which the feed table sits on a dedicated base and one that can be moved. The only difference between the feed tables is length. The first bed, which sits on a cabinet platform, is designed for stock up to 6 ft. long.

The second bed, which I built for a cabinetmaker friend, is 8 ft. long and has a more compact platform. It must be placed on a stable bench or work table (see the top photo on p. 45), but it will handle longer stock and is more portable. With the help of a buddy, you could stand the unit—with the planer attached—against a wall, store it overhead or transport it in a truck or van. Most portable planers don't come with stands, so it's nice to have the planer at a comfortable operating height.



Leveling the table—*Connector bolts screwed into threaded inserts allow precise adjustments to the height of the planer table.*

Inexpensive materials and hardware

You should be able to build either one of these planer auxiliary beds for less than $75. I made both units primarily out of white melamine, which provides a flat, low-friction surface for the feed table. And with melamine, it's easy to spot and remove wood chips and debris. For a rigid table, I fastened two layers of ¾-in. melamine together.

You will need a bit of hardwood to make edge guides for the tables. I used ¼-in.-thick maple strips that extend ¼ in. above the surface. I also covered the melamine ends with maple trim, this time flush with the tabletop. Not too long ago, I added a planer hood that's connected to a dust collector. The table should be kept free of chips; otherwise, boards will plane inconsistently.

I can adjust the flatness of the feed table with 12 connector bolts that join the table to its support platform. The heads of the bolts are sandwiched between the table's two layers of melamine. The bolts screw into threaded inserts set in the top of the platform (see the inset drawing on p. 44). The connector bolts and threaded inserts can be purchased from The Woodworkers' Store (4365 Willow Drive, Medina, MN 55340; 800-279-4441).

Building the feed table and platform

You can construct the auxiliary bed and platform in about an afternoon. You will need three pieces of melamine for the feed table. Two of the pieces—one for the outfeed side and one for the infeed side—are identical. The third is the continuous top of the table (see the drawing on p. 44). Passing only one thickness of melamine through the planer minimizes the loss of cutting depth. This allows enough table flexibility for independent height adjustment at the infeed and outfeed ends.

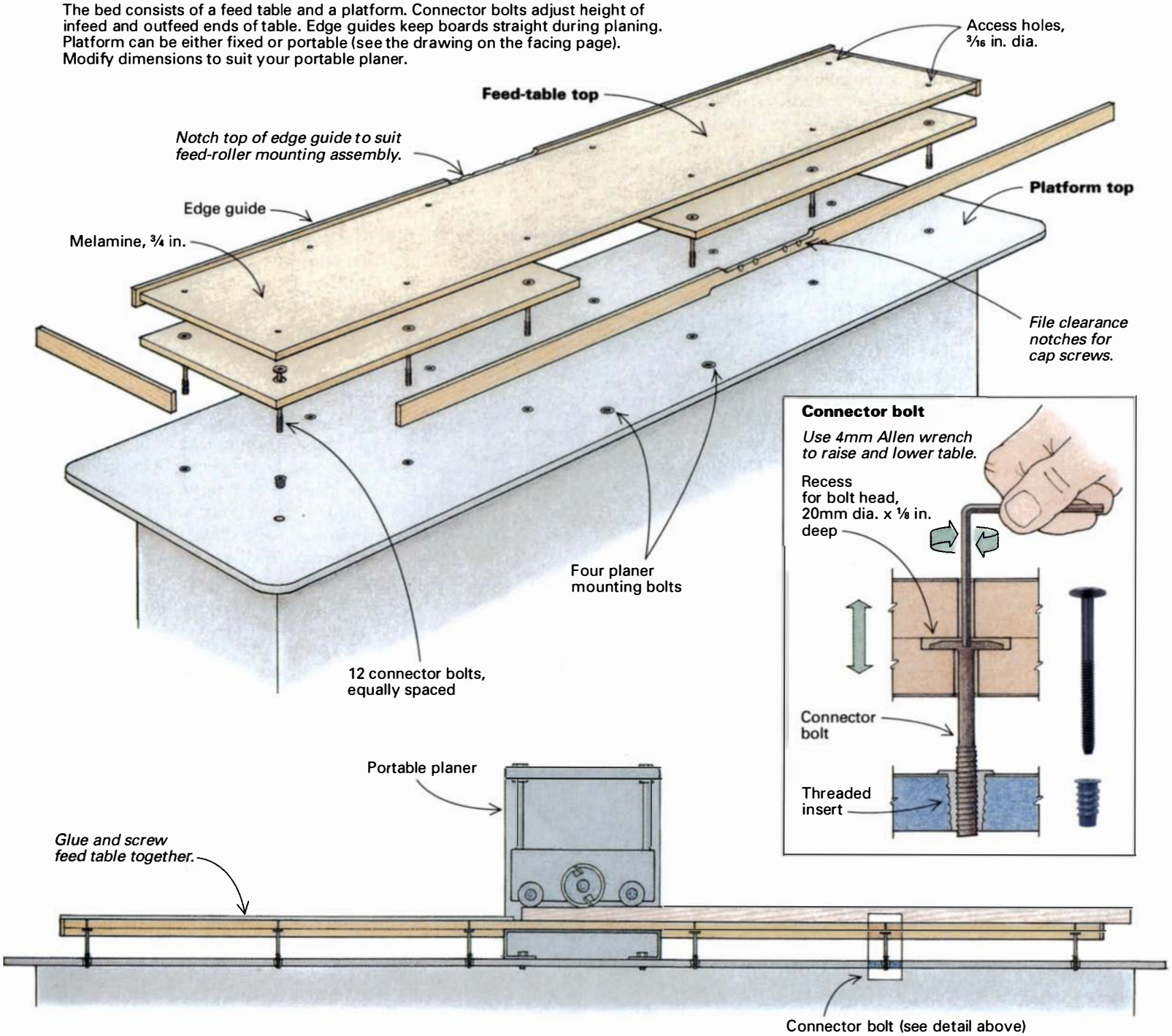
The bottom two pieces are placed just up to the front and back of the planer base. When you have all the table pieces, cut out a piece of melamine for the top of the platform, and place it on a long workbench. Stack the three table pieces on top of the platform top in the right order and relative positions. Temporarily align and clamp the pieces together.

Lay out the six rows of connector bolt holes, mark them with a center punch and drill 3/32-in.-dia. pilot holes through the stack. Unclamp the pile, and remove the piece that will become the feed-table top. Counterbore clearance holes for the heads of the bolts in the two halves of the lower table layer. I used a 20mm Forstner bit (about 13/16 in.). Bore these holes ⅛ in. deep, slightly more than the thickness of a bolt head. Drilling any deeper will only increase backlash and make table adjustment more difficult. Use a 17/64-in.-

Photos: Alec Waters

Auxiliary bed construction

The bed consists of a feed table and a platform. Connector bolts adjust height of infeed and outfeed ends of table. Edge guides keep boards straight during planing. Platform can be either fixed or portable (see the drawing on the facing page). Modify dimensions to suit your portable planer.



dia. bit to enlarge the pilot holes in both lower table sections. These holes should allow a connector bolt to fit easily through. Move back to the feed-table top, and using a 3/16-in.-dia. bit, ream out the pilot holes. These will be the access holes for raising and lowering the table with a 4mm Allen wrench (see the inset drawing above).

Assemble the parts in stages—On another flat surface in the shop, insert all 12 connector bolts between the two table layers (three pieces total). Glue the layers together with construction adhesive; keep the glue away from the bolt heads. Clamp the assembly, place it on its back and then fasten the layers together using 1¼-in. #6 particleboard screws, placing them about 6 in. on center. Let the inverted table cure flat.

Move back to the bench so you can finish the platform. Bore out the pilot holes in the top, and install 12 threaded inserts. To prevent them from vibrating loose, I epoxied them in. Cut out and assemble the pieces for the rest of the platform style you've selected, and attach the platform top.

Finally, rip some hardwood strips for the table's edge guides and end caps. Notch the bottom center of the guides to clear the base of the planer. I wanted to be able to plane 1/8-in.-thick stock, so I also trimmed the top of the guides to fit under my Delta 22-540's

Drawings: Vince Babak

feed-roller supports, and I filed clearance notches for their cap screws (see the drawing on the facing page). Glue and clamp the edge guides and end caps to the feed table.

Mounting the planer and the table to the platform

Place the planer on the center of the platform, and transfer the bolt-hole locations (one at each corner) from the planer's base. Remove the planer, and drill holes for threaded inserts at those spots. I used ¼-in. bolts, nuts and washers to mount mine. If your planer has bed-extension wings or other parts that might interfere with the feed-table installation, remove them.

Before you install the feed table, it's a good idea to thread a ¼-20 nut on each connector bolt. The nuts will keep the bolts from vibrating loose and take up play in the threaded inserts once you've trued up the table. Crank the cutterhead all the way up, slide the feed table through the planer and lower the table until the connector bolts align with the threaded inserts. As you snug the bolts, you'll find that you can only tighten each bolt a few turns before the table starts to bind. Move on to an adjacent bolt, and then continue around the table. Repeat this sequence until the table's edge guides are nesting over and almost touching the base of the planer.

Fixing the platform and adjusting the tables

It's now time to adjust the table for flatness. Place the platform, with planer, where you want it. If it's the portable platform, make sure it's secured to a bench or table. Check that the space between the top of the planer base and the bottom of the feed table is free of sawdust. Tighten the two connector bolts on each side of the planer until the table touches the base. Don't overtighten these bolts. Hold a long (at least 5 ft.) straightedge on the infeed end of the table, and starting at the next pair of bolts, tighten them until that table section is flat (see the photo on p. 43).

Switch to the matching set of bolts on the outfeed end, and do the same procedure. Work outward and back and forth until the entire table is flat. If you installed nuts, snug them to the platform. To reduce friction, I periodically spray the feed table with Top-Cote, a dry lubricant.

Checking planer and depth-of-cut settings

You should check that the planer's two feed rollers are at the right height in relation to the cutterhead and that the knives and rollers are parallel to the table (for more on making planer adjustments, see *FWW* #107, pp. 72-77). The last step before using your auxiliary bed is to reset or replace the thickness indicator to account for the ¾ in. loss in depth of cut. You can recalibrate the original gauge or apply a new scale on the planer, offsetting it by ¾ in.

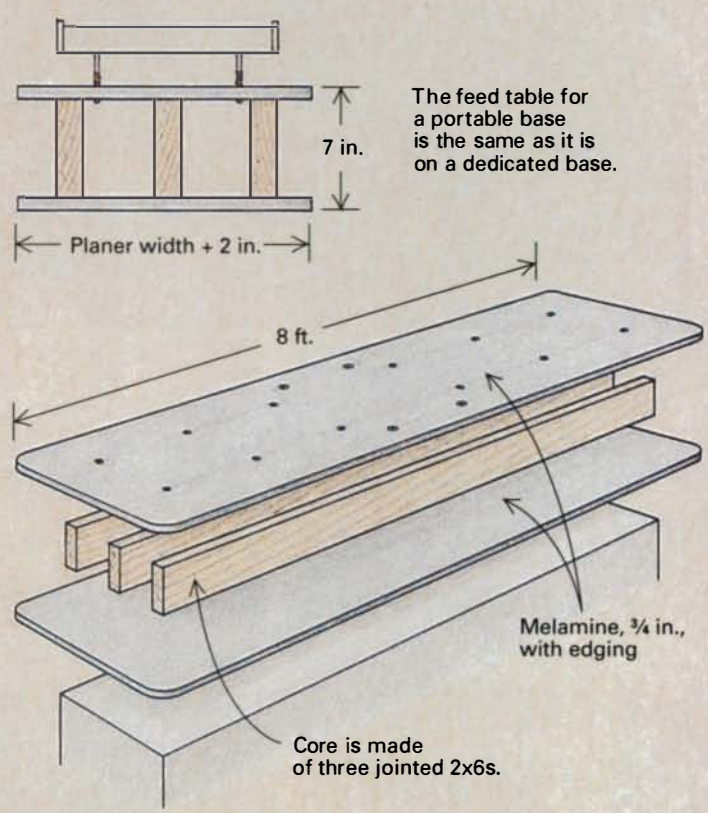
An accurate way of calibrating the scale is to plane a piece of scrap to a known thickness, and align the scale so that the indicator points to that measurement (see the photo at left). □

***Reset the depth scale**—To correct a ¾ in. loss of cutting depth, install a new scale or reset the old one.*

Greg Colegrove is a rocket-launch countdown specialist. He runs a part-time furniture-making business in Aurora, Colo.

If space is a problem, build a portable base

***This planer table can be moved.** A feed table attached to a portable base allows a planer to be parked in a corner when it's not needed. The base can be set up quickly on any stable surface, like a table or a benchtop.*



***A flawless finish—** Hand-rubbing eliminates surface defects, which can mar even carefully applied film-forming finishes. The author's three-step approach includes sanding out surface imperfections, leveling the surface and then polishing to a uniform sheen.*

Rubbing Out a Finish

This vital last step is the difference between ordinary and stunning

by Jeff Jewitt

Photos except where noted: Alec Waters

A cured finish rarely looks or feels blemish-free, no matter how carefully you applied it. Bubbles, dust and debris can lodge in the finish as it dries and are especially noticeable on gloss finishes. Rubbing out a finish eliminates blemishes, so it should be the last step in finishing any piece of furniture. Surprisingly, few finishers I know do it. No doubt, some fear having to abrade a finish film that's only thousandths of an inch thick. Taken in steps, though, rubbing out a finish need not be a terrifying process.

Any film-forming finish will rub out: hard finishes, like nitrocellulose lacquer, flexible ones, like polyurethane, and even waterborne finishes, which can be challenging to polish (see the photo at right).

Rubbing out is a three-step process of removing imperfections, leveling the surface and polishing to a consistent sheen. I always use gloss finish because it can be buffed. Satin-formulated finishes contain silica flatteners that impede light reflection, so they can't be rubbed out to a gloss (for more on this, see the sidebar on p. 49).

How you apply it doesn't matter. *These three panels, two mahogany and one walnut, are buffed to a gloss. From left, the finishes are sprayed-on nitrocellulose lacquer, brushed-on rubbing varnish and waterborne acrylic lacquer, which also was brushed on.*

Prepare the work surface and the finish

If you're finishing an open-grain wood like mahogany or oak, fill the pores first (see *FWW* #108, pp. 57-59). If you don't, light-colored abrasives will lodge in the pores and will be visible. If your wood is textured (from a handplane, for example), sand or scrape the surface flat before you put on the finish. Otherwise, you risk rubbing through high spots and exposing the stain layer or bare wood. In situations where you can't flatten the surface (inlaid furniture and hand-tooled antiques, for example), you'll have to rub gently with steel wool. The wool acts like a cushion, so it's not as likely to shear off the high areas.

Rubbing out removes finish, so be sure to start with a thick coating. Solvent-release finishes, like shellac, lacquer and some waterbornes, fuse into a single film once they're applied. With these finishes, I generally apply six coats.

By contrast, coats of reactive finishes, like oil varnish and polyurethane, do not melt into one another. If you rub too much, you'll go through the top layer (see the bottom photo). Most reactive finishes have a higher solids content, so I usually apply only three coats, and I make sure that the last coat is not thinned.

Fully cured finishes buff up better and faster than finishes that aren't. Shellacs, lacquers and two-part finishes should cure at least a week. Oil-based varnishes and polyurethanes should cure at least two weeks. If the finish is gummy and loads up your sandpaper, let it dry longer.

Keep in mind, too, that soft or flexible finishes do not rub out as easily or to as great a shine as hard, brittle ones. It's like the difference between polishing the sole of your shoe compared to polishing brass.

Sand imperfections

The first step of rubbing out is using abrasive papers to dry-sand or wet-sand defects from the cured finish. If the finish is in good shape, you can skip this step. Dry-sanding can be dusty and tedious, but at least you can tell what you're doing to the surface. Stearated aluminum-oxide paper works well for this, though it will clog fairly quickly on hard finishes like lacquer and shellac. Several new papers are available that have precise, uniform grit sizes. Although they are more costly, 3M's Microfinishing paper and Meguiar's Finesse paper (available at most auto-supply stores) are worth trying. They cut much more efficiently.

Wet-sanding is fast, but the slurry can give you a false sense of finish thickness. It's easy to sand through to the sealer or to the color coats. Wipe the surface, and check your progress regularly. Rub very lightly near the edges of flat horizontal surfaces where the finish is likely to be thinner.

I prefer wet-sanding with traditional wet-or-dry paper, and I use water with a dash of dishwashing soap as a lubricant. I usual-

Photo: Scott Phillips

Witness lines show rub-throughs— *Separate coats of reactive finishes, like water-based polyurethane, remain distinct, so be careful not to rub into an under layer. Witness lines, which look like feathery rings on this piece of birch, are the result.*

Level with abrasive papers. *Wet-or-dry paper backed by a cork block makes a flat abrasive pad for leveling (below). Keep the surface wet while rubbing crisscross over the middle of the panel. Squeegee off the slurry to check your progress.*

SATIN FINISH

After leveling, use steel wool. *For the finish to have a satin sheen, the author uses 0000 steel wool, soapy water and either thinned paste wax or Behlen's Wool-Lube to polish the surface.*

GLOSS FINISH

For a gloss look, use pumice and rottenstone. *Sprinkle on pumice and then wet and rub the slurry over the whole surface. Wipe this off, and follow with rottenstone.*

ly sand the finish with 400-grit, but I'll go to 320-grit if there are big hunks of debris to remove. I wrap the paper around a cork block and sand enough to knock down the tops of dust pimples, so they're even with the rest of the finish. On curved surfaces, I use my hand as a backer. When the imperfections are gone, the surface is speckled with alternating dull and shiny spots.

Level with finer abrasive papers

Leveling establishes a consistent scratch pattern on the finish. I level with 600-grit, but if the surface is rough with brush marks or orange peel, I start with 400- or 320-grit. Wrap a clean sheet of wet-or-dry paper around your block, and squirt some soapy water onto the surface (I use a plant mister). Sand all the edges first. Don't worry about the grain direction.

Next, work the center of the board in manageable sections using a crosshatch pattern (see the photo above left). Rubbing from opposing 45° angles ensures complete leveling. Now rub with the grain. As you sand, keep exposing clean, fresh grit. Change to new paper often. Finishes can gum up and clog paper quickly.

Wipe away the slurry with a rubber squeegee, and look for shiny spots under backlighting. Squirt on more water, and rework areas that are still shiny, but don't overdo it. To avoid making hollows, feather each area into the rest of the surface. You can leave very small shiny areas because they won't be too visible once the whole surface is buffed. Rub shiny spots near the edges with dry steel wool until they're dull like the rest. When you're satisfied, switch to the next finer grit and repeat. Continue on to 600-grit.

Polish with steel wool or powdered abrasives

The last step is polishing, and you have a choice here: satin or gloss. When I want a satin finish, I rub out with 0000 steel wool or synthetic steel wool lubricated with soapy water and Behlen's Wool-Lube (or paste wax thinned with mineral spirits). When I want a gloss finish, I use traditional

powdered abrasives—pumice (powdered volcanic glass) and rottenstone (powdered decomposed limestone) mixed with water or oil. Pumice is sold in grades from 1F (coarse) to 4F (fine). Rottenstone is finer than pumice and is sold in one grade.

For a satin sheen—Squirt some soapy water on the finish, and apply a generous dab of Wool-Lube to a wad of steel wool (unravel it, and fold it into quarters to make it last longer). You can also use a gray Scotch-Brite nylon pad or equivalent grade of synthetic steel wool. Rubbing back and forth with the grain, make nine or 10 slightly overlapping passes. Use two hands for firm, steady pressure (see the photo on p. 46). Wipe away the slurry to make sure you're creating a uniform scratch pattern. You may have to let the slurry dry to see if you've got it right. If you want a silky feel to the surface, let the slurry dry on the surface, and then buff it off just like wax. When backlighted, a satin surface should look like brushed metal.

For a gloss sheen—Skip the above step, and continue wet-sanding up to at least 800-grit. I take it to 1,200-grit. Now sprinkle on some 4F pumice (see the bottom right photo on the facing page), and wet it with water or rubbing oil. Wad up a clean, dry cotton cloth and, working in whatever direction you want, polish every square inch of the surface. Use lots of pressure, and replenish the pumice and water as the slurry dries. Let it haze over, and then wipe it off with a damp rag. Switch to rottenstone and do the same.

Turnings, carvings and moldings

To rub out intricate surfaces, like turned legs or carved aprons, polish with 0000 steel wool and thinned wax. The finish in these areas is just too thin to polish to a gloss. Don't rub too hard, or you'll cut through the finish on sharp details. To avoid a light-colored wax residue on dark finishes, use dark-colored wax. For moldings, wrap some 600-grit wet-or-dry paper around a sanding block that's shaped to match the convex or concave curve of the molding. Rub with steel wool and wax. When the wax is dry, it can be buffed so it approximates the sheen of the rest of the piece. □

Jeff Jewitt repairs and restores period furniture. His book, Hand-Applied Finishes, *will be available from The Taunton Press this fall.*

Drawings: Matthew Wells

Sheen is a measurement of reflection

Finish manufacturers measure sheen using a gloss meter, a device that reads how much light is reflected off a surface. Tests for finishes containing flatteners measure light reflectance at 60°. When the angle of incidence (incoming light) equals the angle of reflection (outgoing light) and at least 80% of the light is reflected, the sheen is considered gloss (see the top drawing below). Semigloss finishes reflect between 70% and 80% of the light; satin finishes reflect 35% to 70%; flat, matte and eggshell finishes reflect 15% to 35%.

But you don't need a gloss meter. A simple visual test can be used instead (see the photo above). A finish that gives a clear reflection, with clean, distinct outlines is gloss. If the reflected image is readable, but fuzzy, the sheen is semigloss or satin. When little or no light is reflected or the reflection is no longer distinguishable, the sheen is eggshell or flat.

Scratches from polishing influence light the same way that flatteners added to the finish do. Both the size and the depth of the scratches affect the interference pattern, or scattering, of the light. As a general rule, the scratch pattern left from 400-grit abrasive paper produces a dull or flat luster. Finishes abraded to 1,000-grit appear satin. Those scratched with 1,200-grit and higher produce sheens ranging from semigloss to gloss.

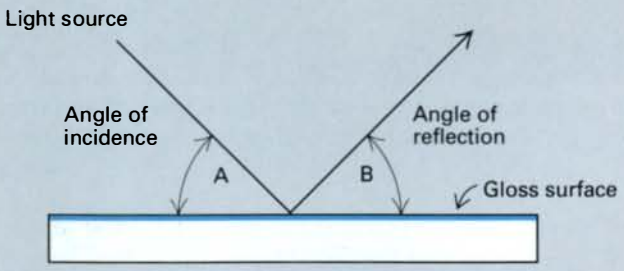
Interestingly, when you lower your viewing angle on any surface, the sheen appears more glossy. That's because you're seeing less diffused light. *—J.J.*

How sheen affects light

Sheen is a measurement of how much light reflects off a surface. Flatteners or scratches on a finish diffuse light, which is why satin and flat finishes reflect less light than gloss ones.

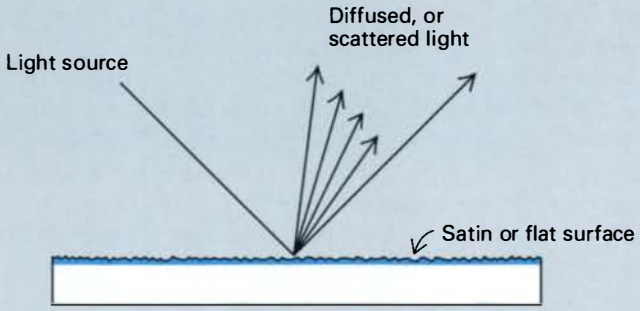
Smooth surface

When angle A = angle B and at least 80% of the reflected light reaches your eye, the finish surface is a gloss.



Rough surface

Scratches on a finish diffuse light. Finishes rubbed out to flat or satin diffuse more light than gloss finishes. The diffused light makes a reflected image less distinct because less light reaches your eye. Generally, the finer and more uniform the scratch pattern from polishing, the glossier the sheen.



Jointing by Hand

Planes make tight edge-joints, quietly and efficiently

by Richard Starr

Looking for contact—Author Richard Starr inspects two jointed boards for fit. If he sees light through the joint, he goes back to the bench for more planing.

Joining boards edge to edge is a skill every woodworker needs. Maybe you can't find a board wide enough for a panel you're making, or you need glued-up stock because it will be more stable than a single board. You might want book-matched pieces or different species of wood side by side. Edge-glued joints can be inconspicuous and stronger than wood itself, but only if the mating edges have been jointed straight and true.

Power jointers certainly have their place in the shop for truing edges. But if your machine is out of whack or if you have to joint unwieldy boards, you can't beat handplanes. They're quick, quiet and satisfying. I joint with two planes: a 14-in.-long jack for rough work and a 24-in.-long jointer for final correcting and smoothing.

Plane boards in pairs, if you can

I lay the boards side by side on my bench and shift them until I get a pleasing grain arrangement. A triangular witness mark drawn across each joint indicates mating edges and keeps matching grain aligned. I fold a pair of the boards so the adjoining edges are side by side. If the boards are not too long or too thick, 1¼ in. or less, I clamp the pair in my vise with the edges even (see the photo on the facing page).

By jointing two boards at once, I don't have to be concerned if the edges are not exactly 90° to the faces (see the drawing on the facing page). I joint boards in pairs for all the edge-joints I'm preparing for glue-up. I plane thicker boards one at a time.

Use a jack and then a jointer

If the board edges are noticeably rough or wavy, I chop down the high areas using a jack plane set for a coarse cut. Using the jack saves time and wear on my carefully tuned jointer plane. When the edges look pretty flat, I take the boards out of the vise and unfold them, stacking them edge to edge on the bench.

A small space between the boards at the center is a welcome sight, but large gaps at the ends mean I need to shave down the center some more. It helps to hold the joint up to a light to see where the gaps are. When the boards touch at the ends and leave a tiny crack at the middle, I'm ready for the jointer plane.

I keep my No. 8 jointer adjusted for a fine cut, with the nose of the cap iron set back between 1/32 in. and 1/16 in. from the tip of the blade. The jointer plane bridges low spots and skims off high spots.

But if the surface is convex from end to end, the jointer tends to take off wood the entire length of the board. That's why I prefer a very slight concave shape end to end. To eliminate a bow shape, I start cutting with the blade several inches from the near end and then lift the plane off a few inches short of the other. Taking a few passes is usually enough.

To keep the plane from diving when it overhangs each end of the board, I put hard pressure on the front handle of the plane at the beginning of the stroke. I push down at the rear tote at the end of the pass. Extra downward pressure at the center of the board encourages a slight hollow.

Photos: Alec Waters

Planing two edges at once saves work. *After matching boards to be joined, Starr folds and clamps them slightly tilted in a vise. Planing both boards at once helps stabilize the plane. And boards planed out of square will mate correctly.*

Check your progress

Many woodworkers glue up boards with a small gap, 1/64 in. or so, at the center of the joint (a spring joint). This gap closes when the joint is clamped.

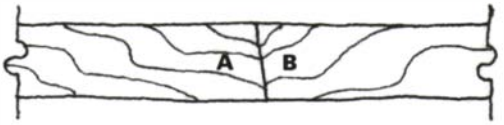
However, I prefer straight edges for gluing, so the last thing I do with the jointer is plane the edges dead flat end to end. I plane from the ends toward the middle and then plane the surface until I get a continuous shaving from one end to the other. Missing sections on the shaving indicate low spots. A narrow section indicates a low spot on one side. With either problem, I keep on planing, testing the fit frequently.

If it's easy to rotate one board against the other, there's a high spot in the middle. Don't try to compensate for a poor fit with high clamping pressure. When the edges mate right, I can fold the boards back and forth and feel them click tightly (see the photo on the facing page). Now I'm ready to glue them up. □

Richard Starr teaches middle school in Hanover, N.H. He is the author of Woodworking with Kids (*The Taunton Press, P.O. Box 5506, Newtown, CT 06470*).

Getting a flat panel

Folding boards together and planing both edges at once help the panel stay flat when it is glued up. Jointed edges may not be exactly 90°, but the two angles will complement each other.



Drawing: Matthew Wells

Curly Cherry Highboy

Flame finials and carved fans complete this classic

by Randall O'Donnell

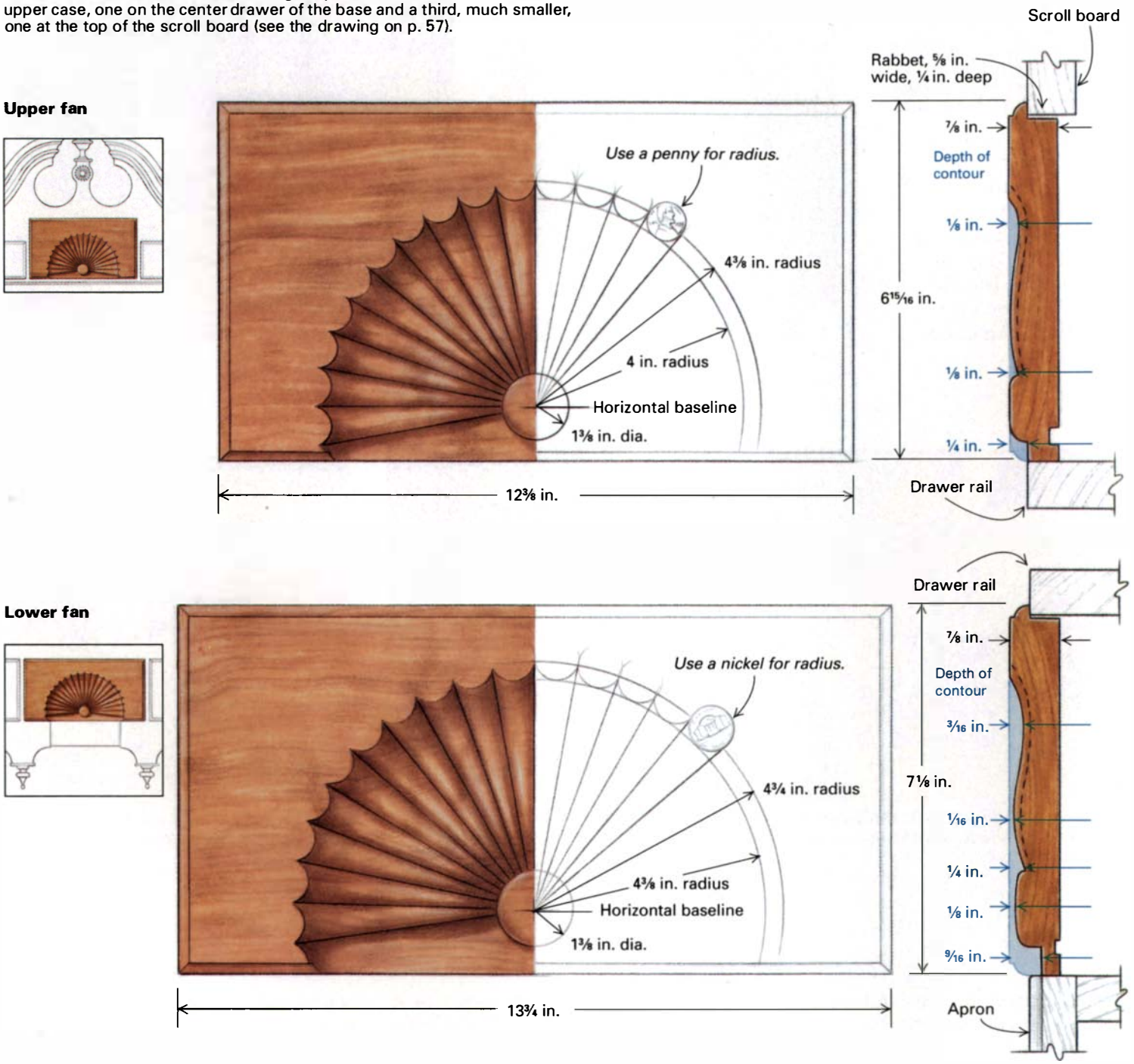
Imagine moving your household and three days later, packing up and moving again. That's what it's like to be an exhibitor at a furniture show. Setting up a booth is hard work. After the carpet was down and everything in place at a recent show, I caught my breath and watched as prospective customers walked into my booth to take a closer look at this highboy. It's almost 7½ ft. tall, and the figure of the curly cherry is exceptional.

Invariably, admirers would walk up to

Photos except where noted: Dennis Preston

UPPER AND LOWER DRAWER FANS

There are three carved fans on this highboy: one on the center drawer of the upper case, one on the center drawer of the base and a third, much smaller, one at the top of the scroll board (see the drawing on p. 57).



the highboy and somewhat tentatively run their fingers over the fans carved into the two center drawers. Carving seems to serve as the touchstone of a piece (see the photo at left on the facing page). If the carvings look and feel right, customers stay to ask questions, take a brochure and, perhaps, place an order.

I make 18th-century-style furniture. Working within this form, I like to play with the details—to put my stamp on a piece. And nowhere is the ground more fertile for expressing individuality than in carving. Although I have no reservations about using machines for preparing stock, carving is one of several things that I do completely by hand.

In the last two issues of *Fine Woodworking*, I described building the base and upper case of the highboy. Now it's time to carve the fans in the two center drawers and turn and carve the flame finials that crown the bonnet.

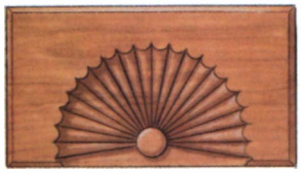
This highboy also has two smaller drop finials in the base and a small, round fan carved in the center of the pediment. These parts use the same carving and turning techniques and are shown in the drawings on p. 57.

Lay out the fans with a compass and coins

The fans (or shells) in the center of the upper chest and lower base are one of the most eye-catching details on a highboy. There are many regional variations. I adapt-

Drawings: Bob La Pointe

CARVING THE FANS



Fans carved into drawer fronts at the top and bottom of the case help give the highboy its distinctive look. The 20 rays in each fan are laid out and carved on a serpentine background.

1

A coin for the scalloped edge—*A penny is the right size for the upper drawer fan. A nickel fits the lower fan.*

2

A scribe line marks the depth *of the carved surface below the fan. This area forms the transition between the fan and the case rail.*

3

To prevent wood from splintering *into the hub surface, outline this area with carving tools.*

4

Shape the fan background across the grain. *Developing the S-shaped surface with mostly cross-grain cutting gives greater control over the tool.*

5

Smooth the surface with a sculptor's rasp. *A uniform surface makes carving the fan's rays easier.*

ed these fans from several Boston pieces.

To lay out a fan, I start by drawing a vertical centerline on the drawer front and then marking the horizontal baseline by eye (see the drawing on p. 53). The intersection of these two lines forms the center point of the fan. From this point, I scribe the outer radius, inner radius and hub diameter with a compass. These lines establish the overall size of the fan.

The fans are sized in proportion to drawer height, and each of these drawer fans has 20 rays. I found that the edge of a coin works well for laying out the ray spacing and scalloped edge. Starting at the center, I lay the coin on one side of the vertical centerline so that the coin just touches the inner radius (see the top left photo above). I trace a semicircle around the coin, stopping at the outer radius.

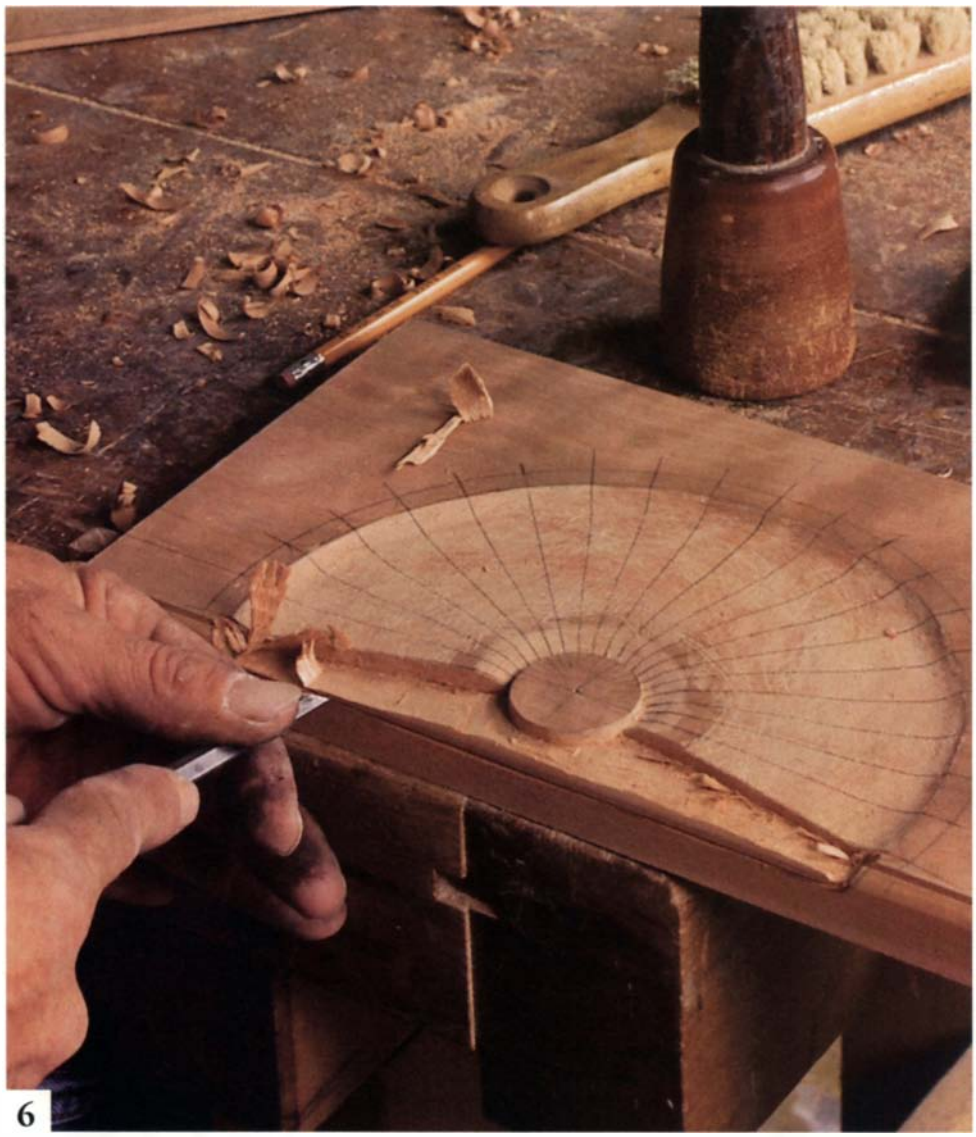
I continue scribing the semicircles along the length of the arc and then repeat the procedure on the other half of the fan. I use a penny for the upper drawer fan and a nickel for the lower fan. With the spacing established, I draw lines from the center point to the scallops, marking the rays.

Because the lipped drawers stand proud of the case, the fan carving needs a transition to the horizontal rail below the drawer. To do that, I lower the surface of the drawer front immediately below the fan. I complete the layout by setting the drawer front in the case and scribing a line on the lower edge of the drawer using the rail as a guide (see the top right photo above).

Carve the background and then the rays

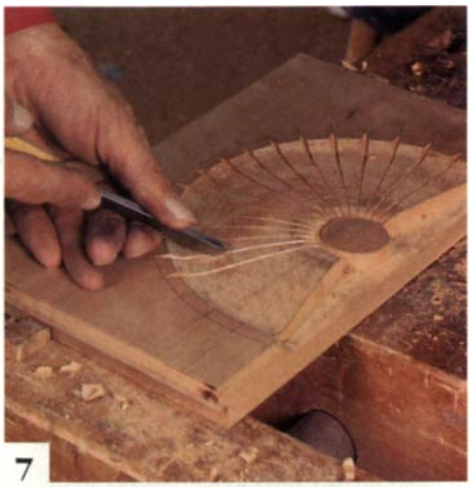
A crisp scalloped edge heightens the contrast between the fan and drawer surface. To prevent wood splintering beyond the area being worked, I cut the outline of the hub and scallops into the drawer face with carving tools (see the bottom left photo above). Using a gouge with a sweep that closely matches the curve makes this easy.

The area on which the rays are carved is



6

Use a bench chisel to remove the waste below the fan. *This surface provides the transition from the carved drawer to the case rail.*

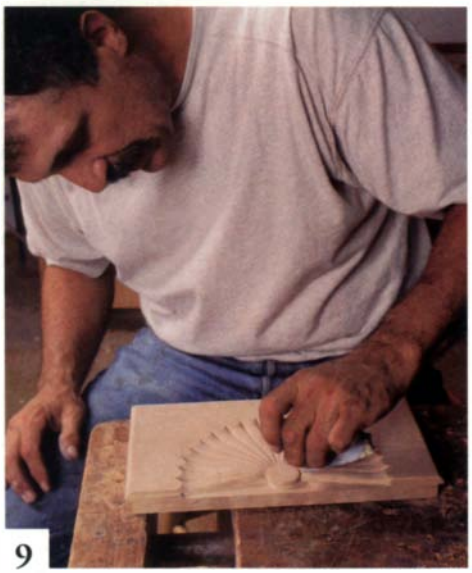


7

A V-parting tool is used to define the rays. *Because the surface is S-shaped, wood grain can change direction. Take care not to run tools against the grain, which could cause tearout.*

8

A successful fan carving is symmetrical. *Shape the rays so they appear uniform in width and depth.*



9

Sand the fan. *The scallops and hub should not be rounded over.*

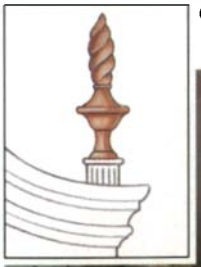
worked with gouges to form a shallow S-profile. This S-contour makes the finished fan sensuous. The serpentine effect can be further accentuated by the depth of the individual rays, so don't hog out too much material at this stage. I get the best results by removing the waste in a series of cuts along the curve. This is mostly cross-grain and skew-cutting (see the bottom center photo on the facing page), which minimizes the chance of taking too much material at once.

Once the bulk of the waste is removed, I smooth the surface with a sculptor's rasp (see the bottom right photo on the facing page). I don't use sandpaper until all carving is completed because grit particles left behind can quickly dull carving tools. Working the surface to the serpentine shape removes most of the ray lines between the hub and the inner radius. Now I redraw them.

The rough-shaping for the ray surface is complete. I now hog out waste below the hub and bottom rays, making the transition to the rail on the carcase. A ⅜-in. bench chisel works well for bringing this surface down to the line scribed earlier in the layout (see the photo at left above).

With the scallops and hub incised and the ray surface formed, I start carving the individual rays. A ray, in cross section, has a

CARVING THE FLAME FINIALS



1

A strip of paper wrapped around the finial creates a helix. *The ends of the helices are brought to a point by eye.*

2

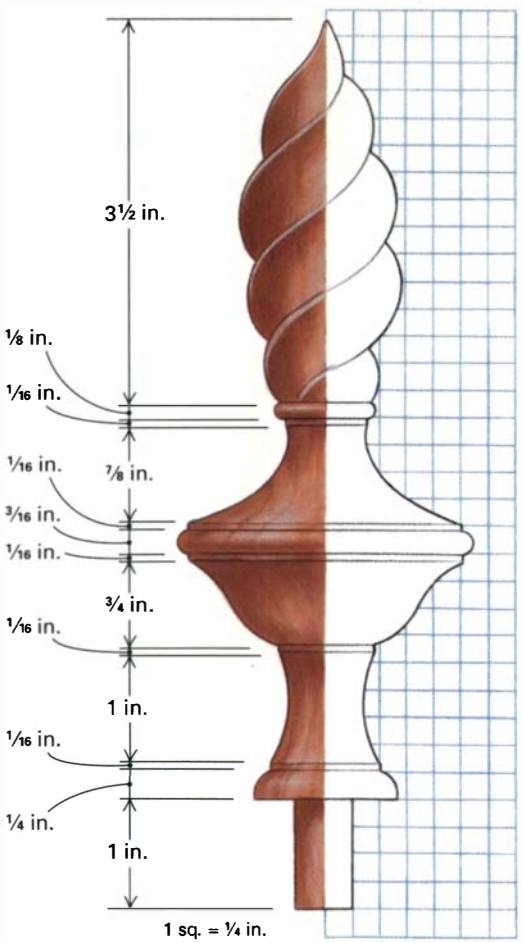
Begin carving with a narrow veiner. *Be careful not to cut into layout lines.*

3

To form the flute, *remove waste from between the helical grooves with a larger gouge.*

Finial layout

Three flame finials cap the top of the upper case. Each has four flutes, which make one complete turn around the finial.



crowned shape. The height of the crown remains constant as the ray broadens, expanding from the hub to the scalloped edge. I begin carving the rays by defining the lines with a V-parting tool (see the top right photo on p. 55). Because of the serpentine surface, I have to change the tool direction so that I am always cutting downhill in relation to the grain. This helps me avoid lifting a big chip or having the wood split far ahead of the tool.

I use gouges to shape the rays. Starting from the V on either side, I cut along the ray, gradually working it to a rough convex shape (see the center right photo on p. 55). The faceted surface is smoothed into a continuous curve.

The hub is slightly tapered and crowned, but this detail is carved last. The hub can get nicked if you get too close with a V-parting tool or a gouge. These nicks are cut away with the final shaping. Periodically, I check the rays to make them the same, deepening the V between rays where it's needed. I crown the surface of the hub and taper the sides slightly. Finally, rifflers and sandpaper complete the fan (see the bottom right photo on p. 55).

Flame finials start on the lathe

These finials use the burning-torch motif that's seen on many high chests and tall clocks. The lower part of the finial is an urn, and the twist above it represents a flame. The overall shape is developed on the lathe, and the flame is then carved at the bench. The finials are made of 2¾-in.-sq. cherry stock.

I start by cutting the billets about 2 in. longer than the overall length of the completed finial (see the drawing at left) and then locating the center points for mounting them on the lathe. I turn the finial to shape and use a parting tool to establish the key diameters and gouges to cut and blend the sections together.

I turn a ½-in.-dia. by 1-in.-long tenon on the end of the urn, nearest the headstock. Then I turn the tip of the flame to ¼ in. dia. and sand the entire finial. Even though the flame surface will be carved, a smooth surface makes it easier to lay out the twist.

The flame detail is somewhat like a screw thread—four grooves spiral up from the urn to converge at the tip to a point. Each groove (or flute) makes one complete turn. To lay out the flame, I mark the middle of the length of the turning. Then, using the indexing head on my lathe to hold the stock in position, I make four longitudinal

lines at 90° intervals. Using these lines on the flame section, I create the helical flutes by wrapping a strip of paper around the flame portion and scribing a line along the edge of the paper (see the top photo on the facing page). After all four helical lines are drawn, I blend the starting and ending points by eye. Now I can remove the turning from the lathe and saw off the waste at the ends.

Carve the flame with gouges

Holding turned pieces for carving can be a problem. The best solution I've found is to drill a hole slightly smaller than the finial tenon in a piece of scrap the size of a short 2x4 and jam the finial's round tenon into it. I can now clamp the scrap stock in my vise to position the finial at a comfortable angle and height.

I start defining the helix with a narrow gouge (see the center photo on the facing page), and then I work up to a gouge that is slightly smaller than the flute width (see the bottom photo on the facing page). Be careful not to cut into the helical layout line because this will alter the profile of the flame. I work each flute one at a time to avoid any mix-ups. After the flutes are carved, I smooth them with a round rasp and sandpaper.

Make the waist molding

When the fans and finials are completed, it's time to return to the highboy and finish the remaining details: the waist molding, plinths and finial caps.

The waist molding visually eases the transition between the base and the upper case. The molding, on the front and both sides of the case, also has a practical purpose. It keys the upper case to the base. I make the bead-and-cove profile on a shaper (see the waist-molding drawing detail at right). About 7 ft. of stock is needed to frame the front and sides.

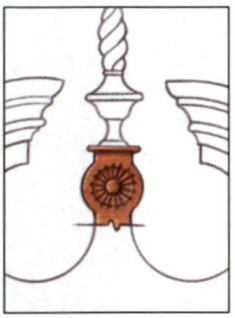
To install the molding, I center the upper case on the base with the backs flush. This leaves a 1-in. gap on the front and sides to cover with the waist molding. I now measure and cut the molding stock. The molding is glued and nailed (with 4d cut nails) to the base unit. When the molding is in place, it's not necessary to fasten the upper case to the base.

Make the plinths, and mount the finials

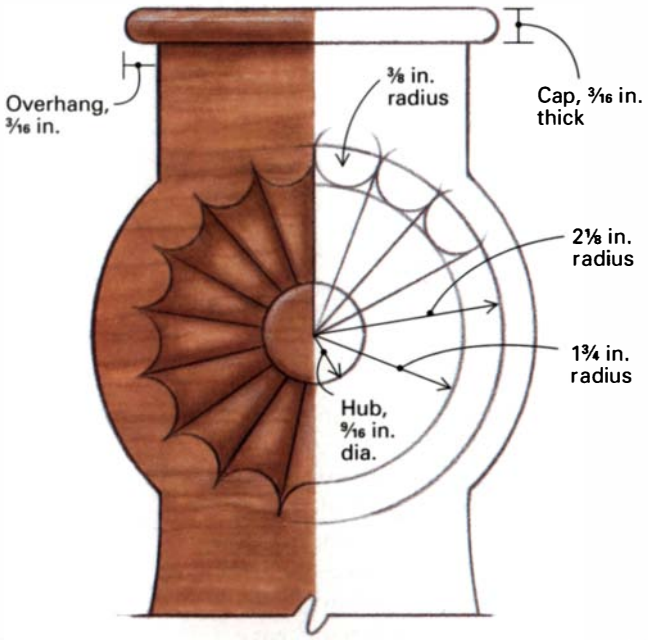
The finials on the upper corners of the bonnet sit atop small pedestals, also called

FINISHING TOUCHES

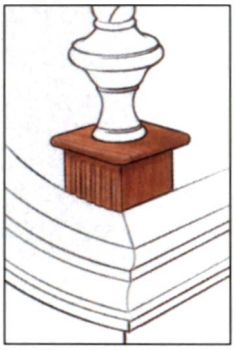
Scroll-board fan



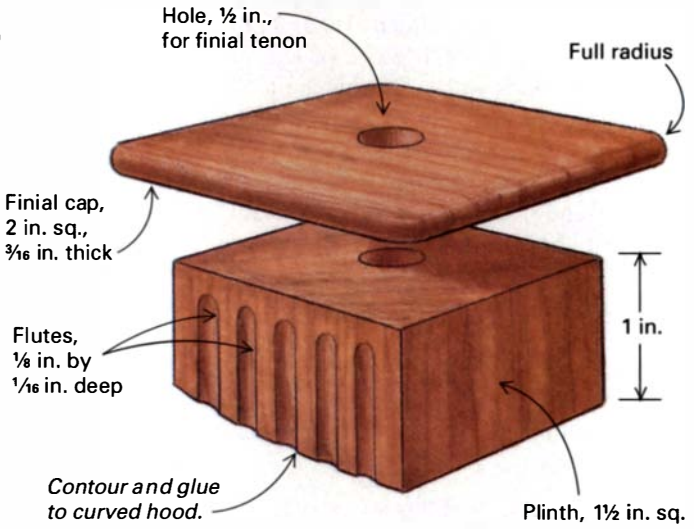
A carved fan punctuates the top of the scroll board. The fan has an outside radius of 2⅛ in. and a total of 17 rays.



Plinth and finial cap

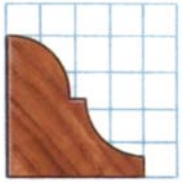


The plinth and the finial cap provide a base for the finial.



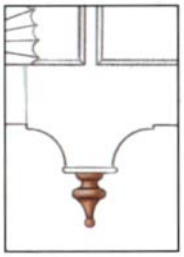
Waist molding

This molding holds the upper case in place on the base unit. It also provides the visual transition between these two large masses.

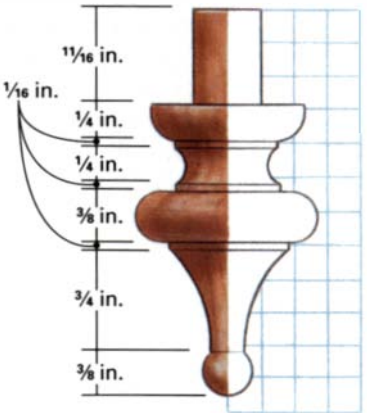


1 sq. = ¼ in.

Drop finial



Tenons, ½ in. dia., attach two drop finials to the apron of the highboy's base. The finials are set on cap pieces 3/16 in. thick.



1 sq. = ¼ in.

plinths. Each plinth is a 1½-in.-sq. by 1-in.-tall cherry block with a ½-in.-dia. hole bored through the top center for the finial tenon. Five ⅛-in.-wide, evenly spaced flutes are carved into the front face (see the plinth and finial cap drawing on p. 57).

The only trick to making the plinths is scribing the bottom of the plinth block to the curved hood, making certain that the plinth sits plumb. Here's what I do: Because the plinth is rather stubby, I temporarily fit a 2-ft.-long dowel into the hole in the plinth block. I use this long dowel as a sighting device.

I position the plinth block in the corner of the bonnet and, holding the dowel plumb, scribe the block to the bonnet curve. Because there's not much stock to remove to the scribe line, I use my belt sander. Then I glue the plinth blocks to the bonnet hood with contact cement—yellow glue doesn't work as well for this end-grain joint.

All five finials (three upper and two drop finials on the base) sit directly on a plinth cap. Each cap is a small piece of cherry stock, 3/16 in. thick with a full radius on all edges. The caps overhang the bases on which they are mounted by 3/16 in. on each side. A ½-in. hole is bored in the center for the finial tenon, and the caps are glued and nailed with brads to the plinths.

I don't glue the finials in place, so they can be removed when the highboy is moved. They are less likely to break or be damaged that way. Placing the finials on the highboy completes the woodworking portion of this project (see the photo at right on p. 52).

Apply the finish

Finish is such a personal preference. Advocates speak passionately for their favorite finishing materials and techniques. For me, the choice is simple—I use shellac. It's hard to beat for depth, luster and authenticity. Before applying the finish, I wet the surfaces to raise the grain. After the surfaces dry, I sand away the fuzz. I then apply a water-based aniline dye.

If you're unfamiliar with aniline dyes, experiment on scrap first to check the color. These dyes produce beautifully clear and vibrant colors, but they won't behave exactly like the oil-based pigmented stains you may be used to. It's easy to get lap marks if you're not careful. Using several coats of diluted dye is more predictable than trying to get the right color in a single coat.

After the dye is dry, I lightly rub the surface with a Scotch-Brite pad to remove any additional raised grain. I then apply an oil-based glazing stain. Unlike the dye, glazing stain is very forgiving. It evens the base color and gives the look of 100 years of patina. I leave some residue in cracks and crevices to add to the aging effect.

After a 24-hour drying period, I start padding on shellac with a soft cloth. Between each coat of shellac, I lightly sand with a fine Scotch-Brite pad and wipe the surface with a clean cloth. I used four coats of shellac on this highboy. Customers often request a final waxed surface. It certainly imparts a satiny depth, but wax attracts dust and fingerprints and always needs periodic re-waxing. I usually skip it. □

Randall O'Donnell is a period furniture-maker who lives in the countryside near Bloomington, Ind.

THE UPPER CASE

This highboy's dovetailed upper case, with curved gooseneck molding and contoured bonnet, was covered in *Fine Woodworking* #118, pp. 34-41.

THE LOWER CASE

Construction of the highboy's lower case, including its cabriole legs, interior framework and carved knee blocks, was described in *Fine Woodworking* #117, pp. 80-85.

Photo this page: Boyd Hagen

The Belt Sander as a Cabinetmaking Tool

This hand-held machine does a lot more than sand surfaces flat

by Sven Hanson

The belt sander has the reputation as a tool for the heavy-handed. Even so, here's one guaranteed "secret of the pros": When a whole lot of sanding must be done on time and on budget, every professional I know relies on the belt sander.

Granted, a belt sander generates a lot of noise and dust, which makes it easy to dislike. But if you select the right belt, put it on a well-tuned sander and carefully monitor stock removal, you just may develop an affection for this machine. When guided by skilled hands, the belt sander will do surprisingly delicate work. And it's fast.

It's more than a finishing machine

Some woodworkers overlook the more creative uses of belt

A tool with many uses—A belt sander can smooth contours, like this chair seat, as well as flat surfaces.

Figure 1

Smoothing flat surfaces

Move the machine in small rectangular patterns, working mostly with the direction of the grain of the workpiece. Don't force it. Let the weight of the machine do the work.

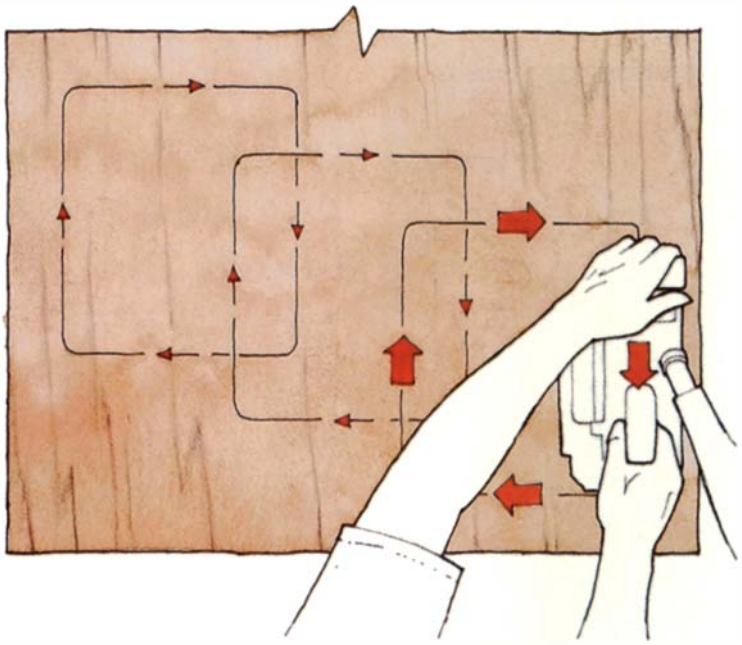
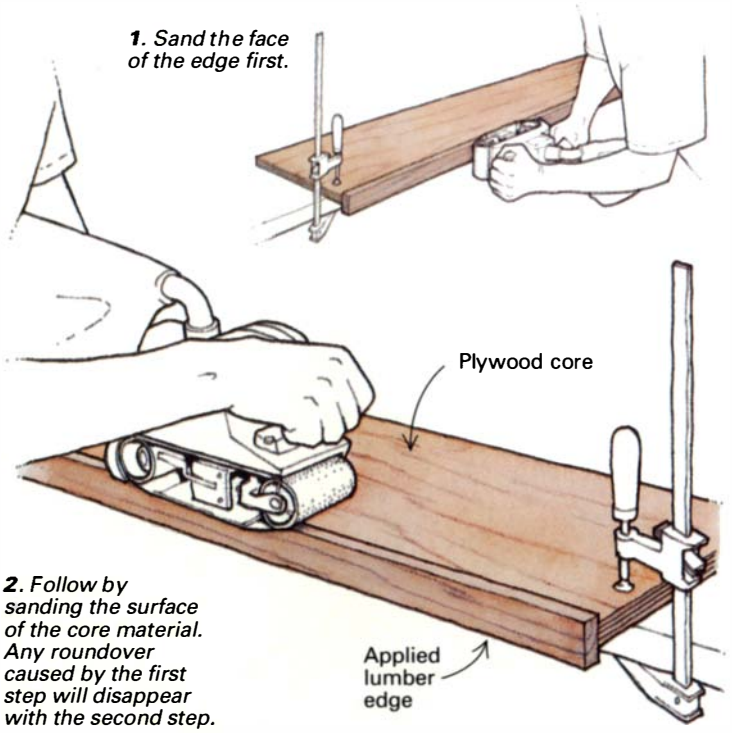


Figure 2

Leveling applied edge molding



sanders because they think that they are only for flat surfaces. A belt sander can perform many other jobs—work that's often done with other tools.

Besides flattening, the belt sander will level applied edge molding, round over or square off edges, hollow out chair seats, sand several pieces of narrow or thin stock at the same time, and scribe-fit a cabinet to a wall faster than any handplane I ever used.

Master the basics first: smooth and flatten

For smoothing, you only need to follow two rules: Keep the sander moving in small rectangular patterns across the work surface, as shown in the drawing above left, and don't press down. Allow the sander to balance itself. Let the machine do the work with its own weight. I draw lines across the surface with a no. 2 pencil. As the lines disappear, I know where the sander has been.

Improperly handled, a belt sander quickly rounds over edges that should remain square. I avoid this problem by sanding from the inside out. I always sand surfaces, such as a tabletop, from the internal areas out toward the edges. And I always sand in the same direction as the grain of the workpiece. When the sander reaches an outside edge, I barely extend the pad over it. I try to keep two-thirds or more of the platen on the work surface.

To flatten a surface, I use a straightedge to mark the highs with X's and the lows with O's,

The abrasion equation: choose the right belt for the job

I call the roughest grits available—24, 36 and 40—picnic-table grit. Belts in those sizes perform quick and dirty tasks, like cleaning up an old, painted picnic table. Most other work requires something just a little less aggressive.

For flattening rough laminated boards and smoothing irregular surfaces, 60-, 80- and 100-grit belts work best. Belts made of 120- and 150-grit will sand off light tearout and perform preliminary smoothing in tight-grained woods, like maple or cherry. A used 150-grit belt can accomplish the final smoothing in open-grained woods like oak or ash. For most of my work, I like to begin sanding with a new 150-grit belt. The wood must be smoothly surfaced. Sharp and well-adjusted planer knives make a difference. I finish with a well-used 150-grit belt, using very light pressure against the surface. After that, the surface needs only a small amount of orbital sanding to be ready for finishing.

Belts made of 220- and 320-grit abrasives can be hard to find, but they're great for smoothing fine-grained and exotic woods, like ebony or bubinga. They're also good for putting a very smooth surface on any wood species, almost to a polish.

Grade counts as much as grit: Manufactured belts come in grades that I would call premium, adequate and cheap. With

Drawings: Jim Richey

as shown in the photo at right, as though the surface were a topographic map full of hilltops and swamps. I also check the diagonal to see if the surface twists, and I mark the high and low corners. I'll sand a little extra on the high corners and take it a little easier on the low ones.

I sand until the first set of X's disappears, leaving the O's in place, and then I mark the peaks once again and continue. Once the high spots are eliminated, the low spots will sand out effortlessly.

Edges can drive you over the edge

One of the most valuable uses of the belt sander is leveling applied edge molding to an adjacent surface, such as a shelf or the carcase of a cabinet. When I have glued molding to the edge of a $90 piece of walnut plywood, I really can't afford mistakes in bringing the edge flush to the surface.

I begin by sanding the face of the applied edge, as shown in the drawing at right on the facing page. After that, I mark the surface of the plywood with pencil lines and then sand with a slightly used 150-grit belt to bring the molding flush and to restore a crispness to the edge.

I keep the sander in constant motion, with one part of the belt always hanging no more

***Mark the highs and lows with a soft pencil** to indicate which areas need more sanding. The author makes his first pass over the surface of a glued-up cherry panel with high spots marked with X's and low spots marked with O's.*

sanding belts, price is a real good indicator of quality. One source I use a lot is Klingspor Abrasives in Hickory, N.C. (800-228-0000). The company sells all kinds of sanding supplies, including belts in three different grades.

Cheap belts are often light brown. They're usually available in local hardware stores and are made with an abrasive material that's not sharp enough or tough enough to stand up to a lot of sanding. These belts also have an inferior cloth or paper backing, and the abrasive is glued on with hide glue. Hide glue softens with exposure to heat and dissolves in any hint of water. Sanding generates heat. Wood contains water. Go figure.

Both adequate and premium grades have a place in my shop. The less expensive belts often fall short in some ways, but I use them in two typical situations: on surfaces that contain hard materials, like metal or minerals that quickly wear out even the hardest of abrasives, and on gummy or resinous surfaces. In both cases, the less expensive belts do the same work as premium belts for two dollars less per belt.

The premium grades always use a strong, blemish-free cotton or polyester cloth backer, accurately graded, very hard abrasives, and two coats of phenolic resin to bond them together. The abrasives are electrostatically placed on the belt with the long axis pointing up. Then they're held captive by a strong, flexible resin. Premium-grade belts last longer and cut more consistently.

If you have some cheap belts or sandpaper sheets that need beefing up, try putting a thin coat of Waterlox (a sealer that's made with tung oil and phenolic resins) over the abrasive side. That will give you the equivalent of a resin-coated belt, which will help hold the grit to the backer and make the sandpaper wear better. —*S.H.*

Photos: William Duckworth

Turn the belt sander into an edge sander. *With both hands free to move the workpiece, you can control the cut better.*

Hogging out the hollow of a chair seat. *The author stuffs a small rag (above) underneath the cork and graphite cover to the platen. The belt now can cut shallow contours.*

than one-third off the surface, to keep from sanding through the veneers. When the pencil lines disappear on the veneered area, I creep a little farther out, hanging the pad over the edge. To avoid a disaster, I stop often and check my progress.

Being right-handed, I prefer to hang the front or right side of the platen over the edge—not the left or the back. This way, it's easier to see the belt and where it's cutting.

But if I'm sanding edging on a larger workpiece or the inside of a cabinet, I sometimes have to use the sander's left side or back edge. I find it useful to mark some prominent black lines right on the body of the machine, which indicate the position of the left and back edges of the platen.

Another method I especially like for sanding the edges of solid stock is to place my machine on its side in a jig, as shown in the top photo at left. This leaves both hands free to control the cut.

Hollowing chair seats

The front wheel of the sander quickly digs out concave areas in flat stock (see the near left photo). When a hollow area has a double curve, as a chair seat does, I stuff a small rag beneath the sander's friction pad (see the far left photo). The rag flexes the belt downward in the center and shapes it better to the curve of the seat. Pressing down flattens out the belt some. Maintaining only a light pressure allows the sander to cut more of a curve.

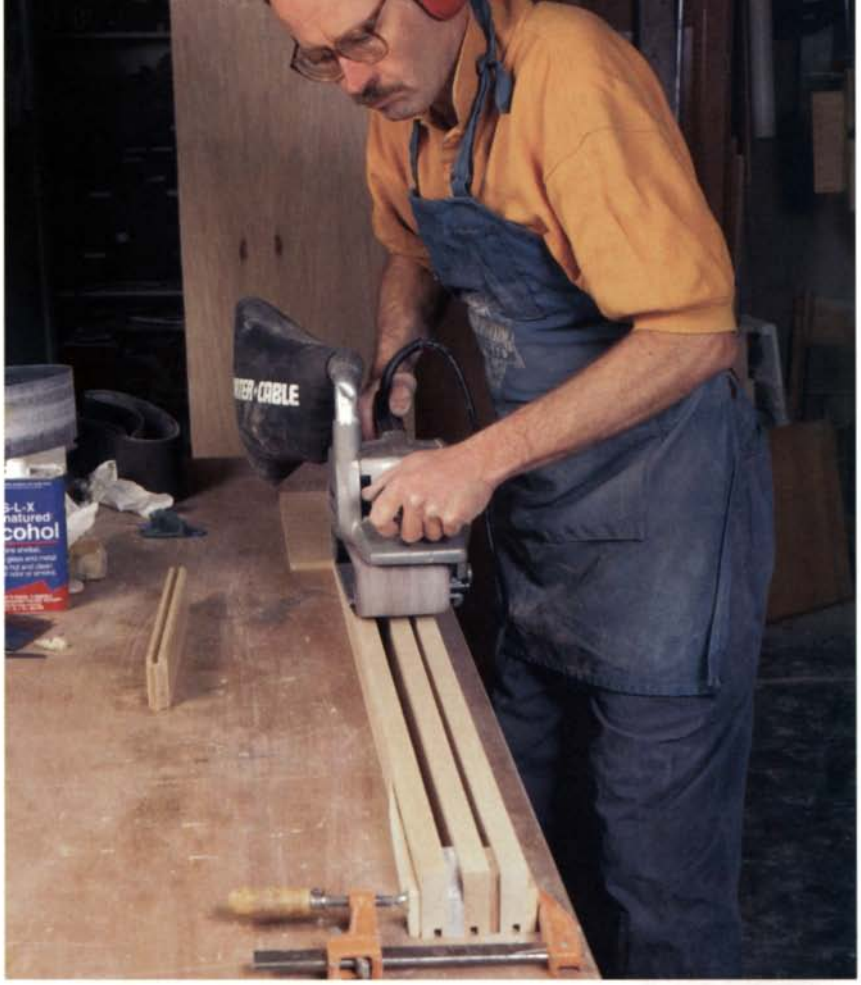
Fitted with a fresh 60-grit belt, the sander cuts rapidly. Even if you prefer shaping a seat with a rounded drawknife or an inshave, you still might want to sand the surface this way to prepare it for finishing.

Managing narrow stock

Balancing a powerful sander on top of narrow stock requires a light touch and good nerves.

If you plan to sand a lot of stock that measures less than 3 in., you may want to consider a belt sander with a 3-in.-wide platen instead of the more common 4 in. size. The narrower platen is less likely to cause you trouble, and the machine balances more easily on narrow pieces.

You can do a good test of a sander's equilibrium by setting it on top of a narrow strip of wood until you find the balance points, left to right and front to back. The closer you balance the machine to the center of the cutting surface, the better the results will be. When I sand 2-in.-thick molding with my 4-in. sander, I mark the pieces first with pencil lines. Also, I watch the belt as it goes over the front wheel to see that the center of the dust trail on the belt lines up with the center of the strip.



Gang narrow pieces together. *This technique solves the problem of balancing a heavy machine over a single piece of narrow stock.*

Sanding thin strips

Balancing a heavy belt sander on strips of wood narrower than 1½ in. is difficult because the tool can rock from side to side. And if it does, the edge quickly becomes uneven and out of square.

One way around the problem is to place two or three pieces of molding side by side, clamp them together and then sand them all at once (see the top photo at right). The machine will level out on top of the set and sand them uniformly. If you don't have enough molding, make sacrificial strips of wood, and put them on either side of the workpiece.

Scribe to fit. *By using the front wheel of the belt sander, you can cut into tightly scribed areas, like this plastic laminate backsplash. A saw would likely chip out this material, and a block plane would dull very quickly.*

On-site scribing

"Land of Curvy Walls" should be the motto on license plates here in New Mexico. Walls in the adobe houses that are traditional in this part of the country are rarely as flat as you'd find in a modern wood-frame house finished in drywall. The houses are certainly charming, but the curves can make cabinet installations a little challenging. No built-in cabinet or countertop looks well-fitted without scribing or carving away the edge to match the wall (see the bottom photo above).

I begin by placing the cabinet box or countertop plumb and level, as close to the wall as possible. I copy the shape of the wall onto the mating back edge with a scribing compass. Then I sand to the line. You can, of course, use a saw or a plane. But the sander—if you use the front wheel—can best follow the scribe lines.

I prefer to sand with a 60-grit belt with an aluminum-oxide abrasive that's tough enough to grind down the occasional brad, staple or screw. On any large job, though, you will find plenty of these booby traps that will tear up a good block plane or sawblade. □

Sven Hanson builds custom cabinetry and furniture in Albuquerque, N.M.

Photographing Your Work

A systematic approach delivers successful results with simple equipment

by Susan Kahn

Photo above: Boyd Hagen

Neutral color is the goal. *Use a tungsten-balanced film with a tungsten light source. The color appears as you would see it with the naked eye.*

Warm color balance—*If you use daylight-balanced film with a tungsten light source, orange tones will result.*

Cool color comes in shades of blue *when you use tungsten-balanced film with daylight or electronic flash.*

Photos in the shop—*This equipment costs about what you'd pay a professional photographer for one day's work.*

To ply my trade as a professional photographer, I've invested more than $20,000 in camera equipment and now charge $600 to $800 a day. But I've been to many woodshops and met a number of woodworkers who photograph their own work using basic equipment that is far less expensive than my own. Whether you are shooting photographs for portfolios, entry into juried shows or publication in brochures and magazines, you can get good results without spending a lot of money. Taking good-quality photographs amounts to choosing equipment you really need, selecting the right film and learning how to set up one or two lights.

Basic equipment

You will need a 35mm SLR (single lens reflex) camera with an in-camera meter. You should be able to set the camera manually, which will allow you to adjust the aperture, or lens opening, and the shutter speed. Basic models, like the Pentax K1000 with a 50mm lens, are available for about $250, and excellent used cameras can be found in many camera shops.

A standard 50mm lens should be sufficient for most situations, but a wide-angle lens—35mm, 28mm or 20mm—will come in handy if you have to photograph large pieces or you need to shoot in cramped quarters. If you purchase a new lens, don't skimp: the optics are the most important component of any camera system.

Buy a major brand of camera, such as Nikon, Canon or Pentax. A sturdy tripod, a cable release for tripping the shutter and a lens shade that fits each lens are all essentials for a basic setup. You'll also need some lights. Most furniture should be shot indoors under controlled conditions.

Tungsten lights cost less than fancy flash systems—Many woodworkers (and some photographers) prefer tungsten lights, which have incandescent bulbs (usually halogen) that stay on continuously. These lights are cheaper than more sophisticated flash units, and the bulbs produce a light that is pleasing on furniture. Light from an on-camera flash is too harsh on furniture and causes ugly reflections and shadows.

Lowell, Smith-Victor and Mole-Richardson are three common brands of tungsten lighting. Lamps should be at least 250w; 500w is a better choice. A setup with two or three lights will cost about $200 to $300, but you can start with just one.

Choosing the right film—If you do use tungsten bulbs, you'll need film made to show the right color under tungsten light (see the top photo at left). When daylight-balanced film is used with tungsten lights, the image will look strongly orange (see the center photo), or warm in color. Conversely, when tungsten film is used in daylight, the film will have a strong blue cast (see the bottom photo), or cool in color.

You'll need to decide whether you want color negative film (for prints) or transparency film (for slides). For your portfolio, you'll need prints, so go with color negative film. Slides are usually preferred for images that will be published or entered into a juried show. You can have prints made from transparencies, but that route is more expensive, and some of the quality of the original image is lost.

You'll also need to choose the right ISO, or film speed, which indicates the film's sensitivity to light. The ISO (International Standards Organization) number replaces what used to be called the ASA (American Standards Association) number, but the numbers are interchangeable.

Generally, the lower the ISO number, or slower the film, the finer the grain in the finished picture. Slower films give better color renditions as well. For most furniture photography, I would recommend a film somewhere in the 50 to 160 ISO range.

Buy additional equipment, budget permitting—If you need to shoot a lot of small pieces or close-up detail shots, a longer focal-length lens in the 70 to 100mm range is helpful. It's usually best to go with the longest focal-length lens that is practical. Doing so will eliminate the distortion you may find when moving in close with a shorter, or wider, lens. If very small details are important, purchase a lens with macro, or close-up, capability. This lens also will work well at normal distances.

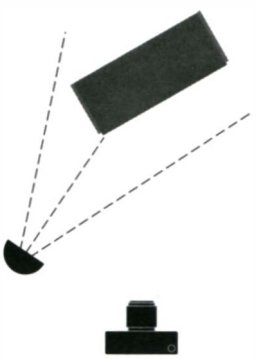
Paper or cloth backdrops make a big difference. The goal is to highlight the furniture, not the background. Use a backdrop that contrasts in either color or shade, or both, with your finished piece. Many woodworkers prefer white, cream or gray.

Seamless paper is available in more than 50 colors. It comes in 53 in. and 107 in. widths, 12 yds. long. When the paper becomes torn or wrinkled, it can be cut off and discarded. A good photo shop may stock seamless paper, or you can mail order it through one of the suppliers listed on p. 67.

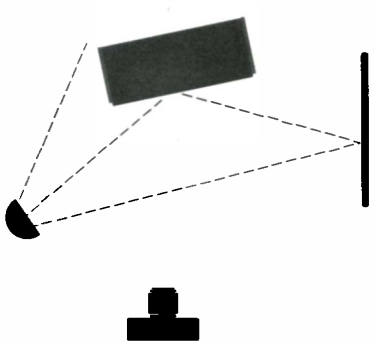
Fabric backdrops are very forgiving of

Photos except where noted: author

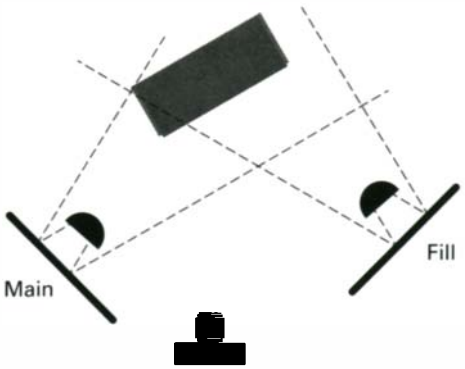
One light for high drama. *This effect can work if harsh shadows are not a problem. This photo was shot with a single, undiffused light, positioned to the left of the bookcase.*



Softening shadows—*By placing a 30-in. by 40-in. sheet of foam board just off the right side of the bookcase, the same light source used in the photo above is toned down a bit.*



A main light and fill light—*Adding a second light source and bouncing both lights off large white pieces of foam board create the softer effect seen here. The light on the right is less powerful. But moving a light equal in strength to the main light farther away would achieve the same result.*



wrinkles and stains. They can be expensive in large sizes. Muslin can be stuffed into a small bag for storage. Some people find the resulting random wrinkles very attractive. Canvas must be stored on a long roll. Both are available plain or painted, and you can dye muslin in your washing machine.

Think the shot through

To begin, set up your tripod, adjusting leg extensions for uneven ground and making the center column approximately vertical. For the most stable tripod, use the leg extensions rather than the center column for height adjustments. Attach your camera firmly to the tripod, either horizontally or vertically. The camera back should be perpendicular to the floor. Raise or lower the tripod to center it on your subject.

If you angle the camera down (if some of the top surface of a tabletop must show, for example), vertical lines will be distorted. This is called keystoning; a slight amount is acceptable. If in doubt, shoot the subject several ways, and evaluate it later on film.

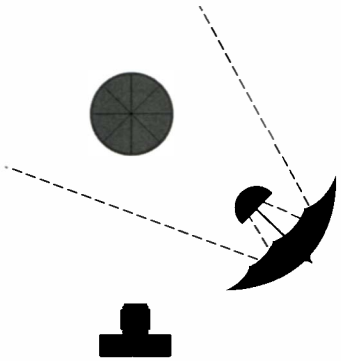
After you compose your framed image, check for obtrusive items like outlets or unattractive wall coverings. You may want to focus the lens into the background. It's frustrating to get your film back with unwanted objects in the picture. And make sure the lens is clean. If not, use lens cleaner and tissue or a clean camel-hair brush.

Lighting affects the mood of a piece— Set up with a main and a fill light (one light stronger or closer to the subject than the other) or with lights equidistant on each side. Darker pieces, like the mahogany bookcase shown in the photos at left, may need more even light. Lighter pieces, like the side table with the painted octagonal base shown in the photos on the facing page, look better with a bit more contrast. For flatter, more even lighting, point the main light straight at the subject, and locate it close to the camera. A light 45° to the subject will result in a three-dimensional effect; a light placed directly to the side of the subject makes more dramatic shadows.

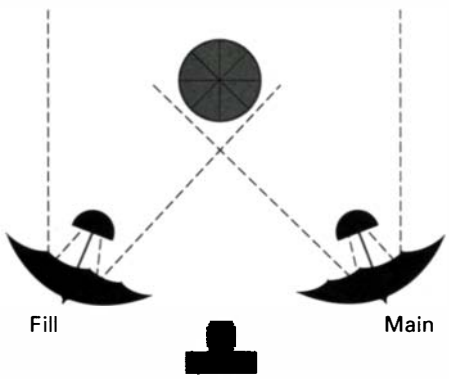
Start with one light, moving it around the piece until it looks right to you. A second light is usually needed to fill the shadows, especially with side or 45° lighting. A white wall, a piece of foam board or a sheet placed on the opposite side of the subject as the main light will often reflect enough light to serve as a soft fill. You can also use a third light on the backdrop or on the subject, but it may not be necessary.

Drawings: Matthew Wells

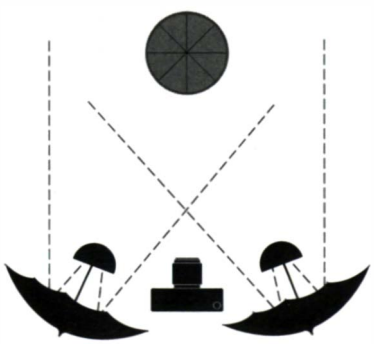
Side lighting shows details. *The tapered octagonal base and the honey-colored sycamore top of this pedestal table show clearly with one light bounced off an umbrella.*



The main light on the right and the fill on the left, *both at a 45° angle to the table and bounced off umbrellas, bring dimension to the photo without extreme shadows.*



Flat light doesn't work with light furniture. *Two lights placed closely to either side of the camera wash out the painted base. The tapered sides at the center of the pedestal are virtually lost.*



The distance from the light to the subject affects its brightness. A light twice as close to the subject as another light will have four times the brightness. So if you have two lights of equal power and you want the second one to act as a fill, place it farther from the subject than your main light.

Determine the focus—What's in focus is called depth of field. It is not always necessary—or possible—to get everything in focus. Usually a picture appears most natural if the closest part of the subject is in sharp focus; a back corner or leg can be a bit soft—out of focus. If you are having trouble keeping everything you want in focus, set the lens opening at one of the smallest apertures on your lens (probably f/16 or f/22). This increases the depth of field. But using a smaller aperture means less light goes through the lens, so you'll have to compensate by increasing exposure time.

Expose the film in brackets—Be sure to set your camera for the proper ISO. Attach a cable release. Take a reading with a light meter. If you're using slide film, expose a series of five shots in half-stop increments at settings above and below your meter reading. At the same shutter speed, each full-stop setting on the lens will expose the film with half or twice as much light as the setting next to it; for example, f/22 will give half the amount of light as f/16. This technique is called bracketing. With color negative film, you may not need to bracket. A good photo lab can compensate for exposures that are too light or too dark. But for your first shoot, you may want to take some additional exposures. □

Susan Kahn is a freelance photographer working in Syracuse, N.Y.

Sources of supply

General photography equipment:

Abbey Camera, 320 N. Charles St., Baltimore, MD 21201; (800) 638-2600

B & H Photo, 119 W. 17th St., New York, NY 10011; (800) 947-8006

Calumet Photographic, 890 Supreme Drive, Bensenville, IL 60106; (800) 225-8638

Raw muslin and canvas backdrops:

Rose Brand, 517 W. 35th St., New York, NY 10001; (800) 223-1624

Hanging a Cabinet Door

Install butt hinges carefully for a precise, non-binding fit

by Philip C. Lowe

Begin with the bottom. *This edge, planed clean and square, becomes the reference point for the fitting and hanging to follow.*

Photos: William Duckworth

It's the simple pleasures that make my day. Fabricating a pair of doors, mortising them for good-quality butt hinges and then installing the doors so they function without binding all add up to one of those simple pleasures in furnituremaking—a door that's hung right.

Real technological advances have been made in hinges in the past 20 years. For cabinetwork, you can choose butt hinges of stamped sheet brass bent around a steel pin, hinges of extruded material milled to shape and fitted with either fixed or loose pins, cast hinges milled with stops, hinges with one leaf longer than the other, or hinges with and without finials. For more on these choices and where you can get them, see *FWW* #112, pp. 68-73. All of them, though, depend on careful installation for smooth operation.

Dry-fit with 1/16-in. shims under the door. *Check and adjust the hinge stile next and the top after that. The joint between the doors is the last edge to be fit.*

Choose before you build

The best time to select hinges for any project is in the design phase. Here are some of the questions you should ask:

- Is the hinge strong enough to support the weight of the door?
- Where and how will the hinges be installed?
- How many hinges do you need?
- How thick is the material the hinges will be set into?
- What size screws will you need to secure the hinges?
- Will those screws have enough holding power?

For casework, like the cabinet shown in the bottom right photo on p. 72, you will have to decide whether you want the doors to have an overlay or an inset design (meaning that they fit within the frame of the case, as I did with this one). With an inset design, the thickness of the door will determine the size of the hinge. With an overlay design, the thickness of the case, or face frame, will dictate the width of the hinge leaf. Butt-hinge sizes are specified by their length and their width in the open position, which includes the width of both leaves plus the knuckle.

Score hinge locations with the layout knife. *No shop should be without this knife; it provides a precision unmatched by a pencil or a scratch awl.*

Set the marking gauge for the thinnest part of the leaf. *With extruded hinges, an even spacing between the two leaves will be just right if the hinges are mortised to the depth of the thinnest part of the hinge.*

Fit the door on three sides first

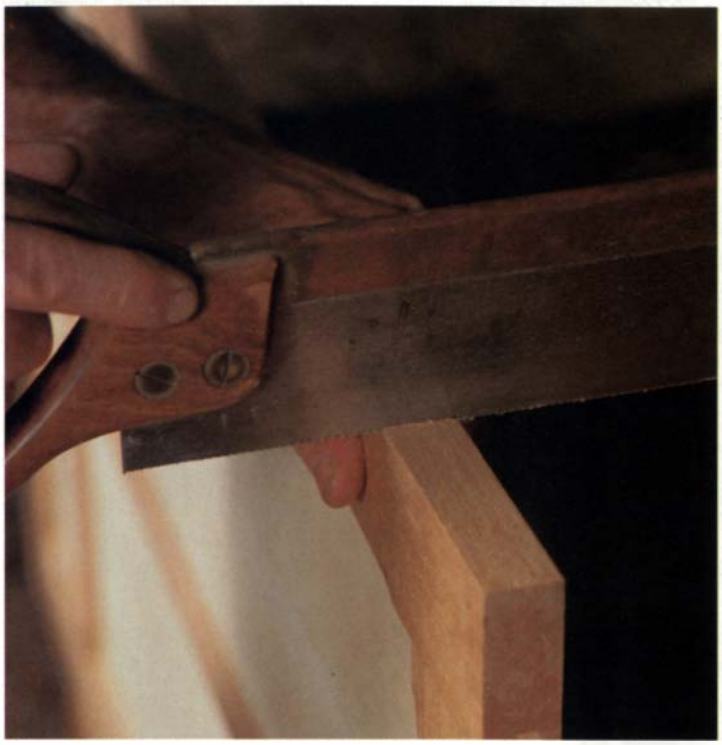
A pair of inset doors will function well only if they fit the opening of the case with enough clearance not to bind; 1/16 in. on all sides is ideal for most cabinet doors. After the doors are assembled (I make them a little oversized), I fit them to the case, leaving the two edges that meet in the middle. Those are trimmed later.

I start by planing the bottom of the door in both directions to avoid tearout on the edges of the stiles (see the photo at left). I find or make some 1/16-in. shims, place them on the case bottom and set the door on top of them to check the fit, as shown in the top photo above. I pay attention to the stile on the hinge side. If it doesn't meet the side of the case squarely, I can do one of two things: either plane the edge of the door to follow the line of the case or, if that would take off too much of the stile, plane the bottom of the door on one side or the other to square up the fit. Once the bottom and hinge edges look good, I plane the top edge as necessary to maintain a consistent 1/16-in. gap along the width of the door.

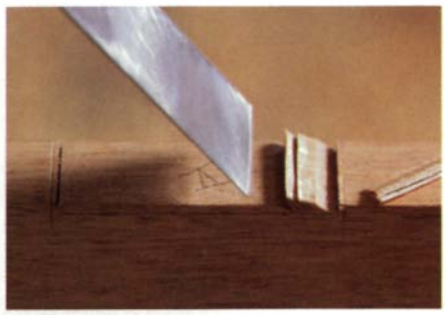
Locating the hinges on the door

The placement of the hinge will vary with the design of the door. I usually align the top of the upper hinge and the bottom of the lower hinge with the inside lines of the top and bottom rails. But with these doors, I thought the upper hinge would look better centered on the small top panels.

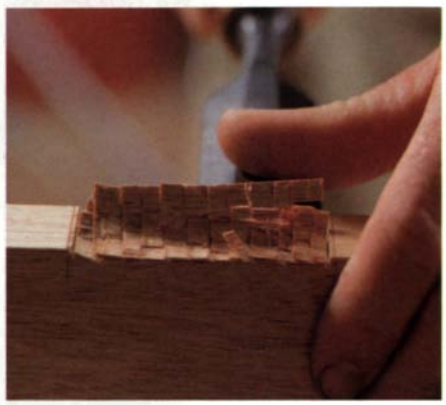
Using a square and a knife, I scribe lines on the edge of the stile to indicate the top of the upper hinge and the bottom of the lower



Mortising into the door stile—*The author begins the mortising process by cutting a sawkerf just shy of his knife line.*



Feather cuts against the grain—*Striking these chisel blows first makes removing the waste easier.*



Paring strokes remove the waste. *By working to a scribed line, the author cuts a clean mortise in a few easy strokes.*

Final chops to size—*This last chisel cut on the ends of the mortise for the door stile will make a snug fit for the hinge.*

hinge (see the bottom left photo on p. 69). With the door held in a vise, I place each hinge on the edge of the door, tight to the scribed lines, and then use the knife to mark the corner at the other end of each hinge. I transfer those marks with a square across the edge of the stile.

At this point, for a good custom fit, I usually number each hinge and door so I won't get any of the hinges mixed up later (you'll find minor variations even in hinges that look identical). I use a pencil to extend the scribed lines to the face of the door. These lines give start and stop marks that keep me from scratching in a line past where the mortise will be cut. I set a marking gauge to the thickness of the hinge leaf (see the bottom right photo on p. 69) and scribe a line along the face of the door between the two pencil marks.

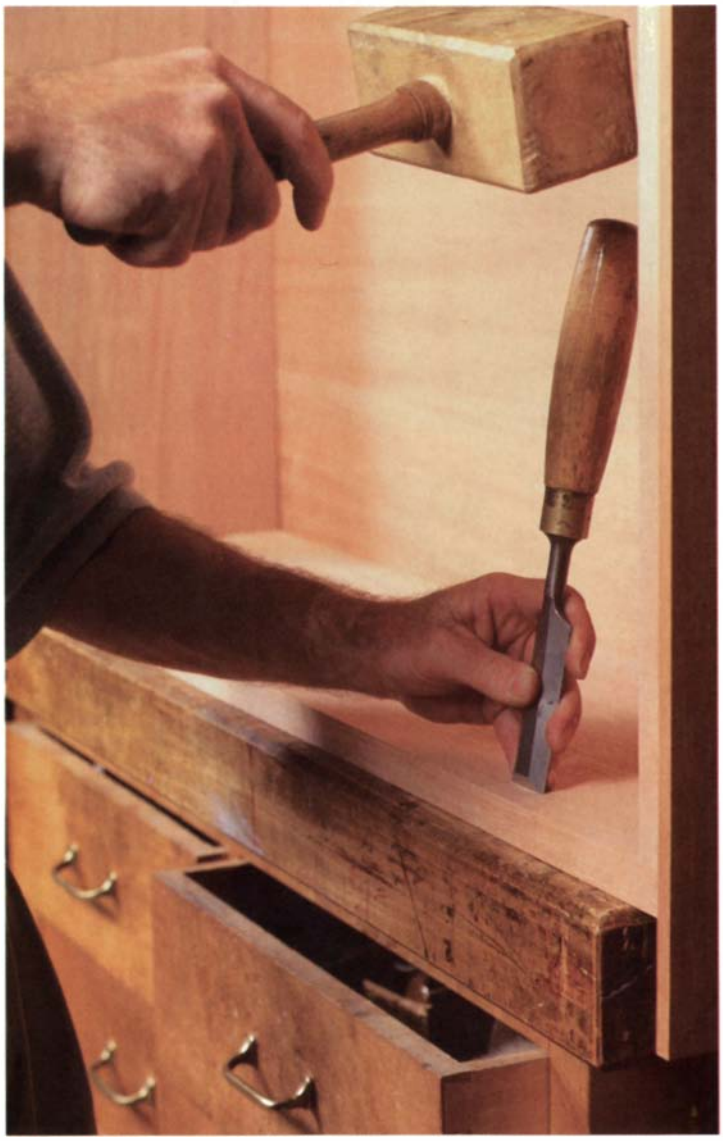
Cutting the mortises in the door

As long as the width of the hinge leaf is the same or even a little less than the thickness of the door stile, I mortise all the way across the edge. I use a dovetail saw to make a relief cut about 1/16 in. away from the scribed lines, down to the depth of the marking-gauge line, as shown in the photos above. With a wide chisel, I chop a series of feather cuts across the edge of the stile, taking care not to go below the scribed line. Then I pare away the waste. For the final depth cut, I place the chisel in the marking-gauge line, flat side down, and cut across the stile. To finish, I place the chisel vertically into the scribed knife lines at the top and bottom of each hinge and chop out the little bit of remaining waste.

Self-centering bit finds the hole. *This bit, with the hinge held firmly where it belongs, locates pilot holes for the screws.*

With the door in place, mark the hinge locations for the case. *After the doors are fit and hinged, the author puts them back into the cabinet and scribes the top and bottom locations with the layout knife.*

Mortising into the case—*The author follows the same procedures as he did for the door-stile mortises. He starts with scribed knife lines (left) and follows that with relief cuts made with the backsaw (right).*



Score and clean out the mortises with a chisel. *Sharp tools make this job quick and accurate.*

After the mortises are cut, I screw the hinges to the stiles. I find a self-centering bit is a big help (see the bottom photo on the facing page). Some people like to start with just one screw per hinge leaf to check the fit. I prefer to start with at least two, because the door will sometimes pivot and rack on one screw. If the job feels like it's going well, I'll add all the screws.

Marking and cutting the case

I set the door back in the case, on top of the shims. Then I mark the top and bottom of each hinge on the inside corner edge of the case side with the layout knife, as shown in the top left photo above. Again, using a square and a knife, I scribe the lines into the case as far as the hinge leaf needs to go for the door face to sit flush with the front of the case (see the top center photo above).

The marking gauge should still be set for the thickness of the hinge. I scribe that line into the front edge of the case, reset the gauge to the width of the hinge leaf and scribe that line parallel to the front edge of the case. If the size of the cabinet will allow it, I place the case on its side on my workbench. That makes it easier to do the work that follows.

With a dovetail saw, I make relief cuts 1/16 in. inside the finished top and bottom scribed lines, as shown in the top right photo. I hold the saw on a slight diagonal to stop the cut at the back and bottom lines of the mortise. I define the back line of the mortise with some firm chisel strikes (see the photo at right). Just as I did with the door, I stay 1/16 in. away from the outside lines, chop feather cuts down to the line made by the marking gauge, and relieve

Getting the center gap right—*Mark the overlap of one door to the other (above). Get a precise measurement of that overlap (right). To end up with a 1/16-in. gap between the two doors, divide the overlap distance by two, add 1/32 in. and remove that amount from the first door. Trim the second door to fit.*

the waste with the flat of the chisel. After that, I finish the mortise by chiseling out the small bits of waste left along the outside lines.

Hanging the doors

I place a few battens (the same thickness as the side of the case) on the workbench to support the door and fit the hinge leaves into the mortises. Just as I did with the doors, I bore holes with a centering bit, pilot bit and a bit for the screw shank. Keep in mind that you may need to use a shorter screw in the side of the case. I secure the doors in place. Then I put the case in an upright position so the doors can swing freely.

Final fitting—The last adjustment needs to be made at the joint where the two doors meet (see the photos at left). The object is to remove the same amount of material from each door and to end up with a 1/16-in. gap in the middle. So with the doors closed and one overlapping the other, I mark and measure the overlap, divide that by two and add 1/32 in. That tells me how much to remove from the first edge.

Then I mark that dimension in pencil along the stile of the first door, move it to the vise and plane to that line. I secure the door in its place, close it in position, overlapping the other door, and mark a pencil line at the joint. I add another 1/16 in. to that line, move the door to the vise and plane to the finished line. I like to put a slight bevel to this inside edge, removing a little more material from the back side, so that the doors clear one another more easily when they open and close.

I hang the door and check that the spacing is consistent top to bottom, making any final adjustments before the final sanding and finishing stages. At this point, it doesn't hurt to take a moment to step back and appreciate the result of your efforts. □

Philip Lowe is a furnituremaker in Beverly, Mass., who gets the chance every once in a while to build something for himself.

A finished fit—*Gaps around doors are almost perfectly consistent in this mahogany and Sitka spruce cabinet.*

Desktop Storage

This versatile cabinet turns any table into an organized work space

by Chris Becksvoort

"A place for everything and everything in its place" was a favorite Shaker sentiment, and this tabletop unit aptly reflects it. This cabinet design also can be customized to suit just about any purpose.

I was sitting at my kitchen table one morning last winter, sipping my Earl Grey tea and surveying the landscape of the tabletop. Stacks of catalogs and magazines dominated. Bills, junk mail and several Christmas cards added to the clutter. A few pens and pencils, my wife's coffee mug and the stamps I hadn't been able to find the afternoon before completed the picture. It was clear to me that some organization was in order. What I needed was a unit that would let me sit at the kitchen table, where I enjoy working, yet still allow me to get organized. I needed a desk that wasn't a desk. So I designed and built one (see the photo above).

This small cabinet can enhance any workspace, and it isn't difficult to make. Sliding dovetails connect the vertical dividers to the case and stopped dadoes join the horizontal dividers (see the drawing on p. 76). The joinery can be as simple or involved as you wish, and the case can be modified to suit almost any purpose (see the box on p. 77 for a few design ideas).

Once you've figured out the layout and the dimensions, construction is relatively straightforward. For simplicity, I'll describe the construction of the piece shown in the photo above.

Start by making the carcase

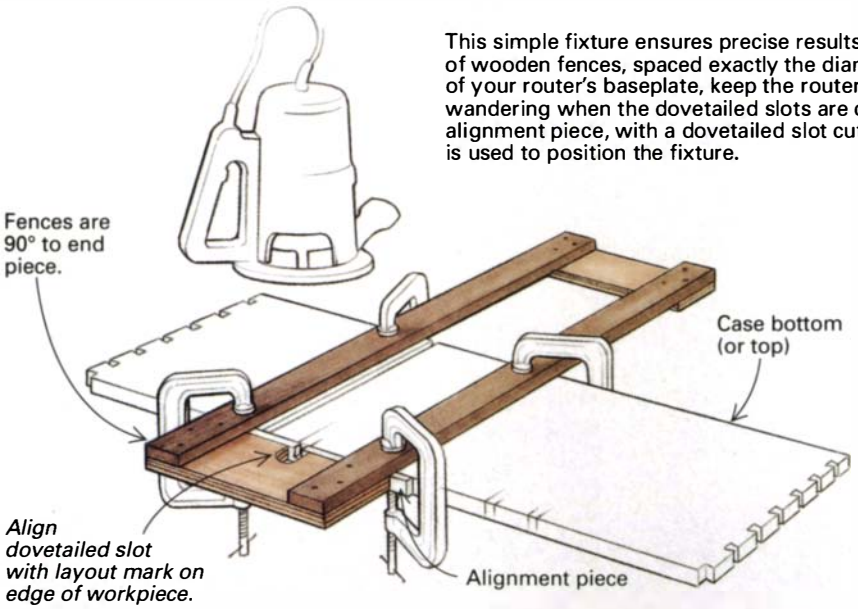
I begin by gluing up stock for the top, bottom and sides. For aesthetic reasons, I use one long board (either one piece of wood or a glued up board) and run the grain up one side, across the top and down the other. The bottom doesn't need to match.

I cut a rabbet for the back of the case in the back inside edges of the top, bottom and sides. To complete the four sides of the carcase, I dovetail the corners. I find that half-blind dovetails (visible from the top and bottom) work best. Because I cut the dovetails and the rabbet for the back to the same depth, I don't have to cut into the dovetails and weaken them.

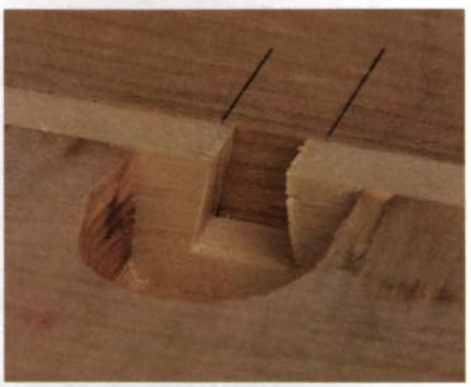
I omit the half pins at the back of the case; they would be vulnerable because of the stock removed when rabbeting. Instead, I simply square off the last tail at

Photo: Dennis Griggs

ROUTING SLIDING DOVETAILS



Set your bit height. *For a carcase that's made of 3/4-in.-thick stock, set the bit so it's 3/8 in. high. A ruler with graduations on the end works well.*



Precise alignment. *Splitting lines on the front edge of the workpiece, visible at the base of the dovetailed slot, ensures dead-on accuracy.*

Sliding dovetails, the simple way. *The fixture keeps the router tracking true; the alignment piece, replaced each time you change bits or depth of cut, makes sure the slot is exactly where you want it.*

each rear corner (see the drawing on p. 76). The result is a stronger joint. Once all the joints fit snugly, I take the case apart.

Dividing the case vertically with sliding dovetails

Because this unit is so long and narrow, I thought sliding dovetails would work best as vertical dividers. They lock the top and bottom together and lend the carcase strength and rigidity. These joints are easy to make with a router and router table.

Routing the slots—For the slots, I used a shopmade router fixture (see the drawing at left and the bottom photo). The fixture consists of two parallel fences, spaced the exact width of the router base, screwed to plywood pieces on both ends. The fixture guides the router so that it makes a dovetailed groove perpendicular to the edge of the workpiece. I have three of these fixtures in different lengths to use on narrow, medium and wide cases.

I lay out the dovetailed slots by clamping the top and bottom case pieces together with their ends flush, and marking the locations for the vertical dividers on their faces and edges. For this piece, I used a 3/8-in. dovetail bit adjusted to a 3/8 in. depth, which is half the thickness of the carcase pieces (see the far left photo).

To align the fixture to the layout marks on the carcase pieces, I tack a squared-up piece of pine against the front end of the fixture and rout a slot through it. The piece of pine is brought up flush against the edge of the case and aligned with the marks on the case's edge, which are just visible in the bottom corners of the dovetailed slots (see the top right photo). This ensures the slot is exactly where it should be. When the fixture is oriented correctly, I clamp it in position and rout across the full width. I repeat the procedure for the other seven slots.

Routing the dovetails—I make the vertical dividers from 3/8-in.-thick stock. The height is determined by taking the inside dimension of the case and adding 3/4 in. (the depth of the two 3/8-in. dovetails, top and bottom). I sand both sides of the dividers and all interior surfaces of the case before measuring for any of the dividers because sanding affects the thickness of the pieces.

I use the same 3/8-in. bit, this time in a router table, and adjust the height to 3/8 in. I make test-cuts in sanded, 3/8-in.-thick scrap,

Drawings: Bob La Pointe

slowly sneaking up on a perfect fit. Remember, you're removing material from both sides of the divider; every time you move the fence, you take off twice that much wood. Be sure to keep the divider pushed tightly against the fence, especially if it has any bow.

Keep testing the fit until the divider slides fully into the slot. It should require only hand pressure, and there should be no gaps or play of any kind. Once the fence is correctly adjusted, repeat the operation for the other three dividers.

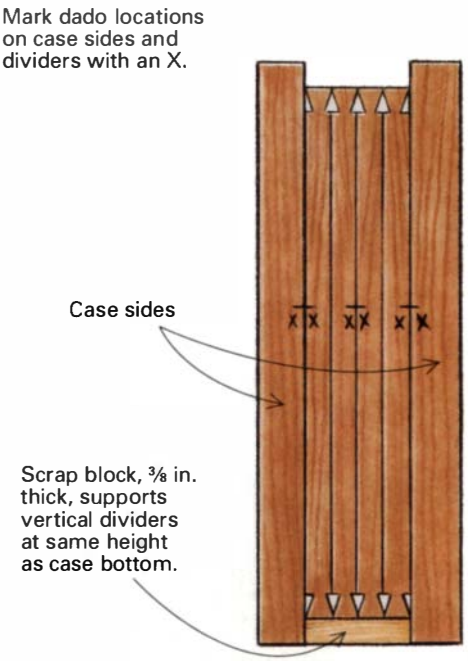
Dividing the case horizontally with stopped dadoes

Dadoes seem like the best way to divide the case horizontally. I want the piece to look neat, so I use stopped (hidden) dadoes. To mark the positions of the dadoes, I clamp the four vertical dividers between the two ends of the case, supporting the dividers at the bottom with a ⅜-in.-thick piece of scrap. I mark the location of the horizontal dividers and then mark small x's on the front edges of the dividers to indicate where the dadoes will be cut (see the drawing at right). An ounce of prevention and all that.

Because the horizontal dividers aren't centered top to bottom on the vertical dividers, I either use two fence settings to cut opposite dadoes (left hand vs. right hand) or use a single fence setting and rely on stops to produce the dadoes safely. I decided on the stops because moving the fence increases the risk of misaligned dadoes. Hand screws work well.

I put a ⅜-in. dado blade in the tablesaw, set the height to ⅛ in. and adjust the fence to match the location of the marks on one of the end pieces. For half the dadoes, I push the workpieces through the blade to a stop that keeps the trailing front edge

Laying out the dadoes



MAKING STOPPED DADOES

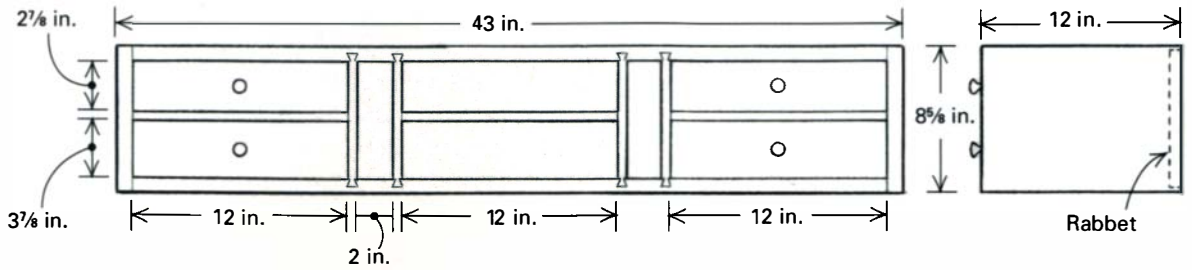
A hand screw makes a good stop. *Dadoes in vertical dividers are stopped ¼ in. shy of the front edge. Because dadoes are not centered on the dividers, there are right- and left-hand pieces. To avoid resetting the fence for facing dadoes, the author cuts half with the hand screw set for a stop cut. Make sure the blade stops before lifting the piece off the table. The other dadoes are made with the hand screw repositioned for a drop cut (below).*

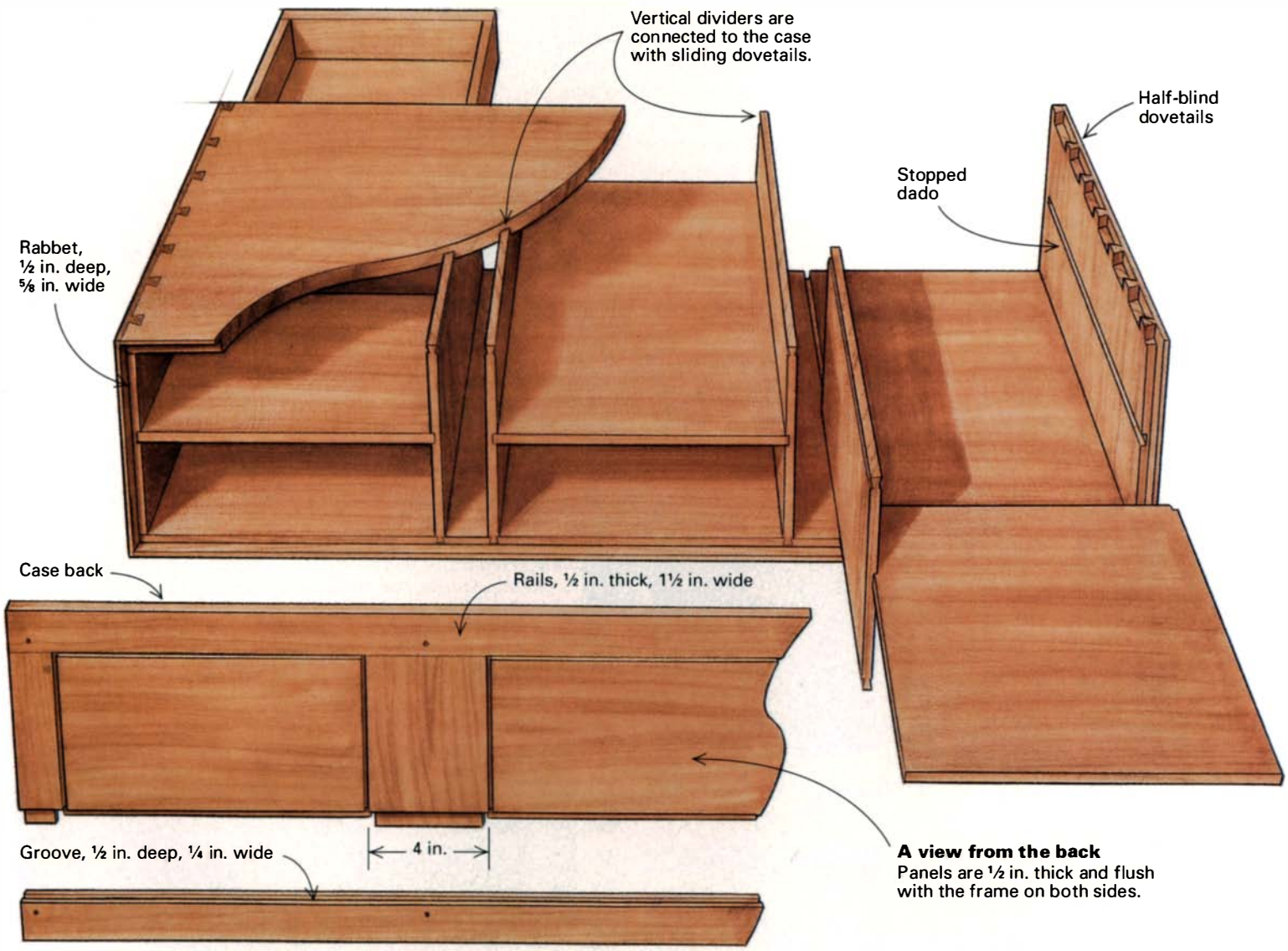
Drop cut gives a mirror-image dado. *The author repositions the hand screw on the infeed side of the blade to cut the rest of the dadoes. Each remaining divider is set against the hand screw and lowered carefully into the blade to start the cut. Case ends are cut the same way except that the fence is moved over ⅜ in.*

Photos except where noted: Vincent Laurence

Desktop storage unit

This small cabinet turns a table into a desk by providing places for stationery, envelopes and bills. Case pieces are ¾ in. thick; all dividers are ⅜ in. thick.





A view from the back
Panels are ½ in. thick and flush with the frame on both sides.

¼ in. shy of the dado blade (see the photo at left on p. 75). For the other half, I place the back edge of each workpiece on the saw table against a stop. I gently lower the front onto the blade so its end is ¼ in. beyond the dado blade. Then I plow forward to complete the cut (see the bottom right photo on p. 75).

I position the stops by making a mark ¼ in. ahead of and behind the blade, placing the workpiece on the stopped blade so that one of its edges lines up with the mark. Then I clamp a hand screw to the saw fence. For the drop cuts, the hand screw prevents kickback; for both the drop and stopped cuts, this technique ensures an accurate ¼-in. stop at one end of the cut.

To cut the dadoes in the dividers, I shift the fence toward the blade ⅜ in. This accounts for the height of the dovetails and the depth of the dovetailed slots. I use a chisel to square the fronts of all the dadoes where the blade exits the stock.

Assembly: one step at a time

I glue and clamp the main carcase first. After the glue cures, I insert the dovetailed

vertical dividers, making sure all corresponding dadoes line up. I slide the dividers in dry about halfway from the front of the case.

Next I apply a thin coating of glue to the front half of the dovetail pins, top and bottom, and to the last few inches of the slots, top and bottom. Applying glue to only part of the joint makes the divider less likely to bind. Then I slide the divider home immediately, getting it flush in the back. The front can always be planed and sanded later. I repeat the process for the remaining three dividers.

I wait to cut the horizontal dividers until after I've assembled the case and can get actual measurements. I plane and cut the dividers to size, notching the corners so they will clear the dado stops. After sanding the horizontal dividers, I slide them halfway into position from the back, lightly glue the back edges of the dividers and then put just a slight smear of glue in the dadoes. This is no place for squeeze-out. Then I slide the dividers quickly home.

After the glue sets up, I plane or sand the front face to be sure that all members are flush and in the same plane.

Back, drawers and finishing

The back is constructed like a door. I use thin quartersawn stock for the perimeter frame (see the drawing on the facing page). This virtually eliminates wood movement, which is a good thing because the back is glued into the rabbeted case. The two middle stiles are 4 in. wide, so they span the pigeon holes. The panels are flat and flush with both sides.

After gluing up the back and pinning the mortise-and-tenon joints, I sand the inside faces of the frame and panels and ease all the edges on this assembly. Then I plane the back to fit the rabbeted opening precisely, apply glue to the edges of the back and clamp the back into its opening.

When the assembly is dry, I sand the back, top, bottom and sides to 400-grit and ease all exterior edges. The drawers come last. Then I finish the piece with three coats of Tried & True boiled linseed oil (available from Garrett Wade; 800-221-2942), waiting a day or two between coats. At the four bottom corners, I glue leather pads so the desk unit won't scratch the tabletop. □

Chris Becksvoort is a professional furnituremaker in New Gloucester, Maine. He is a contributing editor to Fine Woodworking *magazine.*

Design your own instant desk

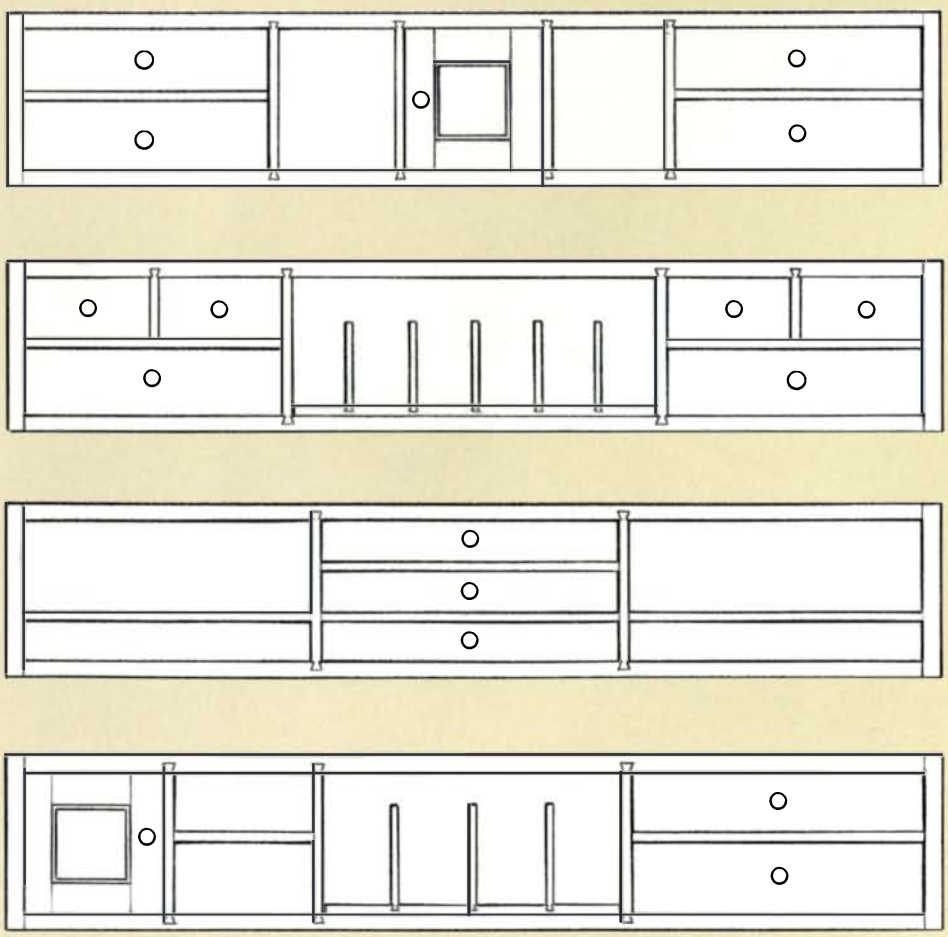
In designing a desk unit to meet your own needs, start by gathering what you would like to store in it. Stationery, for instance, can easily be housed in a drawer that's 8¾ in. by 11¼ in. This allows room for a standard sheet of paper and clearance to get your finger in and remove a sheet.

A deeper drawer below could have a side-to-side divider for envelopes. And the back half could be further divided for post cards, business cards, checks and the like.

Another drawer could hold a pencil tray. You could even make cutouts for things such as ink bottles, scissors, rulers, fountain pens and drawing instruments. A small, square drawer could be devoted exclusively to computer disks.

Instead of fixed dividers or pigeon holes, you could leave a large opening and include a removable pigeonhole unit—a ⅜-in.-thick bottom with a series of ¼-in.-thick vertical dividers glued into dadoes (see the drawing below). You also might want to incorporate one or more doors with adjustable shelves inside.

If you want to make the unit really portable, mount flush handles on the ends. You could even mount the unit on a wall at a convenient height above a table. All you have to do is make the case ½ in. deeper, recess the back ½ in. and use interlocking cleats. The upper half is mounted to the case, and the lower half is screwed to the wall. —*C.B.*



Bracket feet give a box new stature. These feet can be made easily and in any size.

Photos except where noted: Dennis Preston

Making Ogee Bracket Feet

Templates and jigs make neat feet for a box

by Sam Fletcher

I made a stack of Chippendale-style mirrors for our annual church sale, and I was disappointed when they didn't sell as well as I'd hoped. When the next sale rolled around, I looked for a more successful project. I had read that small jewelry boxes are very popular at craft sales, so I decided to make them my next project for our fund-raiser.

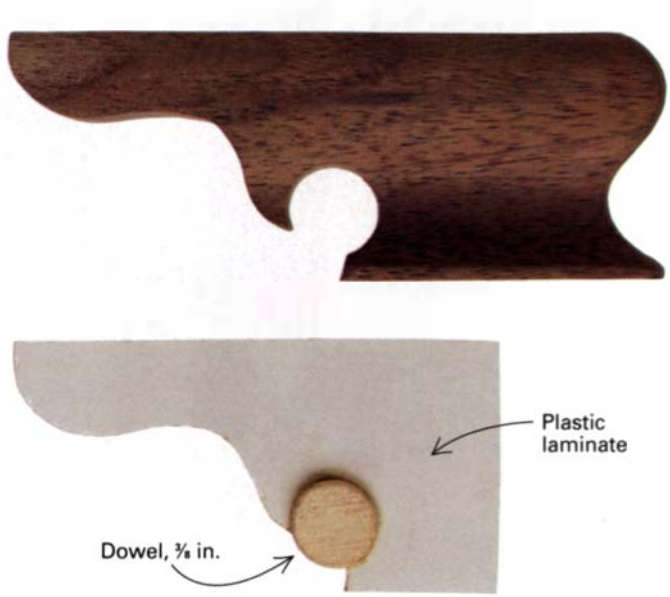
Boxes are simple, and they are easily made, even in quantity. But they can be awfully plain. I wanted to dress them up a bit. I liked the effect that feet add to the overall look of a jewelry box. Small ogee bracket feet elevate a box both figuratively and literally (see the photo on the facing page).

High-volume shops use custom tooling to make ogee bracket feet, but my method uses a standard cove (or flute) cutter and basic hand and machine tools. Although I developed this method to make miniature feet, the general procedure can be used for making larger feet as well.

Make a template and glue jig first

Decorative scrolls on the wings of these miniature feet give them a distinctive Chippendale look. To speed the layout of this scroll, I made a template from plastic laminate and a small piece of ⅜-in. dowel (see the photos at right). The dowel registers the template in each foot blank, saving me the trouble of locating the profile each time. The template also makes the feet consistent.

It can be tricky to glue small mitered pieces, so the simple jigs I make from 2-in.-sq., 1-in.-thick oak pieces are a great help (see the bottom photo on p. 81). I bore a ¼-in. hole in the center of each square and cut a 90° angle out of one side. The hole permits the pieces to fit together properly and takes care of glue squeeze-out. I use a 3-in. spring clamp and a short length of ¼-in. dowel to hold the pieces together.



Simplify bracket feet with a template. A scrap of plastic laminate makes a good template for laying out the decorative scroll on these feet. The dowel quickly and accurately locates the template in the blank.

Making the ogee profile

I use a board 6 in. to 8 in. wide, surfaced to 1 in. thick, for a 1-in.-high foot. The stock thickness corresponds to the height of the foot. To make feet for a box like the ones shown in the photo on the facing page, I use a board about 2 ft. long.

Using a wider board is faster because I can work on two edges at once, ripping them as I go. Having the extra width also makes machining the wood less dangerous.

I start by making the S-shaped ogee profile in the edge of the stock. The ogee can be very dramatic or subtle depending on how deeply I cut the groove and the size of the radius on the top edge.

I cut a groove for the concave part of the ogee curve on my shaper. For the 1-in.-high feet that I'm making here, I use a ⅜-in. cove cutter set about ⅛ in. above the table to define the base of the foot. The fence is set so the cove is ¼ in. deep. I cut the groove on both long edges of the stock (see the top left photo on p. 80).

I complete the ogee by rounding over the convex portion of the profile with a small block plane (see the top right photo on p. 80). Scrapers made from an old hacksaw blade al-

Photos this page: Scott Phillips

A cove cut is the first step in developing the profile. *The author makes a 3/8-in. cove on both edges of a piece of stock.*

low me to make any final corrections in the shape before the pieces are sanded.

Ripping the stock to width and mitering

Now I rip a piece of molding from each edge of the stock (see the bottom left photo). I set the rip fence to 5/8 in., rip one side and then flip the board around and rip the other side.

The next step is to cut and miter the pieces to length. I bought my Sears tablesaw new in 1940 and have made a number of useful attachments for it. One of them is an adjustable cutoff stop that eliminates the need for marking each piece (see the bottom right photo).

To really make cutting and mitering easier, I made additional miter gauges out of 3/8-in. by 3/4-in. steel flat bar and aluminum angle. I keep one of these miter gauges set at 90° and another one set at 45°.

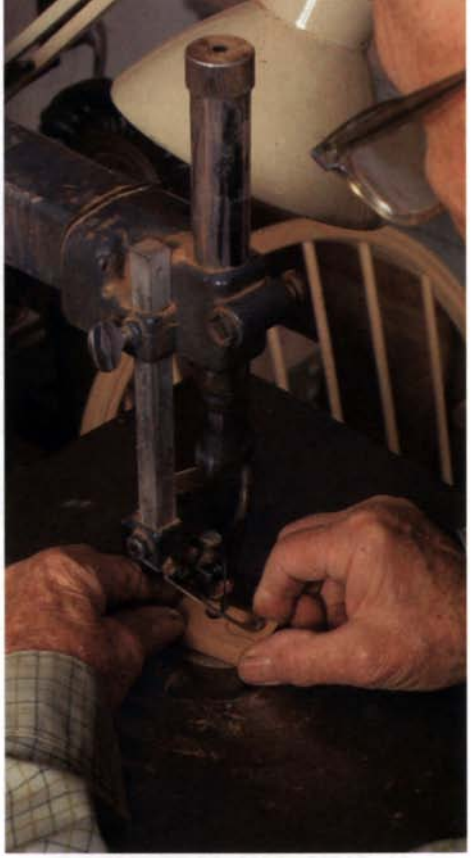
Round over the top edge. *A block plane fairs a cove into the rounded edge at the top of the foot.*

Rip the molding to width. *The author cuts one edge, flips the stock around and rips the opposite edge.*

With a shopmade cutoff stop, *you don't have to mark each piece. Two miter gauges, set at 45° and 90°, also speed the work.*

Bore the hole for the scroll profile. *The hole is part of the profile and provides registration for the scroll template. A vise holds the workpiece precisely.*

Mark out the scroll. *The dowel locates the template on the pieces. The profile is laid out on the back of each foot piece.*



Cut the scroll. *The author uses a jigsaw to cut the scroll profile.*

With these two miter gauges, I don't need to stop and reset the angle. I miter-cut one end, flip the stock end for end and then miter-cut the other end. Then, using the 90° miter gauge and the adjustable stop, I cut the piece to length, flip the stock end for end again, and cut the other piece to length. I repeat this process until I have cut enough pieces.

Lay out and cut the scroll

The scroll at the bottom edge of the foot starts with a ⅜-in. hole bored in each piece. This hole forms part of the scroll profile, but more important, it is the reference for the scroll template. Therefore, the hole must be bored accurately. To do this, I use a machinist's vise on my drill-press table and a brad-point bit.

I separate the work into right-hand and left-hand pieces and then register one end of a piece flush with the edge of the vise jaw. To align the vise and workpiece under the bit, I place the template on the stock with the narrow end of the template flush with the square end of the workpiece.

The drill bit is lowered until it is just above the template. I position the vise so that the registration plug on the template is aligned with the bit and clamp the vise on the drill-press table. I remove the template, bore all the like-handed parts (see the photo at left above), reposition the vise and then bore the rest.

Using the scroll template, I mark out all the pieces, as shown in the center photo above. Because the face of each foot piece already has been profiled, the scroll is laid out on the back side. I use a jigsaw to cut out the scroll shape (see the photo at right above).

Clamp the parts. *Gluing jigs hold the pieces at 90° and give glue squeeze-out a place to go. The dowel bridging the two pieces is temporary.*

Glue jig speeds assembly

I group all the pieces into left-right assemblies, spread glue on the mitered surfaces and rub the pieces together. I clamp together the assemblies using the glue jig, dowel and spring clamp (see the bottom photo). Once the glue has dried, I lightly sand the outside surface of each foot. I use a chainsaw file for smoothing the scroll. The feet are ready to be glued to the box. □

Sam Fletcher has been making furniture and tools for 56 years. He lives in Mechanicsville, Va.

Woodworking on a Grand Scale

Pipe-organ builders combine 500-year-old designs with modern materials

by Aimé Fraser

Shavings litter the floor, and the tang of resin fills the air. A Bach fugue pours from distant speakers, but the real music in the shop is the sound of sharp plane blades on clear, quarter-sawn fir. Robert Lange and Dominick Parker, organ builders at Paul Fritts & Co. in Tacoma, Wash., are smoothing panels that will become part of the crown on the first level of a large organ case. Wide, lacy shavings curl from their wooden planes. They are two months into an almost two-year-long job.

Fifteen feet to their right, under the peak of the four-story roof, stands the foundation and lower framework of a 54-stop Baroque-style organ (see the photo on p. 85). They're building the case the same way organ cases were built 500 years ago—solid-wood frame-and-panel construction with mortise-and-tenon joints, splined miters and decorative dovetails.

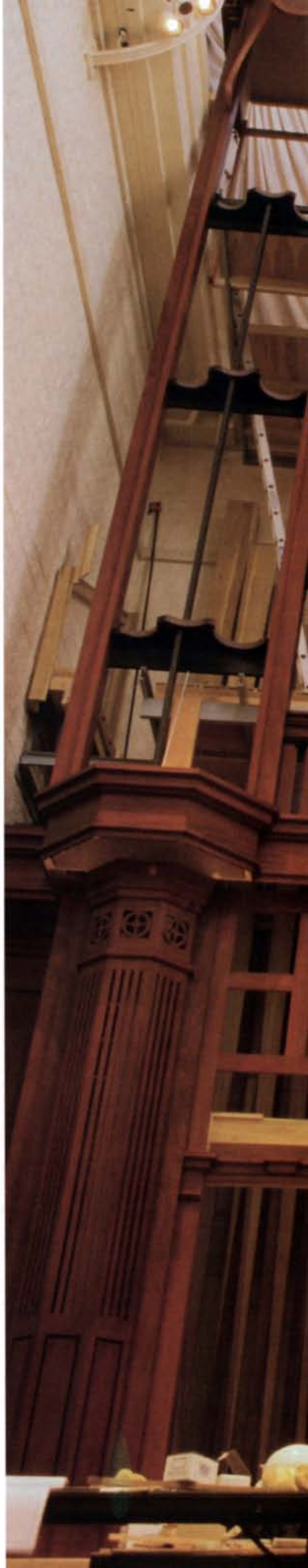
By the time the case is done, Parker figures they will have cut and fitted more than 300 mortises and tenons. There will be more than 25 sets of dovetails for the corners of the three levels of crowns, dozens of splined miters for the pipe towers and miles of molding. That doesn't even take into account the woodworking required to build and fit the panels into the mortised-and-tenoned frames. Before the panels go in, Parker and Lange will install the keyboards and wind-distribution system, as well as the thousands of tiny parts that connect the two. "Organ building is pretty straightforward woodworking," says Parker. "It's just that there's so much of it."

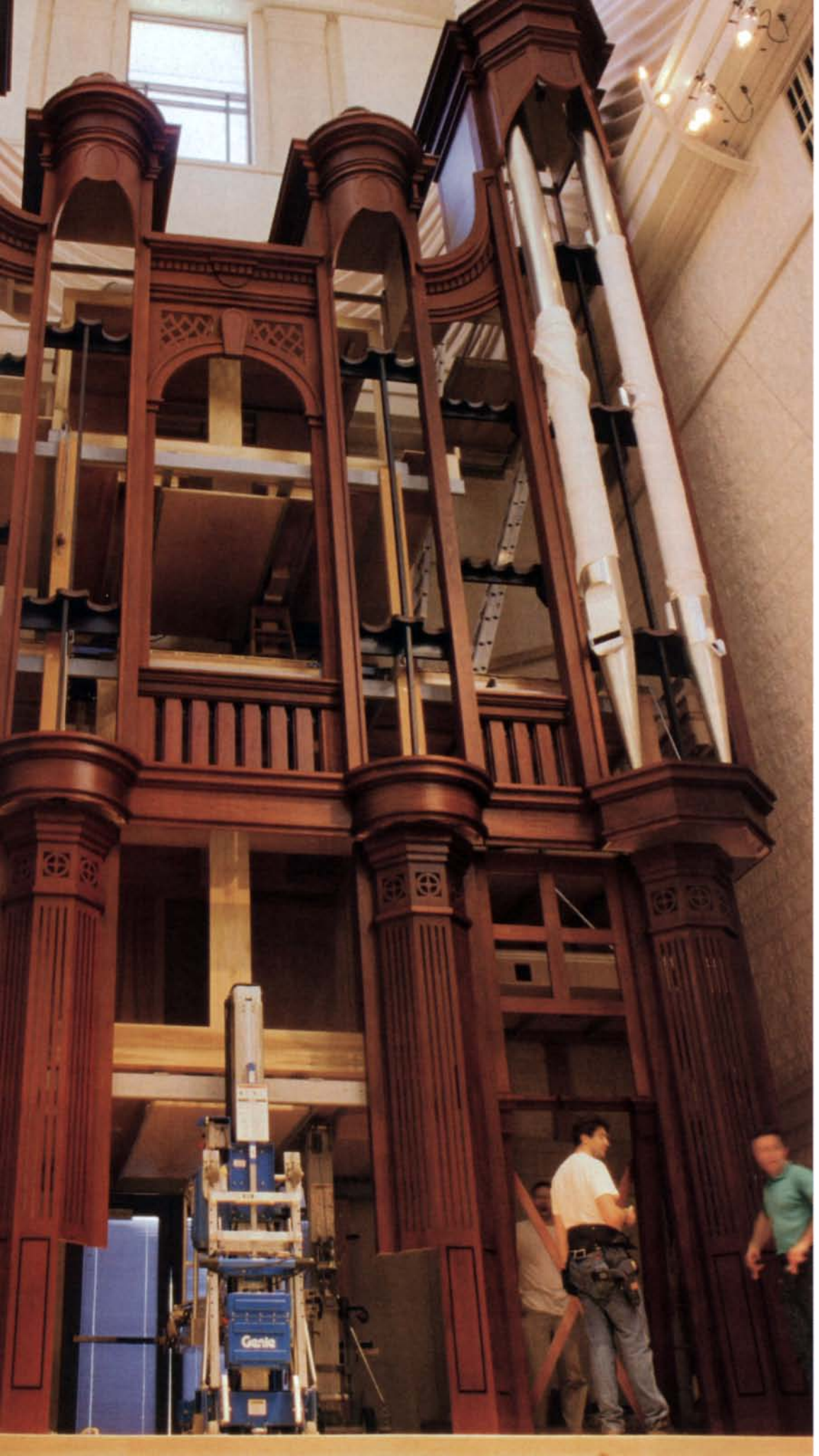
Organs built twice: in the shop and on-site

A year and a half from now, when this organ is finished, its highest point will just fit under a beam 35 ft. off the shop floor. It will weigh more than 19,000 lbs. and contain more than 3,800 pipes. Most of this colossal instrument will be made of wood. The case is made of fir, the duct work is poplar and the keyboards are basswood and ebony. The pedals are made of maple and oak, one-third of the pipes are oak and the wind chests are redwood,

Photos: John Fidlow

***Organs are built and tested in the shop,** disassembled, shipped and reassembled on-site. The scene above is the Edythe Bates Old Recital Hall at Rice University in Houston, Texas, just after the C.B. Fisk Co. organ arrived. It took about six weeks to get the organ in playable condition and another 42 weeks to tune all the pipes properly (right).*



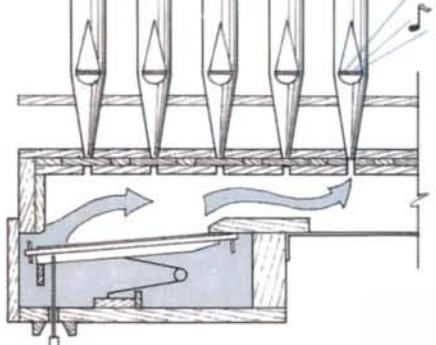


poplar and oak. A few months from now, when Parker and Lange finish the case, they'll also build the inner workings of the instrument the old way. The keys will open valves to deliver wind to the pipes some 30 ft. away through a complicated series of levers, springs, bell cranks and push rods; most of these small parts are made from sugar pine, maple and cherry. Virtually every piece of this instrument, from the tiny maple bell cranks to the huge lead-alloy pipes, will be built in this shop by six men. When the work is done, they'll completely disassemble the instrument and pack it for transport. When the pieces reach their destination, the builders will spend weeks rebuilding the instrument (see the photos at left), but in the greater scheme of things, it's nothing. These fine organs are built with more than 300 years of music-making in mind.

In at least a dozen small shops scattered across the United States, talented woodworkers devote themselves to the art of building organs with mechanical, or tracker, actions. These shops combine 500-year-old Northern European designs with modern tools and materials to create some of the world's finest pipe organs. Universities, churches, symphony orchestras and even private individuals from all over the world are lining up to buy these organs. They happily sign contracts for instruments that cost $750,000 or more, knowing full well five or more years may pass between signing and installation.

Old ways don't work

These builders travel extensively to learn the secrets of the great old instruments and their warm, sweet sound. But methods that worked for centuries in Europe don't work in the United States. Builders trained in classical European organ



Two years, one organ—This 54-stop, 3,900-pipe organ is under construction at Paul Fritts & Co. in Tacoma Wash. When finished, the organ will go to Pacific Lutheran University, also in Tacoma.

Press a key; hear a note

In a tracker organ, the connection between the key and the valve that gives voice to the pipe is purely mechanical. Pressing the key actuates a series of levers, springs and push rods that can span more than 30 ft. The design is basically unchanged since medieval times, but today's tracker organs use modern materials, making them easier to play and maintain.

Many organists prefer the direct feedback of tracker action to electrical or pneumatic action; they say it allows subtle musical expression.

shops say seasonal wood movement is three times greater in the United States than in northern Europe. "We study the woodworking in the old instruments," one builder says, "but we can only use it as a guide."

A perfect example of the difficulties in transferring classical organ building to the United States can be found in the wind chest, a complicated box that distributes wind to the pipes. In most modern organs, the wind is supplied by a high-volume electric turbine. The low pressure (only about 0.1 psi) is maintained by expanding wood and leather boxes weighted with lead. From there, the wind is channeled to the wind chests through ducts, called wind trunks. The wind chests (six or seven in a 50-stop organ) are located throughout the case to spread both the weight of the pipes and the sound they produce.

The size of a wind chest depends on the number of pipes it supplies. In a big organ, the wind chests are something on the order of 4 ft. wide by 8 ft. long by about 4 in. deep. The chest is built like a torsion box with an oak grid and thin wooden skins, called tables, glued to the top and bottom.

The old way of building a wind chest was to make it entirely of oak, including the ¼-in. tables. If it were built that way in the United States, it would crack in just weeks.

Some modern builders make wind-chest tables from high-quality plywood with many plies and no voids. A typical wind chest supplies several hundred pipes, and with so many holes in such a small area, a void in the plywood would be a problem. Air could leak between channels, causing two notes to sound when only one is intended. Plywood's dimensional stability makes it ideal for wind-chest tables. But some say plywood might affect the organ's sound; they maintain plywood has no place in the inner sanctum of an organ.

Thirty years ago, when classical organ building was new to the United States, builders studied and tested a variety of native woods to find a species stable enough to stand the tough environment of a wind chest. Some builders settled on red cedar, some on redwood and others on basswood as table material. These tables are glued up from narrow boards and attached to the grid with yellow glue.

Lately, some organ builders have started using boat-builder's epoxy and consider it to be a big improvement in wind-chest technology. Unlike yellow glue, epoxy adds no moisture to the assembly. When applied all over the undersides of the table, epoxy stabilizes the table and fills any gaps between it and the grid.

The tracker keyboard action is mechanical

Many organists favor tracker organs because the direct link between their fingers and the pipes gives them control over how the pipes begin and end their speech. The effects are subtle, but to a sensitive ear, tracker organs are profoundly expressive.

The design of the tracker action has changed very little since medieval times (see the drawing at left). It relies on three principal pieces to connect the keyboards to the valves (called pallets) in the wind chests located above, behind and off to both sides of the keyboards.

Most of the distance is spanned by trackers—3/32-in.-thick by ⅜-in.-wide strips of sugar pine, varying in length from 8 in. to 12 ft. long. Tiny maple squares take the trackers around a corner, changing the movement from up and down to in and out. As the trackers and squares leave the keyboard, they are as close to-

Photo this page: Aimé Fraser; drawing: Vince Babak

gether as the keys on the keyboard. At the wind chest, the trackers need a wider spacing to match the pipes. Parts called rollers change the spacing over the horizontal distance between the keyboards and wind chests. A big organ has some 2,000 action pieces. Keeping all these small wooden parts aligned in all seasons is not easy.

The old rollers were oak, round or hexagonal in section. For stability, the rollers were mounted on thick boards pieced together from small blocks with opposing grain. But even under the best conditions, the roller boards warped. These days, most builders mount the rollers on ¾-in. plywood boards, and many builders use metal rollers with nylon bushings. The new assemblies are smoother and quieter, and they stay in adjustment for decades.

Organists who played in the old European churches took it for granted that they'd have to spend a lot of time and energy adjusting the action and developing the finger strength to play through minor misalignments. That's no longer the case, thanks to modern materials. Today's tracker organs are much easier to play and maintain.

Today's trackers and squares look very much like the old ones. Most are made of wood, but some builders use aluminum when an instrument has more than 54 stops or will be installed in a place with climate extremes.

The trackers and squares of both materials are made with modern drilling and cutting tools, something the old builders didn't have. The precision of modern tools makes a good, tight fit between the parts of the action.

Simple tools build complex instruments

Organ builders tend to be multi-talented people. In most shops, every builder can and does work wood, and they are all expected to have other skills as well. For instance, the craftsman who spends most of his time making metal pipes might also build the wooden pipes.

The wooden pipes are basically rectangular boxes, but they're not easy to build. No two are alike. They range in size from 30-ft.-long pipes, weighing 300 lbs., to pipes smaller than a penny whistle. Pitch and tone vary with wall thickness. A high degree of woodworking skill is needed to cut and shape the wind channel through the pipe's mouth.

By the same token, the craftsman who spends most of his time doing old-fashioned woodworking on the case might help out in the metal shop on the lathe or by doing some of the preliminary pipe tuning. Many shop workers pride themselves on being able to build every single piece of an instrument. This self-sufficient attitude is obvious in the kinds of machines found in a typical shop. Organ builders don't buy specialized tools. It's all basic industrial-quality stuff; none of it is huge.

In their shops, you'll see tablesaws, bandsaws, metal lathes (used for wood and metal), chop saws, radial-arm saws, jointers, planers, grinders for sharpening and, maybe, wide-belt thickness sanders. The only thing different from scores of other woodworking shops are the multiple radial-arm drill presses occupying places of honor. Machines, though, aren't the focus of an organ shop. Hours go by without the whine of a machine disturbing the peace of handwork.

Hand tools are at the center of the organ-builders' trade. You'll see planes, chisels, scrapers, saws and knives in all sizes, but no specialized organ-building tools handed down through the ages. Most shops work in the metric system, and there are plenty of metric tapes and rules around for frequent checks against computer-generated plans. Building an organ is slow, careful work, and the simple tools reflect the fact that there are no shortcuts.

If you listen to Bach played on a modern tracker organ, you'll understand what the 19th-century French novelist Honoré de Balzac meant when he said the organ is "a pedestal on which the soul poises for a flight forth into space." While you're preparing for takeoff, pause for a moment to remember that the platform was built by skilled woodworkers, one small piece at a time. □

Aimé Fraser is an assistant editor of Fine Woodworking.

Photo above: Greg Bahnsen

CLASSIFIED

The CLASSIFIED rate is $5.85 per word, 15 word min. All orders must be accompanied by payment, all are non-commissionable. DISPLAY CLASSIFIED rates on request. THE WOOD & TOOL EXCHANGE and SITUATIONS WANTED are for private use by individuals only; the rate is $10/line. Min. 3 lines, maximum 6 lines, limit 2 insertions per year. Send to: *Fine Woodworking* Advertising Dept., PO Box 5506, Newtown, CT 06470-5506. Deadline for the Sept./Oct. issue is June 25, 1996. (800) 926-8776, ext. 562 or FAX (203) 270-6751.

Business Opportunities

FULLY EQUIPPED SHOP and Showroom in Colorado. Small Living area. $64,500. Deer Creek, Ltd. (719) 673-2733.

BROOKLYN WOODWORKERS CO-OP seeks new members. Professionals sharing fully-equipped shop; private space. Greenpoint, Brooklyn, NY. Joe (718) 349-3610.

SHOP SPACE. Includes use of panel saw, 20-in. planer, 17-in. jointer, Northfield saws, etc. Full dust collection. Brooklyn, NY. (718) 499-2954.

Situations Wanted

FURNITURE, ARCHITECTURAL ornamental patterns by Old Worlde Master Woodcarver, 35 yrs. exper. Peter: (904) 985-0980. (FL)

Help Wanted

18TH CENTURY FURNITURE MAKER wanted— High-end custom reproduction furniture maker looking for an experienced, motivated, intelligent journeyman willing to continue education. Some turning and carving experience preferred. Send resume an photos to Charles Bender and Company, PO Box 271, Glenmoore, PA 19343 or fax to (610) 942-0177. Pay commensurate with abilities and benefits.

EXPERIENCED CRAFTSMEN AND APPRENTICES needed for high quality door, cabinet and moulding company. Near Telluride, CO. Call (970) 327-4429.

ASSEMBLE SIMPLE CRAFT products at home! Easy work! Excellent extra income! Call now: 800-377-6000, ext. 8910. (FL)

Instruction

THE HYMILLER SCHOOL of Fine Furniture Finishing/Repair and Hand Joinery. 1 & 2-week courses, with 3rd generation craftsman. Send $3 for testimonials and information package. 783 North Clayton, Lawrenceville, GA 30245. (404) 682-8046.

SCOTTISH INTERNATIONAL School of Furniture. Final applications invited for one-year intensive Restoration Course, September intake. Full details: Myreside School, Gifford, E Lothian, EH41 4JA Scotland. Tel: 44-1620-810-680 or Fax 44-1620-826-295.

WORKSHOPS IN TRADITIONAL WOODWORKING Techniques. Plane making, carving, joinery, and planecraft. Mario Rodriguez, Warwick Country Workshops, PO Box 665, Warwick, NY 10990, or call (914) 986-6636 for brochure and schedule.

APPRENTICESHIP 1 YEAR fine furniture making/design/marketing. Jeffrey Greene Design Studio—some related prior experience—tuition. (215) 348-5232.

1996 SUMMER INTENSIVES

- Variety of beginning, advanced and specialized courses
- Combine with vacation in New England
- Starting July 1996

One Cottage Street School of Fine Woodworking
Easthampton, Ma. 01027
413-527-8480

The School of Classical Carving

The school offers full time classes in hand carving. British Master Carvers teach from one to twelve week courses. Training video also available.

10 Liberty Ship Way
Sausalito, CA 94965
Handcarving @eworld.com
Tel: 415-332-7563 Fax: 415-332-7570

CONOVER WORKSHOPS
EDUCATING AMERICA'S WOODWORKERS
18125 Madison Rd.·P.O. Box 679-Parkman, OH 44080
ph. 216-548-3491 fax 216-548-2721

APPRENTICE WITH MASTER CRAFT ARTIST

in-shop experience
furniture design
production and marketing

CALIFORNIA CONTEMPORARY CRAFT ASSOC.
Box 2060, Sausalito, CA 94966
Phone/FAX (415) 927-0321

CAREERS IN WOODWORKING

- 35 week hands on training
- Career counseling and job placement
- Adjunct course in design and business
- Starting September 1996

One Cottage Street School of Fine Woodworking
Easthampton, Ma. 01027
413-527-8480

Hands-on Workshops

Two-week Basic and Advanced courses
Twelve-Week Intensive.
In beautiful Maine.
For information contact:
Center for Furniture Craftsmanship
25 Mill Street, Rockport, ME 04856
Peter Korn, Director **(207) 594-5611**

Accessories/Miscellaneous

BRANDING IRONS. Names, signatures, logos. Any size, design. Norcraft Custom Brands, Box 277F, So. Easton, MA 02375. Telephone (508) 238-2163 anytime.

Glues & Adhesives

HIDE GLUE, all grades including wood sizing and glass chipping. Bjorn Industries, Inc., 551 King Edward Rd., Charlotte, NC 28211. (704) 364-1186.

Finishes

SPRAY-ON-SUEDE. Free brochure (sample enclosed). Donjer Products, Ilene Ct. Bldg. 8F, Belle Mead, NJ 08502. (800) 336-6537.

Plans & Kits

SCROLLSAWING—PATTERNS—WOODCRAFTS. Full color, bi-monthly newsletter $23.95 (sample $2.00) *Patrick Spielman's Home Workshop News*, Box 867FW, Fish Creek, WI 54212.

SOUTHWESTERN STYLE FURNITURE PLANS. Classic construction techniques. High Desert Design, Box 26674-F, Birmingham, AL 35226.

PLANS TO BUILD 700+ TOOLS, machines and accessories for your shop. Cat., $1: Wood-Met, Dept. FWW, 3314 W. Shoff Circle, Peoria, IL 61604-5964

FULL-SIZE PROFESSIONAL PLANS catalog $3. Over 200 professionally-designed plans for building fine furniture. Furniture Designs, Inc., CK-76, 1827 Elmdale Ave., Glenview, IL 60025

WOODEN GEARED CLOCK PLANS. Easy, Unique! Free information. Riggs Publications-E, Box 2983, Gardnerville, NV 89410.

Publications & Catalogs

BUILD, RESTORE, REPAIR, Refinish! Carvings, moldings, brass hardware, veneers, upholstery, caning, lamps. $1 for unique wholesale catalog. Van Dyke's, Dept. R7199D6, Box 278, Woonsocket, SD 57835.

FREE CATALOG

FREE CATALOG of NEW Woodworking Books to help you master new techniques and perfect your skills, plus FREE information on a great new money-saving joining offer from Woodworker's Book Club. Write to
Betterway Books, Dept. W, 1507 Dana Avenue, Cincinnati, OH 45207.

Musical Supplies

PLANS KITS & SUPPLIES FOR musical instruments; harps, duclimers, psalteries, banjos and more. Musicmaker's Kits, Dept. FW, PO Box 2117, Stillwater, MN 55082. (612) 439-9120.

GUITARMAKING SUPPLIES: Send $2 for our catalog of quality tonewoods, kits, accessories, books, tools, and finishing supplies. Guitarmaker's Connection, Martin Guitar Company, Box 329, Nazareth, PA 18064. 800-247-6931.

HAMMERED DULCIMER PLANS! By noted builder Charlie Alm. Best book on subject. $19.95. Woodworks, Box 428, Dept. FW, Brookston, IN 47923. (317) 563-3504.

LUTHIERS' SUPPLIES: Imported tonewood, tools, varnishes, books, plans, parts, accessories, strings, cases for violins, violas, cellos, basses and guitars. Assemble-yourself violin and guitar kits. International Violin Co., Ltd., 4026 W. Belvedere Ave., Baltimore, MD 21215. (410) 542-3535, or (800)-542-3538.

VIOLIN, GUITAR, banjo, mandolin-making materials, accessories, books. Catalog, $1. International Luthiers Supply, Box 580397, Tulsa, OK 74158.

GUITAR, BANJO, MANDOLIN and violin building materials. Repair tools, replacement parts, tone woods and finishing supplies. Free 104-page catalog. Stewart MacDonald's Guitar Shop Supply, Box 900F, Athens, OH 45701. 800-848-2273.

Hand Tools

TASHIRO'S SHARP JAPANESE TOOLS since 1888. Free ZETA™ saw system catalog. 2939 4th Avenue South, Seattle, WA 98134. (206) 621-0199. FAX (206) 621-0157.

BRANDING IRONS. Personalized signatures, logos, names. Any size/design. Lowest custom prices. Brand-New, Phone/FAX 1-800-964-8251 or (805) 964-8251. (CA)

Power Tools

POWER FEEDERS: 3-roller, 4-roller, 6-roller. 4-speeds, 8-speeds, single or three-phase. ANDREOU MACHINERY. (201) 224-6005. (NY)

LAMELLO BISCUIT JOINERS and Accessories/Parts/Repairs. Best prices, most knowledgeable. Call Hank 1-800-789-2323 (NY). SELECT MACHINERY, INC.

NEW & USED AMERICAN MADE

American Made Machinery New & Used **DELTA**, **POWERMATIC** and **NORTHFIELD**. New Single phase 3hp **UNISAW** motor $288 ppd., mag. control $99.00. **BALDOR** grinders 25% off. Motor and machine specials, free list.

PLAZA MACHINERY, 802-234-9673
Bx 14, Bethel, VT 05032 • Fax 802-234-6325

Wood Parts

QUEEN ANNE LEGS—1/2 PRICE. Cherry and Oak. Four sizes: 7-in., 8-in. 10-in. and 16-in. Call 1-800-228-2553. (CO)

Wood

EXOTIC, SEXY, NUDE. Hawaiian Koawood pen-turning blanks. ¾-in by ¾-in by 5-in. Ten: $5; twenty: $9; + $3 shipping. Satisfaction or full refund. Hawaii Systems, Box 3095, Kailua-Kona, Hawaii. 96745-3095.

HONDURAN MAHOGANY 5/4, 20—30-in. wide. Hard maple bench tops. $99; bird's-eye maple. (716) 871-9729.

SAWMILL DIRECT: Ebony, cocobolo, chac-te-koke, bocote, tulipwood, kingwood, lignum vitae and 70 other species. Quantity discounts, good freight rates. Quality at a fair price. SASE; Tropical Exotic Hardwoods, PO Box 1806, Carlsbad, CA 92018. (619) 434-3030. Visa/MC. Mitch Talcove.

DOMESTIC AND IMPORTED EXOTICS. For musical instruments, pool cues, knife handles and custom furniture. Price list. Exotic Woods, 1-800-443-9264. (NJ)

TURNING BLOCKS, BURLS, AND CROTCHES -exotic and domestic hardwoods—write or call for price list. Wood-Ply Lumber, 100 Bennington Ave., Dept. F, Freeport, NY 11520. (800) 354-9002.

CLASSIFIED

HARDWOODS CUT TO ORDER. 120 species in stock from ¼-in. to 4-in. thick, burls for turners, wood ID kits; $59.95. Veneers, woodworker's supplies. Colonial Hardwoods, Springfield, VA. (800) 466-5451.

20BF BULK PACKS of selected lumber: red elm $1.75/bf, red oak $2.20/bf, walnut $3.10/bf. Additional Species. FREE Catalog. Visa/Mastercard. Badger Hardwoods of Wisconsin, Ltd., N1517 Hwy. 14, Suite FW678, Walworth, WI 53184. (800) 252-2373. Email Address: Badgerwood@aol.com URL http://www.commerce.com/badger.

GUARANTEED CLEAR COCOBOLO squares, lumber, bocote, ebony, lignum. cirocote. Ebony fingerboard special. Tropical Timber Corporation. (503) 621-3633.

CALIFORNIA BLACK WALNUT & elm. Highly-figured, crotches, fiddleback. Wideboards & slabs; KD/AD sequentially sawn, 4/4, 8/4, 12/4. Gilroy, CA (408) 842-0784.

ATTENTION VA/MD AREA WOODWORKERS. KD cherry, walnut, quartersawn sycamore, elm, apple, hickory, and other domestic hardwoods. Leesburg, VA. (703) 771-3067.

LONGLEAF (HEART) PINE lumber. Resawn from salvaged timbers. 4 - 12 in. width. Lee Yelton: (706) 541-1039. (GA)

HIGHLY-FIGURED WALNUT SLABS, planks and blocks. California Walnut Designs, 12681 Wolf Rd., Grass Valley, CA 95949. (916) 268-0203.

OREGON BLACK WALNUT—Lumber, turning squares, carving blocks, highly figured wide boards. Goby Walnut Products, Dept. FW, 5016 Palestine Rd., Albany, OR 97321. (541) 926-7516.

HOMESTEAD HARDWOODS, 800-241-3770, 216-889-3770, Ash, basswood, beech, bird's-eye, butternut, cherry, chestnut, curley maple, oak, walnut. (OH)

ATTENTION WOODWORKERS—Maple, redwood, myrtlewood burl. Figured, quilted, bird's-eye, lace. Any size or thickness avail. Quality. Albany, OR (503) 926-1123.

CALIFORNIA'S FINEST QUALITY BURLS. Gigantic selection redwood, maple, walnut, buckeye, manzanita, madrone, myrtlewood, etc. All uses. BURL TREE. 800-785-BURL.

GOOD HOPE HARDWOODS - Tiger maple and curly cherry in 12/4 through 4/4 thickness. Curly walnut in lumber and slabs up to 54-inches wide. Plain walnut, cherry, and flooring. (610) 274-8842. 1627 New London Rd., Landenberg, PA 19350.

MANZANITA DECORATIVE WOOD
Australia/Mexico/USA Exotic Hardwoods
Banksia Pods - Buckeye/Manzanita
Burls - Assorted Turning Squares
Importer Direct - No Middle Man
MANZANITA DECORATIVE WOOD
1554 Round Potrero Rd.
Potrero, CA 91963-0111
IWF Atlanta Booth #21512
619-478-5849 • FAX 619-478-5130

RARE HARDWOODS? WE HAVE 'EM! Over 100 species include; sandalwood, amboyna burl, pernambuco, cocobolo, curly-koa, pink ivory, lignum vitae, snakewood, lilac burl, gabon ebony, Brazilian plus other rosewoods, ad infinitum. Free price list/details (310) 542-3576. (CA)

GILMER WOOD CO.
503-274-1271
Rare & Exotic Woods
• in logs, planks & squares
• over 50 species in stock
• also cutlery, turning & musical instrument woods
2211 NW St. Helens Rd., Portland, OR 97210

QUALITY NORTHERN APPALACHIAN HARDWOOD
FREE Delivery
Bundled, surfaced, shrink-wrapped.
Satisfaction Guaranteed
NIAGARA LUMBER & WOOD PRODUCTS, INC.
47 Elm Street, East Aurora, NY 14052
(800) 274-0397

WOOD & TOOL EXCHANGE

Limited to use by individuals only.

For Sale

Fine Woodworking back issues 64-116. $195. *Woodsmith*, Nos. 24-104 $185. (319) 338-6248. (IA)

TWO EMMERT PATTERN Maker vises at $425. each and one Paragon Multiplane, cased w/all extra cutters, perfect, unused, (retails at $700.) Sell at $525. (608) 849-7321. (WI)

Fine Homebuilding, 1-100, w/ indexes. $600. negotiable. FHB 1-55 available separately. Matthew: days (502) 583-4697, or evenings, (502) 834-9927. (KY)

WOOD magazine back issues 1-85. $200 pre-paid. Lobo 18-in. joiner-planer blade sharpener, new. $75. (708) 485-3869. (IL)

Fine Woodworking 1-95, missing 4,11. $250. plus shipping. *Woodsmith*, 1-54 and 66-72. $125. plus shipping. Lee: (203) 438-6163. (CT)

CRESENT ANTIQUE 32-in. Band saw and Walker-Turner 10-in. cabinet saw. Both excellent condition. $950. each. (450) 946-9322, evenings. Rex. (OK)

RECORD MULTI-PLANE #405. $250. Leigh dovetail jig, 12-in, new. $100. Leigh dovetail jig, 24-in., new. $200. (618) 785-2377. (IL)

WOODMASTER MODEL 800 Stroke sander, 5HP. Very good condition. $1100. (618) 282-3743. (IL)

LUREM Combo-machine, 14-in. saw, sliding table, 5HP shaper, 16-in. planer/jointer w/7-ft. bed, horizontal mortiser, 4 motors, 3PH. $7000. (805) 255-9059. (CA)

BLADES & PARTS for older planes. Peter Niederberger: (415) 924-8403 after 6pm. Box 887, Larkspur, CA 94977.

ONSRUD 40-133, ⅜-in. spiral router bits, ½-in. shank. 10 for $29. includes shipping. (508) 365-3348. (MA)

EMMERT PATTERN MAKER vises #1, 7 x 18 good condition $775. #2, 5 x 14 good condition $675. plus shipping. Tom (301) 824-5223. (MD)

PETE YOUNG, I have a Bailey #5, circa 1910 with your name on it! $65. Tom: (301) 824-5223. (MD)

HITACHI B600-A resaw. $975. /OBO. Jeffrey; (717) 379-3067. (PA)

RECORD MULTI-PLANE #405. Original owner, never used. All standard and all additional cutters. All special bases complete, with nosing tool. 14 special bases extra cutters. Spare misc. parts. $775. (502) 753-4698. (KY)

JDS Multi-Routers, including stand air-clamps, follower stylus, very good condition. $1100. Plus freight. (864) 296-3073. evenings. (SC)

WALNUT PREMIUM QUALITY 4/4, surfaced 2-sides, 74 bd. ft., 12-20 inches wide. from one log. After 5pm. (815) 842-2093. (IL)

HEART PINE lumber 8000 board ft. in storage; 4x4, 4x6, 2x12, 10x10-in. excellent condition. $14,000. Ethel, MS. (601) 674-5270.

LUREM C-260N, combination woodworking machine. (Like Robland X31) 10-in. saw. Jointer, planer, sliding table, shaper and mortiser. 220V-motors, with accessories. $2398. Ulmia Red Beech master-carver's bench. $680. Bill: (310) 377-1856. Los Angeles.

Fine Woodworking back issues 1-116. $350. plus shipping. (515) 287-4646, Des Moines. Please do not call after 6/30/96.

FELDER BF-3 12-in. jointer/planer/saw blade, shaper, mortise tenon. $6000. OBO. (703) 791-6501. (VA)

CAHVG WESTERN RED CEDAR, 4/4 rough, widths to 20-in. lengths to 20-ft. 2000/bd ft. lot available. Spar quality, eastern spruce, 6/4 rough. Nate, (603) 863-2915. (NH)

DELTA DJ15, 6-in. jointer, excellent condition, mobile base, two sets knives, extra fence. (616) 285-8728. Grand Rapids, MI.

WOODEN PLANES. 18 in good condition various sizes. For information send SASE to Larry Haigh, 48238 Monac Dr., Toledo, OH 43623.

STANLEY PLANE COLLECTION for sale as one lot. 297 pieces. In good/plus condition. $25,000. Andy, (310) 392-5441. (CA)

1993 FELDER BF6-31 excellent condition $8800. 3 X 200 Volt, 3HP w/phase conv., 1 HP power feed, other extras. John Strauel, (910) 259-9992. (NC)

REDWOOD or cedar veneer strips; ⅛-in by 4-in by 48-in, 384 sq. ft./case. $50 each. New Furnes magnetic starters single phase models up to 7 1/2 HP. $60. ea. (207) 797-3258. (ME)

Professional cabinetmakers workbench. 80-in. by 24-in, with 2 vises. Good condition. $300. Industrial floor model pantograph/router. Up to 100:1 reductions, light milling. $1200. (410) 521-4530. (MD)

Protect Your Back Issues

SLIPCASES FOR YOUR BACK ISSUES. Bound in blue and embossed in gold, each case holds at least 6 issues of *Fine Woodworking* (a year's worth), and costs $8.95 ($24.95 for 3, $45.95 for 6). Add $1.50 per case for postage and handling. Outside the U.S., add $3.50 each (U.S. funds, only). PA residents add 7% sales tax. Send your order and payment to the address below, or call toll free, 1-800-825-6690, and use your credit card (minimum $15). Let us know if your order is for issues 1-116 or 117 and later. Jesse Jones Ind., Dept. 95 FWW, 499 E. Erie Ave., Philadelphia, PA 19134 (No P.O. boxes please).

EXPECT TO GET YOUR HANDS DIRTY.

At the Worcester Center for Crafts, you'll have one-on-one instruction from nationally recognized craftspeople and 24-hour studio access. It's intensive, studio-based study that will give you the hands-on experience you need to launch your career in crafts. And there's still time to apply.

For more information about our two-year certificate programs and bachelors degrees in clay, fiber, metal, wood and artist-in-residence program,
call 508-753-8183, FAX 508-797-5626
or e-mail us at craftctr@usa1.com.

Worcester Center for Crafts

READER SERVICE NO. 160

Ryobi 1600 wide drum sander

I once dreamed of owning an industrial-quality thickness sander—the kind that would sand a solid tabletop in a few passes on its way to the finishing booth. I had a custom cabinet business at the time, so the machine would have been put to good use. But the $8,000 to $10,000 price tag kept me from realizing that dream. So when I got a chance to try out the Ryobi WDS 1600 wide drum sander, I was delighted.

By no stretch is this sander an industrial behemoth; it's a benchtop machine (see the photo at right). The main structural members are cast aluminum. The sanding drum has a 1-hp motor, with a separate, smaller motor to drive the feed belt. The feed rate is variable from 0 to 10 ft. per minute. A handwheel adjusts the height of the drum from the feed belt, with a maximum height of 3 in.

The 16-in. sanding drum is cantilevered from one side. This open-ended design lets you run stock up to 32 in. wide by turning the stock around and making a second pass. The machine comes with two shims to make adjustments for keeping the sanding drum parallel to the feed table. I didn't have to use them.

Right out of the box, the machine had some problems. The owner's manual listed the loose parts packed inside. But the 12/14mm open-end wrench was missing, and one of the Allen wrenches was the wrong size for the screws on the machine. No big deal for me. I have metric tools, so I was able to make adjustments.

The manual lists 18 safety rules to follow, clearly worded and easy to understand. There's also a troubleshooting guide that spells out likely problems, probable causes and solutions.

This troubleshooting guide came in handy because the feed belt slipped on its rollers when I first tried out the machine. When I consulted the guide, there it was: probable cause—belt tension loose; solution—adjust belt tension. However, there was one problem. The owner's manual

Benchtop sander handles wide stock. *The Ryobi WDS 1600 drum sander has a variable-speed feed belt motor and a 1-hp drum-drive motor.*

Photo this page: William Duckworth

does not tell you *how* to adjust it. Most woodworkers are a resourceful lot (I was able to figure it out), but it would have been nice to have a little more guidance.

In adjusting the belt tension, two of the Allen screws stripped and one of the brackets bent under the force of hand tightening. I would recommend that the hardware be beefed up.

I spent several hours making adjustments to the feed belt, but once it was working, the machine did a pretty good job of sanding everything that I gave it. I started with 1½-in.-wide pieces of poplar and worked up to a full 14½-in.-wide board (see the photo on p. 88). The recommended maximum depth of cut is 1/16 in., but with wide stock, I found that the machine would stall when trying to take half that amount.

The hinged dust cover has a built-in coupling to fit a standard shop-vacuum hose. It worked well removing the dust. You would quickly clog the abrasive if you try to use the machine without hooking it up to a good vacuum.

The $600 price tag is reasonable for taking the drudgery out of sanding. The machine is best for light-duty work; I wouldn't recommend it to shops expecting heavy-duty production service.

The Ryobi WDS 1600 wide drum sander is available at hardware stores and home centers. *—William Duckworth*

DML Thoroughbred dado

This adjustable dado doesn't wobbl . A cam in the hub moves the blades along the saw arbor.

Adjusting the width of a stack dado set is a trial-and-error process of adding chippers and shims to set the width of cut correctly. It's time-consuming, but the payoff is a flat-bottomed groove and a clean cut. Wobble-blade dadoes are easier to set, but they produce a lot of tearout on the face of the stock and leave a slight radius on the bottom of the groove. DML's Thoroughbred dado set is designed to combine the best features of each type. It makes a flat-bottomed groove, produces very little shoulder splintering and is easy to adjust.

The carbide-tipped blades move in and out along the saw arbor to adjust the width of cut, which makes it as easy to set as a wobble dado.

The set consists of three unusual-looking 8-in.-dia. blades (see the photo at left). Gaps in the line of teeth provide clearance for offset teeth on each neighboring blade. The offset teeth act like chippers to hog away waste from between the two neatly sawn shoulders of the dado. The blades have a 5/8-in. arbor hole and require an arbor at least 1⅛ in. long for full-width cutting. The blade assembly can be set up for either a right- or left-tilting arbor. A dial-cam adjustment on the hub nearest the arbor nut provides quick adjustment in dado width from ¼ in. to 13/16 in. The middle blade must be removed to make cuts of less than ½ in.

The blade does produce grooves that are flat-bottomed, square and, surprisingly, splinter-free. I won't be going back to my old wobble blade.

The DML Thoroughbred sells for about $200 and is available at home centers and hardware stores. *—Jim Tolpin*

Built-in dust collection. This Elu plunge router was introduced this spring in Cologne, Germany.

A European slant on tools

In a word, this year's International Hardware Fair in Cologne, Germany, was all about big: 3,380 companies from 52 countries, 2.8 million sq. ft. of exhibition space and a show catalog 2⅛ in. thick.

The show is an opportunity for manufacturers to introduce brand-new tools as well as roll out improved versions of tools already on the market. A new Elu plunge router, for instance, comes with a dust-collection chute built into one of its two support columns (see the photo at left).

Many European tools are basically the same as what's available here until you get to tablesaws—they're just plain different. The only thing I have seen in the United States that's at all close is the Ryobi BT3000 tablesaw. These tablesaws aren't new (saws with some of the same features were discussed in *FWW* #93, pp. 52-55), but they are a lot more sophisticated than I had expected. And lots of manufacturers make them.

The saws are designed to be carted from job site to job site, even up narrow stairwells. They aren't benchtop tools. Typical was a 75-lb. tablesaw from Festo, a German company (see the photo on p. 92). The saw comes with fold-up legs, extension tables, a well-engineered sliding table and a sophisticated dust-extraction system.

This saw also can function as a kind of upside-down radial-arm saw. When you pull on a knob at the front of the saw, the blade and motor assembly move forward. Manufacturers say that this allows precise

Photos except where noted: Scott Gibson; top photo: Craig Wester

Lightweight tablesaw design. *Several European manufacturers offer portable tablesaws with sliding tables and dust-extraction systems.*

cuts on heavy pieces of wood.

Festo doesn't claim its tablesaw will take the place of the heavy, cast-iron cabinet saws traditionally found in woodworking shops. But this is no cheesy substitute for a real tablesaw. Similar models are made by Mafell, Metabo and others.

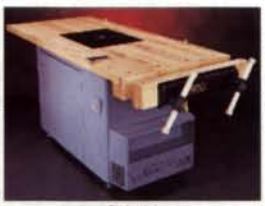
The tablesaws may never be big sellers in the United States, but other European power tools might be welcome. The reason they're not here is marketing. Some companies don't have U.S. sales representatives, and some haven't found a way to break into the U.S. retailing system. The good news is that some of these companies, like Festo, are exploring ways of getting their tools to U.S. buyers. When they do, the tools will be worth looking at. *—Scott Gibson*

William Duckworth is an associate editor of Fine Woodworking. *Jim Tolpin is a woodworker and writer in Port Townsend, Wash. Scott Gibson is editor of* Fine Woodworking.

Work smarter, safer and cleaner

At last... the ultimate workbench, downdraft table & complete air filtration system. Remove the dust before it can pass your face at a rate 3 times faster than the average ceiling-mounted unit! The Dust Eliminator Workbench collects dust at its source (from sanding) and airborne particles created by other shop tools. A generous select and better grade hard maple work surface sits atop a powder-coated, heavy gauge steel cabinet.

Original
30" x 54" x 1¾"
Only $889.00 + S&H
Workbenches shown with some options.



Deluxe
30" x 69" x 2"

- Locking casters
- Powerful motor (930 CFM, OPT 1600 CFM
- GFI-protected outlet
- 20' power cord

WOODMARK Call toll-free **1-800-845-4400**
Mailing: P. O. Box 211434 • Bedford, TX 76095 • 924 Airport Rd. • Roanoke, TX

READER SERVICE NO. 103

WHILE OTHER POCKET CUTTERS ARE ASKING FOR A HAND . . .

a hand to set the clamp . . . a hand to route the pocket hole . . . a hand to drill the pilot hole . . .

. . . WE'VE STOLEN THE APPLAUSE

#DK FULLY AUTOMATIC POCKET BORING MACHINE

With no clamps to set or levers to pull the Kreg #DK pocket cutter couldn't be faster or simpler to operate. It allows greater efficiency and real cost savings, plus all the advantages of round-sided pocket holes. Kreg Tool provides a wide range of pocket hole solutions from less than $100 to $1,645

Please call for a free catalog! **800-447-8638** Dealer inquires welcome.

READER SERVICE NO. 108

BLUME SUPPLY, INC.

3316 South Blvd. • Charlotte, NC 28209
704-523-7811 or 1-800-288-9200

STEP UP TO...

POWERMATIC

YOU DESERVE THE BEST!

$1975

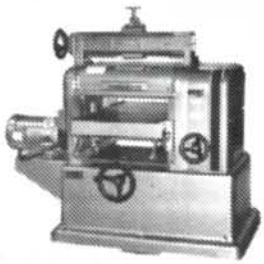
$1725

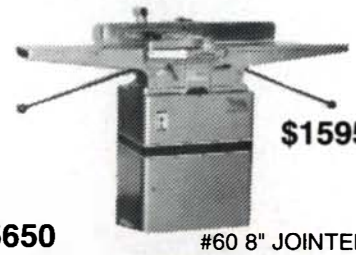
#27 SHAPER 3 HP

#66 10" SAW 2 HP W/50" VEGA FENCE
w/FREE promo-package

WHILE SUPPLIES LAST

PRICES SUBJECT TO CHANGE WITHOUT NOTICE





$1595

#180 18" PLANER 5 HP 1ø
W/ KNIFE GRINDER **$5650**

#60 8" JOINTER

NEW! POWERMATIC 15"PLANER
3 HP, MAG. CONTROLS $1250

READER SERVICE NO. 73

SECO AUTO FEEDER

◄ SK-40FD
MOTOR: 1HP
4 ROLLERS, 4 SPEEDS

◄ SK-30FD
MOTOR: 1HP
3 ROLLERS, 4 SPEEDS

~~$389~~
$359

◄ SK-32FD
MOTOR: ¼ HP
3 ROLLERS, 4 SPEEDS

SECO INVESTMENTS COMPANY
WOODWORKING DIVISION
145 W Hillcrest Ave., San Bernardino, CA 92408
(909) 889-1799 • Fax (909) 885-1799
1-800-CAL-SECO ORDERS ONLY

READER SERVICE NO. 6

CENTER FOR FURNITURE CRAFTSMANSHIP

1996 WORKSHOPS

JOHN ALEXANDER	*Green Woodworking*
JIM BAREFOOT	*Upholstery*
ROBERT DEFUCCIO	*Chair Making*
MICHAEL EMMONS	*Rustic Bentwood*
MICHAEL FORTUNE	*Furniture Making*
BOB FLEXNER	*Finishing*
KATHLEEN FRENCH	*Faux Finishing*
RAY GONZALEZ	*English Carving*
NORA HALL	*Classic Carving*
SILAS KOPF	*Marquetry*
PETER KORN	*Basic Woodworking*
JAMES KRENOV	*A Personal Spirit*
PHILIP LOWE	*Carving Ball & Claw*
DANIEL MACK	*Rustic Furniture*
TERRY MOORE	*Veneering*
STEPHEN PROCTOR	*Advanced Furniture*
MARIO RODRIGUEZ	*Planemaking*

for more information contact us at:

25 Mill Street Rockport, Maine 04856
Peter Korn, Director (207) 594-5611

For that "SPECIAL" project

Made In Tennessee

IN STOCK

NO MINIMUM

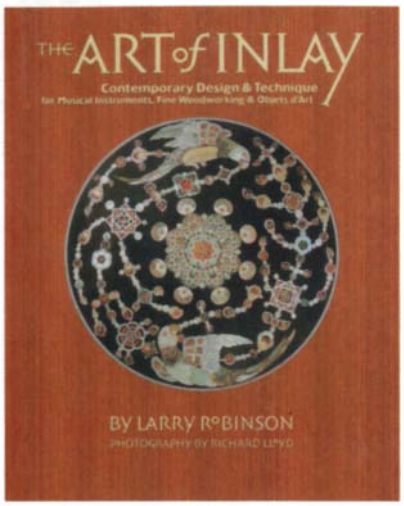
VARIOUS WOODS

FREE COLOR CATALOGUE

Kits Ready to Assemble & Finish
Adams Wood Products, LTD., LP
974 Forest Dr., Dept. Q23
Morristown, TN 37814 (423) 587-2942

READER SERVICE NO. 101

The Art of Inlay: Contemporary Design and Technique by Larry Robinson. *Miller Freeman Books, 600 Harrison St., San Francisco, CA 94107 (800-848-5594); 1994. $24.95, hardback; 112 pp.*



This book contains a gallery of well-done contemporary guitar inlay and a basic how-to section. The gallery section includes 45 high-quality color photos of the author's work and 28 photos of work by 12 other fine inlayers and engravers.

The author, Larry Robinson, is self-taught, and much of his earlier work was done from photos, using tracing techniques and a photocopy machine. One can see how his designs have matured. His rendering and finished inlay look exceptionally clean.

His inlays are made primarily of abalone and some wood, metal, bone and stone cut into a solid-wood background. These inlays are glued into a recess and then sanded flush to the surrounding background of wood. This is unlike marquetry, which he defines as plates of wood veneer fixed directly to the surface of a workpiece—not in it.

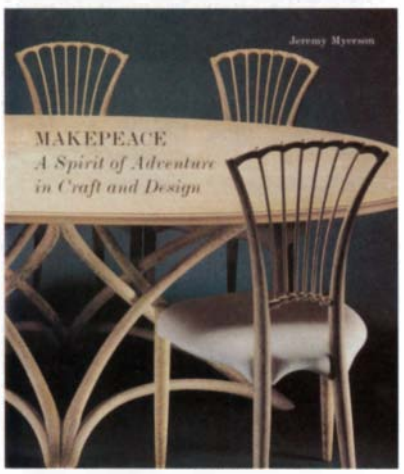
I especially enjoyed a few of the tips: a multiple-inlay clamping device called a go-deck, fretsaw cutting by hand and a vacuum attachment for removing the toxic dust generated by filing abalone.

Robinson covers abalone very well, but he falls short with other inlay materials, like stone and metal. I disagree with his use of cyanoacrylates, which I feel are too brittle and not appropriate for wood. He discourages the use of five-minute epoxy, which I have found useful and durable in certain types of inlay work. A small description of cutting out inlay with a scroll saw would have been helpful.

The Art of Inlay features more design than technique. Still, I would recommend this book for anyone seeking to learn more about inlaying fret boards of guitars or jewelry box lids with shell or bone. Inlay is a specialty that requires a great deal of patience and dedication, and Robinson has given us a good overview of how he does it.

—Paul Schürch

Makepeace: A Spirit of Adventure in Craft and Design by Jeremy Myerson. *Cross River Press, 488 Madison Ave., New York, NY 10022 (800-278-2665); 1995. $40, hardback; 208 pp.*



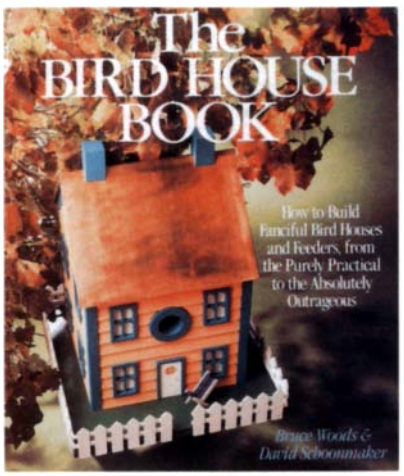
John Makepeace is the most celebrated British furniture designer and maker alive. His unique style is well-known in Britain, but he has had only limited exposure in North America. This book may help to correct that. The photographs throughout the book are exceptional, and closeups reveal stunning examples of truly remarkable craftsmanship.

The content of this book is arranged chronologically, beginning with early experiences that taught Makepeace the importance of blending innovative design, craftsmanship and entrepreneurial skills. He has been very critical of conventional design schools for failing to teach sound business practices.

John Makepeace is a visionary in his field. This book provides a fascinating insight into the man and his career.

—Michael Fortune

The Bird House Book by Bruce Woods and David Schoonmaker. *Sterling Publishing Co., 387 Park Ave. S., New York, NY 10016 (800-848-1186); 1996. $14.95, paperback; 128 pp.*



About 10 years ago, a friend of mine who is a member of the Audubon Society sent me a postcard with a picture of an Eastern bluebird on the front and instructions for building a bluebird house on the back. It was simple and cheap to build. I made one and hung it on a fence post that spring; I've since added two more. Every year after that at least one of the houses has been occupied by a bluebird family. This book features six variations on this basic design, which will accommodate bluebirds and other species.

Good color photos show examples of more than 30 houses and feeders, ranging in styles from the "split-log house" to the "plywood Parthenon," for those aviary architects and builders in need of inspiration. The book also includes some useful advice on design and construction techniques. *The Bird House Book* is strictly for birders or would-be birders.

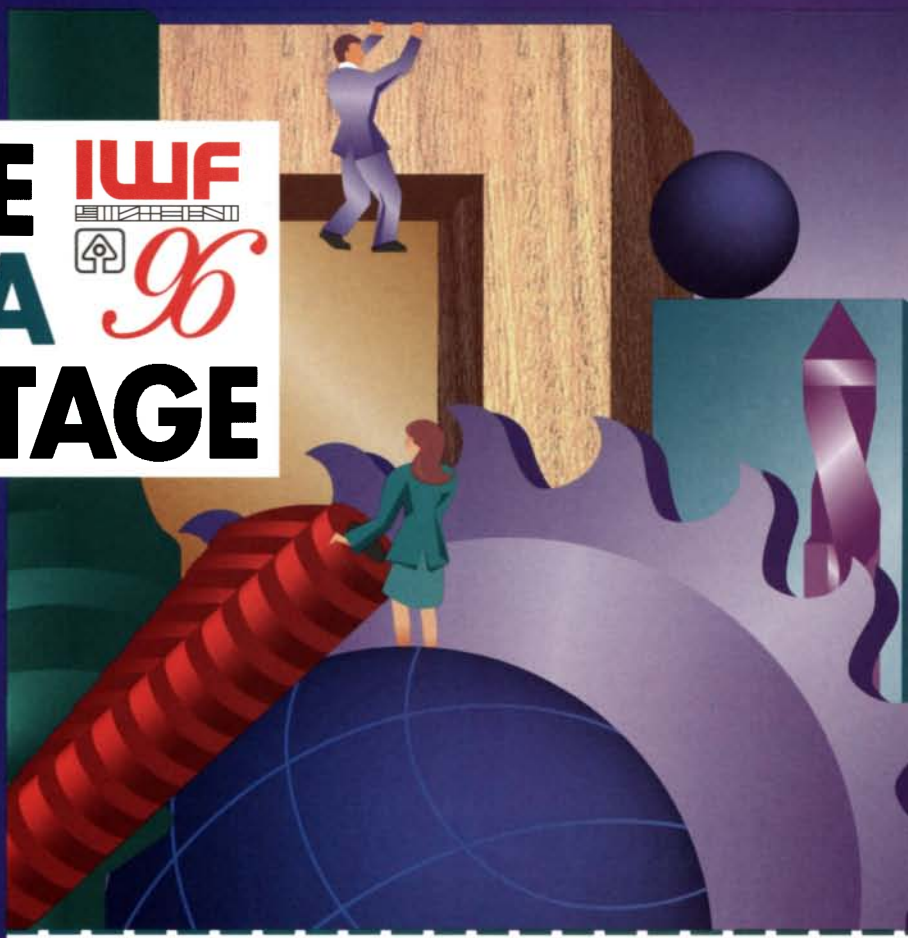
—William Duckworth

Paul Schürch makes custom furniture in Santa Barbara, Calif. Some of his inlay work appeared on the back cover of FWW *#115. Michael Fortune designs and builds furniture in Toronto, Ont., Canada. He is also developing a three-year program in wood product design at Kootenay School of the Arts in Nelson, B.C. William Duckworth is an associate editor of* Fine Woodworking.

SHAPING TOMORROW

THE ATLANTA ADVANTAGE

IWF '96



The International Woodworking Machinery & Furniture Supply Fair — U.S.A.®

August 22-25, 1996

Learn How To

- Drill holes faster; sand a finer finish
- Create a more comfortable sofa seat
- Insert an easier drawer slide
- Scan wood for better yield

Join residential and contract furniture, store fixture, architectural millwork, cabinetry, custom woodworking, plastic fabricators and other professionals at **IWF '96,** Georgia World Congress Center, Atlanta, Georgia and learn how to

- Get multi-task flexibility out of a single machine
- Gain the competitive edge on perfect joinery
- Profit from "fresh air" solutions to VOC problems
- Cut the best dimension angle AND the best sales deal

IWF '96

- 1200 exhibiting companies with the newest in machinery, materials, services
- 640,000 sq. ft. of innovative products and ideas
- Technical conferences to show you how to bring technology and capability together
- Hotel rooms at discounted prices and more!

Pre-Register for IWF '96 by July 26, 1996 and Save $10.

Mail registration form at right along with a check for $10 per person to IWF '96, PO Box 571, Brookfield, IL 60513-0571, USA. You'll save $10 over the on-site fee of $20. You may duplicate the form to register other personnel. Make checks payable in U.S. funds to IWF '96. We'll send you The Atlanta Advantage guide to the Fair. Badges will be mailed to U.S. addresses if postmarked by July 26. Badges for non-U.S. visitors will be held for pickup in the International Business Center.

IWF '96 is owned and sponsored by the American Furniture Manufacturers Association, the Wood Machinery Manufacturers of America, and the Woodworking Machinery Importers Association

ADVANCE REGISTRATION FORM

Number of people employed by your company.

CHECK ONE

- A ☐ 01-09
- B ☐ 10-19
- C ☐ 20-39
- D ☐ 40-99
- E ☐ 100-249
- F ☐ 250 or more

Do you specify, recommend and/or approve the acquisition of machinery, supplies, or services? **Yes** ☐ **No** ☐

What is your company's approximate sales volume?

CHECK ONE

- A ☐ Less than $250,000
- B ☐ 250,000 to 500,000
- C ☐ 500,001 to 1 million
- D ☐ 1.1 million to 5 million
- E ☐ 5.1 million to 10 million
- F ☐ 10.1 million to 50 million
- G ☐ 50.1 million or more

World Wide Web

Do you have access to the World Wide Web?
Yes ☐ No ☐

For more information on IWF '96, visit us on the Internet at: **http://www.woodweb.com/~woodweb/iwf**

Business type that best describes your company's products.

CHECK ONE

- A ☐ Residential Furniture: Wood
- B ☐ Residential Furniture: Upholstered/ Upholstery Products
- C ☐ Contract Furniture: Wood
- D ☐ Contract Furniture: Upholstered/ Upholstery Products
- E ☐ Wood Cabinetry: Kitchen/Bath/TV/Stereo/ Boat/RV/Games
- F ☐ Architectural Woodwork
- G ☐ Millwork/Moulding/Doors/ Windows/Stairs/Flooring/Frames
- H ☐ Store Fixtures/Office Partitions
- I ☐ Veneers/Plywood/ Composite Panels/Dimension
- J ☐ Laminates: Components/ Panel Products
- K ☐ Distributor/Dealer/ Service Company
- L ☐ Other Than Above

(Must write in your specific business category in order to process)

Job title

CHECK ONE

- A ☐ President/Senior Executive/ General Manager
- B ☐ Sales or Marketing Executive/ Purchasing Agent/Designer
- C ☐ Plant Position: Production Mgr/ Supervisor/Foreman/Engineer/ QC/Maintenance Mgr.
- D ☐ Industry Consultant or Sales Rep.
- E ☐ Guest or Other

(Must write in a specific position in order to process)

Visitor Information

☐ Mr ☐ Ms. ☐ Mrs

FIRST NAME M.I. LAST NAME

JOB TITLE

COMPANY

DIVISION

MAILING ADDRESS DEPT. or MAIL STOP

CITY STATE ZIP

COUNTRY

TELEPHONE FAX

FW

☐ Check here if you have a disability that requires special assistance.

READER SERVICE NO. 63

IWF Phone: 770-246-0608 Fax: 770-246-0620

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

ALASKA: **Meetings**-Alaska Creative Woodworkers Association meets at 7:00 p.m. on the fourth Monday of each month at the Anchorage Museum. (907) 345-3077.

ARKANSAS: **Meetings**-Woodworker's Association of Arkansas meets the first Monday of each month at 7:00 p.m. at J.T. Shannon Lumber Co., Woodworkers Center, 6200 Sears Drive, Little Rock, 72209.
Meetings-Ozark Woodturners meets the third Saturday of each month in Mountain Home. For more information, call Michael Kornblum at (501) 424-5893.
Meetings-Central Arkansas Woodcarvers meets the second Tuesday at 7:00 p.m. and the fourth Tuesday at 6:30 p.m. at the J.T. Shannon Lumber Co., 6200 Sears Drive, Little Rock, 72209.

CALIFORNIA: **Show**-California Carvers Guild's (Central California Chapter) annual wood carving show, July 13-14. Madera District Fairgrounds, 20 miles north of Fresno on Highway 99. For more information, call Lola Nelson at (209) 229-7906.
Show-California Carvers Guild's (Central Coast Chapter) 20th annual wood carving show, Sept. 14-15. Coast High School, Cambria. For more information, call (805) 528-8107.
Call for entries-California Design '97, Jan. 23-Feb. 28. Deadline: Aug. 1. Contract Design Center, San Francisco. Furniture and decorative objects for interiors and outdoors. Send an SASE to California Contemporary Craft Association (CCCA), P.O. Box 2060, Sausalito, 94966. (415) 461-0321.
Exhibition-Wood Fair 96: A Celebration of Wood and Woodworking, July 12-14. College of the Redwoods, 7351 Tompkins Hill Road, Eureka, 95503. (707) 445-6915.

CONNECTICUT: **Call for entries**-Second annual juried woodworking show at Gallery 12. Deadline: July 1. For more information, send an SASE to Doug Noyes, Gallery 12, 29 Whitfield St., Guilford, 06437. (203) 458-1196.
Exhibition-15th annual Carvers Day, July 6 (rain date July 7). Olde Mystic Village's apple orchard, Mystic. For information, contact Mystic Carvers Club, P.O. Box 71, Mystic 06355. (203) 848-8194.

FLORIDA: **Meetings**-South Florida Woodworking Guild meets every second Monday at 7 p.m. Constantine, 1040 East Oakland Park Blvd., Ft. Lauderdale. For further information, contact Woody McLane at (305) 565-2729.
Meetings-Central Florida Woodworkers Guild meets the second Thursday of each month. Woodcraft Supply, 246 E. Semoran Blvd., Casselberry. For more information, contact Bob Elliott (407) 695-8960.
Meetings-Tallahassee Woodcrafters Society meets the second Tuesday of each month. Contact Walt Behrle at (904) 668-6653 or Austin Tatum at (904) 386-6876.
Meetings-St. Petersburg Woodcrafters Guild meets the fourth Thursday of every month at 7 p.m. Montgomery Electric and A/C, 1200 19th St. N., St. Petersburg, 33713. Contact Don Montgomery at (813) 898-0569.

GEORGIA: **Meetings**-Woodworkers Guild of Georgia meets the second Monday of every month. Southern College of Technology, 1100 S. Marietta Parkway, Marietta. For more information, call (404) 299-3972.

HAWAII: **Exhibition**-Woods of Hawaii '96, Sept. 7-15. Aloha Tower Marketplace, Pier 10, Honolulu. For more information, call Linda Butts at (808) 239-5563.

INDIANA: **Call for entries**-Chesterton Art Gallery sixth bi-annual Works in Wood. Deadline: Aug. 16. For more information, contact Marsha Demkovich, Chesterton Art Gallery, P.O. Box 783, Chesterton, 46304. (219) 926-3041.

KENTUCKY: **Meetings**-Kyana Woodcrafters Inc. meets the first Thursday of each month. For more information, write or call Bethel United Church of Christ, 4004 Shelbyville Road, Louisville, 40207. (502) 426-2991.

MAINE: **Meetings**-Guild of Maine Woodworkers meets the first Wednesday of every month. For more information, call (800) 805-5100.

MARYLAND: **Classes**-Woodworking classes, May thru December. Glen Echo National Park. For more information, contact Glen Echo National Park, 7300 MacArthur Blvd., Glen Echo, 20812. (301) 492-6266.

MASSACHUSETTS: **Classes**-Woodworking classes, most of the year. Contact Boston Center for Adult Education, 5 Commonwealth Ave., Boston, 02116. (617) 267-4430.
Workshops-Box construction, hand tools, joinery, cabinetmaking and more. Hancock Shaker Village, Box 927, Route 20, Pittsfield, 01202. (413) 447-9357.
Classes-Year-round intensives in woodworking and wood carving. Horizons New England Craft Program, 108 N. Main St., Sunderland, 01375. (413) 665-0300.
Show-Juried exhibition of woodworking, furniture and more. Sponsored by the Society of the Preservation of New England Antiquities, Sept. 18. Codman House, Lincoln. For more information, call Janet at (617) 259-8843.

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

MINNESOTA: **Meetings**-Minnesota Woodworkers Guild meets the third Tuesday of each month at 7:15 p.m. Demonstrations presented each month. Contact Richard Gotz at (612) 544-7278.
Call for entries-The Minnesota Woodworkers Guild's Northern Woods Exhibition, Oct. 17-20. Southdale Center, Edina. Deadline: Sept. 16. For application, write Northern Woods Exhibition, c/o 4th Street Guild, 2625 4th St. S.E., Minneapolis, 55414. (612) 378-2605.
Show-Twin Cities Woodworking Show, Oct. 4-6. Minnesota State Fairgrounds, Education Building, Snelling & Commonwealth Aves., St. Paul, 55108. (310) 477-8521.

MISSOURI: **Show**-Treasures in Wood, May 11-27. Crown Center Exhibit Hall, Crown Center Shopping Center, 2450 Grand Ave., Kansas City. Contact John Freeland of the Kansas City Woodworker's Guild at (816) 478-8332.

NEBRASKA: **Meetings**-Omaha Woodworkers Guild meets at 7 p.m. the third Tuesday of every month. Westside Community Center, Omaha. For more info, contact John Cahill at (402) 334-5550.

NEW HAMPSHIRE: **Classes**-Various woodworking classes. The Hand & I, P.O. Box 264, Route 25, Moultonboro, 03254. (603) 476-5121.
Auctions-Antique and craftsman's tool auctions, year-round. Contact Richard A. Crane, Your Country Auctioneer, 63 Poor Farm Road, Hillsboro, 03244. (603) 478-5723.
Tour-Guild of New Hampshire Woodworkers sawmill tour, July 20. Three Branches Sawmill, Lumber Co., Kingston Road, Plaistow, 03865. For more information, call Steve Bussell at (508) 392-5405.
Show-New England Woodworking Show, Sept. 13-15. National Guard Armory, 771 Canal St., Manchester, 03101. For more information, call (310)477-8521.

NEW YORK: **Meetings and classes**-New York Woodturners Association meets bi-monthly. YWCA, 610 Lexington Ave. (53rd St.), New York City. Contact Howard Alalouf (914) 337-0226.
Classes-Traditional and contemporary woodworking with Maurice Fraser, Bill Gundling, Jack Van Deckter and Susan Perry. The Craft Students League at the YWCA, 610 Lexington Ave., New York City. (212) 735-9731.
Meetings-Long Island Woodworker's Club meets the first Wednesday of every month, September thru June. Brush Barn, 211 Jericho Turnpike, Smithtown. (516) 360-1216.
Show-The Second Handmade home show, Nov. 15-19. Lexington Avenue Armory at 26th St. For more information, contact Richard Rothbard (800) 834-9437.
Show-Metro-New York Woodworking Show, Sept. 20-22. Westchester County Center, Main Hall, Bronx River Parkway & Central Avenue, White Plains, 10606. For more information, call (310) 477-8521.

NORTH CAROLINA: **Meetings**-North Carolina Woodturners meets the second Saturday of each month. For more information, contact the North Carolina Woodturners, P.O. Box 1833, Hickory, 28603. (704) 324-5960.
Classes-Carving, whittling, bent willow furniture, thru December. Southern Highland Craft Guild's Folk Art Center, Milepost 382 of the Blue Ridge Parkway, East Asheville, 28815. (704) 298-7928.
Classes-Carving, plane making, lapstrake boatbuilding, more, thru December. North Carolina Maritime Museum, 315 Front St., Beaufort, 98516. (919) 728-7317.
Classes-Woodworking classes offered all summer. Penland School of Crafts, Penland, 28765-0037. (704) 765-2359.

OHIO: **Meetings**-Cincinnati Woodworking Club meets from 9:00 to noon on the second Saturday of January, March, May, September and November. Reading High School, 801 E. Columbia Ave., Reading. Contact Cincinnati Woodworking Club, 5974 Gaines Road, Cincinnati, 45247.
Meetings-Woodworkers of Central Ohio meets on the second Saturday of November, February, April and June. For more information, call Chuck at (614) 457-3704.
Show-Greater Cleveland Woodworking Show, Sept. 27-29. Cuyahoga County Fairgrounds, Building 23, 164 Eastland Road, Berea, 44017. For more info, call (310) 477-8521.

OREGON: **Meetings**-Cascade Woodturner's Association meets every third Thursday. For more information, contact Cascade Woodturners, 11575 S.W. Pacific Highway, #104, Tigard, 97223. (360) 887-3903.

OKLAHOMA: **Show**-Eastern Oklahoma Woodcarvers Association 20th annual woodcarving show, July 12-14. Tulsa Promenade Shopping Mall, 4107 S. Yale Ave., (41st at Yale) Tulsa, 74135.

PENNSYLVANIA: **Call for entries**-Third annual Wharton Esherick Museum woodworking competition/exhibition. The theme is jewelry boxes. Deadline: July 1. Send SASE to Wharton Esherick Museum, P.O. Box 595, Paoli, 10301-00595.
Workshops-Woodcarving instruction, June thru October. Contact Sawmill Center for the Arts, P.O. Box 180, Cooksburg, 16217. (814) 677-3707.

RHODE ISLAND: **Exhibition**-Contemporary studio furniture by Rhode Island School of Design graduates and instructors, Aug. 31-Nov. 10. 175 Newbury St., (between Dartmouth & Exeter) Boston, 02116. (617) 266-1810.

TENNESSEE: **Workshops**-Turning, carving and more, year-round. For more information, contact Arrowmont School of Arts and Crafts, P.O. Box 567, 556 Parkway, Gatlinburg, 37738-0567. (615) 436-4101.
Classes-Lumber selection and more. For more information, contact Tennessee Valley Authority, 17 Ridgeway Road, Box 920, Norris 37828-0920. (615) 632-1656.

TEXAS: **Meetings**-Woodturners of North Texas meets the last Thursday of every month, 7:30-10:00 p.m. Paxton Beautiful Woods Store, 1601 W. Berry St., Fort Worth, 76110. (817) 927-0611.
Meetings-North Texas Woodworker's Association meets the third Tuesday of each month. For info, contact Bruce May, P.O. Box 831567, Richardson, 75083. (214) 271-0125.
Show-Texas Mesquite Association annual meeting and woodworking showcase, Oct. 11-13. Market Square, Fredericksburg. For more information, call (210) 997-8515.
Show-Rio Grande Valley woodcarvers show, Jan. 17-18. McAllen Civic Center, McAllen. For more information, contact Dorothy Chapapas, Rural Route 2, Box 150, McAllen, 78504. (210) 581-2448.

VERMONT: **Exhibition**-In The Tradition, Contemporary Vermont Furniture Inspired by History, July 1-Oct. 31. Bennington Museum, Bennington.

CANADA: **Association**-Canadian Woodturners Association, Markham, Ont. For more information and to receive the newsletter, call (905) 479-0755.
Meetings-West Island Woodturners Club (Montreal) meets every Tuesday, thru May. Contact Dennis Brown, 8817 Cure Legault, Lasalle, Que., H8R 2V9. (514) 366-6071.
Association-Superior Woodworking Association meets 7:00 p.m. the last Monday of each month. Confederation College, Ont. Contact Vic Germaniuk at (807) 767-5964.
Symposium-Conservation and Collaboration, July 26-30. Symposium on woodturning, furniture design and technique. Kenderdine Camp, 125 miles north of Saskatoon. For more information, contact the Saskatchewan Craft Council, 813 Broadway Ave., Saskatoon, Saskatchewan, S7N 1B5. (306) 653-3616.

WOODWORKER'S MART

WOODWORKER'S MART

WOODWORKER'S MART

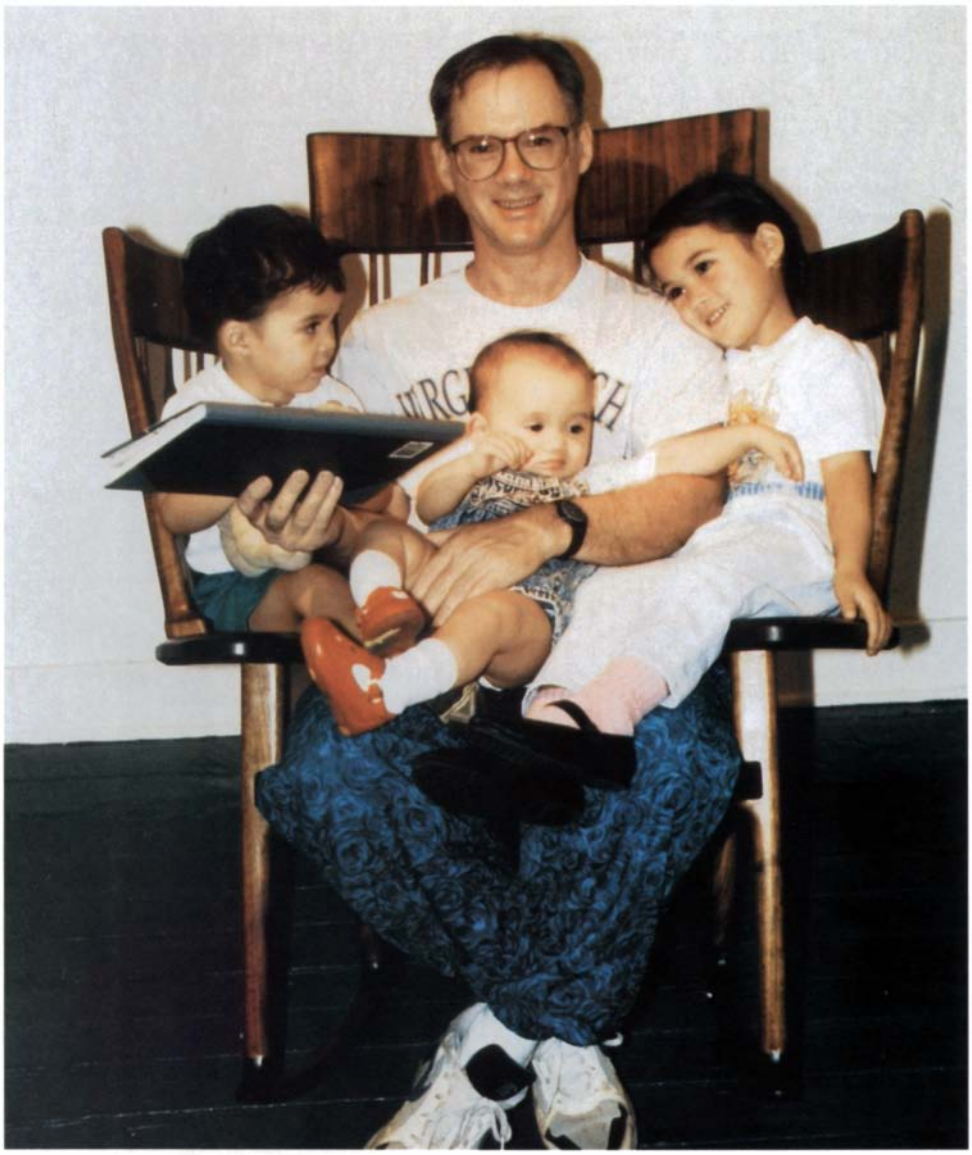
Story-time rocker

One of my favorite times of day is story time, when I read aloud with my children on my lap. Until recently, we had to crowd onto one of the rocking chairs that I build for a living.

When our third child was born, I was faced with something of a space shortage. Because I only have room for two on my lap, I redesigned one of my rockers. Now all three kids can sit close enough to see the pictures while I read aloud (see the photo at right).

I lowered and widened the arms of a regular rocker so the two older children would have comfortable seats. I wanted the rocker to be stable with any combination of children (with or without an adult), so I swept little backs around the seats to locate the children correctly. I also widened the stance of the rocker to decrease its tendency to tip with only one child in the chair.

The chair won a first-place overall ribbon at "Use It," a show for functional art at the Fredericksburg (Va.) Center for Creative Arts. But more important to me, my children love it. —*Hal Taylor, Hartwood, Va.*



Making room for everyone—*When a new baby upset story-time seating arrangements, chairmaker Hal Taylor built this rocker so everyone would have a good seat. It's made of black walnut with purpleheart accents.*

Frequent flyer and wood buyer

For 40 years, I worked in the world of electrical engineering research and development. It's a sharply defined world of positive and negative. Everything is measured in millionths of an inch and millivolts. As an antidote, I carved wood.

My work involved some traveling, and I always made a point of buying local wood for carving. It sometimes added an interesting element to sightseeing.

For instance, while in Israel, I teamed up with a stranger to hire a guide for a day. We saw the sights and made a side trip to Bethlehem, where I hoped to find some olive wood. The guide drove us to a ramshackle factory that produced "hand-carved" camels. Inside, the light came from bare bulbs hung over a dirt floor. In the middle of the room stood a four-spindle, fully automatic carving machine spitting out olive wood camels as if they were cigarettes. I selected several small olive limbs from a mountainous pile, while the guide and the factory owner got into a shoving match

Rocky Mountain bighorn sheep carved from Barbados mahogany—*The author, an inveterate collector of wood, carved this piece to commemorate the birth of his twin grandsons.*

Top photo: Hal Taylor; bottom photo: Leonard Feldberg

INDEX TO ADVERTISERS

over how much I should pay for them. Finally, the guide threw a handful of bills into the air. As the owner scrambled for the cash, we quickly left with our treasures.

Locating places to buy wood is difficult—they aren't exactly tourist attractions. Hotel concierges don't study up on wood dealers, and lumberyards as we know them don't exist overseas. I've even hired private detectives to locate a particular supplier.

Another problem is logs or billets are not really suitable as carry-on luggage. Checking a small log as baggage always works for me, but it usually evokes suspicion. I leave the log bare and write my name and address directly on the wood. If anyone asks, I say it's a piece of a tree.

I can remember rosa peroba and rosewood from Brazil, mahogany from Barbados, briar from Italy and some unknown and forever unidentified pieces from Greece and Turkey. I've collected bass wood and cherry from upstate New York; spalted beech and maple from New Jersey; holly, quartersawn sycamore and others from Pennsylvania; cherry from Indiana; cottonwood from Texas; mesquite from Arizona; tupelo from Louisiana and myrtle wood, maple burl and yew from Oregon.

For more than half a century, I've made these woods of the world into bears, elephants, tigers, birds, boxes, turnings and toys, always with wonderful memories of wood gathered on the quick while colleagues, taxis, limos or my wife waited.

—Leonard Feldberg, Chestnut Ridge, N.Y.

Ten thousand-year-old fir trees

Really old-growth fir—*According to carbon dating, the dark wood used in this dictionary stand grew in the British Columbia forest 9,000 to 12,000 years ago—the lighter about 5,000 years ago.*

Back in 1992, the Victoria, British Columbia, landfill was getting a little cramped, so authorities drained an adjoining lake to provide room for expansion. Not surprisingly, they found some big firs at the bottom.

It was obvious the wood had been submerged for a long time. Carbon dating showed the wood was anywhere from 5,000 to 12,000 years old.

The Vancouver Island Woodworkers Guild got a few planks of the old fir, and several members built a dictionary stand (see the photo at left). They donated it to Victoria Regional Library, only a few miles from the lake where the wood rested for thousands of years.

"The wood gave off a definite boggy smell and had numerous petrified pitch pockets, but didn't dull our tools. After two years of drying, the moisture content was about 9%, but some of the pieces were still twisting. It made for some inventive clamping," writes Karen Robertson, a teacher in the furniture department at Camosun College in Victoria.

—Aimé Fraser, assistant editor

Chainsaw artistry

Rough methods, delicate results—*This cherry bowl was carved with a chainsaw and shaped with grinders.*

Brad Sells of Knoxville, Tenn., creates delicate vessels using some pretty crude tools. *Sacrifice*, the cherry bowl shown in the photo above, is a good example.

Sells roughs out his vessels with a chainsaw, uses grinders to sculpt the final shape and then finish-sands with a drill-mounted disc. He wields his tools with enough finesse to get a consistent wall thickness of ¼ in. or less. *—A.F.*

Do you know of a great shop class?

All over the country, schools are cutting back on programs that teach hand skills, particularly woodworking. Faced with budget cutbacks, safety and liability concerns and visions of a computer-controlled future, many school districts are giving up on woodworking to focus on technology. The surviving shop classes will be the ones that engage and challenge students—no easy feat nowadays when so many forms of passive entertainment compete for teenagers' attention.

If you know of a shop program so engaging that it makes kids want to go to school, we'd like to hear about it. Send us a letter with the particulars and some snapshots. Mail it to "Notes and Comment" at the address in the box at right. *—A.F.*

Notes and Comment

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

Photo at left: Aimé Fraser; photo at right: Brad Sells

10% TO 20% OFF SUPER SALE

With **FREE** Shipping thru 8/31/96.
Good on any new blade or DADO purchase. *Must Mention Fine Woodworking!*

FREE $45 IN SHARPENING COUPONS

GOOD ON ALL FORREST OR *OTHER MAKES* OF CARBIDE BLADES OR DADO SETS. COUPONS EXPIRE 12-31-97.
Must mention *Fine Woodworking* for discounts, coupons & FREE shipping with purchase.

CHOPMASTER FOR SLIDING COMPOUNDS & MITER SAWS

New specs, 5° Neg. Pts. & flat, runs out less than .002 for perfect, tight, smooth, splinter-free miter joints. **TAKE EXTRA 10% – 20% OFF COMBO SALE!**

NEW SIZES AVAILABLE

	LIST	SALE
Delta Sidekick 6-1/2"x40Tx5/8"	$149	$ 89
Sears 8-1/4" & Delta 8-1/4"x60Tx5/8"	$170	$ 99
Hitachi 8-1/2"x60Tx5/8"	$179	$109
DeWalt 8-1/2" & Ryobi 8-1/2"x60Tx5/8"	$179	$109
Delta 9"x80Tx5/8"	$204	$119
Ryobi–Makita & all 10"x80Tx5/8"	$207	$129
DeWalt, Makita, B&D, Hitachi 12"x80Tx1"	$229	$139
Ryobi–Makita 14"x100Tx1"	$266	$179
Hitachi 15"x100Tx1"	$277	$189

For good general purpose cuts use Woodworker II 30T & 40T or Woodworker I. Use small stiffener where possible.

WOODWORKER I – For TABLE and RADIAL SAW

This trim and crosscut ALL PURPOSE blade gives scratch-free polished cuts on all materials RIP or CROSSCUT UP TO 2".

- ALL 60T AND 3/32" THIN KERF 30° ATB and 5° face hook on 10" diameter and under. 12" and 14" are 20° ATB 1/8"K.
- DOUBLE HARDER and 40% STRONGER carbide.
- THIN KERF: Saves 1/3 wood loss on each cut. radial or table. Feeds easy when used for moderate rip and crosscut on table saw. Reduces "JUMP IN" for better "PULL CONTROL." Practically eliminates bottom splinter on RADIAL CROSSCUT.
- Totally stops ALL bottom and top splinter on ply veneers in push-cut mode on RADIAL.
- Our STIFFENER STRONGLY RECOMMENDED AGAINST outside blade for best cuts. Made and serviced in U.S.A. for your benefit.

	LIST	SALE
14"x60Tx1" 1/8"K	$224	$159
12"x60Tx1" or 5/8" 1/8"K	$198	$139
10"x60Tx5/8" 3/32"K	$162	$129
9"x60Tx5/8" 3/32"K	$156	$119
8"x60Tx5/8" 3/32"K	$150	$109
NEW!		
8-1/4"x60Tx5/8" 3/32"K	$150	$109
7-1/4"x60Tx5/8" 3/32"K	$150	$109

RYOBI RA200
SEARS TS200
MAKITA 500B NBA
HITACHI PSM8
PORTER CABLE 368-1

SPECIAL COMBO SALE EXTRA 10%-20% OFF

BUY 1 BLADE OR DADO AT 10% OFF SALE PRICE, OR BUY 2ND BLADE AT 20% OFF (EQUAL OR LESSER VALUE) 15% OFF DADO AS SECOND CHOICE.

WOODWORKER II

With this one ALL PURPOSE blade you can RIP & CROSSCUT 1"–2" ROCKHAROS and SOFTWOOOS resulting in a **SMOOTH AS SANDED** surface. PLY-VENEERS of OAK and BIRCH will crosscut with NO BOTTOM SPLINTER at moderate feed rates.

- DOUBLE HARD and 40% STRONGER C-4 CARBIDE
- Ends blade changing
- Ends scratchy saw cuts
- Ends second-step finishing
- Ends cutting 1/16" oversize to allow for RESURFACING
- **BUY AND SHARPEN 1 BLADE INSTEAD OF 3**

5/8" holes, boring thru 1-1/4" add $7.50. Larger at Time Basis—Shipping $4.50

WOODWORKER II	LIST	SALE	10%	20%
14"X40TX1"	$215	$149	$134	$119
14"X30TX1"	$195	$139	$125	$111
12"X40TX1"	$183	$129	$116	$103
12"X30TX1"	$162	$119	$107	$ 95
10"X40TX1/8" or 3/32"	$156	$119	$107	$ 95
30T 1/8" or 3/32"	$135	$ 99	$ 89	$ 79
9"X40T	$146	$109	$ 98	$ 87
30T	$125	$ 99	$ 89	$ 79
*8-1/4"X40TX 3/32"	$136	$ 99	$ 89	$ 79
8"X40T 3/32"	$136	$ 99	$ 89	$ 79
30T	$115	$ 89	$ 80	$ 71
7-1/4"X30T 3/32"	$112	$ 69	$ 62	$ 55
**6"x40T 3/32"	$136	$ 89	$ 80	$ 71

*NEW for Sears & Makita Table Saws **New For Saw Boss

THE ONE BLADE THAT LEAVES A SMOOTH-AS-SANDED SURFACE!

BUY OUR BEST SELLER 10" X 40T FOR ONLY $107 OR $95 ON SECOND BLADE.

RECEIVE WITH EVERY FORREST BLADE OR DADO LISTED, 9 SHARPENING COUPONS WORTH $5.00 EACH!

ONLY **$62 or $50** NET COST TO YOU AFTER USING SHARPENING COUPONS

Outperformed 36 other premium blades, both foreign and domestic! WOOD® Magazine test, Sept. '93, pg. 45

TRY A FORREST CARBIDE BLADE TODAY!

> I just purchased your WOODWORKER II 3/32 blade, and I AM TICKLED PINK with it. My RYOBI BT 3000 saw acts like it had a 3 H.P. motor in it. Cuts so much easier and quieter and smoother. Don't need my jointer or sander now.
>
> **P. Rose, PA**

> After installing your blade and 5 in. stiffener the vibration in my saw went down another 20%. I ran several pieces of hardwood through the saw, both crosscut and ripping, and was amazed at the smoothness. It was like cutting butter, maybe smoother. I have never had a saw blade that cut this smooth.
>
> I also am going to send you my old Craftsman blade to sharpen. I'm not satisfied with our local sharpening. Now, how to justify another one of your blades....because I don't ever want to be without one.
>
> **Rick Price**

NEW DELUXE DADO-KING

AS LOW AS $184 NET AFTER USING SHARPENING COUPONS

C-4 Carbide Tips–4 on each chipper with special negative face hooks.

	List	SALE	10%	15%
6" D. 5/8" Bore **NEW**	$299	$269	$242	$229
8" D. 5/8" Bore	$321	$289	$260	$245
10" D. 5/8" & 1" Bore	$389	$349	$314	$297
12" D. 1" Bore	$499	$449	$404	$382

(Bore up to 1-1/4" Add $25 — Plus $5.50 S&H)

DURALINE HI-A/T FOR TABLE & RADIAL SAWS ALL FLAT FACE

5/8" HOLES. Boring up to 1-1/4" $7.50 extra. Larger holes–time basis. Shipping $4.50.

Faster feed rates & absolute splinter control. Stops splintering on OAK/BIRCH PLY VENEERS & MELAMINE

SIZES AVAILABLE	LIST	SALE
7-1/4"x60Tx3/32" K	$149	$129
8"x80Tx1/8" & 3/32" K	$202	$169
9"x80Tx1/8" & 3/32" K	$207	$179
10"x80Tx1/8" & 3/32" K	$207	$159
12"x80Tx1-1/8"K	$212	$181

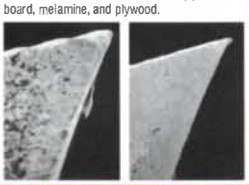
SIZES AVAILABLE	LIST	SALE
12"x100Tx1-1/8"K	$253	$215
14"x80Tx1"	$232	$197
14"x100Tx1"	$266	$226
16"x80Tx1"	$262	$223
16"x100Tx1"	$294	$243

Above 1" bore standard.

SPECIAL COMBO SALE EXTRA 10%-20% OFF

CARBIDE IS THE HARDEST OF THE C-4 GRADES AND 40% STRONGER, NOT WEAKER! FOR 50% TO 300% LONGER LIFE.

Standard C-2 Carbide (below, left) and FORREST **still sharp** Oxidation and Corrosion Resistant Sub-Micron C-4 Carbide (below, right). Each shown after cutting 3,500 feet of MDF. Similar results obtained cutting particle board, melamine, and plywood.



STILL SHARP AFTER 3,500 FEET OF CUTTING!

BLADE DAMPENERS-STIFFENERS

FOR BETTER CUTS on all brands of blades, use our large 1/8" DAMPENERS-STIFFENERS against one side.

- **Parallel and flat to .001**
- **Stop vibration, flutter, cutting noise, and blade ring**
- **Tryable and returnable for full cash refund.**

4"	$21
5"	$24
6"	$25

7" AND LARGER AVAILABLE
FULL RANGE OF OTHER INDUSTRIAL SIZES
REDUCES NOISE 50%–75%

WE RECOMMEND OUR FACTORY SHARPENING as some local sharpening creates problems with **MICRO-CHIPPED EDGES** reducing blade life & cutting quality. 3-5 DAYS ON THESE AND ALL MAKES OF FLAT FACE & CONCAVE CARBIDE TIP SAWS. Ship via UPS. Typical 10x40T $17.00, 60T $19.00. Add return UPS $5.00, $1.00 each additional blade.

FOR SPECIAL PRICE COUPONS AND FREE SHIPPING MENTION *Fine Woodworking* MAGAZINE.

We honor AMEX, VISA, MasterCard & Discover, Money Orders, Personal Checks, and COD's. Specify Dept. FW when ordering.

PHONE TOLL FREE! (800) 733-7111
(In NJ: 201-473-5236) FAX: 201-471-3333

Quality is why we're different!

FORREST

(800) 733-7111

BUSINESS OPEN ACCOUNTS AVAILABLE

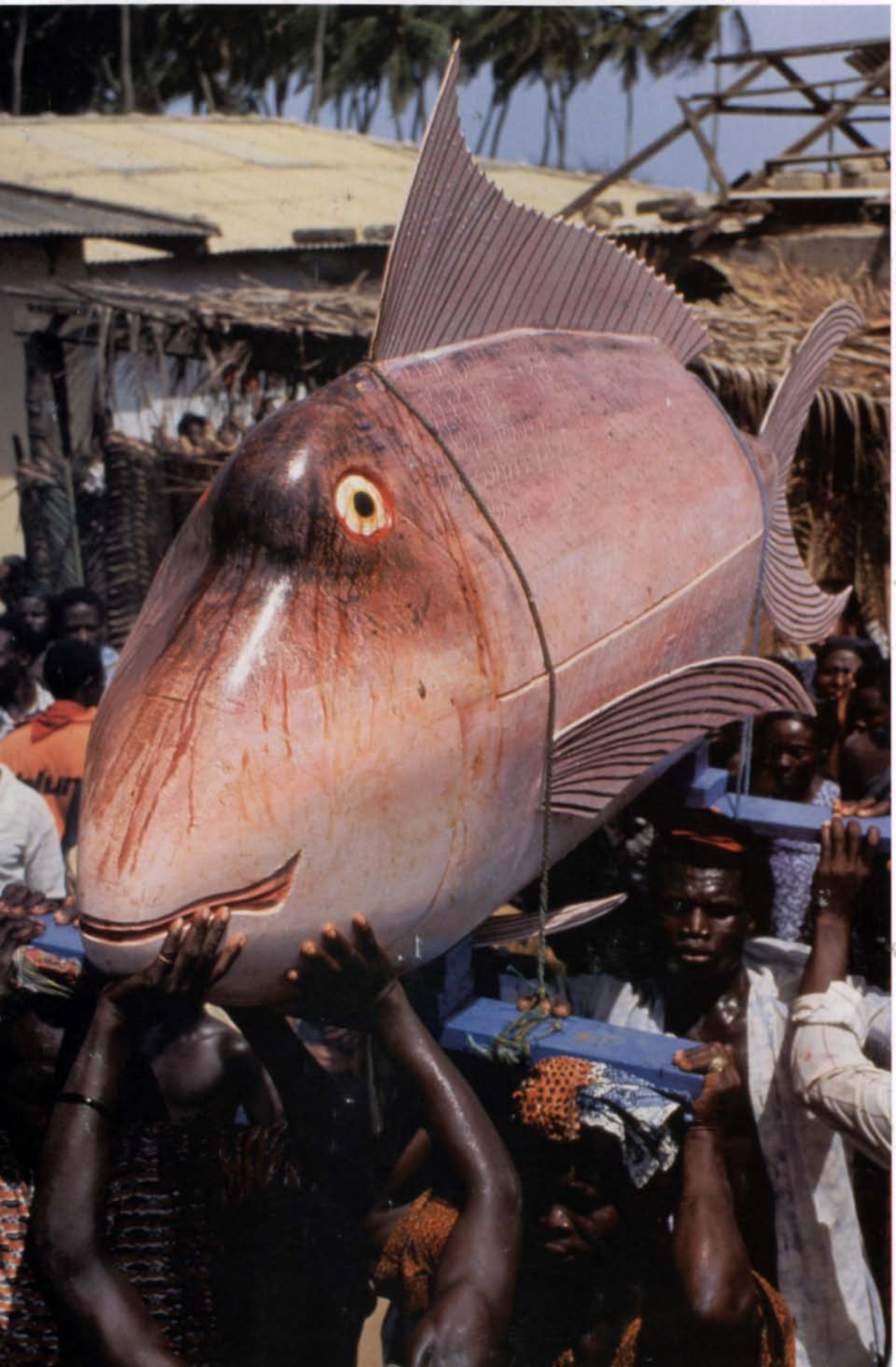
CA, FL, NJ, NY, PA Residents Please Add Sales Tax
SATISFACTION GUARANTEED OR FULL CASH REFUND.
Fine American saw making & sharpening since 1946.

DEALER INQUIRIES WELCOME

FORREST MANUFACTURING COMPANY, INC. • 461 RIVER ROAD, CLIFTON, NJ 07014 • FAX (201) 471-3333

READER SERVICE NO. 98

Coffin Makers of Ghana



Passing on to your reward can be almost festive in the west African nation of Ghana, provided your family can afford the services of one of the country's talented coffin makers. The made-to-order wooden coffins are carved and painted to reflect a person's lifetime passion—whether that's fishing, farming or trucks. Coffin makers have plenty of orders, despite the $2,000 price tags on some of their creations. Among the titans of the industry is Paa Joe of Teshi, who made the coffins shown here, including the fish built for the body of a deep-sea fisherman.

Photos: Carol Beckwith and Angela Fisher