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Fine WoodWorking

April 1996, No. 117
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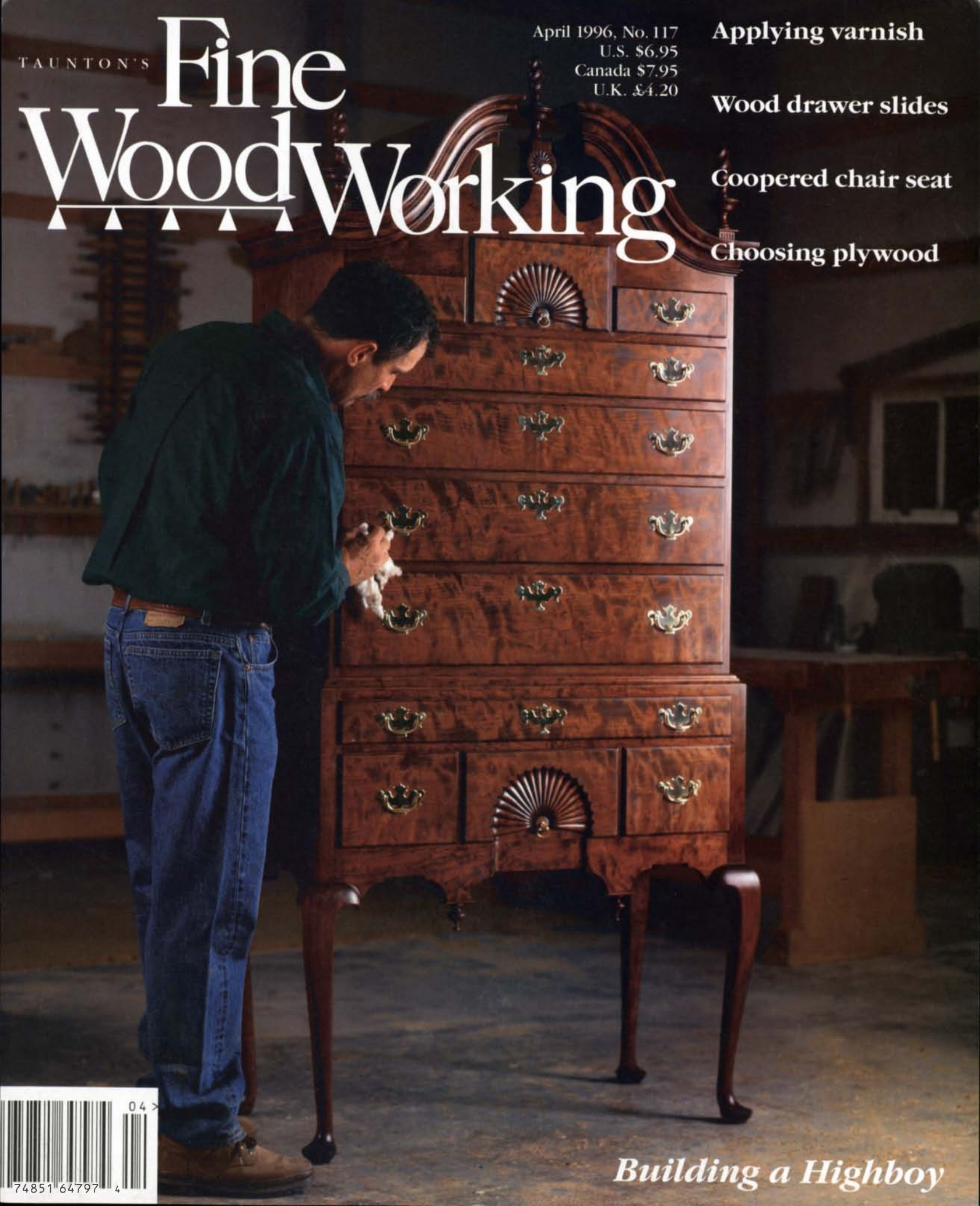
Wood drawer slides

Coopered chair seat

Choosing plywood



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Fine WoodWorking®

DEPARTMENTS

Making a case for varnish, p. 52

On the Cover:
Randall O'Donnell's highboy in curly cherry is an American classic. The first of three articles detailing construction of this piece, beginning on p. 80, covers the highboy's base. Photo: Boyd Hagen

Coopering a chair seat, p. 60

Making wood drawer slides, p. 56

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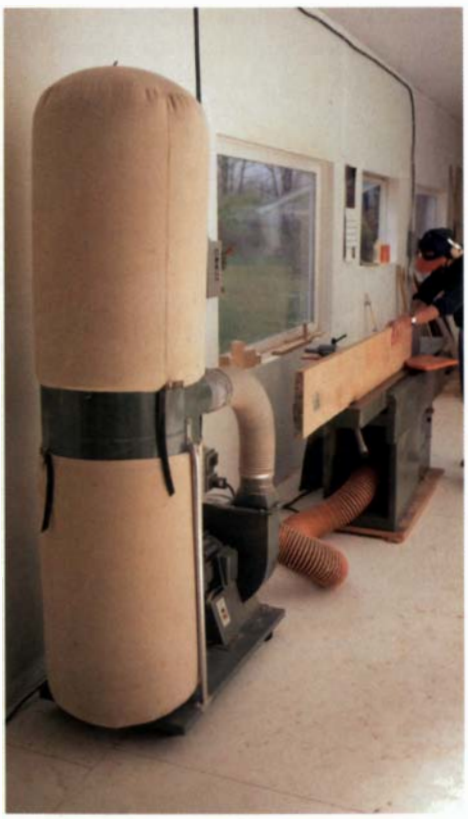
March/April 1996 No. 117

ARTICLES

Drawer design strategies, p. 45



Small-shop dust collection, p. 66

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

Yes, this issue is different—For 20 years, the dimensions of a printed page in *Fine Woodworking* have remained essentially unchanged. With this issue, we lose ⅞ in. in height. If you've been a subscriber for a while, you'll notice the difference when you put this issue on the bookshelf and find that it doesn't line up with the others.

In 1975, when the magazine was first published, there were several printers in the United States capable of printing its oversized pages. Now there is one. A press failure, a fire or any one of a dozen other calamities at the printer could be a disaster for us as well. Postage and paper costs are another reason. Both have gone up dramatically. Even though we're ⅞ in. shorter, we hope that you find *Fine Woodworking* no less useful.

—Scott Gibson, editor

Hydrocote users reply—After reading Chris Minick's evaluation of waterborne finishes (*FWW* #115, pp. 48-53) and the letter from Hydrocote protesting the low grade given Hydrocote Equal in the following issue, I felt I had to write.

I used Equal when it first came out. I experienced problems with poor heat- and water-resistance. A few of the musical instruments I made stuck to their cases by the time the customers got home. Although this was a pain, it was small compared to the problem an acquaintance had. He used the stuff on a whole set of kitchen cabinets and then had to refinish them, free, when they all clouded over.

A phone call to Hydrocote resulted in assurances that the problem had been noticed and the formulation changed, and it sounds as though the company has continued to change the formulation. But why weren't these problems noticed before Hydrocote started selling the stuff over the counter? And if the first batch or two had these problems, why didn't the company recall them? And if it didn't recall them, why complain if someone actually does buy a gallon for review?

For a year, I went back to shooting mostly Behlen's Rockhard Tabletop varnish. It may not meet clean air standards, but at least I know exactly what it's going to do.

—Nicholas Blanton, Shepherdstown, W. Va.

I've used water-based finishes for six years, and I've tried many brands. I have found the full line of Hydrocote products the best ever. I'm now a distributor.

Chris Minick states that Resisthane outperformed Equal and was more expensive. The absurdity of his conclusion is obvious to anyone familiar with wood finishes because he virtually compared apples to oranges. Resisthane is a poly/acrylic, and Equal is an acrylic finish.

Moreover, Mr. Minick's article failed to compare cost. Equal is one of the least expensive finishes. Two of the three finishes that ended up at the top of the list retail for more than twice as much.

I would never recommend that anyone use mineral spirits to wipe away dust between applications of a water-based finish as Mr. Minick did. You are only asking for problems. A rag dampened with water works just fine.

—A.J. Vincolisi Jr., Custom Wood Supply, Inglewood, Calif.

Two views of Johnny Grey kitchens—Do I have to be the one who cries, "The emperor has no clothes"? The article on the kitchens of Johnny Grey (*FWW* #115, pp. 93-97) features a kitchen that has got to be the most obnoxious, gaudy and outright disturbing room I have ever seen. I have shown the article to at least 30 people, and the responses have ranged from outbursts of laughter to a painful loss of equilibrium.

Individual pieces taken on their own are not so offensive. But when I looked at the whole, I am left wondering whether Mr. Grey has been the victim of an alien abduction or is having groovy flashbacks of the '60s.

—Steve Anthony, Santa Barbara, Calif.

Outstanding! Something out of the ordinary for kitchen-cabinet design and con-

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.

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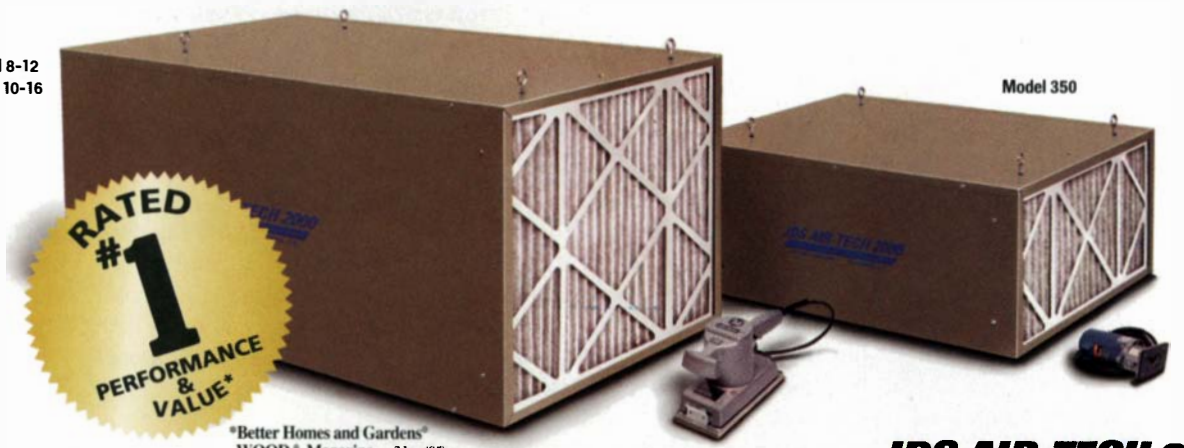

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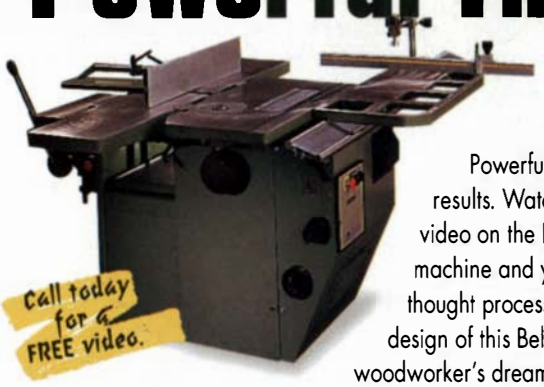

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struction. As an industrial designer and woodworker, I was glad to see some innovative alternatives to the same old kitchen. Great to see designs and work from craftsmen outside the United States. Many thanks for the Johnny Grey story.
—Christopher Ryan Farrel, Westport, Conn.

Beware of orchard woods—I read Jon Arno's article on orchard woods (*FWW* #115, pp. 66-69) with great interest. I've always thought that wood of various fruit trees would be excellent for carving or building furniture.

I did not, however, see any mention of a serious health hazard associated with orchard woods—residual pesticides. A member of a wood-carving group I belong to visited a commercial decoy company that had tried using wood from nearby apple orchards. The employee working the milling machines became very ill and was out for about three weeks.

It seems the trees absorbed insecticides, and milling the wood created contaminated dust. Woodworkers attempting to salvage orchard woods should be aware of the health hazards.
—Gerald A. Dominick, Summerville, S.C.

The scoop on cleaning teak—Aimé Fraser has it all wrong on commercial teak cleaners ("Questions and Answers," *FWW* #115, p. 36, 38). Hydrochloric acid is not an ingredient of any of them. The two-part cleaners all use a strong alkali (sodium hydroxide or potassium hydroxide) to dissolve the stain along with some of the wood. Phosphoric acid neutralizes the alkali.

Born a parsimonious Connecticut Yankee, I resist paying fancy prices for cheap ingredients. I developed my own. Part A is a 12-oz. can of lye ($1.75) dissolved in three pints of water. Part B is a gallon of vinegar ($1.75). This combination is equivalent to approximately $25 worth of commercial cleaner.

The concentrated alkali solution of the two-part cleaners is a most hazardous material. Once on tissue, it is very difficult to wash off because it reacts so rapidly. It is most dangerous to the eyes. Always wear at least safety glasses and rubber or plastic gloves.

In my experience, household bleach diluted with an equal part of water works as well if you give it a little more time. I recommend that Perry Wydman clean his teak furniture with diluted bleach, wash with water and wet it down with auto antifreeze, which seems to prevent fungus growth.
—David W. Carnell, Wilmington, N.C.

Folding rule's hidden danger—I take exception to James Vint's comments on using a folding rule for inside measurements (*FWW* #115, p. 8). Several years ago, I talked with a cabinetmaker who had measured a kitchen for new cabinets, made them and found on installation at least one cabinet 6 in. short of the required space. Somewhere along the way, a section of folding rule had broken off, leaving his ruler 6 in. short. He never again used a folding rule.
—Orv Dunlap, Garland, Texas

Don't sell old planes short—Sven Hanson's article on planes (*FWW* #112, pp. 40-44) was well-written and illustrated. There were, however, what read like disparaging comments concerning antique wooden planes.

Except for my 10-year-old Stanley block plane, all of my planes are antique, warm and wooden; they are flat and razor-sharp. On a friendly wood like butternut, I can plane a shaving 4 ft. long, as wide as the blade and thin enough to read through. With a shooting board, I can quietly plane an edge as square as any $1,000 jointer can.

I doubt Mr. Hanson meant any disrespect. Unfortunately, such apparent condescension only contributes to the shameful attitude that it is best to discard the old and traditional—yet still very useful—be it a plane, an idea or a person.
—Randall J. O'Malley, Bramalea, Ont., Canada

More on Japanese chisels—Your December issue contained a feature on preparing Japanese chisels (*FWW* #115, pp. 58-61). There was, however, one important step missing. I would also like to suggest a modification to the sequence.

After mushrooming the handle, my next step is to flatten the back and then polish to a mirror finish on a 6,000-grit waterstone. Then I check the tip for squareness before grinding the bevel in case adjustments need to be made. If you grind the bevel, then flatten the back, you sometimes end up back at the grinder to correct the trueness, which is an inconvenience.

Also, instead of dealing with lacquer thinner for removing the finish on a new handle, a quicker method is to use a scraper.
—Anatole Burkin, Tacoma, Wash.

Leigh manual a big improvement—Thanks for your review of the new instruction manual for the Leigh D3 dove-

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tail jig (*FWW* #115, p. 106).

It's great! The manual is large (166 pp.), and it's extremely comprehensive. Its innovative presentation, excellent illustrations and clear, easy-to-follow instructions make setup and use of the jig as easy as turning a page. The new edition should serve as a model for other equipment manufacturers.

—Ben Helprin, Los Gatos, Calif.

McGuffy Ash lives on—You folks might be interested to know that the Virginia Department of Forestry has several grafted "McGuffy Ash" trees in one of our seedbeds at the New Kent Forestry Center in Providence Forge, Va. (for more on the McGuffy Ash, see *FWW* #115, p. 130).

We collected scions (branch tips) from the tree in Charlottesville when we saw the tree was near death and grafted them onto healthy seedling root systems. Plans are to return one or more of these grafted trees to the University of Virginia campus as soon as they are large enough to move and we are confident that the plants will continue to grow without any health problems.

—Bill Apperson, Dept. of Forestry, Williamsburg, Va.

Selecting a jointer—Your report on 6-in. jointers by Charley Robinson (*FWW* #115, pp. 82-87) appeared just in time. It convinced me that I would be dissatisfied with the quality of a Taiwan-produced machine, so I ordered Delta's DJ-15 6-in. jointer. The machine looked great, but when I ran my first 8-ft.-long board through, the edge showed a severe concave surface. After making several adjustments and trial cuts with no luck, I discovered the tables were out of parallel by about .10 in. The machine also had a serious vibration problem.

I called the nearest authorized service center (60 miles away) and the consensus was to bring the machine in for repair. I decided to document the serial number before I did. Imagine my surprise and disappointment in discovering fine print on the jointer's label that read, "Made in Taiwan." Apparently Delta makes only the base and motor in the United States. The jointer itself is made in Taiwan.

After repairs, the jointer still vibrates as badly as ever, and it still won't joint a straight edge. I'm in the process of returning the jointer to Delta and will continue my search for a quality machine. I should have kept my old Craftsman—it worked.

—Leo D. Reynolds, Cedaredge, Colo.

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

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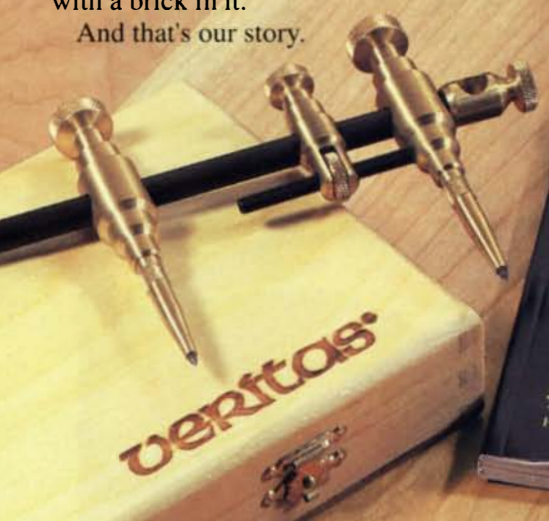

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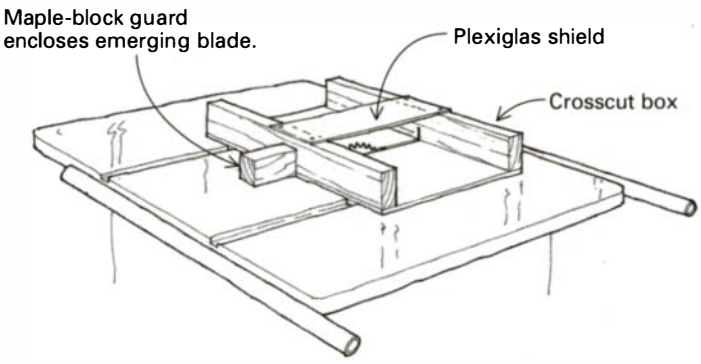
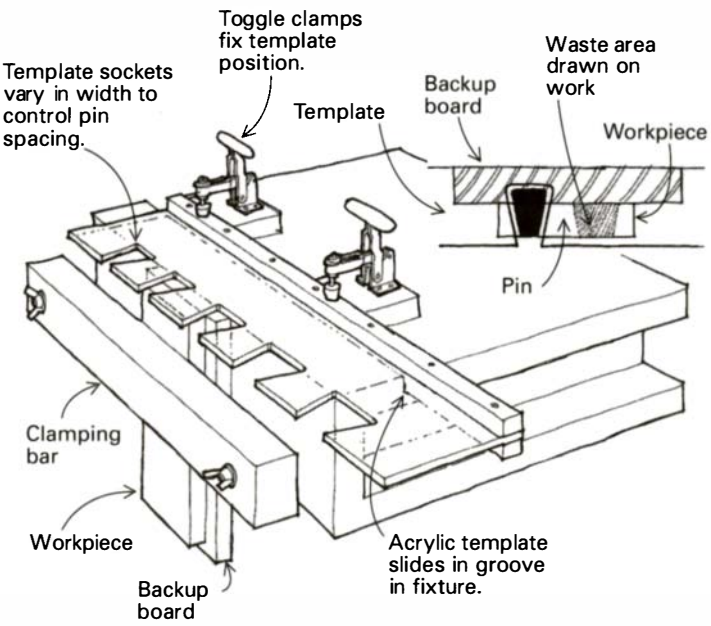


A sliding crosscut box is a big help when working with small pieces of stock on a tablesaw. But the sawblade emerges suddenly from the rear of the box at the end of a stroke just where your fingers could be. This hazard is greatly reduced by adding a hard maple guard (I painted mine red) to the jig where the blade emerges. When the jig is at the end of its stroke, the blade is still safely within the maple block. My guard is held by screws through the back fence. I also added a Plexiglas shield over the blade.

—Michael A. Covington, Athens, Ga.

Router fixture for dovetail pins



Rout pins with ¼-in. straight bit and bushing.

My variation on routing dovetails involves cutting the pins with a router equipped with a ¼-in. straight bit and a bushing that follows an acrylic template.

I mark the pins on the edge of the workpiece, and clamp the work to a fixture made of 1⅛-in. particleboard. For through dovetails, sandwich a sacrificial piece of scrap between the work and the fixture to prevent tearout in the workpiece and damage to the fixture. For blind dovetails, clamp the work directly to the fixture.

Slide the template into position over the workpiece. The template controls the spacing between the pins. I've cut several opening sizes on mine. They vary the pin spacing between ¾ in. and 2¼ in., in ⅛-in. increments, depending on the bushing. For accuracy, make the template's angled cuts on the tablesaw.

Clamp the template into place with two toggle clamps, as shown. Set the router to the desired depth, and remove the material between the first two pins. Loosen the clamps, and reposition the template by eye to the layout lines for the next cut. It takes less than 5 minutes to cut the pins on one edge of a typical drawer. When cutting half-blind dovetails, the router bit leaves rounded inside corners that must be cleaned up with a chisel.

To complete the joint, I mark the tails from the pins and cut to the lines with a bandsaw. I chop out the waste with a chisel.

—Jim Hale, Saline, Mich.

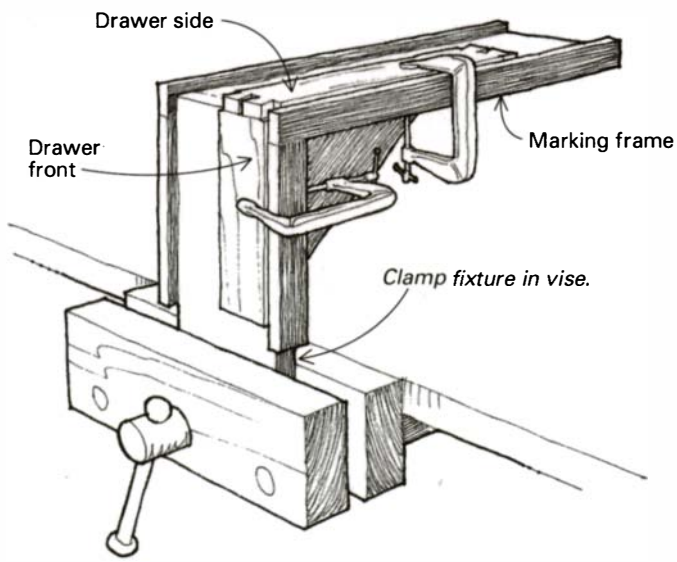
Use a drywall screw to tap holes for hinges

I recently made a pair of display cabinets that required many solid-brass hinges. To avoid breaking the soft brass screws, I drilled pilot holes and coated each screw with wax before installing. Nonetheless, I hadn't gone far before I broke the first screw.

As I fumed over the task of retrieving the stub of the broken screw, I got the idea of tapping the screw holes. I ground the Phillips head off a 2-in. drywall screw, filed flats in the shaft to give my drill a gripping surface and began tapping the holes with my reversible drill. I completed the project, which contained 12 doors, without breaking another screw.

—Robert F. Reynolds, Columbia, Md.

Marking frame for hand-cut dovetails



Inspired by the tool cabinets featured in *FWW* #105, I decided to construct a cabinet for my own tools. Because the design called for eight hand-dovetailed drawers, I needed a quick way to transfer

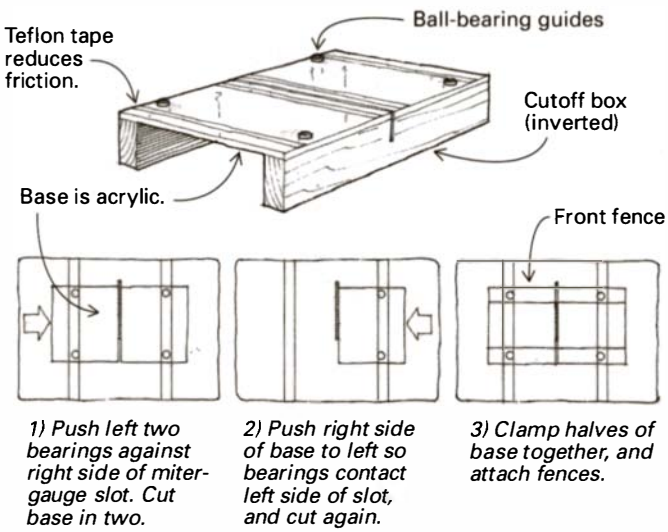
the dovetail layout from the drawer side to the drawer front. I also wanted to ensure that the edges of the top and sides were in the same plane to eliminate any twist in the assembled drawer. So I built a simple right-angle frame with short fences on both edges. This frame allows me to align and clamp the two pieces to be marked. The frame keeps them in perfect registration.

–Alan Cleven, Pointe Claire, Que., Canada

Quick tip: To speed up planing chamfers with a block plane, cock the blade so that one side cuts coarse shavings and the other fine. Use the coarse side to rough out and the fine side to finish up.

–Tony Konavaloff, Bellingham, Wash.

Ball-bearing guides for tablesaw cutoff box



The wooden puzzles I make require safe, accurate cuts of small pieces of wood. That's why I designed this cutoff box that uses ball-bearing guides, an acrylic base and Teflon tape.

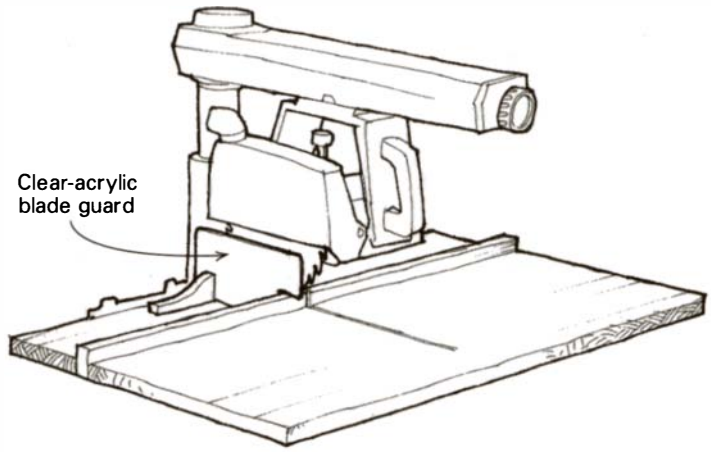
Start with a 12-in. by 24-in. piece of ½-in.-thick acrylic. Drill four holes, and install bolts for bearing axles. Space the axles in pairs a distance equal to the center-to-center spacing of your saw's miter-gauge slots. The bearings don't need to be precisely located at this stage.

With the bearings mounted, flip the base so the bearings are in the saw's miter slots. Push the acrylic base to the right to cause the two left-hand bearings to contact the right edge of the left miter-gauge slot. Saw the base in half. Repeat this step for the right half of the base, but this time, push it left so that its two bearings contact the left side of the saw's right miter-gauge slot. You now have two pieces of acrylic separated by a sawkerf when the bearings are against the inboard edges of the miter-gauge slots.

Attach the front and back fences to the base using 4-in.-long bolts and washers in oversized holes to provide adjustment. Hold the base on the saw table with bar clamps while you're attaching the fences so you locate the bearings properly. To complete the box, add strips of Teflon tape to the underside of the acrylic base along both sides of the sawkerf and outside of each miter-gauge slot.

Use quick-action clamps to hold workpieces safely in place during cuts. Be careful that you don't push the box too far past the blade because the box will lose lateral stability. However, stops clamped to the back side of the saw will prevent the bearings from coming out of the miter-gauge slots.*–Wayne Daniel, Minden, Nev.*

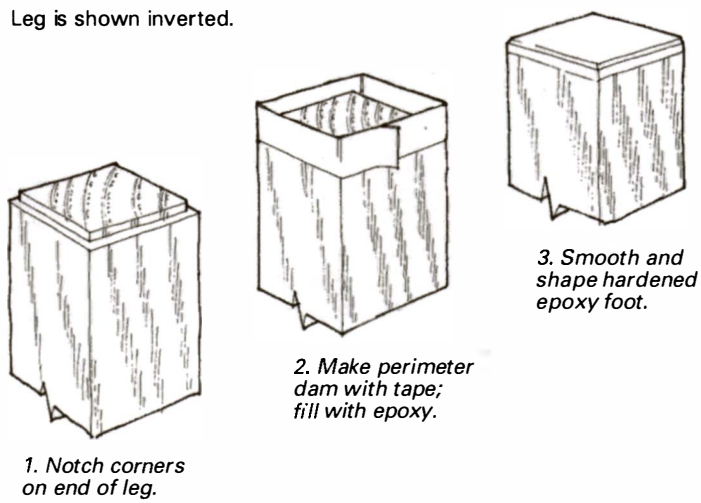
See-through guard for a radial-arm saw



A simple guard made from acrylic plastic, screwed to the radial-arm saw table just to the left of the blade, protects the fingers of your left hand (see the drawing above), yet it still allows you to see the blade clearly. The idea for this guard occurred to me while crosscutting a run of face-frame stock. I noticed that as I slid boards past the carriage with my left hand, one moment of inattention might put my fingers into the spinning blade. With my new windshield guard in place, my hand would hit only the plastic.

–Paul K. Murphy, San Jose, Calif.

Weatherproofing outdoor furniture feet



Last winter, I built a bench destined for a flagstone porch—a place that can pick up a bit of weather. To prevent the bench legs from wicking moisture and marking the flagstone floor, I devised this method of casting an epoxy cap on the end of each leg

Before assembling the bench, I notched the perimeter of each

foot by cutting a ⅛-in.-deep rabbet with the tablesaw. Then I placed the leg in a vise, foot up, and leveled the bottom in both directions. I wrapped ¾-in.-wide masking tape around the foot to make a dam. Using West System epoxy, I wetted the bottom of the leg thoroughly with clear epoxy. Then I poured thickened epoxy over the bottom of the leg until the entire foot was covered at least ⅛ in. deep. The addition of the thickener (West System No. 406) is necessary because pure epoxy would be too brittle by itself and would chip or crack. After the epoxy hardened, I peeled away the tape and flattened the epoxy with a sander and a file.

This technique could be used on the legs of any wooden outdoor furniture and might even negate the need to add felt or plastic feet on indoor furniture, especially chairs used on a hardwood floor.

–Douglas A. Mirk, Islesboro, Maine

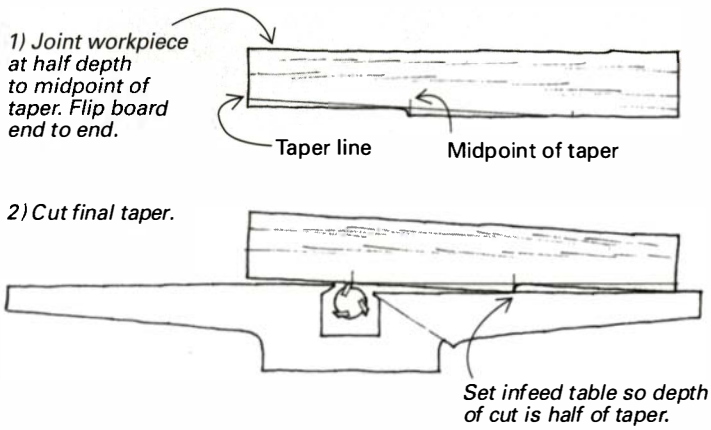
Polystyrene makes inexpensive pattern material

The pattern material I use for the chairs I build is white, high-impact polystyrene, available from plastic distributors. I get the .040-in.-thick material in a 40-in. by 72-in. sheet for about $13.

To cut a straight or curved line, just score the surface with a sharp X-Acto knife, and bend the plastic at the line. It will snap cleanly. To cut a rectangular opening, score the outline, bend the line back and then forward. The plastic takes pencil lines and erasures well and cements together easily with acrylic solvent cement, which makes it ideal for scale-model work. The material becomes brittle after a number of years, but this is a minor disadvantage.

–Edward S. Koizumi, Oak Park, Ill.

Tapering on the jointer, revisited

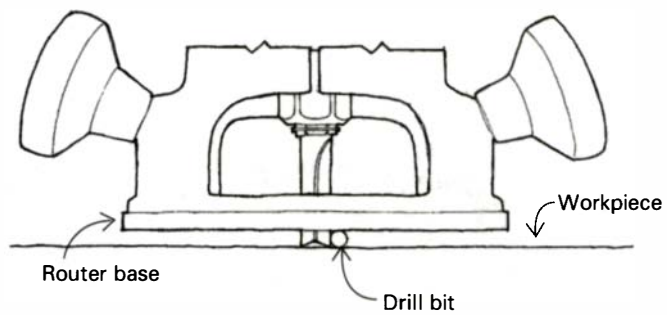


Here's another jointer-tapering method to add to those presented by Chris Becksvoort in *FWW* #112 (p. 32). First, make sure that the infeed and outfeed tables on your jointer are long enough to support the work the whole way through the taper. Second, your jointer should be heavy-duty, tuned and able to handle a hefty, ¼-in. cut.

Draw the taper on the workpiece. Mark the midpoint of the taper, and set the jointer for half the depth of the taper. So if your taper is ½ in. over 22 in., you would set the jointer at ¼ in., and mark the workpiece at 11 in. Push the end to be tapered into the cutterhead until the cut reaches the halfway mark on the piece. Reverse the workpiece, and with the two points resting on the infeed table, make another pass to cut the taper. Because of the heavy cut, push the workpiece through slowly and carefully. The results will be quite consistent from piece to piece.

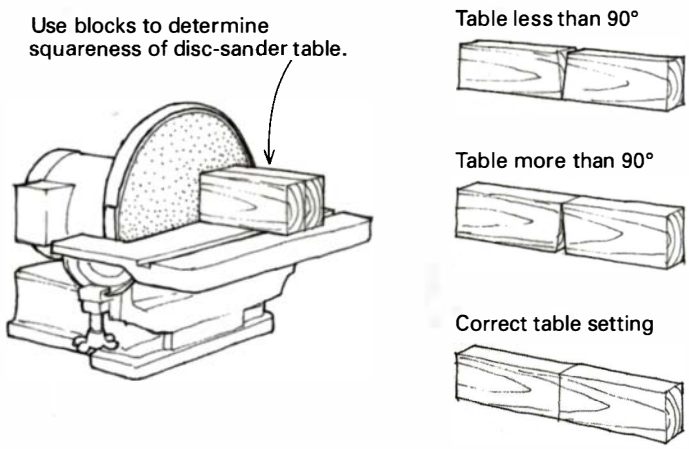
–Edwin C. Hinkley, Provo, Utah

Using drill-bit shanks as depth gauges



Twist-drill bit diameters are exact, so a drill laid on its side can be used to set a plunge router to an accurate depth. Put the bit on a flat surface, rest the router base on it, extend the cutter to touch the surface and lock the depth stop.*–Percy Blandford, Stratford, England*

Squaring the table on a disc sander



To get dead-square results from your disc sander, take a 2x4 about 1 ft. long, joint one edge and cut the block in half. After sanding the ends of the blocks, as shown in the drawing, bump both blocks together on a flat surface, end to end as they were originally. If there is a gap between the top of the blocks, the sander's table is set at less than 90°. If there is a gap between the bottom of the blocks, the sander is set at more than 90°. Adjust the sander's table, and repeat the process until you've removed any daylight from the joint.

–Kirt Kirkpatrick, Albuquerque, N.M.

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Model	Description	List	Sale
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23-680	6" Bench Grinder 1/4 HP	86	69
23-680	8" Bench Grinder 1/2 HP	151	115
11-950	8" Drill Press	199	128
28-180	10" Hobby Band Saw	210	135
31-050	1" Belt Sander 2.0 amp	104	75
31-460	4" Belt/6" Disc Sander	198	129
31-340	1" Belt/8" Disc Sander	266	204
31-080	1" Belt/5" Disc Sander	134	89
40-560	16" 2 speed Scroll Saw	268	169
40-530	NEW 16" Scroll Saw	153	115
11-990	12" Bench Drill Press	276	184
11-090	32" Radial Bench Drill Press	399	305
43-505	1/2" Bench Router/Shaper	399	295
22-540	12" Bench Top Planer w/ extra knives	595	385
36-220	10" Compound Mitre Saw	350	215
14-650	Hollow Chisel Mortiser	668	285

NEW TOOLS BY DELTA

23-710	NEW Sharpening Center	210	185
11-980	NEW 10" Bench Drill Press	186	149
33-060	NEW "Side kick" Miter saw	510	389
14-070	NEW 14" Floor Drill Press	450	349
28-185	NEW Bench Band Saw	232	185
40-640	NEW 20" Bench Scroll Saw	466	295
28-190	NEW 12" Band Saw w/ stand	485	395
20-150	NEW 14" Cut-off Saw	375	219
36-090	NEW 10" Sidekick Miter Saw	293	225
37-070	NEW 6" var. speed Bench Jointer	337	258
37-190	NEW 6" Deluxe jointer	554	479
36-275	NEW 8-1/4" Builders Saw	444	265
36-210	NEW 10" Compound Mitre Saw	438	255
36-070	NEW 10" Mitre Saw	284	165
36-830	NEW 10" Contractors Saw II	700	579
34-555	NEW Sliding Table	459	289
36-250	NEW 10" Slide Compound Saw	Sale	489
36-230	NEW 12" Compound Mitre Saw	480	359
31-695	NEW 6" Belt/9" Disc Sander	441	379

DELTA STATIONARY

17-900	16-1/2" Floor Drill Press	462	415
40-601	18" Scroll Saw w/stand and blades.	1003	819
34-080	10" Mitre Box	Xtra Special	194
33-990	10" Radial Arm Saw	818	695
37-280	6" Motorized Jointer	488	389
50-179	3/4 HP 2 stage Dust Collector	483	358
43-355	3/4" Shaper 1-1/2 HP	964	795
46-700	12" Wood Lathe	548	449
33-055	8-1/4" Sawbuck comp with legs	865	629
36-540	10" Table saw	210	169
34-670	10" Motorized Table Saw	511	395
32-100	Stationary Plate Jointer	645	255
36-040	8-1/4" Compound Mitre Saw	224	149
38-905	30" Unifence	385	249
36-906	50" Delta Unifence	525	305
36-755	10" Tilt Arbor Saw	1264	1039
33-890	12" Radial Arm Saw	1829	1495
14-040	14" Bench Drill Press	362	345
28-560	16" Three Wheel Band Saw	487	445
28-245	14" Band Saw w/open stand 1/2 HP.	719	598
34-444	Table Saw w/1-1/2HP motor & stand	812	659
34-445	34-444 Saw with 30" unifence	1200	829
	above saw comes with mobile base		
28-283	14" Band Saw w/enc stand 3/4 HP	910	779
28-280	14" Band Saw w/ enc stand 1 HP	1100	798
	above saws come with mobile base & fence		
22-661	13" Planer with stand 2 HP	1513	1239
22-675	NEW DC380 15" Planer	1439	1275
37-154	DJ15 6"Jointer w/ mobile base	1451	1239

DEWALT TOOLS

DW945K	3/8" 12V cdlss drill kit w/cs & 2 batt.	309	185
DW364	7-1/4" Circ. Saw w/brake, 13 amp	285	158
DW306K	8.0 amp Recip Saw w/case var. spd	291	184
DW610	1-1/2 HP 2 handle Router	274	149
DW411	1/4 sheet Palm Sander, 1.7 amp	97	58
DW705	12" Compound Mitre Saw	706	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.	169	94
DW254	4.5A Drywall Gun, 0-2500 rpm, rev.	169	94
DW280K	NEW Screwdriver kit complete	207	124
DW402	4-1/2" Grinder 6 amp	158	92
DW682K	Biscuit Joiner with case	429	219
DW815	1-1/4 HP Elec. PIge Router	290	164
DW825	3 HP Electronic PIge Router	511	275
	Above router comes with Free DW6966 Fine depth adjustment !		
DW875K	3-1/8" Planer with case	289	164
DW431	3 x 21 var. speed Belt Sander	331	184
DW420	Palmgrip Random Orb Sander	120	69
DW421	above Sander with dust collector	138	74
DW423	NEW Palm Random Orbit Sndr v/spd	170	99
DW930K	12 volt 5-3/8" Trim Saw kit	370	199
DW444	6" Random Orbit Sander - PSA pad	268	139
DW443	DW444 with hook & loop pad	268	139
DW935K	NEW 14.4 volt 5-3/8" Trim Saw kit	444	237
	DW935K Saw comes with 2 batteries!		

NEW DEWALT CORDLESS DRILLS

DW952K	3/8" v/spd incl. two 9.6V batteries.	280	145
DW962K-2	3/8" v/spd incl. two 9.6V XR batt	324	179
DW972K-2	3/8" v/spd incl. two 12V XR batt	352	189
DW904	12 volt flashlight		29.95

DW972K-2 drill & DW904 flashlight Sale 205

DW944KQ	1/2" v/spd incl. one 14.4V XR batt	450	235
DW944KQ-2	DW944KQ drill kit w/ 2 batteries	Sale	259
DW991K	3/8" v/spd inc. one 14.4V XR batt	370	199
DW991K-2	above drill with 2 batteries		225
	Above drill kits come w/charger & steel case !		

DW991KS-2 DW991K drill, DW935 saw, &case.... 339

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 speed "Best buy"	302	174
1895	16" var. speed Scroll Saw	408	229
290	Electric Engraver with point	25	16
1731	5" Disc1" 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	58.50
#2/0	7"	3-1/2"	18.30	10.70	80.95
#0	8"	4-1/2"	20.35	12.10	68.95
#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	24.85	140.95

STYLE 3400 NEW E-Z HOLD II

Model	Opening	List	Sale	Lots of 6
3410	10"	15.95	11.95	59.95
3416	16"	17.20	12.75	85.95
3422	22"	18.40	13.25	71.00
3428	28"	20.00	14.50	76.95

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"	36.50	23.85	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	29.80	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	12.90	6.95	74.95

QUIK DRIVE KITS

Model	Description	List	Sale
SG-2000	Subfloor/drywall, drives screws 1" - 2", complete kit including extension	765	485
SG-3000	Deck/subfloor, drives screws 2" - 3", complete kit including extension	936	595

Msx636	FEIN Triangle Sander Kit	Sale	199
Msxe6362	NEW Triangle Sander var/spd	Sale	229
Msx625	FEIN NEW Air Triangle Sander	Sale	189
LPN672	PONY Air Palm Nailer with glove	Sale	94.99
RTM01	ROTOZIP Drywall cutout unit	Sale	68.95

BLACK & DECKER

1168	3/8" Drill 0-2500 rpm 4 amp	118	68
2600	3/8" Drill 0-1200 rpm 4.5 amp	187	98
79-034	Workmate 400	184	109
1350K	1/2" Timberwolf Drill 2 speed	551	319
1180	3/8" Drill rev. 0-1200 rpm 5 amp	207	119
2037	Drywall Gun 0-4000 5.0 amp	184	95
2038	Drywall Gun 0-2500 rpm 5 amp	184	95
2054	Tek Gun 0-2500 5.0 amp	287	159
2750	4-1/2" Grinder 10,000 rpm 6 amp	158	89
2694	7-1/4" Super Sawcat Circ Saw w/cse	285	158
2695	8-1/4" Super Sawcat Circ Saw w/cse	328	179
3339	Elu 3 HP v/spd Plunge Router	511	269

Black & Decker Continuous Rim Dry Cut Diamond Blades

Model	Size	Thickness	Arbor	List	Sale
40280	4"	.080	7/8"	79	44
40281	4-1/2"	.080	5/8", 7/8"	90	49
40282	7"	.090	5/8"	154	79
40283	8"	.090	5/8"	199	98
40285	12"	.118	1"	419	195

Piranha Carbide Tooth Saw Blades by B & D

Model #	Diameter	# Teeth	List	Sale
73-715	5-1/2	16	14.39	8.25
73-716	6-1/2	18	14.39	8.25
73-717	7-1/4	18	14.80	7.99
73-737	7-1/4	24	18.06	9.45
73-757	7-1/4	40	32.87	17.49
73-718	8	22	20.95	11.25
73-759	8-1/4	40	46.66	25.95
73-719	8-1/4	22	20.63	12.45
73-740	10	32	34.83	18.85
73-770	10	60	70.37	35.50
73-711	10	50	68.33	35.50

DURA II- ADJUSTABLE STILTS

Model	Description	List	Sale
D1422	14"-22" extension	270	205
D1830	18"-30" extension	268	222
D2440	24"-40" extension	304	239
	Above models include strap adapter kits		

SIOUX TOOLS

8030	3/8" variable speed Drill	250	145
8000	3/8"v/sp close quarter Drill 0-1300rpm	201	125
8005	Same as 8000 but is 0-2500 rpm	200	139
690	5" Air Random Orbit Sander	139	132
658	5" Air Random Sander - dual action	261	155

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

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M7-14	7'	43	159.95
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6004	4'	13#	57.95
6005	5'	16#	68.95
6006	6'	16#	72.95

FIBERGLASS STEP - TYPE 1- 250# RATING

6004-S	w/pail shelf 4'	15#	63.95
6005-S	w/pail shelf 5'	16#	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#	268.95

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'	68#	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#	259.95
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

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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	68.64	46
28390	48" Magnetic level w/ Freecase	88	59
28410	72" Magnetic level	135	94

RECORD WOODWORKING VISES

Model	Jaw Width	Opening	List	Sale
53E	10-1/2"\15"	Quick release	199	109
52D	7"\8"	Quick release w/dog.	137	85
52-1/2D	9"\13"	Quick release w/dog.	186	99

KRAUSE MULTIMATIC LADDERS

Model	Description	List	Sale
121482	12' Aluminum Multi Purpose	228	128
121499	16' Aluminum Multi Purpose	272	148

AEG POWER TOOLS

Model	Description	List	Sale
HBSE75S	3 x 21 variable speed Belt Sander	309	182
FSPE100X	Barrel Grip v/spd Jig Saw	274	164
BSPE100X	Top Hdle v/sp Jig Saw w/cs	286	164
TXE150	6" var/spd Rand Orb Sander	304	142
WS1200	5" Grinder 11amp	249	135

HITACHI TOOLS

C8FB	8-1/2" Slide Compound Saw	1400	489
998862	8-1/2" Carbide blade - 60 tooth	Sale	39.95
C10FS	10" Slide Compound Saw	1595	745
C7BD	7-1/4" Circular Saw with brake	258	139
M12V	3 HP variable speed Router	476	249
TR12	Plunge Router 3 HP	389	192
SB-75	3 x 21 Belt Sander w/ bag 2 speed	278	155
P12R	12-9/32" Planer	1470	795
P12RA	Planer/Joiner	1940	995
C10FC	10" Mitre Saw	432	249
C15FB	15" Mitre Saw	1320	675
DN10DYK	9.6V Right Angle Drill Kit	350	189
G12SA	4-1/2" Grinder 6.9 amp	160	79
DS10DVAK	12V Cordless Drill Kit w/ 2 batt	393	199
DV14V	1/2" Hammer Drill with case	225	109
NR83A	Framing Nailer 2 - 3-1/2 Full Head.	700	409
NR83AA	Framing Nailer 2 - 3-1/2 Clip Head.	750	425
NT85A	16 ga. Brad Nailer 1 - 2-1/2	610	345
NT45A	18 ga. Brad Nailer 13/16 - 1-3/4	490	275
NV45AB	Coil Roofing Nailer 7/8 - 1-3/4	750	425
N5008AB	7/16" Stapler - 16 ga. 1 - 2 lgth	580	325

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255	Airless Kit	180	135
375E	Airless System	195	164
404	Airless Painter & Roller	320	265
505	High performance Airless Painter	440	369
550	Professional Airless Painting System	769	709
HVLP	Fine coat finishing HVLP System	195	159
CS2000	Professional fine finish HVLP System	339	278

DAVID WHITE INSTRUMENTS

LP6-20	Sight Level package - 20x	310	205
LP6-20XL	LP6-20 w/9056 tripod & 7620 rod	375	265
L6-20	Meridian Level - 20x	290	194
LT8-300	Level Transit - 26x	695	479
LT8-300P	above Level with optical plum	821	559
LT6-900	Level Transit - 20x	389	269
LTP6-900	Above Level with tripod & rod	601	389
ALT6-900	Automatic Level - Transit - 18x	638	429
ALTP6-900	above Level with tripod & rod	708	495
ALP6-18HD	Auto. Level-18x w/ tripod & rod	570	385
AL8-22	Automatic Level - 22x	599	385
AL8-26	Automatic Level - 26x	854	545
ALP8-26	above Level with 9075 tripod and 7620 rod	977	609
ML100I	Laser Level	1099	945
ML100	Laser Level w/detector	1249	1075
LL100	NEW Finish Line Laser Level	210	135

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2201	Pump Jack Brace	30	20
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2601	Wall Jack	167	108
	Lots of 4 deduct additional 10%		

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Model	Description	List	Sale
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IM325	Impulse Framing Nailer Kit complete drives 2" - 3-1/4" nails	849	548

SENCO AIR NAILERS

SFN1+	Finishing Nailer 1" - 2" w/ case	448	335
SFN40	NEW Finish Nailer w/cse1-1/4" -2-1/2"	571	389
SN325	Nailer 1-7/8" - 3-1/4"	665	419
SLP20	NEW Pinner w/case 5/8" - 1-5/8"	399	278
SKS	Stapler 5/8" - 1-1/2"	390	275
M2	Stapler 1/16" wide - 1-3/8" - 2" length	535	385
SN70	Framing Nailer Clip Hd 2" - 3-1/2"	690	459
SN60	Framing Nailer-Full Hd 2" - 3-1/2"	638	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
0635SK	1/4" Crown Stapler 1/2" - 1-3/8" Same as Senco SKS	310	175
EZ-1	Multi-purpose nailer & stapler	180	98
	Above nailers come w/case, fasteners, oil & wrenches		
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

BB-4440	Brad Nailer 1/2" - 1-1/4"	336	199
LFN-784	Finish Nailer 1" - 2"	564	339
HFN-880C	Finish Nailer 1-1/2" - 2-1/2"	720	425
RCN-60\225	Coil Roofing Nailer	740	459
CN-350	Framing Nailer - Full Head	704	455
CN-325	Framing Nailer - Clip Head	670	429

EXCALIBUR Fences & Tables

Model	Description	List	Sale
TT45R24L9	24" Fence	369	309
TT45R50L12	50" Fence	399	325
EXSLT40	Sliding Table	599	485
EXSLT60	Sliding Table	745	595

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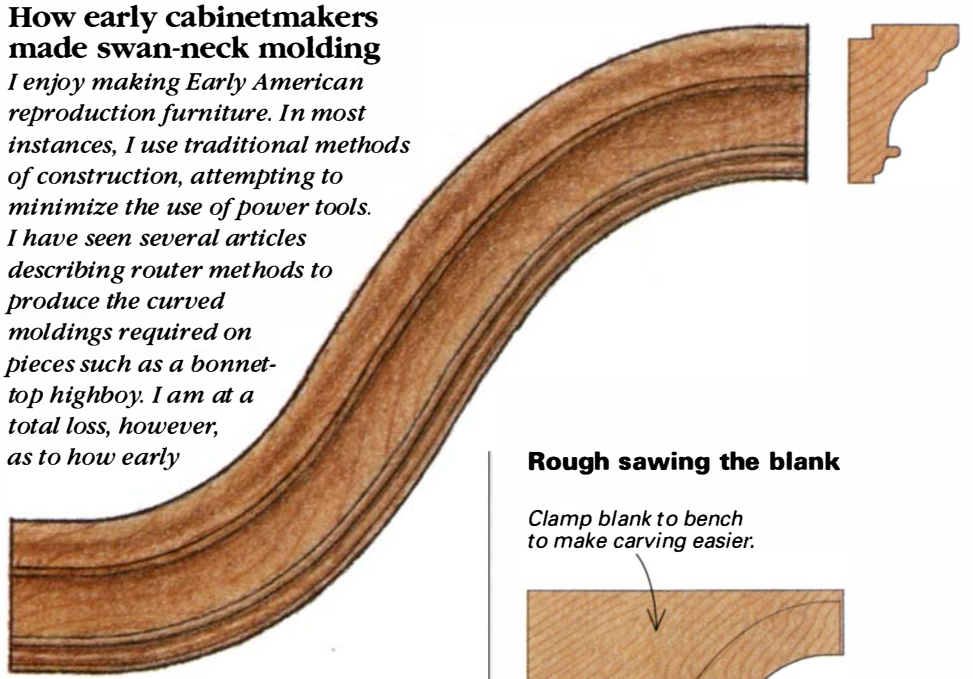
READER SERVICE NO. 43

How early cabinetmakers made swan-neck molding

I enjoy making Early American reproduction furniture. In most instances, I use traditional methods of construction, attempting to minimize the use of power tools. I have seen several articles describing router methods to produce the curved moldings required on pieces such as a bonnet-top highboy. I am at a total loss, however, as to how early cabinetmakers could produce such moldings without the advantage of power tools. Were they steam-bent? Surely, they were not carved freehand.

—Bill Ray, Carbondale, Ill.



Phil Lowe replies: The first step these early cabinetmakers took in making a bonnet was to produce the moldings for the sides of the case. This was done with a molding plane made for that purpose. The swan-neck moldings were next, and they were, indeed, carved by hand.

The blank for these curved moldings would have been roughsawn with a bowsaw. As the drawings at right show, the cabinetmaker cut the curve on the inside edge and left the material beyond the outside curve attached until the carving was finished. This allowed the stock to be clamped to the bench.

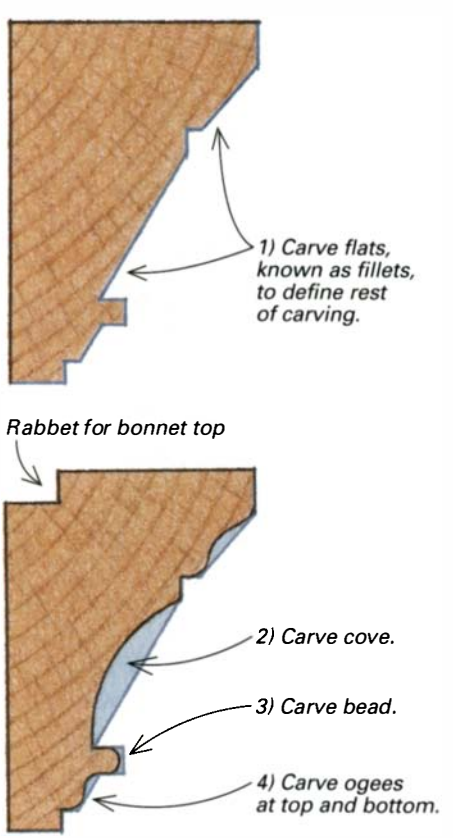
Once the molding was complete, the waste beyond the outside curve would be sawn off and the molding cleaned of tool marks. Finally, a rabbet would be cut to accept the bonnet top itself.

The moldings were carved by first creating a series of flats, called fillets. They defined where any shaping would take place. The coves would be carved next and the bead would follow. The ogee or quarter-round usually found on top would be carved last.

[Phil Lowe designs, makes and restores furniture in Beverly, Mass.]

Rough sawing the blank

Carving the molding profile



Heart of the shop: tablesaw or radial-arm saw?

I am putting together a small home workshop, and I'm not sure what type of stationary saw I want. A quality radial-arm saw would seem a good choice as long as it could cut halfway across a sheet of plywood. Is there a good reason to stay with the traditional choice of a tablesaw rather than a radial-arm saw?

—Robyn E. Tyler, Baton Rouge, La.

Peter Korn replies: There are compelling reasons to choose a tablesaw over a radial-arm saw. Although both machines can rip, crosscut and make angled cuts, the tablesaw is far superior in safety, accuracy and versatility.

The radial-arm saw is comparatively unsafe because its blade rotates in the direction of the cut. This causes the blade to try to pull itself toward you when you crosscut. Similarly, when you rip, the wood wants to self-feed. In both cases, you must simultaneously push and pull. Failure to balance these opposing actions can lead to disaster.

By way of contrast, the blade of a tablesaw rotates against the direction of the cut, so only pushing is required, which gives you far greater control.

As for accuracy, radial-arm saws can be set up to cut straight and square, but they are notorious for not holding true. Apparently, there's too much torque on too many movable parts. For this reason, the skilled woodworkers I know use their radial-arm saws exclusively for crosscutting rough lumber to approximate length, which is an operation that requires no accuracy whatsoever.

Tablesaws will dependably maintain their alignment and accuracy, and a well set-up tablesaw, with outfeed and side extension tables and a good rip fence, is more versatile. My 10-in. tablesaw, outfitted with a standard Biesemeyer fence, will rip material up to 52 in. wide. Most radial-arm saws have half that capacity, or less. Crosscut capacity is generally about the same for the two machines, particularly if you make or buy a sliding crosscut box for your tablesaw. As for versatility, the tablesaw can also perform operations, such as cove cutting and tenoning, which are dangerous or impossible on a radial-arm saw.

[Peter Korn teaches woodworking at the

Drawings: Vince Babak

Center for Furniture Craftsmanship in West Rockport, Maine.]

Keeping big slabs flat

I recently acquired two book-matched, spalted red-maple slabs that are 1½ in. thick, 24 in. wide and 10 ft. long. They're very beautiful pieces, and I'm going to use them to make a dining-table top. But I'm concerned that these thick boards could warp and destroy the table.

To minimize this possibility, I plan to edge-joint the two slabs, using biscuits for alignment and breadboard ends to prevent the top from cupping.

The boards, which are from Pennsylvania, have been kiln-dried to between 6% and 8% moisture. I plan to let them acclimate in my southern Arizona shop for two months before doing any milling. Then I'll sand them to final thickness using a wide-belt sander, taking one pass on each side every two weeks.

Is there anything else you suggest I do to keep the top flat? The table will be used in the Los Angeles area.

—David L. Shaw, Tucson, Ariz.

Mira Nakashima-Yarnall replies: I think your plan of letting these boards adjust to the Arizona climate is a good one, and your milling plan sounds very conservative. Because the wood is already kiln dried to between 6% and 8%, there should be a minimum of movement. But I still would make sure that the boards are stacked perfectly flat.

My only recommendation in addition to the breadboard ends is that you screw a perpendicular cleat under the center of the table. It should be approximately 3¾ in. by 1¾ in. by 36 in. and in the same wood as your base. Be sure to elongate the screw holes in the cleat to allow the top to move with changes in humidity. The cleat will help prevent the tabletop from warping.

[Mira Nakashima-Yarnall is a furniture designer in New Hope, Pa.]

Storing yellow glue

What does yellow (aliphatic) glue have against Colorado? In California, I never had a problem with this glue, but since I've moved to Colorado, every bottle I buy gets gummy and refuses to pour after I've had it a month or less.

—Jerome R. Brown, Boulder, Colo.

Chris Minick replies: I'm sure your glue problem has more to do with where you keep your glue than where you live. Polyvinyl-acetate emulsion adhesives (also known as aliphatic glue) are sensitive to temperature extremes. Worse yet, these glues are even more sensitive to temperature cycles such as those found in a typical unheated garage shop. Repeated hot-day and cool-night temperature cycles will destabilize the glue emulsion. Once destabilized, the polymer molecules are free to stick together, forming a gummy, stringy mass in the bottle. The easiest way to avoid this problem is to store your glue in an area maintained at a constant temperature. I keep my glue and waterborne finishes in a closet next to the shop door inside my home.

[Chris Minick is a finish chemist and a contributing editor to *Fine Woodworking*. He lives in Stillwater, Minn.]

Will cherry turn black with boiled linseed oil?

Many years ago, I read of an easy-to-use, practically foolproof finish, which the author called a varnish and oil finish. It's a mix of spar varnish, boiled linseed oil and turpentine and has been my primary finish for new furniture ever since I first tried it.

My dilemma: I have a cherry chest of drawers made in Pennsylvania around 1800. I stripped the varnish and mahogany stain off this piece (it had been refinished earlier this century). I would like to use my regular finish on it, but I've been warned that boiled linseed oil will eventually turn the cherry black. Is that true? And if so, what finish would you recommend?

—R. Lee Whitney, Apohaqui, N.B., Canada

Garrett Hack replies: Linseed oil used alone as a finish darkens cherry considerably. To say it turns the cherry black would be an exaggeration, but it can age to a very dark reddish-brown. I wouldn't recommend it for your antique chest of drawers.

Boiled linseed oil becomes fairly durable only after many coats. Its natural amber color also tints wood slightly, so the more coats you apply, the darker a wood becomes. This is especially true for cherry, which tends to absorb a lot of oil. Add to this the fact that Pennsylvania cherry finishes to a rich, dark color anyway—no matter what finish is used (Vermont cherry is quite light in comparison).

The varnish, boiled linseed oil and turpentine finish you normally use, however, is a good choice for your chest of drawers. The finish will be lighter than linseed oil alone and will provide adequate protection with fewer coats. The varnish will also give some protection from ultraviolet light, which contributes a great deal to the color cherry attains as it ages. Prepare the surface of your chest of drawers well, apply three or four coats of your finish and then polish with a good paste wax.

[Garrett Hack is a furniture designer and maker and one-horse farmer in Thetford Center, Vt.]

Repairing an old smooth plane

I recently inherited an old plane that has "Bailey No. 3" cast into the front. Between the handle and the blade are three patent dates, the last of which is APR-19-10, which I presume to be 1910. The front knob and screw are missing, and there seems to be another adjusting screw missing under the blade. The blade has a few small nicks. Is it worth fixing this plane? If so, where can I get the parts? —Jim Conlin, Greenville, S.C.

Garrett Hack replies: You have inherited a Bailey No. 3 smooth plane made sometime after the last patent date of April 10, 1910. It's one of the most common sizes of the Stanley-Bailey line of cast-iron bench planes, designed to level and smooth small or medium-sized surfaces. If the cast-iron body is not cracked and the sole badly abused or pitted and if there is no other glaring defect, the plane is well worth restoring and using.

Because of the interchangeability of Stanley-Bailey bench-plane parts and the vast number of planes made, repair parts are readily available, both new and used. New parts can be purchased from Woodcraft (210 Wood County Industrial Park, P.O. Box 1686, Parkersburg, WV 26102; 800-225-1153). Used parts are often available from dealers of antique tools. Here's a list of a few of the larger dealers:

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For a more extensive list and an explanation of what to look for in a used plane, see *FWW* #98, pp. 88-91.

Cutting clean finger joints on a router table

I've been trying to cut finger joints on the router table, but haven't been pleased with the results. When I initially tried to cut into 3/4-in. oak stock, I used a carbide-tipped straight bit. But the chatter was excessive, and the joints splintered, even with a backer board. So I bought a high-quality, solid-carbide, spiral-fluted, up-cut bit, as suggested in The Router Table Book ***(The Taunton Press, 1994). To my amazement, this bit wasn't much better than the straight one. It worked on oak, but when I tried it on softer woods like poplar or butternut, it burned the wood. Also, it left significant hanging edges in the entry, and splintering at the back of the joint. This occurs even when I lower the bit to take a lighter cut. I'm using a multi-speed, 3 1/2-hp router at 22,000 rpm.***

—Alan R. Kirk, Cottage Grove, Minn.

Jeff Greef replies: The move to a spiral-fluted bit was the right direction, but I think you need a high shear angle on the spiral. A low-angle spiral, like you'll find on many carbide bits, is not enough to prevent the rough chopping action that causes the chatter you've been experiencing. Try using a steel end mill (available at machinist's supply houses) with flutes at about 45°. These metal-cutting tools are less expensive than solid carbide bits and cut wood well.

You also might use your tablesaw first to make relief cuts inside the slots you're going to rout. The less wood a router bit must bite, the smoother it will cut. One 1/8-in. sawkerf in each slot may be enough to significantly reduce the chatter.

Also, 1/2-in. slots are relatively wide and require the router bit to take a big bite with each cut. You might try making the joints with narrower fingers. If you really want 1/2-in. fingers, you'd be better off setting up on the tablesaw with a dado blade.

I also recommend using a fresh backer board for each set of fingers. This will help prevent the splintering and the frayed edges. Scrap 1/4-in. plywood makes good backer board.

[Jeff Greef is a writer and woodworker in Santa Cruz, Calif.]

Tips for resawing lumber

I have a 12-in. bandsaw with a 1/4-in.-wide blade. The blade wanders when I try to resaw, so I wind up with unevenly thick material. Should I use a wider blade? Will my Craftsman accept such a blade? Who sells them?

—G.G. Browning, Penfield, N.Y.

I would like to find a satisfactory method for reducing wood thickness for

small projects. I believe the best tool for this would be a bandsaw, but I don't know what type to get, especially for resawing boards that are 12 in. to 18 in. wide. I presume blade width is important as well as height clearance and guide adjustment. I've priced several saws, and the cost seems to range from $500 to several thousand dollars. I'd appreciate any guidance you could offer. —Mark Palajac, Fremont, Calif.

Robert Vaughan replies: Smooth, straight rips on a bandsaw can be quite difficult, especially in wide stock. There are some basics that will make the job easier, though. First, you should use a blade with either a skip-tooth or a hook-tooth profile. Either of these will cut faster and more aggressively than a blade with a regular tooth profile. These blades are available through most large woodworking catalogs.

Second, you should either adjust your fence so it's parallel to the cut made naturally by the blade or practice ripping freehand as I do. If you'd prefer to use a fence, you can determine the blade's natural drift by marking a straight line on a board, resawing the board along this line and then, halfway through the cut, turning the motor off without moving the board. Pencil mark the angle at which the board is canted on your bandsaw table. Then clamp a wooden fence to the table parallel to that line and the proper distance from the blade. You'd be surprised, though, how quickly you become comfortable, and accurate, resawing freehand.

Even with a big, well-tuned bandsaw and a fresh blade, you must allow for the kerf and some waste. From a 1-in.-thick board, I wouldn't figure on getting a pair of boards any thicker than about ⅜ in. Using a planer or having some degree of comfort with handplanes is a necessary complement to a bandsaw when it comes to resawing.

Resawing very wide stock is never a good idea either. Even a 36-in. industrial saw will drift to some degree. You're better off ripping an 18-in.-wide board into three 6-in.-wide boards, resawing each of those and then edge-gluing each set of three boards back together.

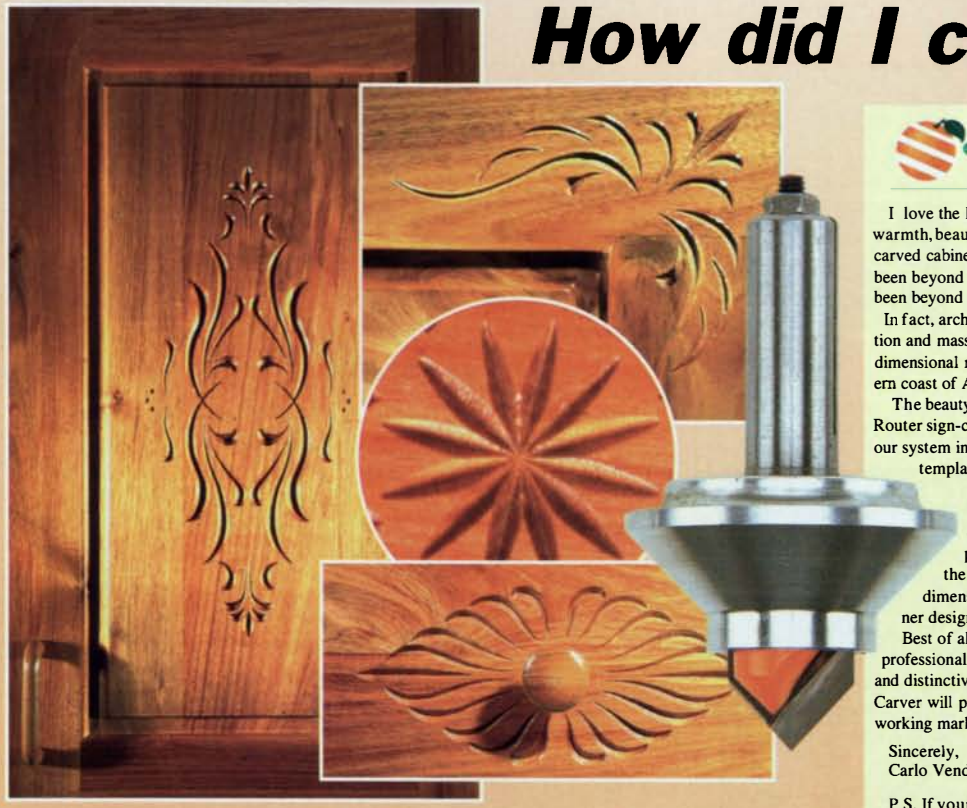
Many woodworkers are tempted to put very wide blades on their bandsaws, thinking that the rigidity will ensure a straight cut. True, these blades are rigid. But unless you have an industrial-sized motor on your bandsaw, the wide blade is likely to eat up so much of the motor's torque that it will negate any benefit. A blade about half the width of your wheel is a good rule of thumb for the maximum resawing efficiency.

Your best choice in a saw would be either a Delta or a Powermatic 20-in. saw. These saws can be pricey, even on the used market, but for a home shop, they're the best compromise between cost and quality.

[Robert Vaughan is a contributing editor to *Fine Woodworking* magazine.

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.*

How did I carve these?



I love the look of hand carved wood, with its warmth, beauty and unique personality. But hand carved cabinets, doors and furniture have always been beyond my budget and quite frankly, intricate carving has always been beyond my skills.

In fact, architectural carving is almost a lost art in this age of automation and mass-production woodworking. So when we found this three dimensional router carving system in Tasmania (an island off the southern coast of Australia) we had to have it.

The beauty of this system is that it carves in three dimensions. Router sign-carving systems only have two-dimensional patterns, but our system incorporates a unique angled template guide and special templates to produce true three-dimensional cuts.

Besides the expense and time required, traditional hand-carving has another limitation: it's very difficult to exactly duplicate a carving. The 3D Carving system allows you to produce any design once, twice or a hundred times! With the 3D System, cabinet shops and door makers can add a new dimension to their work. Furniture makers can add rosettes, corner designs and "hand carving" to their pieces.

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P.S. If your router carvings look "too perfect", just add a few chisel marks for a more primitive look.

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3) Carver Templates: A total of 46 templates (with more in the works) produce a host of designs for cabinet doors, panel doors, door rails and comers, drawer fronts and many other applications.

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Using the 3D Carver is easy. The bit is installed in the router (1/2" collet only) with the plunge mechanism unlocked so that the router can move up and down as you route. The 45º bushing follows the slots in the template. As the slot gets wider, the router moves downward, so the v-groove gets wider. As the slot narrows, the router moves up and the groove gets narrower. That's it!

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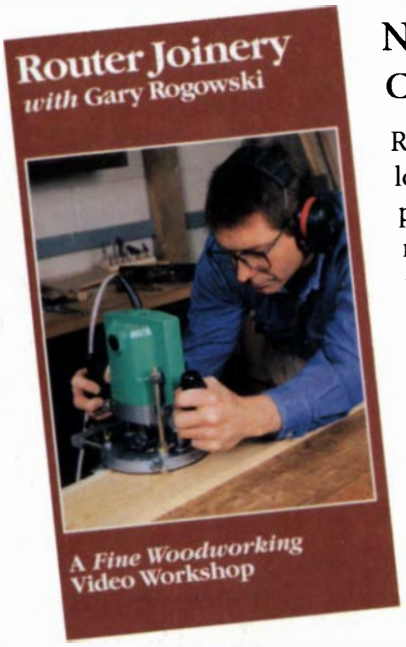

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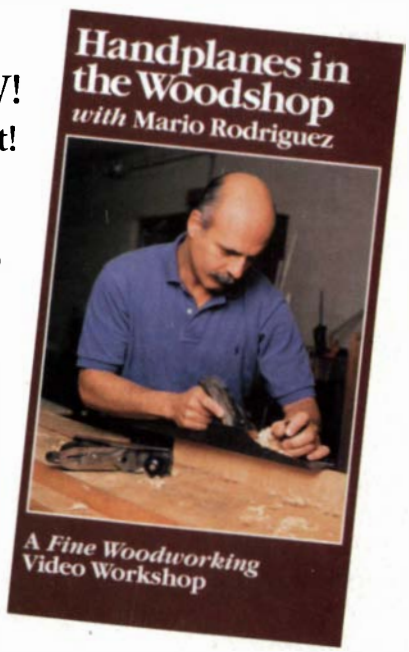

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Photo: courtesy of Columbia Plywood Corp.

Sheet Goods for the Woodshop

How panel products are made and used

by William Duckworth

I became a woodworker almost by accident. Living alone, just out of college and far from home, I started to build furniture for myself because I couldn't afford to buy it. The living room of my three-room tenement apartment, a fifth-floor walkup in New York City, was my shop. The most basic hand tools were all I had to work with. When the downstairs neighbors had heard enough noise, they'd start banging on their ceiling with a broomstick, so even my working hours were limited. Materials? I made everything out of pine—it's all I could buy at the local lumberyard.

I fell in love with the process so much that I started building furniture for friends at no charge. It took a few years before I realized I might be able to do this for a living. So I quit my job, rented a small space in a nearby basement and paid $350 for a Sears Best 10-in. tablesaw.

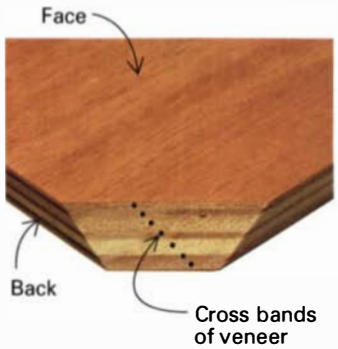
One of my first commissions was a wall of bookcases. I'll never forget my astonishment when a friend of mine suggested I consider making them with birch plywood. My local lumberyard didn't stock it. I didn't even know what it was. That soon changed, and I started using birch plywood all the time. It wasn't long before I graduated to oak, ash, walnut and mahogany panels.

Hardwood plywood has transformed the furniture and cabinet trades. I don't share the belief that woodworking projects are necessarily inferior if not entirely constructed of solid lumber. Lumber and veneered sheet goods can work well together in a fine finished product. Purists who eschew the use of manufactured veneer panels are blind to the realities of the marketplace. These products are the backbone of the business of modern cabinetmaking. They save time and, in some applications, actually improve the quality of the end result. For those who believe otherwise, I would argue that,

This press is hot. *Workers at a manufacturing plant in Oregon unload a plywood press that can glue 24 sheets at 240°, 150 psi.*

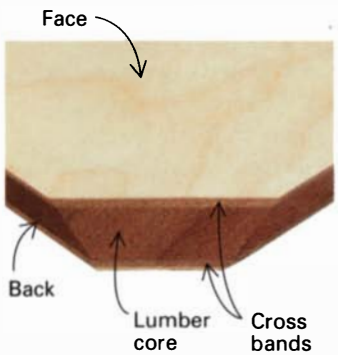
Core construction and material performance

Plywood characteristics are based on research by the Hardwood Plywood Veneer Association and the Architectural Woodwork Institute. Values are averages only. The face species in these samples are (from top) plain-sliced Honduras mahogany, rotary-cut birch, rotary-cut bird's-eye maple and plain-sliced ash.



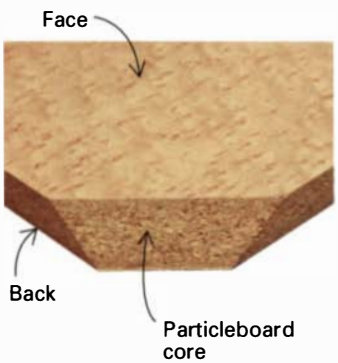
Veneer core

Flatness: Fair
Visual edge quality: Good
Surface uniformity: Good
Dimensional stability: Excellent
Screw holding: Excellent
Bending strength: Excellent
Availability: Good



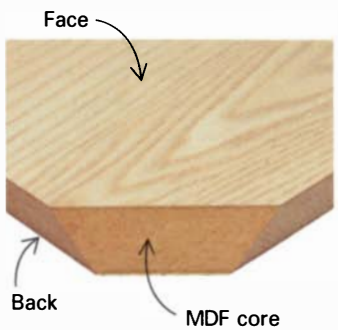
Lumber core

Flatness: Good
Visual edge quality: Good
Surface uniformity: Good
Dimensional stability: Good
Screw holding: Excellent
Bending strength: Excellent
Availability: Limited



Particleboard core

Flatness: Excellent
Visual edge quality: Good
Surface uniformity: Excellent
Dimensional stability: Fair
Screw holding: Fair
Bending strength: Good
Availability: Good



Medium-density core

Flatness: Excellent
Visual edge quality: Excellent
Surface uniformity: Excellent
Dimensional stability: Fair
Screw holding: Good
Bending strength: Good
Availability: Good

given access to the technology, Thomas Chippendale or Duncan Phyfe would have jumped at the chance to use a plain-sliced, book-matched Honduras mahogany panel with a medium-density fiberboard (MDF) core. Whether they were making tabletops, desks or the carcases of small chests of drawers, these two were businessmen as well as artists. Can anyone doubt that the same would be true for the Shakers?

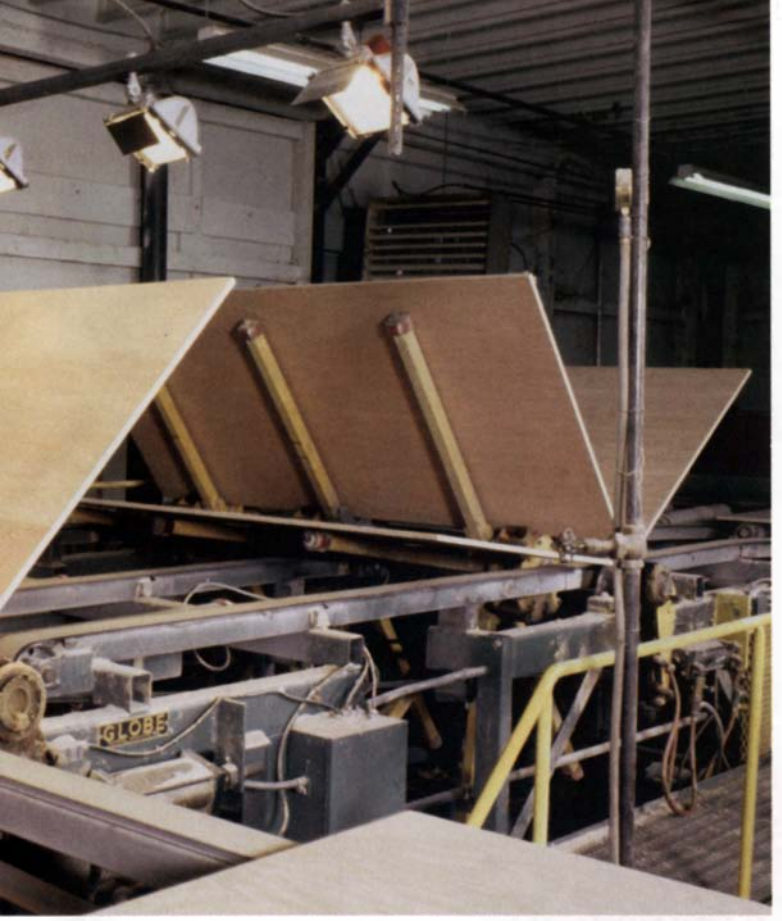
Core follows function

I surveyed the following owners of custom woodworking shops to get an idea of which panels they used for what purposes: Lars Mikkelson of Santa Margarita, Calif.; Sven Hanson of Albuquerque, N.M.; Ron Barzyk of Madison, Tenn.; and partners Marcus Santora and Janis Melone of New Haven, Conn. Each shop has its own particular niche, from residential furniture to commercial case goods, so preferences varied widely. In all cases, though, I asked about panel products meant for interior applications only and those most commonly available to the small shop (see the photos at left).

Veneer core is lightweight and strong—Veneer core is what most people mean when they refer to plywood. (The Architectural Woodwork Institute defines plywood as any panel product made from three or more layers of wood or wood products.) Like Lars Mikkelson and Sven Hanson, who both use it for case work and shelving, I prefer veneer core for wall-hung uppers or floor-to-ceiling cabinets, where weight might be a problem. I also use it for applications like torsion boxes, where strength is important.

Ron Barzyk says quality standards have declined in the veneer

Photos except where noted: author



***Final grading at the sanding station** at a Columbia Forest Products plant in Klamath Falls, Ore. The birch panels on this machine, called a star grader, will soon be bundled and shipped.*

core he's bought in the last two years: more voids and a poor second face, or back. My own gripe about veneer-core panels is that I never met one that was flat and stayed that way. Once exposed to a change in temperature and humidity in the shop, veneer-core plywood often warps.

Ideally, each panel should be manufactured with an absolutely symmetrical construction from the center of the panel. That means the panel should be made from the same materials on either side of its centerline. Materials should contract and expand at the same rate. Somehow, in the real world, it never seems to work that way.

Poplar and aspen make the best cores. Less desirable are those made from meranti and virola, which are less stable. Virola is a species harvested in Panama and Guatemala. The logs are often stored in ponds to prevent them from rotting, and they sometimes absorb a fungus from the mud. When the logs are dry, the fungus prevents the absorption of glues in the manufacturing process. This problem results in cores that can come apart. The fungus also happens to smell bad: Virola is nicknamed stink oak.

Lumber core costs more—Lumber core is the most expensive and the least available. The core stock can be either hardwood or softwood, depending on the manufacturer. Basswood is the best.

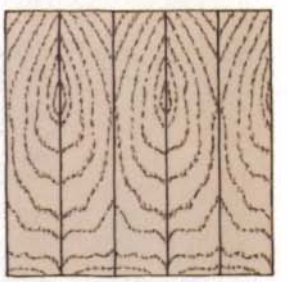
According to industry standards, which are published by the Hardwood Plywood and Veneer Association (HPVA) and based on procedures set forth by the American National Standards Institute (ANSI), lumber-core grades are regular, sound and clear (the best). Regular grade allows butt joints within the core; sound requires full-length or finger-jointed pieces and allows discolorations, re-

Veneer faces laid up five ways

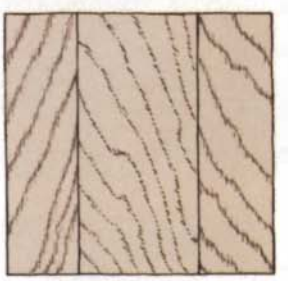
The way veneer is cut from the log makes a big difference in the way it looks when it's applied to a panel and how much it costs.

Whole piece rotary cut: A single sheet of veneer is cut from the tree like paper towels off a roll. This method produces the least waste.

Slip match: Sheets of veneer pulled from a flitch are joined side by side with the same face side up.



Book-match: Every other sheet of veneer is flipped as it's pulled from the flitch. This pattern results in the best-looking panels. Book-matched panels also are the most expensive.



Pleasing match: The veneers in this category match in color more than grain characteristics.

Random or mismatch: Veneers don't match either in color or grain pattern.

Photo above: courtesy of Columbia Plywood Corp.; drawings: Christopher Clapp

***MDF-core birch cases with alder faces**—From left to right, Ron Barzyk, his son Brook and Floyd Parker of Madison, Tenn., dry-fit wall-unit cases. Barzyk prefers MDF core over any other.*

***ApplePly doesn't have to be banded.** Thin, uniform plies become part of the design in case work by Janis Melone and Marcus Santora, partners in a New Haven, Conn., shop.*

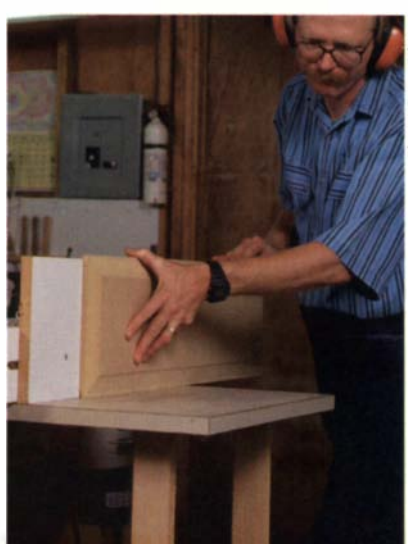


Photo: Scott Gibson

***MDF takes a crisp edge when machined.** Lars Mikkelson of Santa Margarita, Calif., uses MDF with no face veneer for work that will be painted, like this door panel.*

pair patches and sound knots; clear is the same as sound except that no knots are allowed.

Sven Hanson uses lumber core for drawer cases. He bevels the top edges of drawer sides to make the core appear more like solid lumber. He cautions anyone who lives in a dry climate to check lumber-core panels with a moisture meter. Industry standards allow plywood leaving the manufacturing plant to have a moisture content of 12%. That's twice the figure recommended for interior woodwork in Sven's neck of the woods.

Ron Barzyk found a source for some panels with a pine lumber core that he likes to use for toe kicks under cabinetry in kitchens and baths. It holds up well to wet floor conditions. Other uses for lumber core include flat-panel doors and shelving that will not need edge treatment.

Lumber core stays flatter than veneer core, but it's hard to justify using it when it can cost twice as much as a panel with the same face veneer on another core. A ¾-in., 4-ft. by 8-ft. birch panel with a clear basswood core sells for more than $80 and walnut for $125. You could get the same veneers on particleboard for about $35 for birch and $75 for walnut.

***Particleboard core is heavy in the hand**—*Sometimes referred to as flakeboard or chipboard, particleboard core is composed of small particles of wood and wood fibers bonded together with synthetic resin adhesives under heat and pressure. It is manufactured

in low, medium and high densities. None of the four shops uses it as a plywood panel (with a hardwood face and back). Ron Barzyk likes the core material only when he's making countertops with plastic laminate. Sven Hanson commented that it's good for garage shelving, but I don't think he meant that to be taken literally.

Particleboard is the least expensive, and it has an excellent rating for flatness and surface uniformity. So why don't they like it? One problem is weight. A ¾-in., 49-in. by 97-in. panel weighs about 93 lbs. Unless you have a separate scoring blade on your tablesaw, particleboard will sometimes chip out in small pieces on the edge. It will warp easily under even moderate loads, like a bookshelf full of paperbacks. It does work well as a core material for solid-core door manufacturers. It would be a good choice for a well-supported tabletop. And it does make good use of natural resources: What was once waste material has become core stock.

MDF core is the answer to many needs—Ah, MDF, now that's another beast altogether. We've sung its praises in these pages before (see *FWW* #104, pp. 51-55). Like particleboard, MDF is made from small wood fibers bound by synthetic resins under heat and pressure. It's also less expensive than veneer-core and lumber-core panels, but it costs more than particleboard and weighs about the same. However, if you try to break the same size scrap of each over your knee, you'll discover the tensile strength of MDF is much greater than that of particleboard. It will deflect under load more readily than veneer core.

MDF holds a screw well, properly piloted, and it machines beautifully. Crisp and clean edges result when it meets up with a sawblade, a router bit or a shaper cutter (carbide is a must). When you order a ¾-in.-thick panel, that's exactly what you get—not the 23/32-in. or even 11/16-in. sheets that sometimes show up in a delivery of veneer core or lumber core.

Lars Mikkelson appreciates the way the smooth, flat and uniform substrate provides a fine surface for the veneer. The smooth surface won't telegraph the cross-grain patterns you sometimes get with veneer core and lumber core. Sven Hanson says thermal-set glue on edge tape holds well on the dense edges. Ron Barzyk uses MDF-core plywood for all his cabinetry, whether stained or painted, including shelves and door panels. Marcus Santora and Janis Melone use it only occasionally. They don't like the really fine dust kicked up when machining it.

What size, how much and where to get it

Plywood mills can make more than the standard 4-ft. by 8-ft. panel, up to a maximum sheet size of 5 ft. by 12 ft. You pay a premium for those larger sizes, and most distributors stock them in only a few species. I once placed a special order for a large conference table: four sheets of plain-sliced walnut, 1¼-in.-thick MDF core, 10 ft. by 5 ft. (the grain ran with the width, not the length), flitch-matched. They were beautiful, but they cost around $300 a sheet. Any domestic hardwood, from ash to wormy chestnut, that's available in lumber also is available as the face veneer on plywood. The same is true for what makers and sellers call exotics, woods grouped by the location of their origin—Africa, Asia, Australia, Europe and South America.

Lumber core is only available in ¾ in., 1 in., 1⅛ in. and 1¼ in. thicknesses. Veneer, particleboard and MDF cores are standard in the following sizes: ⅛ in., ¼ in., ½ in., ¾ in., 1 in., 1⅛ in. and 1¼ in. Other thicknesses exist, but they're not commonly stocked.

Prices run the gamut from particleboard core, MDF, veneer core

What's new or different?

Innovations abound in the sheet-goods industry. Boise-Cascade (208-384-6610) recently came out with a product called Electrically Conductive particleboard. Loaded with carbon, it's designed to discharge static electricity and meant to be used in computer rooms and medical and military facilities.

The Baltek Corporation (201-767-1400) offers a panel fabricated with a core of plantation-grown end-grain balsa. It's extra light and very strong. And the Norfield Corporation (203-792-5110) offers a product with similar characteristics made from a core of rigid honeycomb plastic. It's available from ¼ in. to 3 in. thick and can be sold in small quantities.

Tim Smith of F.W. Honerkamp Co., a large plywood and lumber distributor in New York, tells me that his company is selling a lot of pre-finished panels made by States Industries. Called Nova by the manufacturer, the finish is a formaldehyde-free, ultraviolet-cured topcoat over four coats of a sanding sealer. The manufacturer will apply it to any kind of core panel.

I saw two products at the Woodworking Machinery and Furniture Fair in Anaheim, Calif., this past summer that looked very interesting. The first, made under a variety of trade names (Classic Core, Armorcore, Fiber-Ply), has been around since 1986. It has a combination core (veneer-core plies in the center with outer layers of ⅛-in.-thick particleboard or MDF) over which face and back veneers are glued. It's been very slow to catch on, and I can't figure out why. Lars Mikkelson is the only person I've spoken with who uses it, and he loves the stuff. You get strength, reasonable weight and a smooth substrate under the veneer.

***Fiber-Ply (left) and Multi-Core** are strong and less expensive than standard veneer-core plywood.*

The second new product I saw in Anaheim is manufactured by Weldwood of Canada. It's called Longlac Multi-Core (LMC), and it's different from any other panel product. The core of a ¾-in.-thick panel consists of 7/16 in. of aspen flakes, or wafers, highly compressed and glued together with waterproof phenolic resins. I would characterize it as a sort of disoriented strand-board core. On either side of the core are cross bands of aspen veneer and face and back veneers. LMC is light and strong like veneer core, but it stays flat like MDF and particleboard-core panels. It's rated far better than any other core for screw holding through the face and about the same as veneer core for edge screws.

Formaldehyde emissions are one-sixth those of MDF. The aspen used for the core is a species that regenerates quickly, which makes for more environmentally friendly forestry management.

Bob McKenna, a salesman for Atlantic Plywood in Woburn, Mass. (a large wholesale plywood distributor), tells me that his company is selling a lot of this product. He says that the cabinet shops love its low cost and its good machinability. They use it mainly for case work but also for doors. —*W.D.*

to lumber core, in that order, no matter what the face species. In general, prices will range from $35 for rotary-cut birch on a particleboard core to $125 for plain-sliced walnut on a lumber core. That's the least and most you should expect to pay for any commonly stocked ¾-in. panel.

Birch and walnut are respectively the most common and the most dear of domestic-species plywood panels. All other face veneers on different cores will fall somewhere between those figures. Quantity matters, too. If you're buying 10 sheets or more, you should be able to get a price break.

There was a time when many distributors would only sell their products on a "to the trade" basis. Some of them have changed that policy. If you can't find what you want at the local lumberyard and your fingers have walked through the yellow pages with no success, there's a source book you might find useful. It's called *Where to Buy Hardwood Plywood and Veneer*. It costs $5 and is published by the HPVA (P.O. Box 2789, Reston, VA 22090; 703-435-2900). About a third of its 120 pages is devoted to advertisements. The rest of the book includes background on the HPVA, information about available veneer species and names, addresses and phone numbers of manufacturers and distributors throughout North America. If you don't live close to a distributor, go to some professional cabinet shops nearby and ask them to buy plywood for you. Be nice, offer to pay a handling fee.

Grading veneers toward a standard—In the past, every manufacturer had its own system of grading panel products, which has led to a lot of confusion. Hardwood plywood makers and suppliers may be moving toward a revised and realistic agreement when it comes to grading sheet goods, which should benefit the end user (see the photo on pp. 40-41). Now, except for a few holdouts, most manufacturers have begun to comply voluntarily with standards published by the HPVA and ANSI. The latest version, approved in January 1995, can be purchased for $15 from the HPVA. It is a 24-page booklet that details face, back and inner ply grades.

Specifications on grading can be complex. Tolerances vary among the face species, so it takes some study to know what you're ordering. This booklet also spells out terms for allowable formaldehyde emissions, moisture content, sanding and grade marking on each panel shipped. It's the source for the Architectural Woodwork Institute's *Quality Standards*, the book professional shops use to communicate construction details to the design trades. If you buy plywood, it's worth the money to know how to specify what you want.

Thicknesses keep getting thinner—With the advent of improved veneer cutting and handling machinery and the desire (environmental and economical) to stretch expensive natural resources as far as possible, veneers really are getting thinner. When I first started working with wood, 1/28 in. was the standard. It seems hard to believe, but furniture manufacturers buy and use more veneer than the plywood mills. So the equipment manufacturers use determines, to a large extent, the prevailing thickness standard. Nowadays, it's 1/36 in. But in response to European competition, they're gearing up with machines that can safely handle veneers up to 1/42 in. So that's likely to be where we're headed. Put away those belt sanders, the future is drawing near. □

William Duckworth ran a custom cabinetmaking shop before he became an assistant editor of Fine Woodworking.

Panel products designed for special jobs

Plywood manufacturers compete to come up with panel products that will serve their customers' needs. The items listed below are among some of the more successful results.

Melamine saves finishing time: Melamine is a panel whose surface is plastic-impregnated paper fused to a substrate by heat. It's a curse to many woodworkers. They hate its heavy core and sharp edges, but their customers love it because it's easy to clean and maintain. It's well-suited for kitchen and bathroom cabinetry. Melamine is most commonly available with a particleboard core, although Sven Hanson has a source that supplies him with an MDF core. It responds with less chipout and holds edge tape better. A ¾-in. standard sheet, 49 in. by 97 in., costs about $25.

ApplePly is not apple: This product was developed in Oregon by States Industries. It's designed to compete with the makers of Baltic- and Finnish-birch panels from Europe. The original versions came in odd sizes (roughly 5 ft. sq.) and were often way out of square and warped. ApplePly cores are made from 1/16-in.-thick western red alder veneers. Seven plies make a ⅜-in.-thick panel and 13 plies make a ¾-in. panel (face and back are sanded to 1/32 in.). The face is maple or birch. The decorative edge is considered an asset because of the uniformly thin and light-colored veneers. Of the shops surveyed, only Marcus Santora and Janis Melone use it, and they use it for almost everything. I have used it in a ⅝-in. thickness for drawers; the core has no voids, and ½-in. screws for slide hardware do not telegraph through the other side. A ½-in.-thick, 4-ft. by 8-ft. panel costs about $65.

Three-eighths-inch bending lauan for curves: Also called wacky wood and wiggle board, ⅜-in. bending lauan was developed for curved work (see the top photo below). It's made from two thick but pliable veneers with a sandwiched sheet of thread-thin cloth between them. It will bend easily to a radius of 3 in. Sales of this product have overcome those of ⅛-in. bending poplar ply, which was the only bendable plywood until this hit the market in 1986. A sheet will run about $30. —*W.D.*

Photo: Margaret Scully

Bending lauan for curves. *Sven Hanson assembles the core of an apron for a demi-lune gate-leg table.*

Melamine for hospital built-ins—*These cabinets were built by Jacob Cabinets in Nashville, Tenn.*

Drawer-Design Strategies

Choose the right materials and construction techniques

by Gary Rogowski

Photo this page: Phil Harris

It's always a wonder to me when I come across an old piece of furniture with drawers that slide as sweetly as they did the day they were made. How is it possible for old drawers to work so well? Odds are they have been weighted down, filled to overflowing, pushed, pulled, slammed home, tipped over and otherwise abused by several generations of owners. Yet if a drawer is well-made, it will fit snugly in its opening and open and close effortlessly, regardless of the season. And it will continue to work that way for a long time.

With so many ways to put a drawer together, which way is best? There's no simple answer, but there are some basic considerations that can help you choose the right corner joint, materials and method of supporting the bottom.

The object is to build a strong, stable, attractive drawer in a reasonable amount of time. How you do this will depend on your skills, tastes and the function of the piece that you are building. I built the drawers shown at left to showcase a number of the best possibilities for drawer construction in a fine case piece. These methods aren't the last word on drawer construction, but they should provide a good starting point.

Function: Make it strong and stable

When I'm working out the design for a piece of furniture that will include a drawer, I think first about function. A file cabinet or tool-box drawer obviously needs to be stronger than a drawer that will hold only socks or a few pencils. And, generally, the deeper a drawer is the stronger it needs to be.

Drawer joints, like all woodworking joints, derive their strength either from the amount of long-grain glue-surface area

Corner construction

Through dovetail

Pros: Very strong, great mechanical strength and large long-grain to long-grain glue area. The hand-cut through dovetail is aesthetically strong, too. End grain shows on the drawer face, providing a pleasing contrast in some furniture styles.
Cons: The end grain exposed on the face may be inappropriate on more traditionally styled pieces. Comparatively speaking, the dovetail is a time-consuming joint to cut, and it takes practice before you can cut it well. Router jigs used to make through dovetails are relatively expensive, and the resulting joint can look too uniform.

Half-blind dovetail

Pros: As with the through dovetail, half-blind dovetails are very strong and look great, too. And because the joint doesn't show on the drawer face, it's ideal for even the most formal and traditional drawers.
Cons: Even more time-consuming and finnicky to cut by hand than through dovetails. Routed half-blind dovetails look routed because of the minimum width of the pins. Most jigs don't allow flexible spacing of pins and tails.

Rabbeted half dovetail

Pros: Simple to cut (one pass on the router table for each drawer component), simple to clamp and quite handsome. When pinned with dowels, it's a mechanically strong joint.
Cons: Not as strong as through- or half-blind dovetails and without the traditional cachet. All glue-surface area is end grain to long grain, a weaker connection than long grain to long grain.

Sliding dovetail

Pros: Very strong, easy to cut once set up. Can be made so the joint is visible at the top edge of the drawer or so the joint is hidden (stopped).
Cons: Difficult to fit and assemble. The fit should be a bit loose when the joint is dry because glue will start to bind the joint almost immediately. You'll need to work fast once you've applied the glue.

Blind-dado rabbet

Pros: Good production joint. It's quick to cut on the router table once it's set up. With a dedicated bit, setup is quick, too. Joint is hidden from front and looks nice if done well.
Cons: Time-consuming to set up unless you have a dedicated bit, which is expensive. Only fair mechanical strength and all glue-surface area is end grain to long grain. Side edges of drawer front are vulnerable to chipping if they're not beveled slightly.

Photos except where noted: Vincent Laurence

shared by the two joined parts or by the way the parts interlock mechanically.

Dovetails make the strongest joints—In a chest of drawers, most any well-made joint will be strong enough because the weight the drawers will have to bear is minimal. But stuff a drawer with reams of paper, a dozen handplanes or a blender, assorted bowls and a Cuisinart, and you've upped the ante.

In situations where I know a drawer is going to have to stand up to some heavy use, I like to use a dovetail joint. Through, half-blind and sliding dovetails (see the photos at left) will stand up to almost any use or abuse imaginable. Short of destroying a drawer, you're not likely to see a well-made dovetail joint fail. So choosing one of these three joints becomes a question of aesthetics and efficiency.

A simpler joint in the back—Often a drawer is held together with two kinds of joints: something a little fancier in the front where it will show and something simpler in the back where strength, not appearance, is the primary consideration. In the chest shown at left, I joined the backs of the top four drawers to the sides with sliding dovetails because they're strong, and I can make them quickly with a router.

There's one situation in which you can't use a sliding dovetail at the back of a drawer: when you want to capture a plywood drawer bottom on all four sides, as I did on the bottom drawer in this chest. For that drawer, I used dado-rabbet joints at the back corners. The dadoes run from top to bottom on the drawer sides, just in from the ends. The back is rabbeted to engage the dado and is flush with the back end of the sides.

Quartersawn lumber is best—Another functional consideration is stability: how much the drawer will move with seasonal changes in humidity. A drawer that's swollen shut is obviously useless, but one with a huge gap at the top isn't very attractive. So I try to use quartersawn lumber for the sides and backs of drawers whenever possible. It's much more dimensionally stable than flatsawn stock and less likely to warp or twist.

Regardless of whether I'm using quartersawn or flatsawn lumber, I make sure the drawer stock is thoroughly seasoned. I also try to let it acclimate in my shop for a few weeks before working it.

Choosing wood for sides, back, runners—For drawer sides and backs, I generally select a wood that's different from the fronts. Secondary wood saves a little money. And there's no need to waste really spectacular lumber on drawer sides or backs. I use a wood that moves about the same amount seasonally as the drawer fronts and is long-wearing. I also use this secondary wood for the drawer runners. This prevents the sides from wearing a groove in the runners or the runners from wearing down the sides.

Using a secondary wood for the sides of a drawer also can set up an interesting contrast when the drawer is opened, especially with a lighter-colored wood.

Aim for a thin drawer side—Drawer-side thickness is a concern for both structural and aesthetic reasons. What you're trying to achieve is a drawer that's light, strong and well-proportioned. For this chest, I used ⅜-in.-thick drawer sides for the top pair of drawers. I added 1/16 in. thickness to the sides and back of each descending drawer. Graduated drawers distinguish this piece from production work; each drawer has sufficient strength and pleasing proportions.

The object is to build a strong, stable, attractive drawer in a reasonable amount of time.

Aesthetics: Make it attractive and appropriate

The next consideration is appearance. A nailed rabbet joint, for example, may work perfectly well but just wouldn't make it in a reproduction American highboy. All of the joints I used in this chest of drawers are attractive, but some are more refined than others. So the choice of joinery, especially at the front of the drawer, may hinge on the expectations or tastes of the client and the style of the piece.

To my eye, the through dovetail, the half-blind dovetail and the rabbeted half dovetail work better aesthetically with this piece than do the sliding dovetail or blind-dado rabbet. But for drawers in a kitchen island or a child's bureau, I'd probably go with the sliding dovetail or the blind-dado rabbet because neither of these furniture pieces requires fancy joinery.

Efficiency: Can I make it quickly and easily?

Ease and speed of construction are related concerns, especially if you make your living as a furnituremaker. As a professional, I have to weigh the time it takes to cut and assemble a joint against what it adds to the piece. I also have to know whether the client is willing to pay for the extra labor. If you're an amateur woodworker, time probably is less of a concern, but there will still be projects you just want to finish.

The relative difficulty of making a particular joint also may be a consideration. If you've never cut dovetails by hand before, it's probably a good idea to practice before you start cutting into those figured-maple drawer fronts.

If you have no desire to cut dovetails by hand, a number of router jigs will cut dovetails that are just as strong or stronger than hand-cut ones. But with a few exceptions, they all give you dovetails that look rigidly uniform and machine-made. These may not be the right choice on a piece of furniture that traditionally would have had hand-cut dovetails. And even if routed dovetails work for you aesthetically, there's a learning curve for most of these jigs. So while there may be some gain in efficiency over time, you shouldn't plan to buy a jig on Saturday to speed you through your dovetails on Sunday.

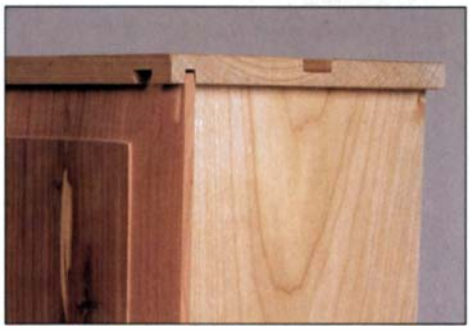
A router can help you make other good-looking, simple joints that are plenty strong. The sliding dovetail and the blind-dado rabbet on the bottom two drawers of this chest fit the bill on all counts.

Supporting drawer bottoms

Corner joinery is only one facet of drawer construction. There's also the question of how to support the drawer bottom. What's wrong with a simple groove cut near the bottom of the drawer sides? Not a thing for most work (see the drawing at left on p. 48), but if you check out a really first-rate

Bottom construction

Fully enclosed plywood panel



Solid raised panel in a groove

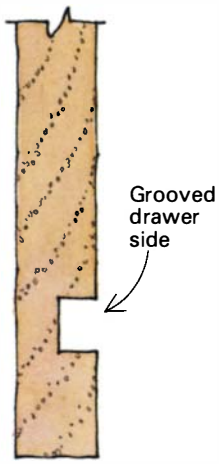
Plywood panel in a drawer slip

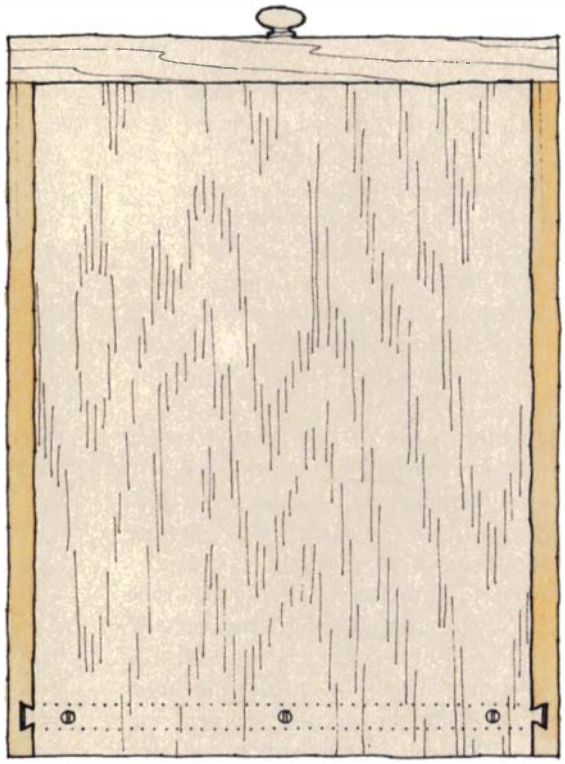
Rabbeted solid panel in a drawer slip

Mix and match: You can support a drawer bottom in grooves cut in the drawer sides or in slips glued to the sides. Drawer bottoms can be made of plywood or solid wood. Either material is compatible with either method of support. Your choice will be based on time, cost and the piece's function.

Grooves

Grooved drawer sides provide plenty of support for most drawer bottoms, as long as the drawers aren't going to carry a lot of weight. Sides should be sized proportionally to the width of the drawer.





Plywood bottom A plywood bottom can be supported on three sides and screwed to the back of the drawer (above) or totally enclosed and supported in grooves on all four sides (top photo at left).

antique, chances are good that the drawer will be riding on slips (see the drawing at left on the facing page).

Drawer slips are strips of wood glued to the bottom inside faces of the drawer sides. They sit flush with the bottom of the side and are grooved to accept a drawer bottom. Designed to increase the running surface of the drawer, slips prevent the drawer side from wearing a groove in the runner. They also prevent a thin drawer side from being weakened by a groove. I used drawer slips on two of the drawers shown at left: one with a plywood bottom and one with a rabbeted, solid-cedar bottom.

Slips are more than just functional additions to a drawer. They add a measure of finish and formality that catches your eye. I didn't add any decorative elements to the slips in this drawer, but you could bead the top inside edge of the slip, cove it or round it over to add more visual interest, as shown in the drawings above.

Plywood or solid wood?

The other big decision is whether to make the drawer bottoms from plywood or from solid wood.

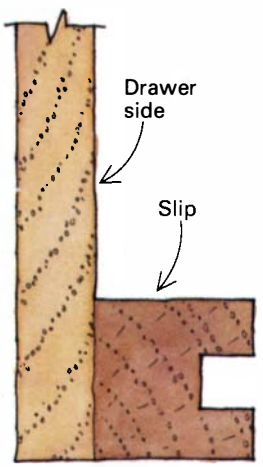
Plywood is stronger but not traditional—Plywood has many advantages over solid wood, but for some purists, it is simply unacceptable.

Plywood is dimensionally stable, so you don't have to take wood movement into consideration. It is stronger for a given thickness than solid material, so you can use a thinner piece: ¼-in. plywood is thick enough for a drawer bottom (I usually use a ½-in. panel if it's solid wood). This also

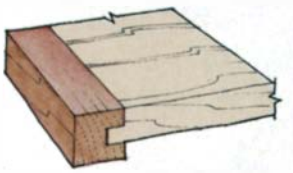
Drawings: Jim Richey

Slips

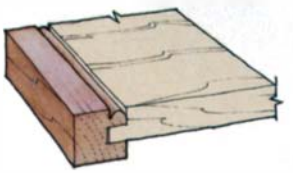
Drawer slips add strength and rigidity and increase the drawer's bearing surface on the runners. Slips can be simple, grooved pieces of wood, or they can be made more decorative, as shown at right.



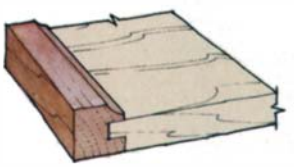
Slip profiles



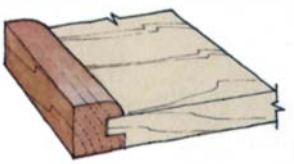
Groove



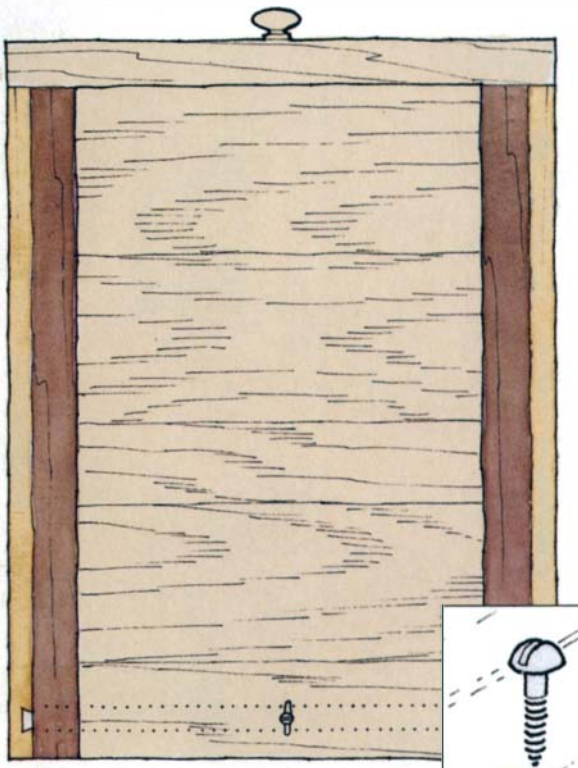
Bead



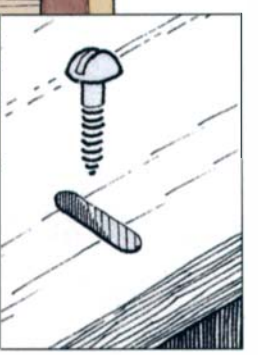
Cove



Half round



Solid bottom can be cut to a tongue profile, rabbeted or raised. Because solid wood expands and contracts seasonally, the panel should be oriented so that its grain runs across the drawer. The screw hole at the back of the drawer bottom should be elongated (right).



Solid-bottom profiles

Tongue

Rabbet

Raised panel

makes plywood a good choice if you're concerned with weight.

One problem with using plywood is that the actual thickness of a ¼-in. sheet is about 7⁄32 in. That means that if you rout a ¼-in. groove in a slip or in your drawer sides, the plywood panel will flop around. Instead, I use a 3⁄16-in. bit and make two passes. I get a perfect fit, but it takes more time. Of course, there are dado sets available that will plow a 7⁄32-in. groove, but you can't always run the groove the length of the drawer piece. On some drawer fronts, for instance, you need a stopped groove.

Installing solid-wood bottoms—For solid-wood drawer bottoms, the grain must run side to side in the drawer, rather than front to back, so wood expansion won't push the drawer apart and shrinkage won't create a gap at the sides. I usually either rabbet or raise a panel on a solid-wood drawer bottom so the edge is thinner than the rest of the field (see the solid-bottom profiles above). This lets me plow a smaller groove in the drawer sides. The result is a strong, sturdy panel that will not weaken the drawer slips or sides excessively.

A rabbeted panel can be slid in with the raised portion facing either up or down. When I use drawer slips and a rabbeted panel, I put the panel in with the raised portion up, mark the panel, remove it and then plane, scrape and sand the panel so it's flush with the drawer slips. With the more traditional raised panel, I position the panel bevel-side down.

Keeping the drawer bottom in place—I don't glue drawer bottoms in place. It's easier to repair a drawer if the bottom just slides right out. To keep solid-wood drawer bottoms from sagging, I screw them to the drawer back with a single pan-head screw and elongate the hole so the bottom can move (see the drawing detail above).

In spite of its strength, a ¼-in. plywood panel is quite flexible, so I usually drive two or three screws into the drawer back. Otherwise, the bottom will sag (see the drawing at right on the facing page).

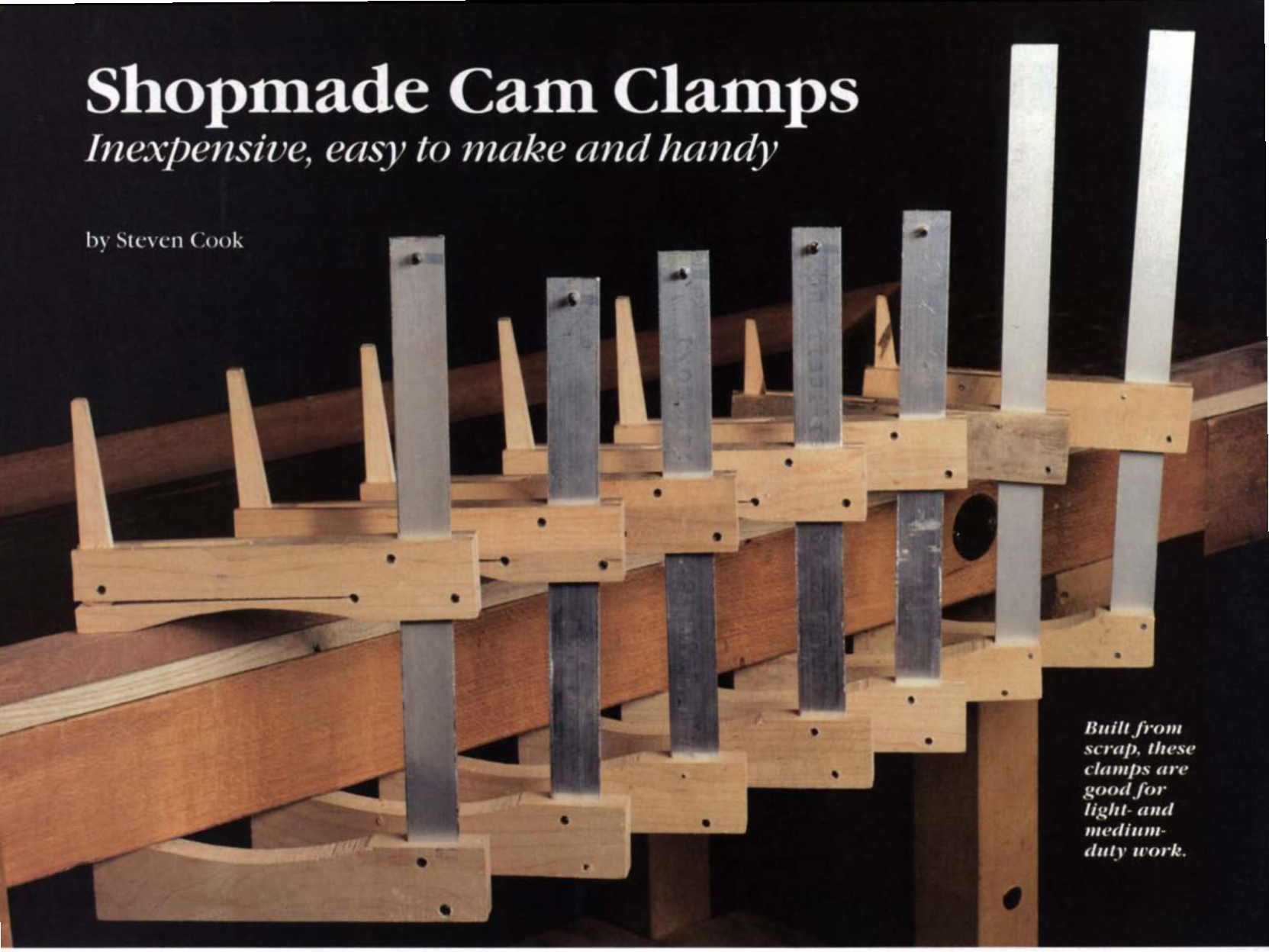
Another possibility for plywood is to enclose it on all four sides (see the top photo on the facing page). Because plywood is dimensionally stable, there's no need to leave the back open. □

Gary Rogowski teaches woodworking and is a professional woodworker living in Portland, Ore.

Shopmade Cam Clamps

Inexpensive, easy to make and handy

by Steven Cook



Built from scrap, these clamps are good for light- and medium-duty work.

A while back, I was hired to replace the veneer on a Steinway grand piano that had been damaged in a fire. Veneering the sides required more clamps than I owned or could afford. But I remembered facing just such a situation when I was an apprentice to a pipe-organ builder. Armed with a Swedish-made cam clamp as a prototype, we churned out a batch of 50 clamps before quitting time.

I was working alone, so it took longer to make the clamps I needed. But I used wood from the scrap bin and aluminum from the junkyard, so I spent next to nothing.

I use these clamps for jigs and fixtures, anchoring a workpiece to a bench for routing and laminating wood strips around a form. You just have to keep in mind that they don't exert a lot of clamping pressure.

How the clamps work

These clamps are a variation of a standard screw-bar clamp. One jaw is pinned to the end of the bar, and a sliding jaw moves along the bar to adjust the clamp opening. Rather than using a screw to exert pressure, the clamps use a cam. The sliding jaw is kerfed, as shown in the drawing, allowing the jaw to flex when the cam is rotated. To use the clamp, simply squeeze the clamp jaws together with hand pressure, and rotate the cam.

How to make them

My standard cam clamps are made from scrap blocks of maple, oak or some other dense hardwood about 8 in. long by 1½ in. wide by ¾ in. thick. You can make the jaws longer or shorter to suit your needs.

The weak part of the clamp is the end grain at the tail of the jaws where the pins connect the jaws to the bar. The fixed jaws are pinned into the bar, and the sliding jaw has pins on either side of the bar. As pressure is applied, the pins want to split the end grain of the jaws. To prevent this, make sure the tail end of the jaws extend beyond the bar by at least ¾ in. If they don't, the clamp will fail.

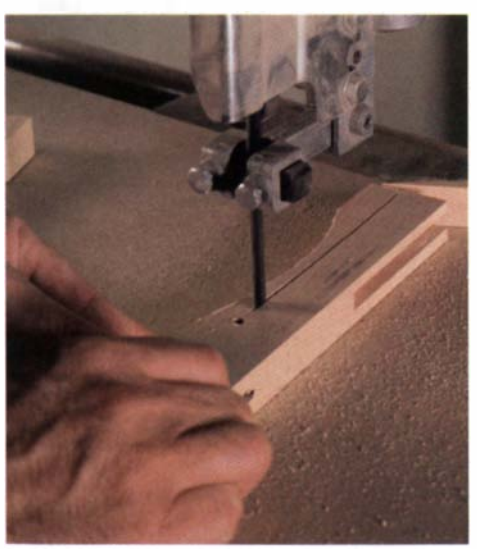
I use ⅛-in. by 1-in. aluminum for the bar, which I get at a scrap dealer or from the local hardware store. To some people, this stock may seem light, but I've never bent one. With the bar only ⅛ in. thick, it's easy to kerf the jaws in the tablesaw with a tenoning jig. Make the kerf wide enough for the sliding jaw to move freely.

If you're going to make a big batch of

Photo this page: Scott Phillips

***A simple jig** makes plunge cutting the bar kerfs fast and safe.*

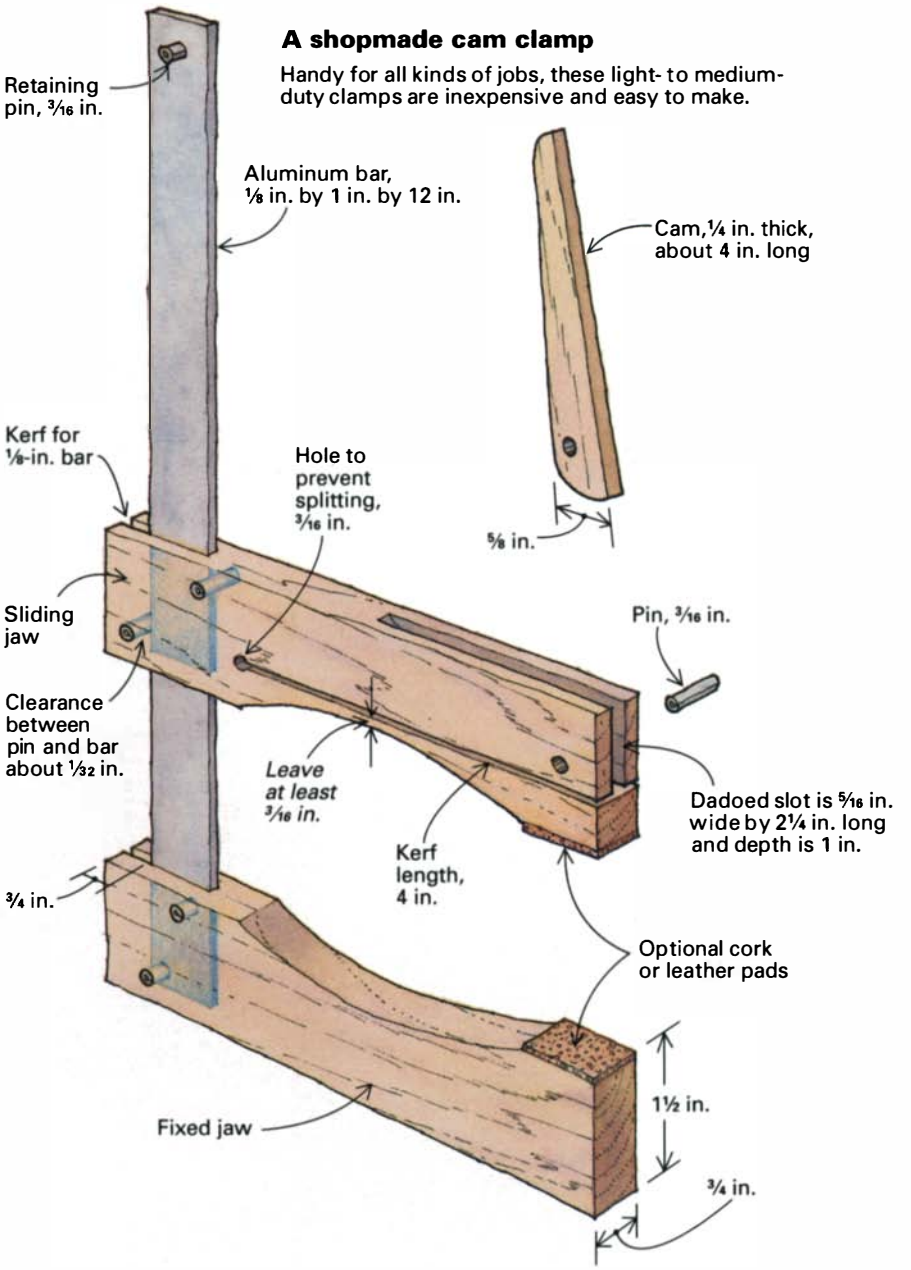
***A stopped block** clamped above the dado cutter controls the cam-slot length.*



***A 3/16-in. hole prevents kerf from splitting jaw.** The cam pushes the kerf open, forcing the pad against the workpiece.*

A shopmade cam clamp

Handy for all kinds of jobs, these light- to medium-duty clamps are inexpensive and easy to make.



clamps, you might try something like the simple plunge cutting jig shown in the top photo. With it, I can safely and easily cut the bar kerfs for a pile of clamp jaws in no time. After kerfing the jaws, cut out the curved waste on the bandsaw.

I drill through the fixed jaw and bar in one shot and take care to locate the pins as shown in the drawing. If they are reversed, the clamp won't hold. On earlier batches, I used nails for the pins, but some of them bent under load. Now I buy 3/16-in. by 3/4-in. roll pins in bags of 100 at the hardware store. They are quite a bit stronger than nails and are already cut to length.

Before dadoing the sliding jaws for the cam, I make up the cams, as shown in the drawing. Because they take more abuse than the rest of the clamp, cams should be made from a strong wood. I use maple. Dado the slots, and then cut the kerf that allows the jaw to flex, as shown in the bottom photo at left.

The correct clearance of the pins on the bar in the sliding jaw is about 1/32 in.—too tight and the jaw won't go on the bar; too loose and the jaw won't slide easily. Make a jig for drilling the holes, and test it before you make up a whole batch.

Drill for the cam-roll pin by holding the cam in the disengaged position (the jaw is not flexed), and drill through them both at once and set the pin. The last step is to install a retaining pin at the end of the bar. Now you're ready to go to work. □

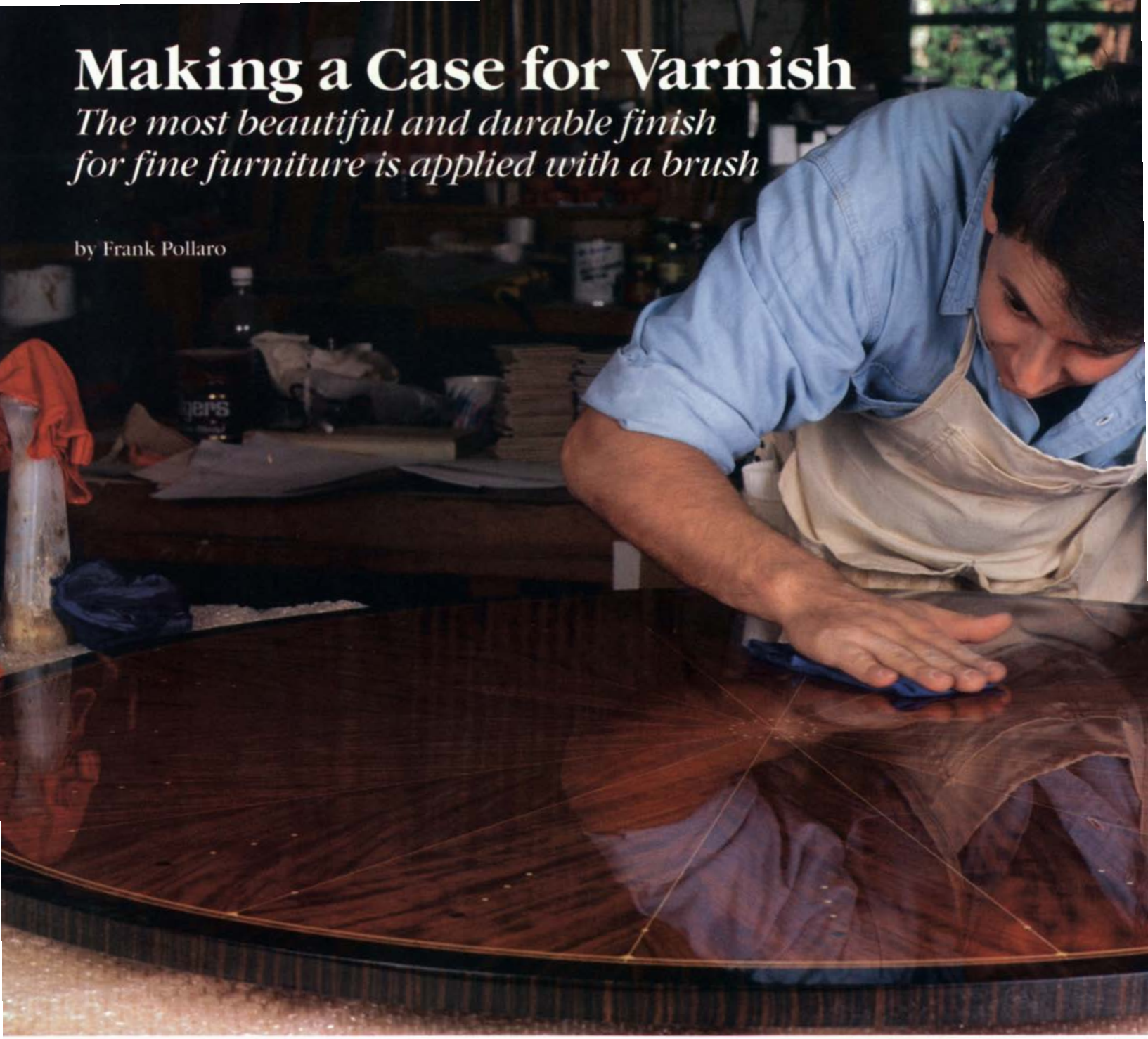
Steven Cook builds furniture and musical instruments in Edmonds, Wash.

Photos except where noted: Aimé Fraser; drawing: Jim Richey

Making a Case for Varnish

The most beautiful and durable finish for fine furniture is applied with a brush

by Frank Pollaro



I'd just finished the most complex piece I had ever attempted, the reproduction of a desk by Emile-Jacques Ruhlmann, the greatest of the Art Deco furniture designers. The curvaceous desk, veneered in amboyna burl and shagreen, or sting-ray skin, had taken me more than 300 hours to complete. The original had been French polished, but I wanted to provide my reproduction with more protection than shellac affords while giving it the same clarity and brilliance.

I asked Frank Klausz, a friend and fellow woodworker, what he recommended, and he suggested that I use varnish. I experimented on scrap boards until I was satisfied with the results. And then I varnished the desk. It was the perfect finish with all the depth, clarity and brilliance I had hoped for.

Now varnish is the standard finish for all my fine work (see the photo above). I've experimented with a number of varnishes and brushes and refined my technique. Now I can brush on a finish that looks as though it has been sprayed.

Understanding varnish

A properly applied varnish finish is glass smooth, hard and resistant to most household chemicals, foods and drinks. It also has a warm, amber glow. That makes it best suited for darker woods, unless you want to add warmth to a light wood, such as maple or ash. Regardless of the choice of wood, a well-polished varnish surface will turn heads.

Varnish must be rubbed out—About the only downside to using varnish is that you

Photos: Vincent Laurence

have to rub out and polish the finish if you want a blemish-free surface. Varnish is oil based, so it takes far longer to dry than lacquer or shellac. Lacquer thinner and denatured alcohol evaporate in minutes, leaving a hard, dry finish behind. Varnish can stay tacky for hours, vulnerable to anything in the air, whether that's dust or a wandering fly. So it's important to apply varnish in as clean an atmosphere as possible.

Depending on the style and function of the piece of furniture I'm finishing, as well as the client's tastes, I may polish it only to a satiny gloss, or I may take it all the way to a high gloss. Either way, though, it's not nearly as time-consuming as a lot of woodworkers think it is. Even a very large dining table won't take more than an afternoon to rub out and polish.

Always use a good brush. *Look for a thick, firm brush with fine bristles, like this badger brush.*

You must sand between coats—The other major difference between varnish and lacquer is that you cannot reactivate dried varnish with a fresh coat or with a solvent. With lacquer, every time you apply a new coat of lacquer, you effectively melt it into previous coats, creating what amounts to a single, thick coat. With varnish, you're building up a finish one layer at a time. Each new coat should bond mechanically to the one below it by gripping the scratches in the surface. For this reason, it's absolutely essential to sand between coats until there are no shiny, low spots.

One final detail about the varnish itself. Always use a high-quality product. It will brush on and flow out much better than cheaper stuff. I've settled on Behlen's Rockhard Tabletop varnish (distributed through Garrett Wade; 800-221-2942 and Woodworker's Supply; 800-645-9292). It's the best varnish I've found, and it dries the hardest, so it rubs out better than any other.

A good brush is the key

The single most important thing you can do to achieve a great varnish finish is to start with a good brush. They aren't cheap—expect to spend between $30 and $60 for a 3-in. brush. My first varnish brush was a badger brush from Behlen's (see the photo above), which I still use. It's a good value at $30 or so. But I discovered another brush last year that I like even better. It's made in Germany from the inner ear hair of oxen and is imported by Kremer Pigments (228 Elizabeth St., New York, N.Y. 10012; 212-219-2394). The brush, listed simply as the Pi72, costs nearly $60. But it has very fine bristles, which leave virtually no brush marks in the finish surface.

Whichever brush you decide to use should be thick, firm and made with fine, natural bristles. This will allow the brush to hold a good amount of varnish and distribute it evenly on the surface. A thin, skimpy brush won't hold enough varnish. A limp brush won't move the varnish around, and coarse bristles can leave marks in the finish. If you're going to use varnish, do yourself a favor and buy a good brush.

Brushing it on

The best place to varnish a piece of furniture is in a small, dust-free room with the windows closed. Few of us have that luxury, though. To reduce the number of little dust specks settling on the wet varnish, I often spray a mist of water in the air, on the ceiling and on the floor just before getting started. Try not to get any water on the piece you're about to finish. Don't get too worked up about dust, though, because any small bumps will be sanded off after each coat has dried.

I cut the first coat of varnish 50% with thinner and add a few drops of Behlen's Fish Eye Flo-Out. This is essentially just silicone, but it enhances the flow of the varnish, eliminates the likelihood of fisheyes and improves the scratch resistance and glossiness of the finish.

Brush technique is important with varnish. The object is to apply a thin, even coat. If you put on too much varnish, it will skin over and the varnish under the skin will never dry. If you use too little varnish, you'll have a hard time moving it around, and it will not flow out. With a little practice, though, the whole process will become second nature.

I find it helpful to let the brush soak in the varnish for a minute or two, so it can absorb some of the finish. Then I apply the first coat, brushing all the way across the table in long, smooth strokes (see the photo at left on p. 54). After covering the table with varnish, I quickly brush over the varnish I've just applied, but at 90° to the original direction and with a much lighter touch (see the top right photo on p. 54). Each coat is applied in the same way. On a piece of furniture with a predominant grain direc-

***Brush on the varnish in long, smooth strokes** (left). On a surface with a single or a predominant grain direction (unlike this sunburst veneer pattern), start by applying the finish across the grain. The first coat of varnish should be a 50/50 solution of varnish and solvent.*

***Brush out the varnish at 90°** to the direction you laid it on (above), usually with the grain. Use a light touch. Just skim across the surface without exerting any downward pressure.*

tion, I apply the varnish first across the grain and then brush it with the grain. You have to move quickly because even though the varnish will stay tacky for hours, it will start to set up after just a few minutes. You'll probably see brush marks, or striations, in the surface at first, but after 15 minutes or so, they'll level out.

I let this first coat dry for at least 24 hours and then sand it out with a random-orbit sander and a 220-grit disc. This gives the surface some tooth for the next coat to bind to. After sanding, I wipe down the surface with a tack cloth before applying the next coat.

I brush on the second coat, cut with 25% thinner and then wait another 24 hours for the coat to dry before sanding it. For a tabletop like this one, I'll apply four or five coats, allowing 24 hours between each coat and 72 hours after the last coat before starting to rub out the finish. The third and subsequent coats are full-strength varnish. Four coats are usually enough, but I've applied as many as eight. If you want the surface to be completely smooth and nonporous, keep applying coats until there are no pores showing after you've sanded with the 220-grit paper. Then just one final coat should do it.

Rub out and polish the finish

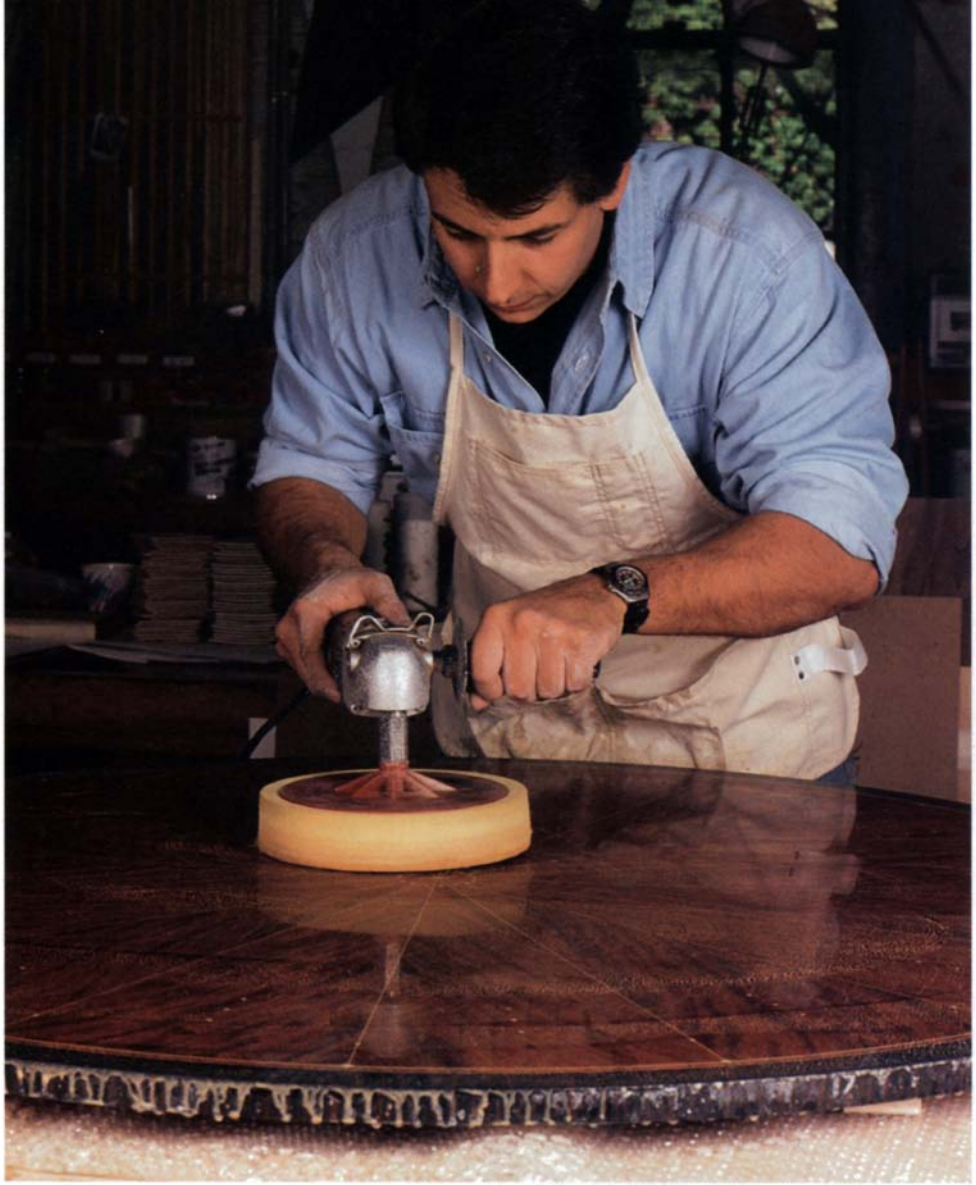
When you're happy with the last coat and have given it at least 72 hours to dry (a week would be better), it's time to rub out the finish. For a satin finish, I just sand with 600-grit paper and polish with 0000 steel wool lubricated with Behlen's Wool-Lube. Then I rub down the surface with a clean cloth, and I'm done.

For a high-gloss finish, I used to wet-sand from 600-grit to 1,000-, 1,200- and, finally, 1,500-grit paper. Now I start and end my sanding with 1,200-grit paper (available at most auto-body supply shops). The advantage of working your way through the grits is that the rubbing out takes less time and the result is likely to be slightly flatter because you're starting with a more aggressive abrasive. The reason I stopped doing it is that I always found myself trying to eliminate a scratch or two from one of the coarser grits that only became apparent after I'd gotten to the 1,500-grit. I'd have to go through the whole routine again, losing any time I had saved.

To take down all the nubs or bumps in the surface of the finish caused by dust or other debris, I wrap the sandpaper around a wooden block (see the center photo at right). I've used naphtha, mineral spirits and water as wetting agents. For this table, I used water with a little Behlen's Wool-Lube in it to make things more slippery. A little rubber squeegee helps to clear away the slurry, so you can check to see if a bump is gone or if you have more sanding to do (see the photo at right). The auto-

***Rub out nubs or bumps** with 1,200-grit paper wrapped around a wooden block (above). Water, naphtha or mineral spirits may be used to lubricate the surface.*

***Use a rubber squeegee to clear slurry.** The 1,200-grit paper works slowly, so keep rubbing and clearing the slurry until all the high spots are gone.*



Polish the finish with a power buffer and automotive glaze. *Once you've sanded out all the nubs and bumps and gotten the surface flat, 10 minutes of power buffing will take the finish to a high-gloss shine.*

body supply dealer I do business with gives me these squeegees.

After I've sanded out all of the nubs and bumps, I swap the wooden block for a cork block and give the whole table an even sanding, trying to get it as flat as possible. It's important to take down any high spots after each coat. If you let these spots build up, you could sand through one coat into another. This shows up as a visible ring between the two coats, and the only way to fix it is to sand off the whole topcoat and apply it again.

Pay special attention to the edges, where the varnish can build up a little ridge. You can judge how flat the finish is by looking at the reflection of a light on the table. If it looks like it's reflecting off the surface of a wind-swept pond, then you have some more sanding to do. If it's relatively undistorted, you're in good shape.

To complete the gloss finish, I apply Meguiar's Mirror Glaze #1 (an automotive rubbing compound), buff it out and wipe it off. (For the closest dealer, call Meguiar's at 800-854-8073.) It's important to get the surface completely clean because any residue from the #1 compound will scratch the surface when you go to the next finer compound. I follow the Meguiar's #1 with the #3 compound, using a different buffing wheel—again, so the residue from the coarser compound doesn't undo what I'm trying to accomplish (see the photo above). After buffing with the #3 compound, I wipe off the table with a clean rag. The surface will shine like a mirror. □

Frank Pollaro designs and builds custom furniture in East Orange N.J.

For porous woods, fill the grain

On very open-grained woods, such as burls, I collect all of the sawdust from my final dry-sanding (220-grit) in a jar. I mix this sawdust with full-strength varnish (see the top two photos below). I hone a square edge on a 2-in. putty knife and use it to apply this paste to the raw wood in place of the 50% dilution I normally use for the first coat.

I lay this paste down in one direction and spread it perpendicularly. I fill the voids, imperfections and pores (see the bottom photo), being careful not to scratch the surface. After 24 hours, I sand with 220-grit to reveal a glass-smooth surface. Two more full-strength coats of varnish and I'm ready to rub out and polish the finish —*F.P.*

Mix full-strength varnish *and 220-grit sanding dust until it has the consistency of molasses.*

Work mixture into the grain. *Apply it in one direction, and then work it into pores crosswise. Try to create a smooth surface.*

All-Wood Extension Drawer Slides

Telescoping dovetails support a fully opened drawer with style

by Karen Robertson

I was rifling through my desk drawer trying to find a key, when the drawer spilled for the third time that day. As I crawled around collecting paper clips, empty film canisters and pens with no springs, I decided to design a drawer slide that would put an end to this sort of thing. I wanted something that worked like a metal, full-extension drawer slide but was good-looking enough to use on fine furniture.

I played around with several versions and finally settled on a telescoping dovetail mechanism (see the drawing on the facing page). The key to the system is an intermediate slider with a dovetail on one face that fits a groove in the drawer side. The other face is grooved to match a dovetailed cleat fastened to the inside of the cabinet.

Like a metal slide, these slides hold a drawer level and stop it from coming out all the way. But unlike a metal slide, this one is easy to make. It uses simple setups and reduces fussing around to a minimum.

As you begin to open the drawer, the slider remains inside the cabinet. When the drawer is halfway open, a pin engages the slider and pulls it out along with the drawer, and when the drawer and slider reach full extension, another pin stops them. At this point, half the slider remains inside the cabinet, acting as a cantilever to support the drawer in the open position.

Build the drawer first

The telescoping dovetail system works best on small- to medium-sized drawers, like those used in dressers and hallway tables. The dimensions shown in the drawing are suitable for drawers from 12 in. to 16 in. deep and 3 in. to 6 in. tall. I've also scaled down the dimensions on the drawing and used the system on small, lightweight drawers, such as the 1½-in. drawers that hold my drafting instruments.

The sliders fit between the drawer and its

Photos: Aimé Fraser

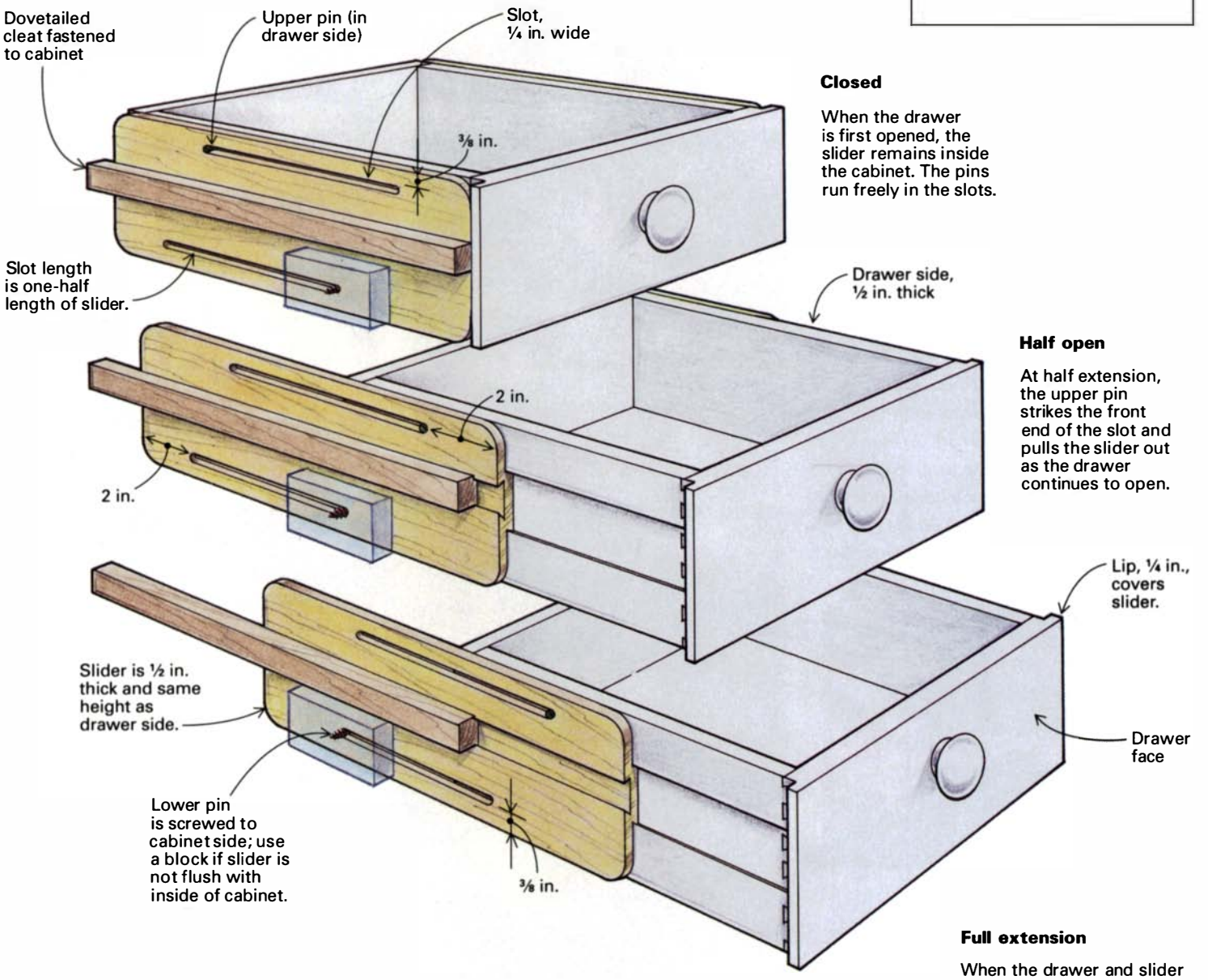
How the telescoping dovetail mechanism works

The key to the mechanism is a maple slider with a dovetail on one face that fits a groove in the drawer side. The other face is grooved to match a dovetailed cleat fastened to the inside of the cabinet. Two brass pins engage the slider and limit the drawer's extension.

Both pins are #8 or #9 screws with heads removed.

Upper pin is attached to drawer.

Stationary lower pin is attached to case.



Closed

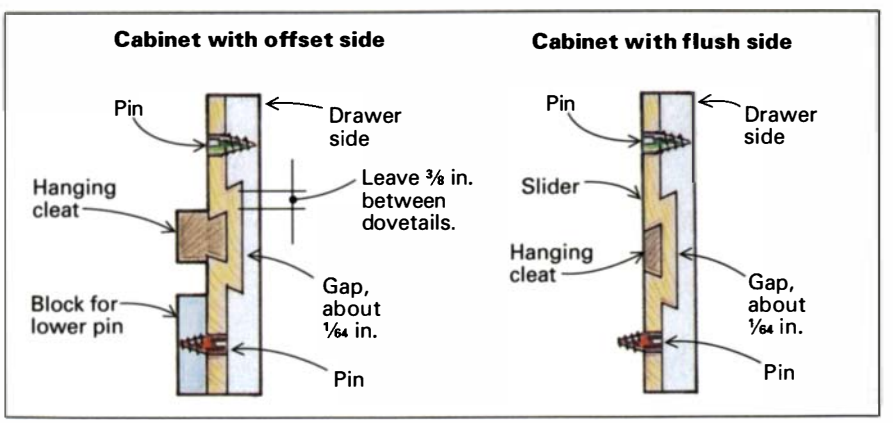
When the drawer is first opened, the slider remains inside the cabinet. The pins run freely in the slots.

Half open

At half extension, the upper pin strikes the front end of the slot and pulls the slider out as the drawer continues to open.

Full extension

When the drawer and slider reach full extension, the bottom pin hits the back of the bottom slot, preventing the drawer from opening farther. The drawer is cantilevered from the slider and can't come out of the cabinet until the upper pin is removed.



Drawings: David Dann

Sequence of cuts

1. Cut the dovetail profiles on both edges of the hanging cleats.

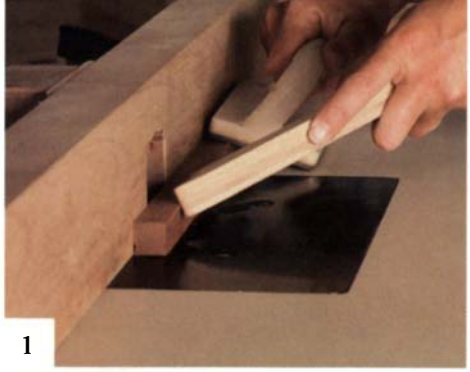
2. Groove and dovetail the outside faces of the sliders to fit the cleats.

3. Leave ⅜ in. of stock between the profiles.

4. Machine the inside face of the sliders into a dovetail.

5. Cut the groove in the drawer sides to match the sliders.

Cutting safety: *The slider gets a little tippy when making the final cuts on its inside face. The only contact with the table is the relatively narrow dovetail. To keep the piece from tipping, leave a thin leg of waste near each edge until the last cut. The leg will split off easily (see the photo below). Make one last careful pass to clean up the face.*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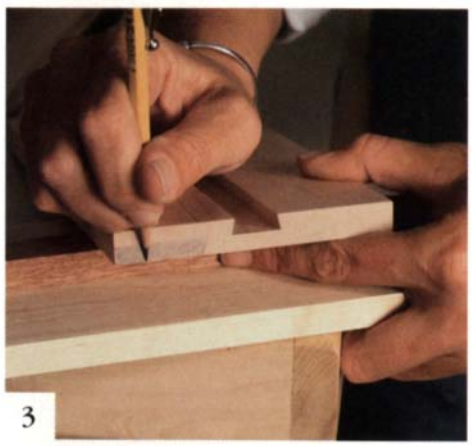

3


4


5

frame, so the drawers are narrower than the opening in the cabinet by twice the thickness of the sliders. To hide them, I put a ¼-in. lip on each side of the drawer front (see the drawing).

The sides of the drawer are part of the telescoping mechanism, so they have to be strong and smooth. I make them from a dense hardwood—usually ½-in. maple. Beyond that, it doesn't matter how you build your drawers. I use dovetails most of the time because I like the way they look.

I cut the grooves for the slider in the drawer side after the dovetails are cut, so when I reassemble the drawer, some of the drawer-front pins will be in the way. I just pare them down with a chisel after the glue is dry. Label the drawer parts before you take them apart to cut the grooves. Note the faces where the grooves will be cut.

Making cleats and sliders

I chose a dovetail profile for the sliders because the shape keeps the drawer aligned even when the fit is loose enough to accommodate seasonal wood changes. The exact amount of play is not critical, but if the groove is too wide, the action will feel sloppy. I make the grooves about 1/64 in. wider than the dovetail, and I've had no problem with binding parts, even in our damp British Columbia weather.

Far more important to prevent binding is the selection of wood. I use ½-in. hard maple for all the parts of the mechanism, except the cleat inside the cabinet, which I

make from a clear, straight-grained wood like mahogany or cherry. I also keep the height of the sliders to less than 6 in. because the wider they get, the more likely they are to warp and bind.

Because you are machining back-to-back dovetails in the slider, the amount of material between the two profiles is very important to its integrity. The slider needs at least ⅜ in. of wood at the shoulder where it meshes with the drawer side (see the drawing on p. 57).

Machine setups and sliding dovetails

When working with something as hard as maple, I like to play it safe and remove stock with a series of light cuts. It's easier on the equipment and on the nerves. I remove the bulk of the waste with a dado cutter. Then I use a router mounted in a table to cut the dovetail profiles and remove the sawmarks. Depending on the amount of wood to be removed, I might make as many as four passes.

For wasting the excess quickly, I use ½-in. dado cutters adjusted to cut a 7/32-in.-deep groove. I set up the table-mounted router with a ½-in., 14° dovetail bit to cut to a depth of exactly ¼ in. (1/32 in. deeper than the dado). Once set, neither of these heights is adjusted. Only the fences move.

The machining process will be far less confusing if you keep the cuts centered on the drawer sides and sliders. I do that by making two cuts for each fence setup. Run the piece through, end-for-end it and cut the other side. Then set the fence for the next cut (for details of the sequence of cuts, see the list and photos on the facing page).

Installing the stop pins

The telescoping mechanism depends on two brass stop pins that pull the slider into its supporting position and prevent the drawer from falling out of the cabinet.

I make the pins by sawing the heads off #8 or #9 by ½-in. round-head, brass wood screws and slotting the shanks for a screwdriver. Rather than trying to drive the soft brass pins into pilot holes, I first run in a steel screw a few turns to cut the threads.

Before you install the pins, put in the hanging cleats, and slide the drawers and sliders in place. Check the fit. If the drawer is too loose side to side, shim under the hanging cleats with paper or business cards. If it's too tight, carefully sand the drawer sides (not the groove).

When the drawer fits properly, it's time to drill pilot holes for the pins in the sliders. Remove the drawer, and push the sliders in all the way. Drill the pilot hole into the cabinet side at the front of the bottom slot. You may need to glue a block to the cabinet to receive the pin (see the drawing detail on p. 57). Install the pin so that the slotted head is just below flush with the slider.

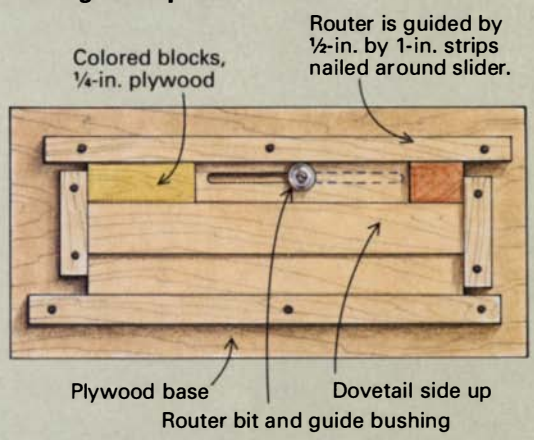
To install the upper pin, pull the slider all the way out, and line up the inside back of the drawer with the front of the cabinet. Drill the pilot hole for the upper pin into the drawer side at the forward end of the slot. As you disassemble everything for finishing, make sure all the parts are clearly marked for easy reassembly. To keep everything moving freely, apply three coats of wax to the drawer sides, sliders and hanging cleats, and buff with steel wool. □

Karen Robertson is a woodworker and part-time instructor in the fine furniture program at Camosun College in Victoria, B.C., Canada.

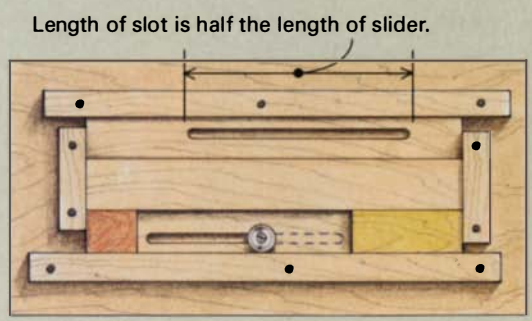
Slotting jig

Color-coded blocks, sized to the slider, stop the router cut at each end. The right and left sliders are mirror images, so the blocks will be reversed.

Routing the top slot



Routing the bottom slot



A jig for plunge routing the slots

The slots in the drawer slider are half as long as the slider's overall length. They're laid out with the top slot toward the front of the slider and the bottom slot toward the back (see the drawings at left). For strength, I leave at least 2 in. of stock between a slot and the end of the slider and ⅜ in. between a slot and the edge of the slider.

Mark the right and left sliders and designate the front and back of each. Now the sliders are identical, but they need to be slotted as mirror images of each other.

A plunge router and a jig make slotting easy (see the drawings). I set up my router with a downcut spiral bit and a guide collar. It's sized so that when I push the collar against the strips, the router cuts the slot ⅜ in. from the edge. I size the stop blocks at either end of the jig to take the collar offset into account.

For the first slot, the blocks are laid in the jig, as shown in the top drawing. When routing the lower slot, the short block is at the back. Remember that the sliders are mirror images, so when you slot the second slider, the blocks will be reversed. Think it through carefully because the placement of the blocks is different for each slot. Coloring the blocks helps to keep things straight. *—K.R.*

Coopering a Chair Seat

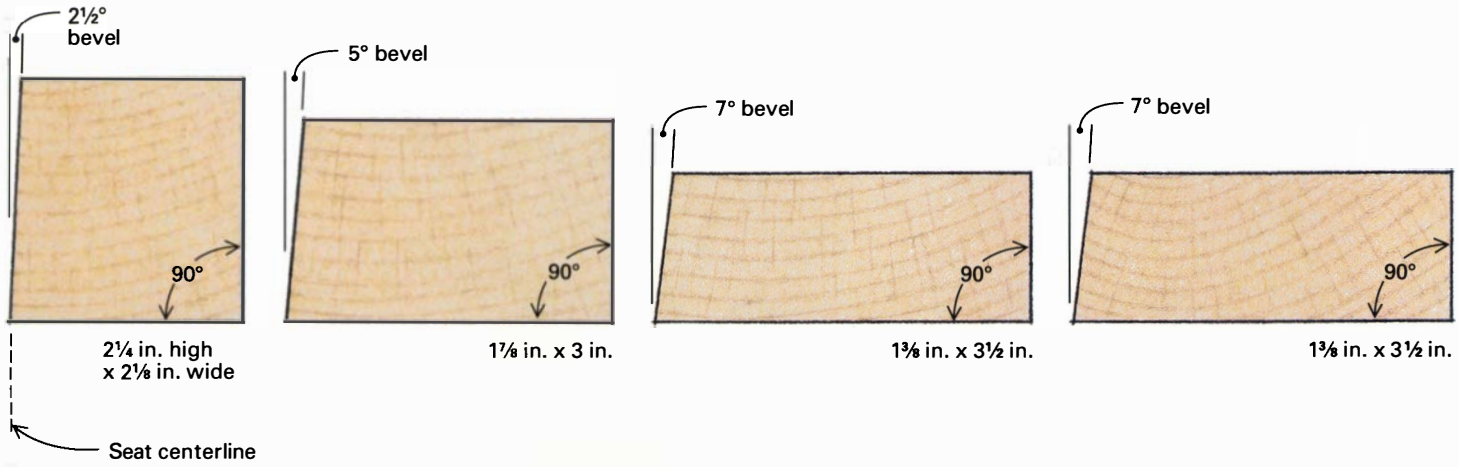
Beveled staves form a graceful seat that's curved on the bottom as well as the top

by Charles Argo

Photo this page: Grant Fly

Rough dimensions for seat staves

This seat is made of eight staves, four on each side of the seat centerline. Because the seat's pommel will be cut from the two staves on either side of the seat's centerline, these pieces are thicker and narrower. Staves are beveled on their inside faces.



Coopering is the barrel-maker's art, the technique of joining beveled staves into curved surfaces. I learned it from James Krenov at the College of the Redwoods, not a place known for its wooden barrels and buckets. Krenov taught me how to use this technique for making a variety of curved furniture parts like cabinet doors and case sides. But it was Jeremy Singley, a woodworker I've never met, who got me thinking about coopering solid wood to form curved chair seats.

Singley had tackled the problem of making a curved chair seat by cutting sawkerfs in the bottom of the chair blank and then driving wedges into the slots to force the seat into a curve. After reading about his approach, I remember thinking that coopering would be a lot easier. Because I wasn't making chairs with solid seats at the time, I filed the thought away.

Eight years later, when I began to consider a chair with a solid seat and spindle-turned parts, it was only a short leap back to the idea of a coopered seat. Unlike the traditional method of sculpting a seat from a thick plank of wood, coopering produces a seat that is curved across both top and bottom. I think of chairs essentially as functional sculpture, so a coopered seat promised to add to the chair's visual appeal (see the photo at left).

At first I was just going to use a simple, curved panel as the seat—something like a section from a barrel. But I soon realized that with a little planning and some judicious cutting, I could form a pommel at the front of the seat before the staves were glued up. It seemed easy enough on paper. In reality, it wasn't, and I did several seats before I was happy with the result. Coopering a chair seat is still a lot of work. Staves must be cut and fitted with great precision and gluing them together correctly takes planning as well as practice. Unlike a seat made from flat lumber, a curved seat provides no flat reference points. There's no doubt that making a coopered seat for a chair like this rocker is more involved than shaping a solid seat. But is it worth it? Absolutely. Coopered seats are extremely comfortable, and they look simply but elegantly sculptural.

Lay out the curves before cutting staves. *Templates of front and rear seat curves are traced onto a piece of scrap. Staves will be cut in order, beginning at the seat centerline.*

Mock up a seat before cutting seat patterns

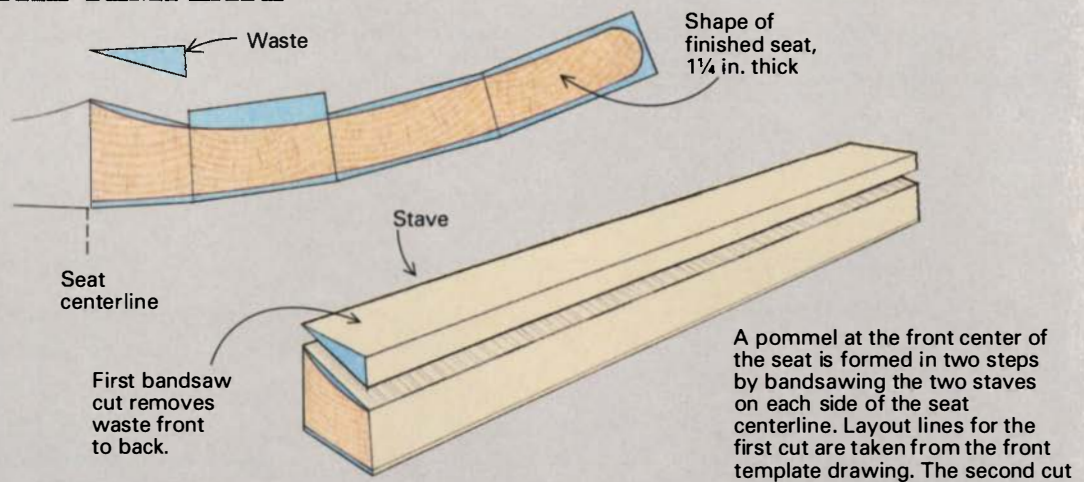
There are two curves in these seats: the basic curve of the seat (the profile you see if you look at the chair from the back) and a double curve in the front that forms the pommel. My first step is to make a mock-up seat. Then I establish the finished size of the seat (19 in. deep by 21 in. wide for this rocker) and find the right radius for the basic curve. I want as much curve as possible. But I don't want the seat to pinch my legs together when I'm seated. So I settled on a radius of 27 in. and a seat thickness of 1¼ in.

With the width, curve and thickness established, making a template that corresponds with the back edge of the seat is a simple matter with a set of trammel points. The front template is more complicated because it has the pommel meeting in the center. I start with the template for the basic curve that I've just made and then lay out the pommel over it. The height and width of the pommel is up to you, but my seats have a ridge that rises 1 in. above the basic curve at the center and fairs into the seat at a point about 5½ in. on either side of the centerline (see the photo above). It's important to get a smooth transition between the basic curve and the double curve of the pommel. Once you have the front edge laid out, you can

Photos except where noted: Scott Gibson; drawings: Vince Babak

FITTING STAVES TO THE TEMPLATE

Work from the center out. *The author has marked this first stave so it will conform to the centerline of the drawing.*



A pommel at the front center of the seat is formed in two steps by bandsawing the two staves on each side of the seat centerline. Layout lines for the first cut are taken from the front template drawing. The second cut is detailed in the top photo and drawing on the facing page.

Mark the cut for the pommel. *After the bevel has been cut on the tablesaw, the stave can be marked for the first of two bandsaw cuts that will define the pommel at the front of the seat.*

Adjust the bandsaw by eye. *The first angled cut for the pommel is made freehand on the bandsaw. The angle is found by marking the end of the stave on the front template drawing.*

Stave now fits the drawing. *The inside edge of this stave has been beveled on the tablesaw and the top cut end to end on a bandsaw. The stave should line up with the template drawing.*

Mark the drawing for the next stave. *The author marks the drawing where the outside edge of the first stave stops. The edge of the next stave, beveled at a slightly steeper angle, starts here.*

make a template of it. The templates can be traced onto a piece of scrap, and each stave is marked and cut directly from this drawing.

Pay attention to grain when selecting staves

Generally, I use eight staves to glue up a seat blank. Because I do the bulk of the shaping on the finished seat with planes and spokeshaves, I look for wood that will cut cleanly. For the same reason, I like to arrange the staves with the grain running in the same direction along the top surface. And because the pommel ridge is so prominent, I always cut the two staves that form the ridge from the same piece of wood. That reduces the chance of seeing the glueline.

The pommel begins at the center of the seat and falls away to either side, so I need thicker material at the center than I do at the outer edges. The drawing on p. 61 shows the dimensions I use for the eight staves. So to save time later, I make the innermost staves narrower than the ones on the outside. The more of a curve you span with a stave, the more material there is to remove by hand after the seat is glued up. I always cut an even number of staves and make identical left and right pieces as I go.

Laying out the staves on the drawing

With the staves roughed out and the templates traced onto a piece of scrap, I'm ready to mark and cut each stave in order. I start in the middle and work out. The series of photos above shows how

the staves are marked. The outer edge and bottom of each stave is left square as I work outward along the curve. The bevels are cut on the inside faces of the staves, and the angles vary.

The first stave is cut on the tablesaw so its inside face (the one along the chair's centerline) is about 2½°. The inside edge of the second stave has a bevel of about 5°, and the two outside staves are beveled at about 7°. These angles will vary with the seat, and you'll just have to experiment as you go along. Just make sure the staves conform to the drawing you've made from the template. And remember to cut the stave's mirror image—the stave for the other side of the chair—as you go along.

Forming the pommel with the bandsaw

The pommel is like a small hill that rises out from the center of the seat in the front. It fairs into the basic curve of the seat to the sides and to the rear. Only the two staves to either side of the centerline have to be cut for the pommel—the two outer staves on each side are simply beveled to fit the basic seat curve.

The side-to-side profile of the pommel is formed stave by stave using the front template and the bandsaw. To cut the second pommel curve, the one from front to back, I start by deciding how far back from the front edge of the seat the pommel ridge will extend. I find that about 5 in. works well on my finished seat. Because I've allowed an extra inch in the length of the staves for the rough seat blank, I make a mark 6 in. in from the front on the top inside edge of the two center staves.

At the back of the stave, I mark the point where the stave intersects the back template. With the help of a straightedge and a cardboard template for the pommel curve, I draw a line on the inside edge of the stave parallel with the bottom that sweeps up into the pommel (see the top photo). The sweep of the second pair of staves is marked after I've cut the first ones on the bandsaw.

There's a trick to gluing up

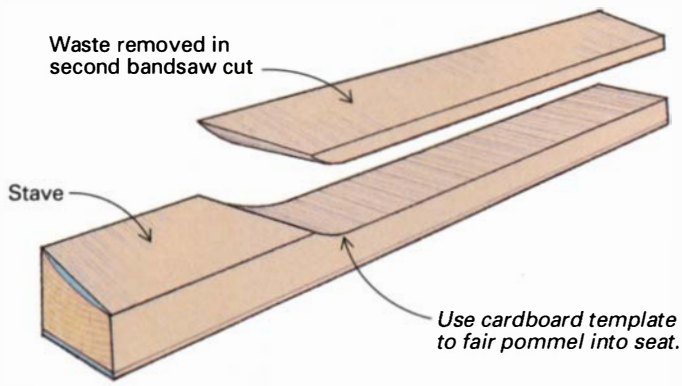
Now that all the staves are cut, how do you glue this thing together? Well, it's not like gluing up straight stock. I glue up staves in pairs: the two outside staves on each side, the two inside staves on each side, then the two halves of each side and, finally, the whole seat. Gluing the whole thing up at once would be nearly impossible. The most important part of glue up in any coopered panel or seat is getting clamp pressure at exactly 90° to the face of the joint. I use my template drawings to determine the correct line of clamp pressure and make angled glue blocks. Keeping clamp pressure on the centerline is crucial to a tight joint. Even small deviations will result in open gluelines.

The final glue-up—in which the two halves of the seat are joined—is the most complicated. Because of the amount of curve involved, the line of pressure for the clamp falls below the outer edge of the seat. I make a heavy jig that fits against the bottom and outside edge of each half and screw it directly to the seat blank in areas that will be cut away later (see the photo at right).

If glue-up has gone well, shaping the seat should be relaxing and fun. I have a variety of round-bottomed planes I've made, some specifically for this chair seat, as well as spokeshaves and scrapers that accommodate the various curves. For me, this is fun. But if it sounds like too much trouble, you could get away with abrasives and curved scrapers alone for final shaping. □

Charles Argo is a partner in Sierra Craftsmen, a custom furniture-making studio in Visalia, Calif.

Lay out the second pommel cut. *The template drawing of the back of the seat, a straightedge and a curved cardboard template are used to lay out the second cut that will finish up the rough pommel shape.*



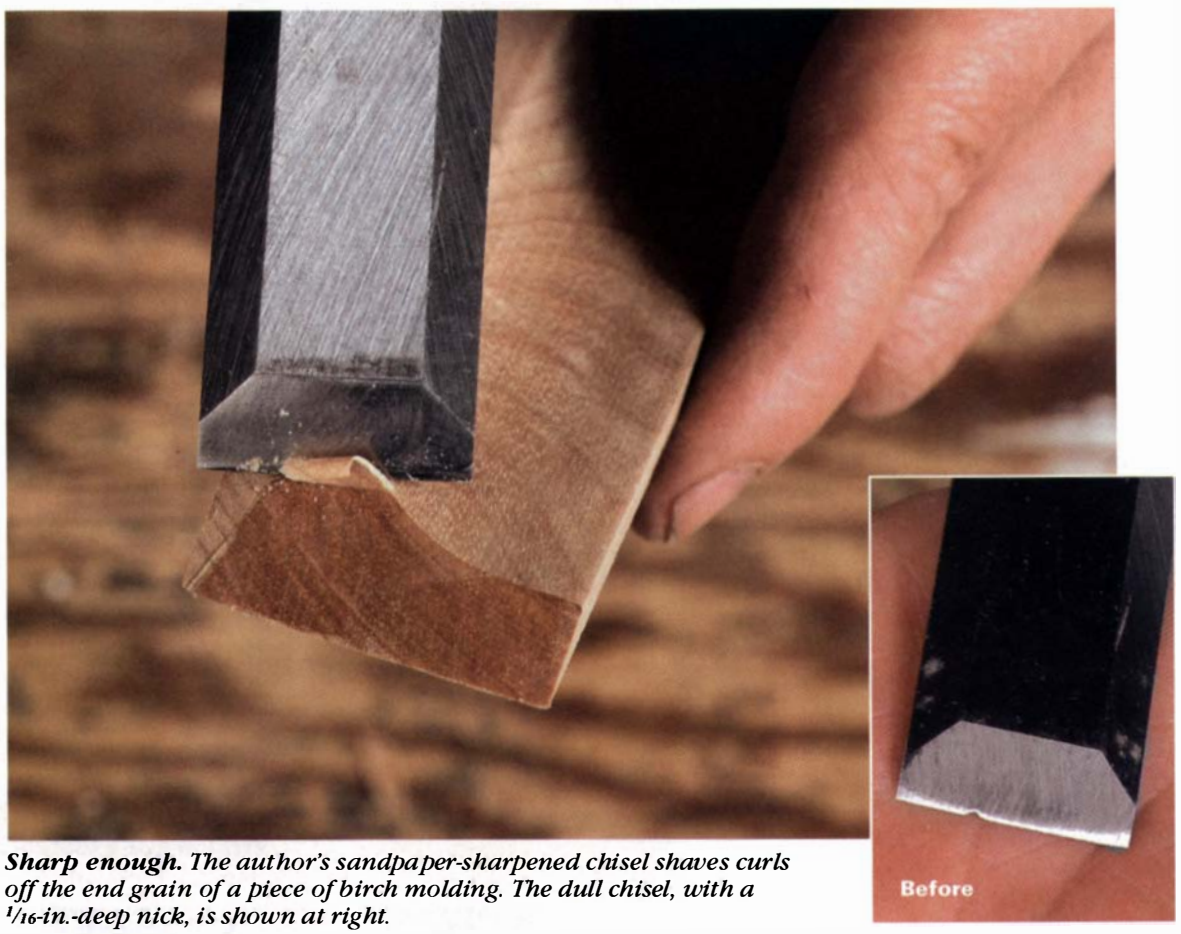
Eight staves make a seat. *Once the contours of the pommel have been cut on the four center staves, seat parts are now ready for glue-up.*

A jig for final glue-up. *By the time the author is ready to glue the two halves of the seat together, the clamp line is well below the two outside edges of the seat, making clamping tough. The solution is a jig that is screwed to the seat blank.*

Job-Site Sharpening

Sandpaper makes a keen edge in a hurry

by Stephen Winchester



Sharp enough. *The author's sandpaper-sharpened chisel shaves curls off the end grain of a piece of birch molding. The dull chisel, with a 1/16-in.-deep nick, is shown at right.*

When I'm in my shop, I sharpen chisels and plane irons with a wet grinding wheel and waterstones. They do a great job, but they're not very portable. So when I'm on a job site installing cabinets, I leave the wheel and stones at home and use sandpaper to sharpen dull tools.

All I need for sharpening is a belt sander, a sheet of 120-grit sandpaper and two pieces of 3M's Microfinishing film. It may sound crude, but the edge I get will shave hair off my arm. More important, the edge will shave tight curls off any hardwood I encounter on the job (see the photo above).

"Never use a belt sander on a chisel or a plane iron!" you say. Trust me. A belt sander grinds a bevel quickly, and it won't hurt the tool as long as you use a light touch. I put a 120-grit belt on my belt sander, set it upside down on a portable bench and take it easy with the grinding. Overheating the blade will destroy the temper, so I don't bear down on the tool. And I don't let the tool stay on the belt for more than a few seconds at a time.

Once I've eliminated any nicks and established the bevel, I hone my edge tools with the 120-grit paper and the Microfinishing film backed by a piece of scrapwood, as shown in the photos on the facing page. The wood doesn't have to be perfectly flat—just free of large gouges or cracks.

After honing on the 120-grit sandpaper, I use 60-micron and 30-micron Microfinishing film. The grades get finer as the number goes lower. The 60 micron is equivalent to about 220-grit, and 30 micron is about the same as 400-grit paper.

This stuff lasts forever, too. I've been using the same pieces of film for two years. I get my Microfinishing film from a local auto-body supply store. Call 3M at (800) 742-9546 to find the nearest distributor. □

Stephen Winchester is a professional cabinetmaker and furnituremaker. He lives in Gilmanton, N.H.

Photos: Vincent Laurence

Grind the bevel. *A 120-grit belt is usually as coarse as you'll need, but if there's a deep nick in the edge, go to 50-grit and then to 120-grit. Use a light touch, and don't let the chisel or plane iron stay on the belt for more than a few seconds at a time. If the tool becomes too hot to hold, it could lose its hardness. Let it cool before doing any further grinding.*

Remove the burr *by rubbing the back of the tool on 120-grit paper. Keep the tool perfectly flat on the paper.*

Use 120-grit on the bevel. *When the bevel has a consistent polish, flip the tool over, and remove the burr again.*

Continue honing with 60- and then 30-micron Microfinishing film*. Remove the burr with the same grit.*

Strop the bevel and back *several times on any convenient piece of leather—a nail apron's tape holder, a belt or a work boot will do fine. Now you're ready to plane or pare.*

Small-Shop Dust Collectors

Choosing the right features and power for your needs

by Sandor Nagyszalanczy

Even woodworkers with no natural housekeeping skills eventually may recognize that the sawdust piling up on the shop floor is a nuisance. Sawdust is also a fire hazard and, worse, poses serious health risks. Some of the bits of dust pumped into the air are many times smaller than the human eye can detect. Dust particles that small can stay aloft for hours, plenty of time to be inhaled and lodge in the deepest cavities of your lungs. Exposure to dust over long periods of time may even give you cancer.

These are good reasons to have a central dust-collection system. A well-designed system whisks wood dust and debris from the machinery, work stations and floor sweeps to a canister or bag. Good-quality filters capture most of the dust before the air is returned to the shop. Any small particles that sneak through can be controlled with an air-filtration device or by wearing a dust mask. The result is a healthier and cleaner shop.

You can get good results by mounting a collector on a dolly and wheeling it from job to job. But I think a central collection system—consisting of a collector, rigid metal ducts and flexible hose—is the best approach. A good central collector is tailored to suit the equipment in your shop.

Central collectors vs. shop vacuums

Shop vacuums or small portable collectors work well when collecting dust from a single machine or from portable power tools. But many of them don't have much chip-holding capacity. A shop vacuum has a small universal motor, like those that are used in most portable power tools, running at a high speed to drive a fan that draws sawdust through a 1-in. to 2¼-in. flexible hose. Hoses that small can clog easily with large shavings.

A central collector is like a big shop-vacuum cleaner, with some important differences. A central collector employs a pow-

Photos except where noted: William Duckworth

erful induction motor (the kind used in most stationary machines) to drive a large-volume fan. This blower, or impeller, moves chips and sawdust through ductwork 3 in. to 6 in. or more in diameter. A central dust collector moves a large volume of air at 3,500 to 4,000 feet per minute (fpm)—a speed just high enough to keep chips and dust moving through the ducts in a well-designed system.

In contrast, a shop vacuum moves a small volume of air at a high velocity—8,000 fpm or more—through a small-diameter hose. This high-velocity air is subject to more friction, which is why these machines quickly choke if you try to draw sawdust through more than just a few feet of hose.

Two-stage systems are safer and more efficient

Once you've decided to buy a central dust collector for your shop, you are faced with a number of choices. The most basic is whether to go with a single-stage or a two-stage design (see the drawings at right). Prices range from less than $200 for a 1-hp single-stage version to more than $2,500 for a big-capacity two-stage collector.

Single-stage collectors are widely advertised in woodworking-supply catalogs and magazines, and most of them are manufactured in Taiwan. These simple devices consist of a blower and a filter-bag assembly (see the top photo at right). Incoming dust and chips travel through the blower and then into fabric bags. The lower bag collects the sawdust.

A two-stage collector removes larger particles and coarse dust before air enters the blower. Most two-stage collectors use either a canister or a cyclone (more about cyclones later) to separate heavier debris. Only fine dust moves through the blower and into the filters.

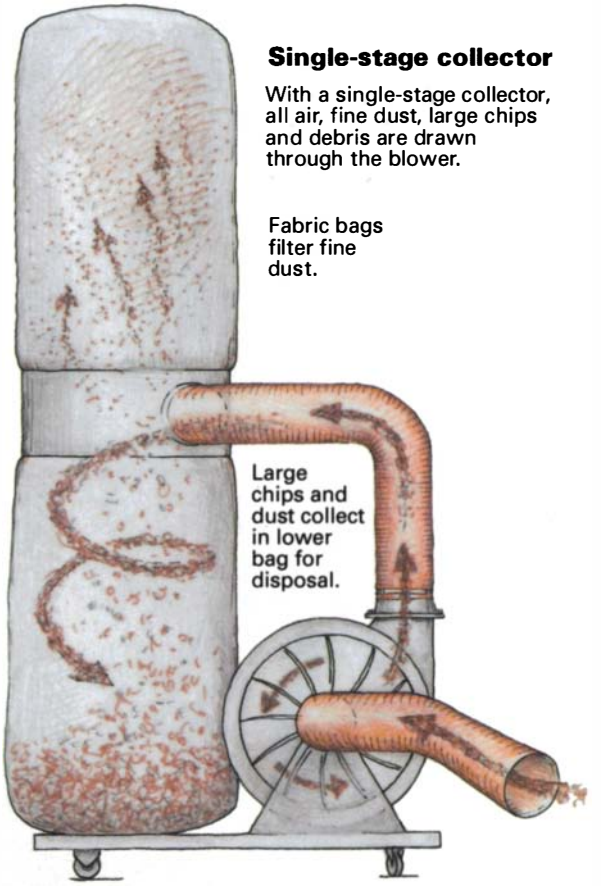
Two-stage collectors have several advantages over single-stage models. Because large debris doesn't go through the blower, there's less wear and tear on the fan and less racket caused by chunks of wood striking the blower. More important, this reduces the risk of a fire or explosion. Bits of metal, like a nail or a staple, can cause a spark when they hit the blower and ignite dust inside the filter bag. When only very fine dust is sent to the filters, they become more efficient: The filters are less likely to clog, they will need to be cleaned less often and they will allow air to flow more freely through the system.

Disadvantages? Canister-style collectors and cyclone collectors are more expensive than comparably sized single-stage units, and many two-stage systems are just too big for small shops.

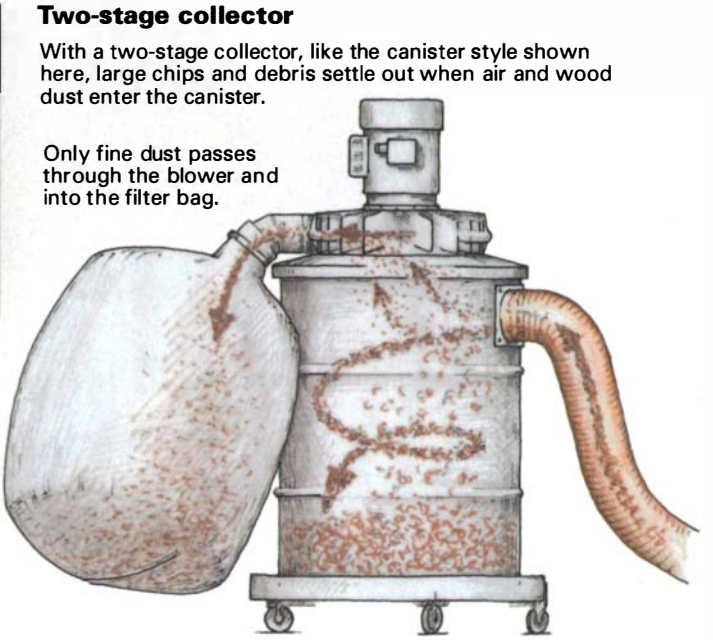
One drawback to canister-style collectors, sometimes called barrel-top collectors, is that you must lift off a heavy top assembly to empty the drum (see the bottom photo). You can make that chore easier by hooking a block and tackle to a ceiling joist over the unit to raise and lower the top.

The low cost and availability of single-stage models make them popular in many small woodworking shops. With a pre-separator added in front of the blower, a single-stage collector will perform like a two-stage unit. This conversion will increase the chip-holding capacity of the collector

***Single-stage collectors**, such as this 2-hp unit, connect easily to small central-collection systems. One drawback is that the debris enters through the unit's blower where cutoffs or stray bits of metal can cause problems.*



***The lid can be heavy** with this kind of two-stage collector. One option would be to install a block and tackle nearby with a wall cleat to tie off the rope.*



Drawings: Christopher Clapp

***A built-in cyclone** does an excellent job separating chips and dust before they reach the blower. This Delta 50-903 collector has a 5-hp motor.*

***A cheaper alternative—**This cast-plastic separator lid (with a 1½-hp Penn State #DC3 portable collector) fits snugly on a 30-gal. trash can. Connected to a ductwork system, the lid isolates large debris and transforms a single-stage collector into a safer two-stage unit.*

Photo: author

and make sawdust easier to empty. More important, it will allow you to collect larger chips and metal debris more safely.

Cyclones, separator cans and drop boxes

A cyclone is one kind of pre-separator. It's a sheet-metal cylinder with a funnel-shaped lower section that empties into a drum. Incoming air full of dust and chips swirls around until the heavier debris slows down and drops to the bottom.

You can purchase a system with a built-in cyclone, such as the Delta 50-900 series (see the photo at left). Or you can build or buy a cyclone and connect it to a single-stage system (for more on this, see *FWW* #100, pp. 76-81). Be sure the cyclone fits the air-moving capacity of your blower and ductwork system.

If you can't afford a cyclone, you can add a pre-separator to your system by installing either a dust-separator can or a drop box ahead of the blower. Though they are less efficient than a cyclone, these devices are inexpensive and can increase the chip-holding capacity of your system.

A dust-separator can is a drum or a barrel with an inlet and an outlet arranged so that heavier materials settle out as dust and debris enter it. Only fine dust travels to the blower and the filters.

You can build your own separator can by installing a few plastic plumbing fittings into the removable lid of a fiber or steel drum. Flexible hoses connect the inlet to the ductwork and the exhaust to the blower. Or you can buy a cast-plastic lid that's designed to fit over a standard 30-gal. galvanized-steel trash can (see the bottom photo). This inexpensive lid accepts 4-in.-dia. hoses and hooks up quickly to most systems. The lid is available through a number of woodworking-supply catalogs.

A drop box is an even more basic pre-separator (see the drawing on the facing page). It consists of an airtight plywood box with an inside baffle. As air from the ductwork enters on one side, chips settle and fall into a removable bin inside the box.

Choose a collector with enough power

To determine the size and power of a central collector, you'll need to know two things: the amount of air the collector's blower is capable of moving, measured in cubic feet per minute (cfm) and the amount of air resistance in the ductwork that the collector must overcome, stated as

static pressure (sp). Generally, more motor horsepower and larger blowers mean more air-moving capacity for the collection system. The amount of power you'll need depends on three factors:

1. How much sawdust your shop produces. The more debris a machine produces, the greater the volume of air needed to capture and convey it. See the chart on p. 70 for average cfm requirements for small-shop machines.

2. How far the ductwork must move sawdust. The farther or more roundabout the distance debris must travel, the stronger the collector you'll need. Ribbed, flexible hose generates more friction than straight, smooth-walled duct. Small-diameter ducts add more friction and require more power.

3. How many machines the collection system must handle simultaneously. In most ductwork systems, blast gates control the suction at each work station. Running several machines at once with two or three gates open, common in a shop with several people, requires more air and power than running a single machine with only one gate open.

If your shop is about the size of a two-car garage and you use only one machine at a time, your central collector should deliver at least 5 in. of sp and about 20%-50% more cfm than is required by your largest dust-producing machine, as shown in the chart on p. 70. Use a 4-in. pipe for most branch ducts; thickness planers need a 5-in. pipe. Connect the branches to a 5-in.- or 6-in.-dia. main duct.

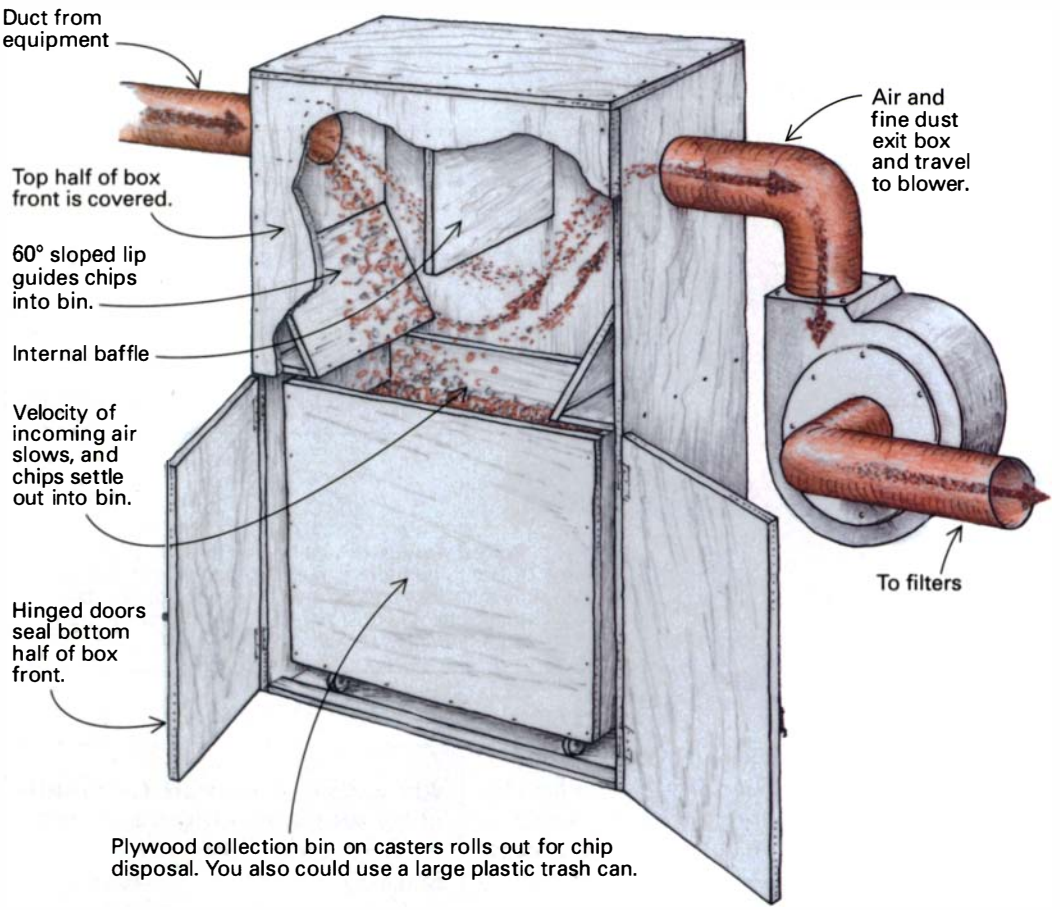
If your shop is larger or your collection system is more complicated, the only way to ensure you'll end up with the right size central collector is to design your entire system first. This involves laying out and sizing all the system's main and branch ducts, figuring the cfm needs for all the machines used at one time and calculating the air resistance, or sp losses, in the system.

This process is too complicated to cover in this article, but if you are up to doing the calculations yourself, Air Handling Systems (5 Lunar Drive, Woodbridge, CT 06525; 800-367-3828) offers a free catalog with instructions for doing the math. The company also sells a simple calculator for $10, which works like a slide rule.

If you need more help in designing your system, your local air-handling equipment supplier usually can help. Oneida Air Systems (1005 W. Fayette St., Syracuse, NY 13204; 315-476-5151) is one dealer that provides free design services.

A drop box creates a two-stage system from a single-stage collector

This 36-in. by 60-in. box, built from ¾-in. plywood, is about right for a system that moves 1,000 cfm. The size of the box is not critical, as long as you make it airtight.



Advertised vs. actual performance—Be aware that the cfm ratings you see in some advertisements reflect the amount of air a collector moves when it's not connected to any ductwork and is operating with no resistance (that's 0 sp). This is known as free-air cfm. Static-pressure ratings also can be misleading because they can represent the pressure loss generated when no air is moving at all, or at 0 cfm.

So how do you really know how much power a collector is capable of generating at a particular cfm? You can ask the manufacturer for a copy of the collector's performance curve. (The performance curve is a graph that plots the actual amount of air the collector will convey under different work loads.) If the dealer can't supply you with one, I suggest buying a unit from one who can, or select a model that is sized at least 50% larger than your requirements.

What if your collector isn't strong enough?

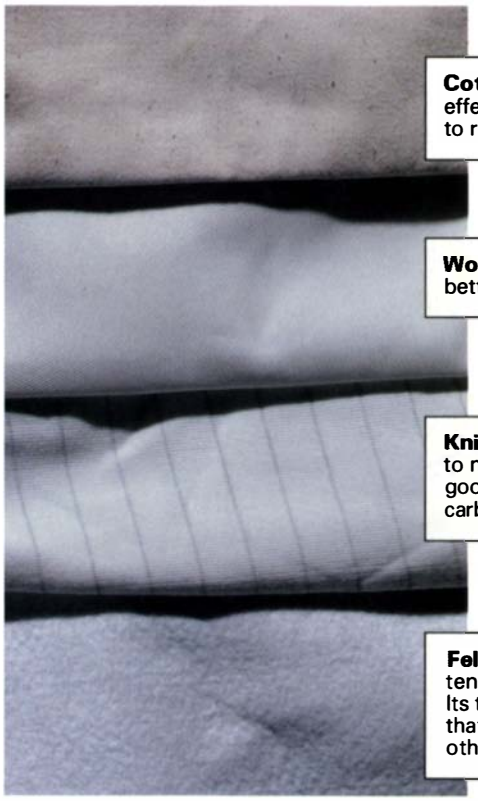
If you own an underpowered collector, you'll know by the telltale sawdust that accumulates around your equipment. Chips that have settled in the ductwork are another sure sign. If you can't afford to buy a new one, there are a few things that you can do to improve the efficiency of your present collector:

1. Relocate the collector so that it's closer to the machines and floor sweeps. When you reduce the length of ductwork and straighten the number of twists and turns, you lower the resistance to air flow.

2. If dust collection is inadequate at only one machine, such as the planer, move it closer to the blower. Or you could disconnect it from your main system, and use a separate dedicated collector to service just that machine.

3. Add more power by connecting two dust collectors in tandem. You'll nearly double the force of your system by attaching two units together. Run a hose from the outlet of one blower to the inlet of another. To avoid pressure imbalances, use two identical units.

4. Buy a larger dust bag, or retrofit the fan-inlet plate with a larger duct (both are



The kind of fabric matters

Cotton sateen is the least expensive and the least effective at filtering fine dust. It's also more prone to rot and mildew.

Woven polyester is more durable but not much better at capturing fine dust.

Knitted polyester stretches like the material used to make athletic tube socks. It's thick enough for good filtration. The dark lines in this bag are carbon fibers, which help dissipate static electricity.

Felted polyester has no nap (like wool felt) and tends to be more expensive than woven polyester. Its thickness creates a three-dimensional maze that traps fine dust particles better than all the other samples shown.

available from Oneida Air Systems). These methods work especially well with many single-stage collectors. Just like fitting bigger carburetors or mufflers to an auto engine, these new components help the unit convey a larger volume of air. Oneida Air Systems also sells large replacement bags.

Getting good filtration

Exhaust from the blower must pass through a filter to remove fine dust and return clean air to the shop. The quality of filtration depends on the kind of fabric material used and the filter's total surface area.

Good and better filter materials—If you purchased a single-stage collector a few years ago, it probably came with a cotton sateen or a cotton duck fabric bag. These do a poor job of filtering out dust particles smaller than 30 microns (1 micron is a millionth of a meter).

Dust particles below 10 microns do the most respiratory damage. Most of the collectors sold today come with bags sewn from polyester fabrics—they're better at filtering out harmful dust. Some manufacturers offer them as an alternative to cheaper cotton bags.

Polyester fibers can be woven, knitted or felted (see the photo above). Filter bags that are made from 12-oz. or 16-oz. felted polyester, singed on the inside by a gas flame to keep the fabric from becoming clogged, are very popular for general woodworking. They can capture 99.5% of very fine dust particles between .2 and 2 microns. For advice on which fabric is best for your collector, consult with a filter-bag company, such as Midwesco Filter Resources (400 Battaile Drive, Winchester, VA 22601; 800-336-7300).

Dust cake and filter cleaning—Fine dust builds up quickly on the inside surface of a filter, forming a film that's known as dust cake. In one way, this is good because the cake acts as a filter in its own right—the buildup of particles blocks the passage of finer and finer dust.

But as a filter becomes more clogged (industry pamphlets call this "blinded"), the air passing through the bag has more difficulty escaping. The mounting static pressure inside the bag actually reduces air flow through the entire collection system. Excess pressure will eventually force fine particles right through the fabric. To keep dust cake from getting too thick, shake the bags occasionally.

Getting enough filter surface area—No amount of cleaning will keep a filter bag working efficiently if there isn't enough surface area. An air-to-cloth ratio is the comparison of a collector's cfm rating to the total square-foot area of its filters.

For general woodworking, an air-to-cloth ratio of 10:1 is about right. So for every 10 cfm of air delivered, you will need 1 sq. ft. of filter area. Many small-shop dust collectors are skimpy on filter area. It is not uncommon to find single-stage units with air-to-cloth ratios of 35:1 or more. On many models, the lower bag also serves as a dust bin, which further reduces the effective filter area.

In addition to replacing original bags with larger ones, you can gain even more filter-surface area by building a plenum that directs exhaust from the blower to multiple filter bags, or tubes (see *FWW* #100, pp. 76-81). By using small-diameter tubes, you can add a surprising amount of filter area in a few square feet of shop space. And clean air makes a more enjoyable workplace. □

Air volume required for small-shop woodworking machines

Machine	Average cfm needed
Tablesaw (8-12 in.)	350-500
Bandsaw (up to 15 in.)	400
Radial-arm saw (10-12 in.)	400
Scroll saw	350
Jointer (up to 8 in.)	400
Planer (up to 12 in.)	500
Shaper (½-in. to ¾-in. arbor)	350-450
Lathe	450
Disc (12 in.) or belt sander (6 in.)	400

Note: These numbers are averages based on duct sizes of 4 in. or 5 in. dia. A shaper cutting a crown molding needs more air volume than the same machine trimming a ¼-in. bevel on a shelf edge. Call the manufacturer or an air-handling equipment supplier for exact figures.

Sandor Nagyszalanczy is a writer and contributing editor to Fine Woodworking *magazine. His book,* Woodshop Dust Control, *will be available from The Taunton Press this summer.*

Photo this page: author

Spray-Finishing Done Right

Getting a blemish-free finish is easier than you think

by Andy Charron

Quite a few woodworkers I know are unenthusiastic, even fearful, about spray finishing. They believe the equipment is too mysterious, too costly and too hard to master. In fact, just the opposite is true. There are many simple-to-operate, reasonably priced spray systems out there (see *FWW* #113, pp. 58-61). It took me less time to become proficient with a spray gun than it did to master a router. Best of all, the finish from a gun is often so smooth that I don't have to rub it out. Following sound spraying principles and knowing how to use the equipment helps me produce virtually flawless finishes.

Spraying takes a bit of practice. *Surface preparation, finish consistency and technique all are important.*

Where to spray

The best place to spray is in a booth where a powerful exhaust removes overspray and dust from the air. If you're spraying solvent-borne finishes, you really have no other choice than to use an explosion-proof spray booth. But they're costly. You don't need explosion-proof equipment to spray waterborne finishes, and they're getting better and better (see *FWW* #115, pp. 48-53). You only need a place that is well-ventilated and clean. If you have the floor space, you can build a spray room that has an exhaust fan and intake filters to ensure a steady supply of clean, fresh air. No matter where you plan to spray, check with your local building officials first.

Careful preparation is essential

How you prepare the surface is just as important as how you spray the finish. Sand the entire piece thoroughly (see the photo at left on p. 72). For stained work, I usually raise the grain with a damp cloth, let the surface dry and sand with 220-grit before I spray. For waterborne finishes and dyes, I sand to 180-grit and spray a light coat of dye stain or finish. This raises the grain and stiffens the fibers, making them easier to sand with 220-grit.

Spraying paint or pigmented lacquers is more involved. Opaque finishes highlight tiny imperfections (see *FWW* #111, pp. 62-65). They often require at least two rounds of filling, sanding and priming before the wood is ready to be sprayed.

Thin the finish to a sprayable consistency

Life would be easier if you could always pour finish straight from the can into a spray pot and begin applying it. But occasionally,

Photos except where noted: Alec Waters

you'll have to thin it. Which thinner you use and how much you add will depend on the material you're applying, the spray system you're using and what the piece will be used for. Some manufacturers do a lousy job of providing thinning information. If the appropriate thinner is listed on the label, use it. Because some cans of finish say that the contents don't need to be thinned, they don't list a thinner. If this is the case, you generally can thin the finish with the solvent that's recommended for cleanup.

Finding the correct viscosity—The viscosity of a finish is a measurement of its resistance to flow. Thinning a finish lowers the viscosity, which allows it to be broken into smaller particles (or atomized) more easily by the spray gun. The finer the atomization, the smoother the appearance.

Sprayed finishes are only as good as the surface below. *The author primed this bookcase and now sands it with 220-grit paper in preparation for spraying on a tinted waterborne lacquer topcoat.*

Thinners can eliminate common spray problems (see the box on pp. 74-75) like orange peel, but if used improperly, thinners actually cause problems. Waterborne finishes are especially sensitive to thinning. Overthinning can prevent the finish from forming a clear, hard film.

Some spray-gun manufacturers recommend finish viscosity for a particular needle/tip combination. This information may be given as a ratio or a percentage of thinner and finish. The viscosity also may be given as the number of seconds it takes to empty a certain size viscosity cup. Viscosity cups have small holes in the bottom, which let liquid drain through (see the photo at right on the facing page). Appropriately sized cups are available from most spray-system makers.

Room conditions are a factor—Temperature and humidity dramatically affect how much thinner to use in a finish and how it will spray. Low temperature and high humidity are not especially conducive to spraying. Even if you follow all the labels exactly, you may have to adjust the amount of thinner you add. You can keep records of how much thinner you need for different conditions. After a while, you'll get a feel for this.

SPRAY THE LEAST VISIBLE AREAS FIRST

Before spraying, make a dry run through the whole process. To help prevent you from overcoating or missing areas, visualize and then practice the sequence of spray strokes. Although the order in which you spray parts of a piece may vary slightly, there are a few rules of thumb worth following: Start with the least visible areas, such as drawer bottoms and cabinet backs, and work your way to those parts that will be seen. For example, spray the edges of tabletops, doors and shelves before the tops. This minimizes the overspray on the most visible surfaces. Working from the inside out holds true for case pieces, too, as shown in the series of photos at right. Always work from the wettest edge, so you can easily blend areas you've just sprayed. Where possible, move the gun away from your body, toward the exhaust fan (assuming you have one). This will help prevent overspray from settling on previously sprayed areas, and it will give you an unclouded view, too.—*A.C.*

1 ***Spray overhead corners,*** *and then fill in the inside top.*

3 ***Shelf tops and fronts***—*Remember to overlap strokes.*

5 ***Do the exterior cabinet sides*** *and front corners.*

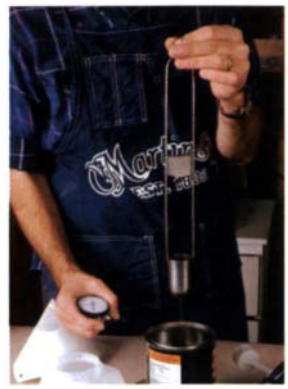
2 Coat interior back and sides. *These areas won't be highly visible when the piece is finished.*

4 Finish the face frame. *Begin with the inside edges, and then move to the front of the case.*

6 Spray the top. *By leaving the top for last, the most visible part of the case isn't marred by overspray.*

Straining the finish and filling the pot

Your finish and your equipment should be as clean as possible because a speck of dirt or dried finish could ruin the job. To remove impurities, pour the finish through a strainer or filter (available at paint-supply dealers). As an added precaution, you can install a filter on the end of the dip tube that draws finish from the pot, or put an in-line filter near the gun. To keep the air that comes from the compressor dry and clean, I run the line through a canister-type separator, which filters out water, oil and dirt before they get in the hose supplying air to the gun.



Check the finish with a viscosity cup. *A stopwatch and the recommended viscosity cup show whether thinner must be added. Once thinned, the finish is passed through a filter.*

Selecting suitable fluid tips and air caps

The fluid tip in a spray gun controls the amount of finish that gets deposited on a surface. In general, lighter finishes require a small tip. Thicker materials (or those with a higher percentage of solids) require larger fluid tips. The air cap in a spray gun controls the velocity of the air, which governs how finely the fluid is atomized. Air caps with smaller holes cause the air to leave the gun at a higher velocity, thus producing finer atomization. Air caps are matched with fluid tips to give optimum performance.

Most guns come equipped with a standard setup appropriate for several finishes. The setup includes a fluid tip that's about .050 in. dia. and a corresponding air cap. The standard setup will produce acceptable results with most finishes, but sometimes it's worth trying other combinations of fluid tips and air caps.

In a turbine-driven high-volume, low-pressure (HVLP) system, the amount of air feeding the gun is constant, so adjustments to the air pressure can only be done by changing air caps. If you are using a waterborne finish with a turbine and a bleeder-type (constant air flow) gun, make sure that the nozzle stays clean. These guns are prone to blobs of finish drying on the air cap and then blemishing the work.

Adjusting the gun

Spray guns come with adjustments for air and fluid. The type of finish being sprayed, the size of the object to be coated and the speed of application all play a role in deciding how to control the fluid and air. I always test my fan pattern and finish delivery rate on scrap wood or cardboard so that I can make adjustments before I actually spray the piece.

Turbine-driven HVLP systems—Adjusting a turbine-powered spray gun is a simple process: no matter what type of gun you own, the idea is to start air flowing through the gun first, and then introduce finish slowly until it flows continuously and evenly. The gun should apply a full, wet coat with no heavy spots or misses. From this point, you can open or close either knob to obtain the best spray rate and fan pattern.

If you want to spray a lot of material in a hurry, open the fluid control more. If you are coating large surfaces, widen the fan pattern. If you're trying to achieve a fine finish or you're spraying

small items, you'll have more control of how much finish is applied and where it lands by restricting the fan and fluid. But remember, how you set one knob affects the other. For example, if you increase the air flow without adjusting the fluid, the finish may be too fine. Conversely, opening the fluid control without widening the fan can cause runs and sags. At the ideal settings, the finish will coat evenly and flow together well.

Compressor-driven systems—With high-pressure spray guns and conversion-air HVLP guns (both powered by a compressor), you have the ability to control the air pressure entering the gun in addition to adjusting the fluid rate and fan shape. Getting all three adjustments coordinated can be a bit tricky and takes some trial and error, but being able to regulate the air pressure at the gun allows more spraying options.

Turntable for even, quick coats—*After arranging trophy bases on a lazy Susan, the author sprays with an HVLP gun.*

Develop a spray strategy

Regardless of the size and shape of the object you're spraying, the main thing to keep in mind is that you want to spray an even coat over the entire piece. Always spray the finish in several thin coats rather than one heavy one. Lighter coats are less likely to run, dry faster and make sanding between coats easier.

If the pieces you are spraying are so small that the air from the gun blows them all over the place, try placing them on a piece of screen or wire mesh. I prefer spraying small parts with my turbine HVLP gun because the spray is softer. A good production tip for spraying many small pieces is to put them on a lazy Susan and spray several at once (see the photo above). Rotate the turntable as you spray, so you don't build up too heavy a coat on the pieces.

Position large work on sawhorses or a stand so that the height is comfortable. You shouldn't have to bend, reach or otherwise contort your arm or body while you're spraying. You should be able to turn and move the work easily. I sometimes support the work on stickers or points (blunted drywall screws work well) to make sure that the bottom edge gets good coverage.

Spraying uniformly

To maintain even spray coverage, there are a few things to remember. Grip the gun firmly, but not so tightly that your hand gets tired or uncomfortable. Point the nose of the gun so it's perpendicular to the work surface, and hold the gun at the same distance from the work on each pass. Move the gun parallel to surfaces, not

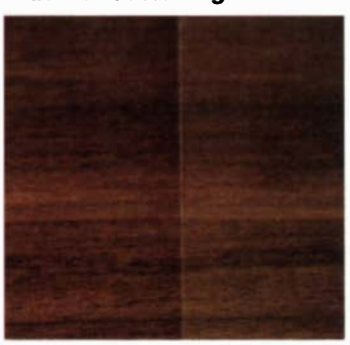
Correcting spray-finish troubles

Fine Woodworking contributing editor Chris Minick found big improvements in his finishes when he switched to spray equipment. But the transition wasn't painless. Here's his list of common spray problems and, where they're not obvious, the solutions.

Orange peel

1) *Atomization pressure too low:* Increase pressure and adjust fluid.
2) *Spray gun too far from work:* Maintain 6- to 10-in. gun distance.
3) *Coating viscosity too high:* Thin to correct application viscosity.
4) *Not enough coating thickness for proper flow.*

Blush or cottoning



(Right half shows blush)
1) *High humidity:* Dehumidify shop, or add retarder to finish.
2) *Improper thinner:* Use only recommended thinner.
3) *Moisture in spray equipment:* Install water separator in air line.

White spots

1) *Water contamination in spray equipment:* Install water separator in air line.
2) *Water on work surface:* Dry work surface before spraying.

Sags and runs

1) *Coat too heavy:* Decrease fluid flow to spray gun.
2) *Spray gun too close to surface:* Maintain 6- to 10-in. gun distance.
3) *Thinning solvent drying too slowly:* Use faster evaporating thinner.
4) *Drafty spray room.*

Plan for drying—The author uses racks to cure his spray-finished items. The area is warm, dry and dust-free.

in an arcing, sweeping motion. Begin your stroke 6 in. or so before the gun is over the wood, and continue the same distance beyond the other side. Trigger the gun a split second after you start your motion, and keep spraying until your arm stops. As you spray across the piece, move your arm steadily and smoothly without changing speed.

For most HVLP guns, hold the gun about 6 to 8 in. from the surface. This will let you spray a full, wet coat with minimal overspray and decent coverage. Move the gun at about the same speed you would a brush. Each pass should overlap the previous one by about half. When spraying small objects or tight places, reduce the flow and move the gun closer. To avoid clouds of overspray and bounce back, work from inside corners out. Use more wrist action, and trigger more quickly. On large areas, increase the flow, pull the gun back an inch or two and make passes in opposite directions. I lightly spray across the grain to make a tack coat. Then I immediately spray with the grain.

In situations where your spray passes intersect, such as the stretcher-to-leg joint of a chair, release the trigger a bit sooner than you normally would. This will feather out the finish. If overlapping passes still give you a problem, mask off adjacent areas.

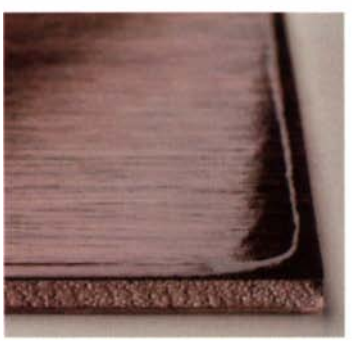
Drying and cleaning up are critical

It's easy to forget that once you spray a piece, the finish needs a warm, dry and dust-free place to cure. If you don't have a separate drying area (see the photo at left), production in your shop can grind to a halt. Even if you have a designated area, storing a number of wet cabinets, doors, drawers and trim pieces can be a problem. I use a system of racks to dry components and store them for short periods. Plywood trays, slipped into old baker's racks, come in handy when I have to dry lots of small pieces. When I'm drying round or odd-shaped items, like balusters, I hang them on an overhead wire from swivel hooks. Each piece can be rotated and sprayed and then hung in my drying area.

I have made it a ritual to clean my spray gun thoroughly while my work is drying. After cleaning the parts with the solvent recommended on the finish container, I dry them with compressed air. Then I coat all the fluid passages with alcohol and let it evaporate before I store the gun in its case. □

Andy Charron writes about woodworking and builds custom cabinets in Long Branch, N.J.

Fat edge



1) *Corner profile too sharp:* Slightly radius 90° edges.
2) *Drafts on one side of workpiece.*
3) *One side of workpiece warmer than other.*

Cratering

(Solid chunk in center)
1) *Solid contaminant (usually from non-loading sandpaper) lowers surface tension:* Sand defect, and wipe entire surface with mineral spirits.

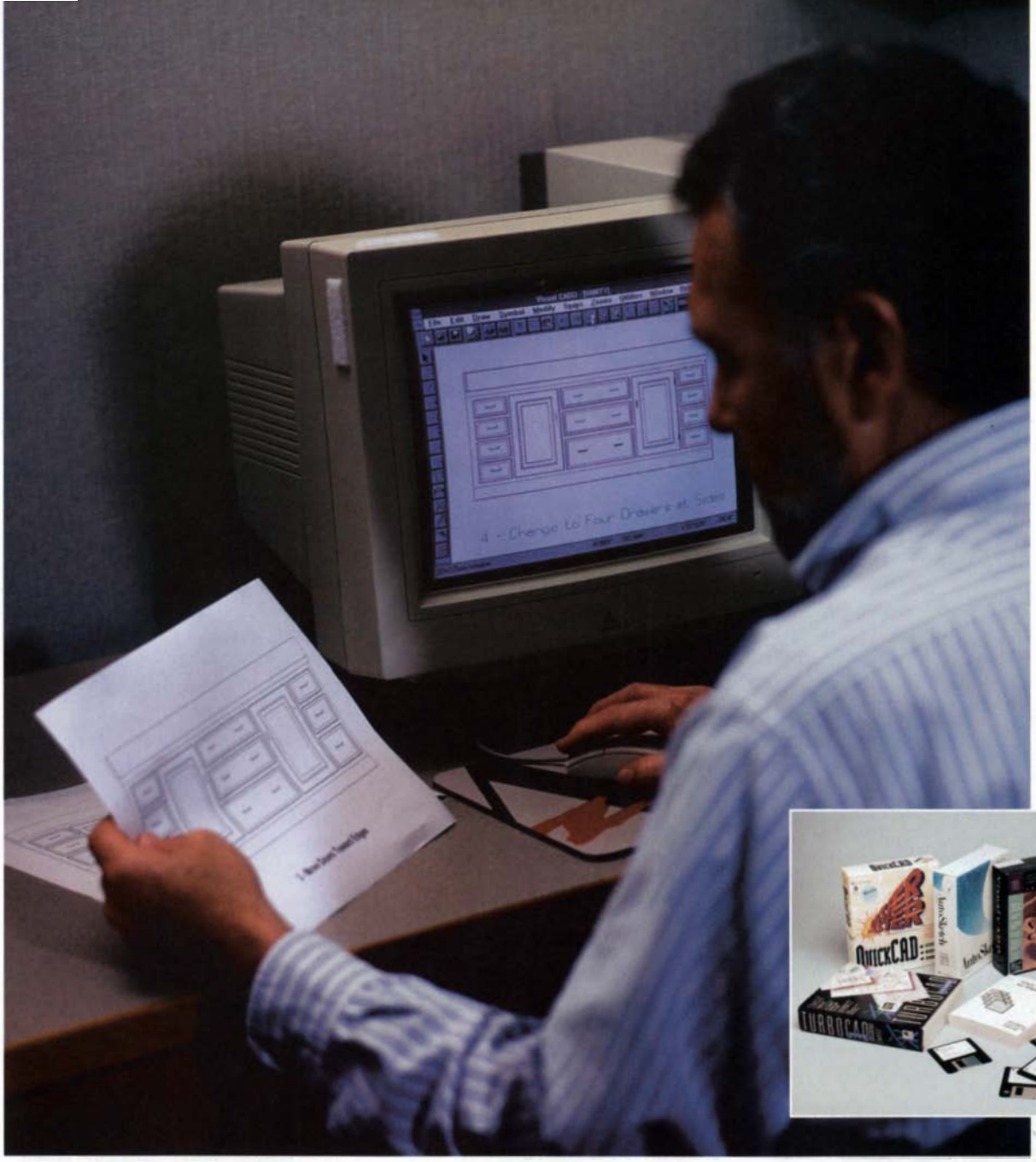
Fisheyes

1) *Silicone or wax residue from paint stripper or old finish:* Wipe surface with mineral spirits; mist coats (let each dry) to trap contaminants.
2) *Oil in spray equipment (usually from compressor):* Install oil separator in air line.

Microbubbles

(Haze, waterborne finish only)
1) *Coating is drying too fast:* Add retarder to finish.
2) *Defoamer deactivates in waterborne finish:* Don't use waterborne finish that's more than 1 year old.
3) *Atomization pressure too high.*

Sample photos: Boyd Hagen



A personal computer does more than homework. *Trying out design ideas is fast with inexpensive software and a computer. The programs are easy to master.*

Designing with Your Computer

Trying new designs and modifying old ones can be painless

by Terrence W. Reigel

Photo above: Boyd Hagen; inset photo: Scott Phillips

I used to sketch cabinets with pencil and paper. But as my cabinets grew more complex, making design changes got harder. I tried drawing the basic framework, photocopying it and sketching in variations by hand. That was my approach when I undertook a bathroom vanity not long ago. When I tried to get the right proportions for all the drawers and the raised-panel doors (see the photo on this page), erasing and redrawing the many possible layouts drove me crazy.

I knew that my personal computer made easy work of rearranging text and financial data, so I looked for a way to let it do the hard work in sketching. After a few false starts, I found a program that makes sketching quick and accurate, tests new layouts easily and prints different views of my drawings.

Virtually any personal computer (PC) sold today will handle this kind of program. If you already have one that runs Microsoft Windows, it probably will be able to help you with sketching, too. The software you'll need costs as little as $100.

Advantages of using a computer for drawing

Making changes easily and quickly is the most important feature of computer drawing programs. Once a basic element, such as a door, has been drawn, I never have to draw it again. I can move it, copy it or change its proportions with a simple command—no erasing or re-drawing. After a little practice, using the computer is faster than drawing with pencil and paper. This is certainly the case with complex drawings that require many tries to get the layout just right (see the drawings at right).

I first tried making my sketches with a program intended for business presentations, but these programs aren't designed for making dimensioned drawings. As a result, they're not nearly as useful as a program developed specifically for this application. There are several sketching programs on the market. All are basically simplified versions of the computer-aided design (CAD) programs engineers have been using for a number of years.

Choosing software

Most easy-to-use sketching programs run under Microsoft Windows, so you need to be comfortable with using a personal computer with Windows. Next you will need to select a drawing software package and have a computer that can support it (my experience is limited to IBM-compatible PCs, but some of the software is available for Macintosh computers).

AutoSketch for Windows, the one I use, is one of several less-complicated CAD programs currently on the market (Autodesk Inc., 2320 Marinship Way, Sausalito, CA 94965; 800-964-6432). AutoSketch seems to be among the easiest to use (see the drawing on p. 79). It works successfully with less-powerful hardware and sells for about $100. Autodesk Inc. also offers the more capable AutoCAD LT (about $400). About half a dozen competitors offer similar products priced within this range. A good software dealer should have several to choose from (see the inset photo on the facing page).

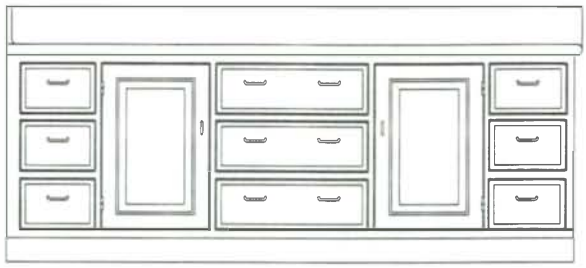
A tutorial included with the sketching program helped me get a feel for the basics. I started with some simple sketches and went on to more complex drawings. I even did a complete plan of my house.

Features that save time

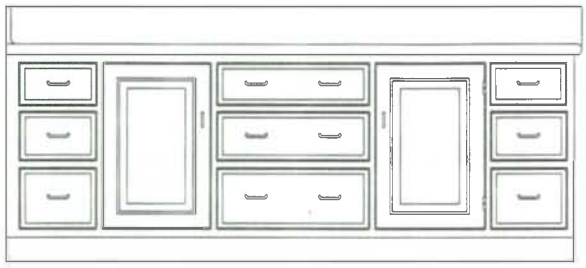
If you want to try many design variations, you can't beat a

Trying different ideas

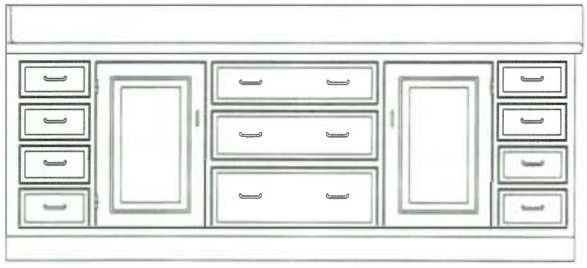
Designing built-ins and furniture on a computer eliminates tedious erasing and redrawing. These drawings show the evolution of a design for a bathroom vanity the author built.



The first try establishes the overall size and concept.



A second version turns equally spaced drawers into graduated drawers.



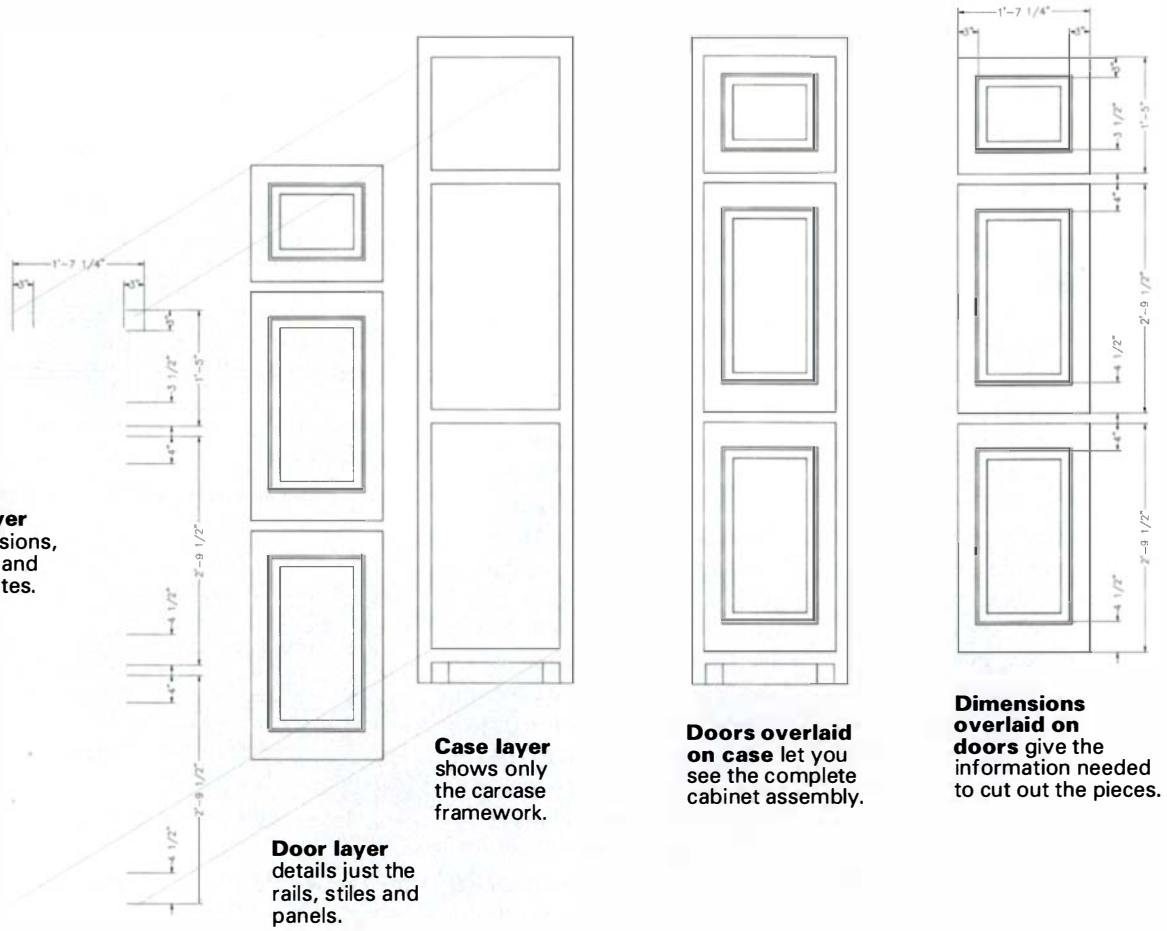
The final drawing retains the graduated drawer theme but increases the number of drawers in each outside bank to four.

***As built:** The author made this cabinet from final drawings he created on a computer.*

Drawings: author; photo at right: Dennis Preston

Layers simplify the view

Drawing this door in layers makes it easier to see individual parts. Each part is created as a separate layer. Layers can be viewed and printed individually or in overlaid groups.



Dimension layer contains dimensions, extension lines and construction notes.

Door layer details just the rails, stiles and panels.

Case layer shows only the carcase framework.

Doors overlaid on case let you see the complete cabinet assembly.

Dimensions overlaid on doors give the information needed to cut out the pieces.

Stretching parts lets you play with proportions

This chest started with equally spaced drawers. Drawers were modified easily by using the stretch command. The whole case was then narrowed to view another design option.

Equally spaced drawers

Graduated drawers

Graduated drawers, narrow case

computer. The following features are real timesavers.

Copying—The copy feature allows me to duplicate parts of the sketch in another location. It's an easy way to space parallel lines. For example, when I'm laying out door rails, I find it easier to draw one line and copy it than to draw each line separately. Copying also is a quick way to add repeated elements, like doors in a cabinet

Stretching helps test proportions—Probably the computer's handiest feature is its ability to stretch parts as if the lines were rubber bands. Once the elements are drawn, I can manipulate the proportions until I find the look I'm after. For example, when I was designing a chest of drawers, I needed to test a number of drawer variations to find the arrangement I liked best (see the bottom drawings on this page).

Copying and stretching work together—In designing a complicated cabinet, I use the copying and stretching functions in tandem. On a large cabinet unit with different-size doors, I sketch one door, copy that door to the locations of the others, then use the stretch feature to adjust the height or width of the copies. This way, I avoid redrawing each one from scratch.

Keeping things clear with layers—Computer drawing programs allow you to put dif-

ferent parts of the drawing on different layers. It's as though they were on separate pieces of tracing paper, stacked one above the other.

You can make the various layers visible or hidden both on screen and for printing. This allows you to include every detail for accuracy and then print views with only the layers of interest.

On the cabinet sketches shown at left, I put the face frame on one layer, the doors on another layer and the dimensions for each on their own layers. Then I printed a clean elevation to see the total effect of the finished product, a dimensioned layout of the face frame and another of just the doors.

The computer manages the scaling—I don't have to worry about what scale to use because I always work with the actual measurements. The computer automatically scales everything to fit. This avoids possible errors from miscalculating or misreading a scale dimension.

Also, I can never run out of space. I can zoom in for a close-up to work with a detail on the screen or zoom out to see the big picture. When I print, the computer adjusts the size of the drawing to print at the scale I select. I can change the scale and print close-up views of portions of the drawing to see how details fit together.

Some tips for easier drawing

Here are a few tricks I've discovered that make computer sketching easier. Though my experience is with AutoSketch, these tips generally apply to most CAD programs.

Always use the snap feature—The snap feature forces the lines on your drawing to jump, or snap, to an invisible grid so that they don't fall at odd fractions. If you don't use the snap grid, the dimensions, which are rounded, may not add up.

You can select the snap-grid size that you need. When I sketched cabinets for my bathroom addition, I set the snap grid to ¼ in., my normal working dimension. But sometimes I temporarily set it to smaller units, like when I'm working out the molding details for raised-panel doors and I want to work to the nearest 1/16 in. I can set the snap grid as fine as 1/64 in.

Tools connect lines easily—Sketching programs let you connect intersecting lines precisely. This ensures that corners close and that lines stay linked together when you stretch a part. You don't have to place the points exactly. Just get them close and the program will connect the new line to the end, mid-point or anywhere on the previous line, according to which option you select.

Another useful trick in connecting intersecting lines exactly is the chamfer tool. It's designed to draw chamfered corners automatically to any size that you select. If you set the chamfer size to zero, it neatly trims or extends two lines to a perfect corner.

How much computer do you need?

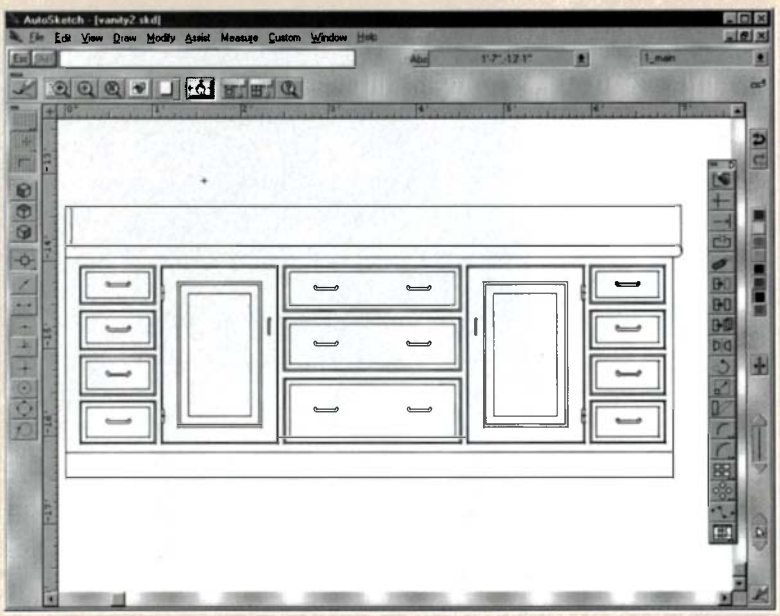
Most PCs offered for sale today will support the light-duty sketching programs needed by most woodworkers. If you select a more full-featured program, you should check the specifications on the package to be sure your computer has enough memory to run it.

If you are planning to use your existing computer, I can offer my experience as a guide. My 4-year-old, 486-33 computer did a very nice job with most of my woodworking projects, such as those shown in the drawings in this article. But when I drew up a complete floor plan of my house, AutoSketch performed better on my new Pentium-based PC, a step up from the machine using the 486 chip.

The penalty for too little computer horsepower is sluggish screen redraws when zooming in on a detail and then switching to a different view. An under-powered computer also slows printing considerably. Your choice of hardware will be based on what you can afford to pay, the complexity of your drawings and your patience.

Before buying and installing a drawing program, it would be a good idea to find out whether your computer can run it comfortably. If your computer is sluggish with your existing applications, adding a sketching program will only make it worse.

In addition to the basic computer, a big 17-in. monitor is nice but not essential. A printer that handles large sheets would be handy, but they are very expensive. A normal letter-size laser printer works well for me. □



What you see on the screen

AutoSketch for Windows will look familiar to Windows users. Special tool bars, like the one on the left, help connect lines. The edit tool bar on the right has commands to stretch and copy parts.

Terrence W. Reigel is a weekend woodworker in Warren, N.J., with 30 years experience in home improvements.

Curly Cherry Highboy

Combine hand and machine techniques to produce an American furniture classic

by Randall O'Donnell

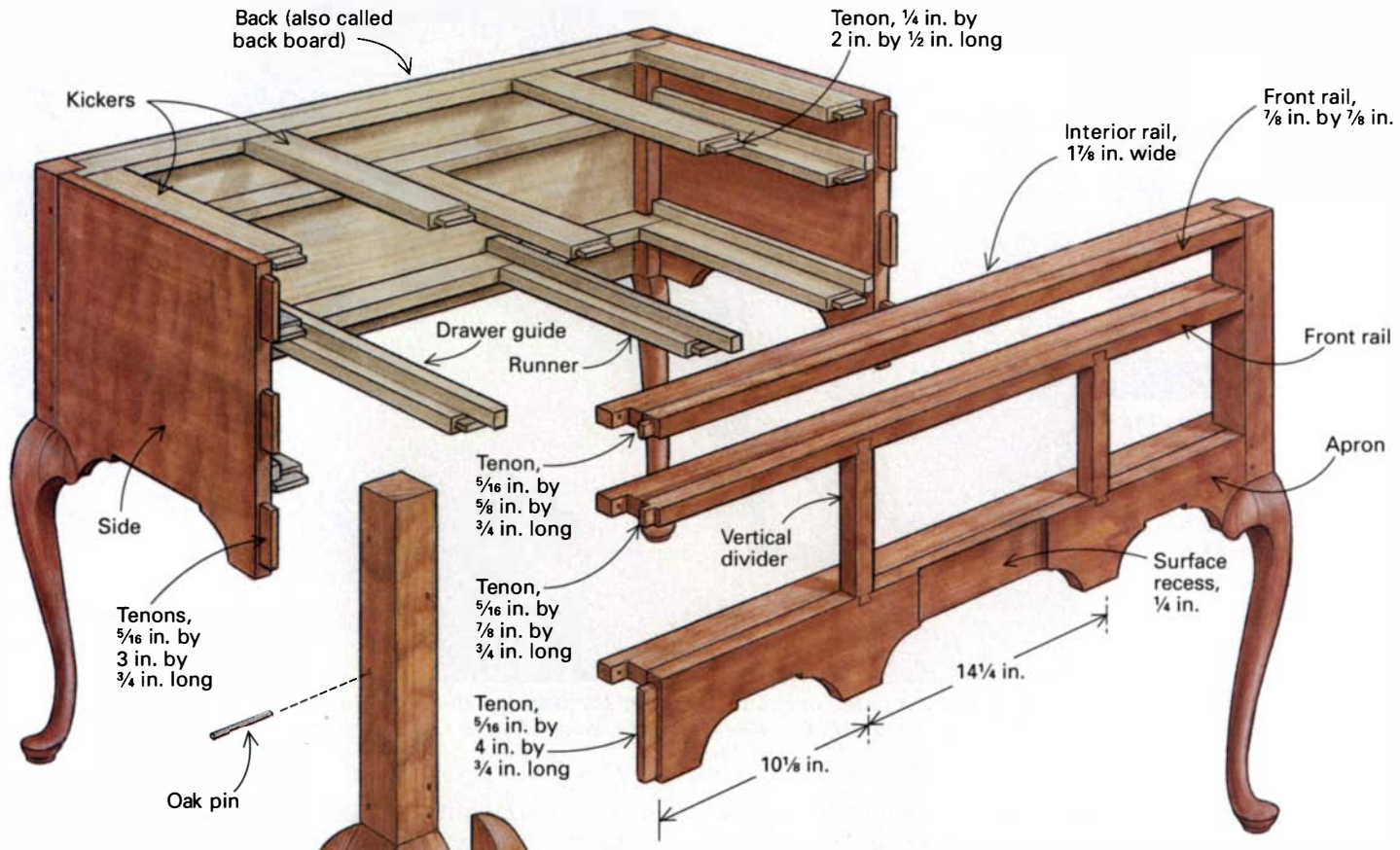
When I watch a sawyer cut open a hardwood log that has highly figured wood inside, it's like stumbling across a buried treasure. Wood like that is a gift of nature, and it deserves the best showcase I can provide.

Most of the pieces that I make are reproductions of Early American furniture, and for showing off unusually beautiful lumber, there's nothing quite like a high chest of drawers. Unlike a tabletop, a highboy can be appreciated from a distance and the character of the wood really becomes three-dimensional. Add a bonnet top with a dramatic gooseneck molding, brasses and carved fans and finials—all dancing on cabriole legs—and the result is a piece of furniture with real presence (see the photo above).

I've examined a number of original highboys. Only a few stand out as true masterpieces, but many include wonderful details that provide a rich palette for the period furnituremaker. This piece is my interpretation of a Massachusetts style from about 1750. The blocked apron, finials, arch cutouts and shells are based on designs from Boston in that era.

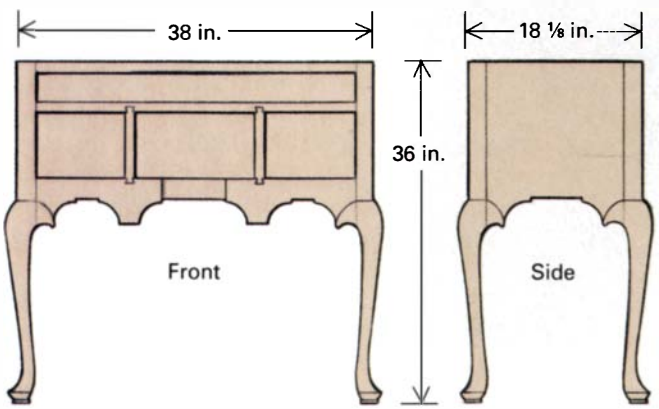
The highboy exercises just about every skill of the traditional cabinetmaker: turning, sculpting, mortise-and-tenon joinery, dovetailing, carving and (gasp!) even driving nails where appropriate. Colonial cabinetmakers usually had apprentices handle routine

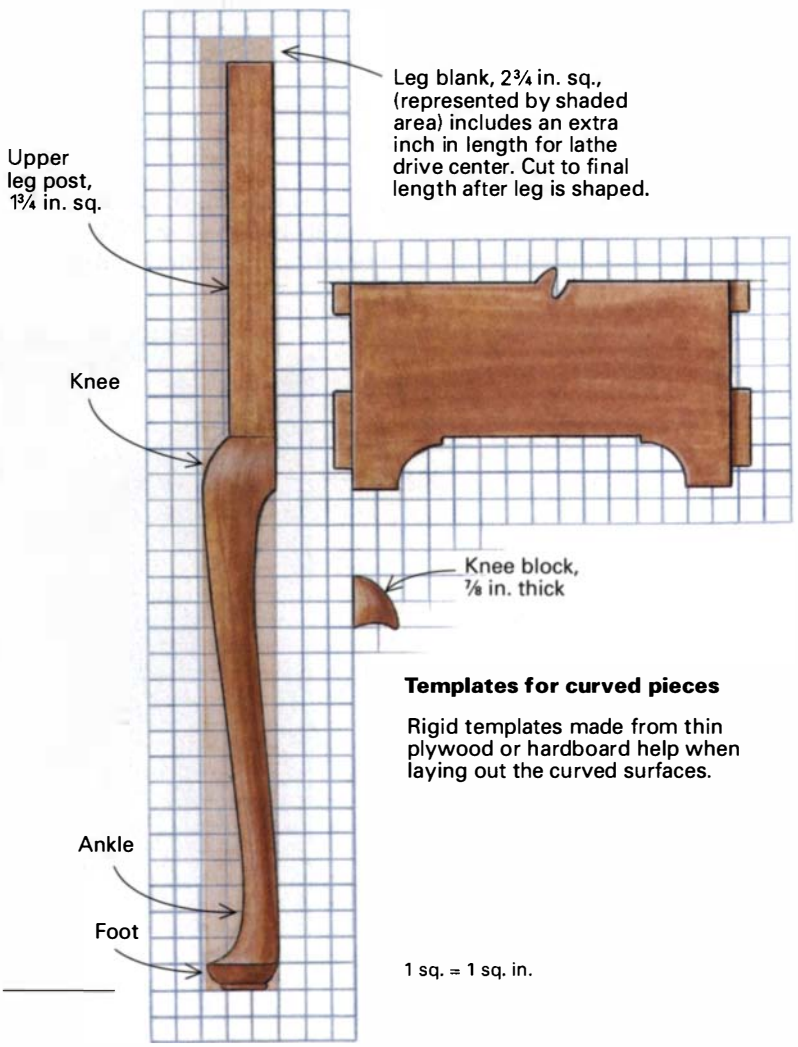
Photo this page: Boyd Hagen



A highboy starts with the base

The foundation for this classic piece of case work is a 36-in.-high base with cabriole legs and a block-front apron. Most of this highboy is made of curly cherry, the secondary wood is poplar and the drawer bottoms are aromatic cedar. Construction of the highboy's upper case, including its carved fans and finials, will be covered in the next two issues of *Fine Woodworking*.



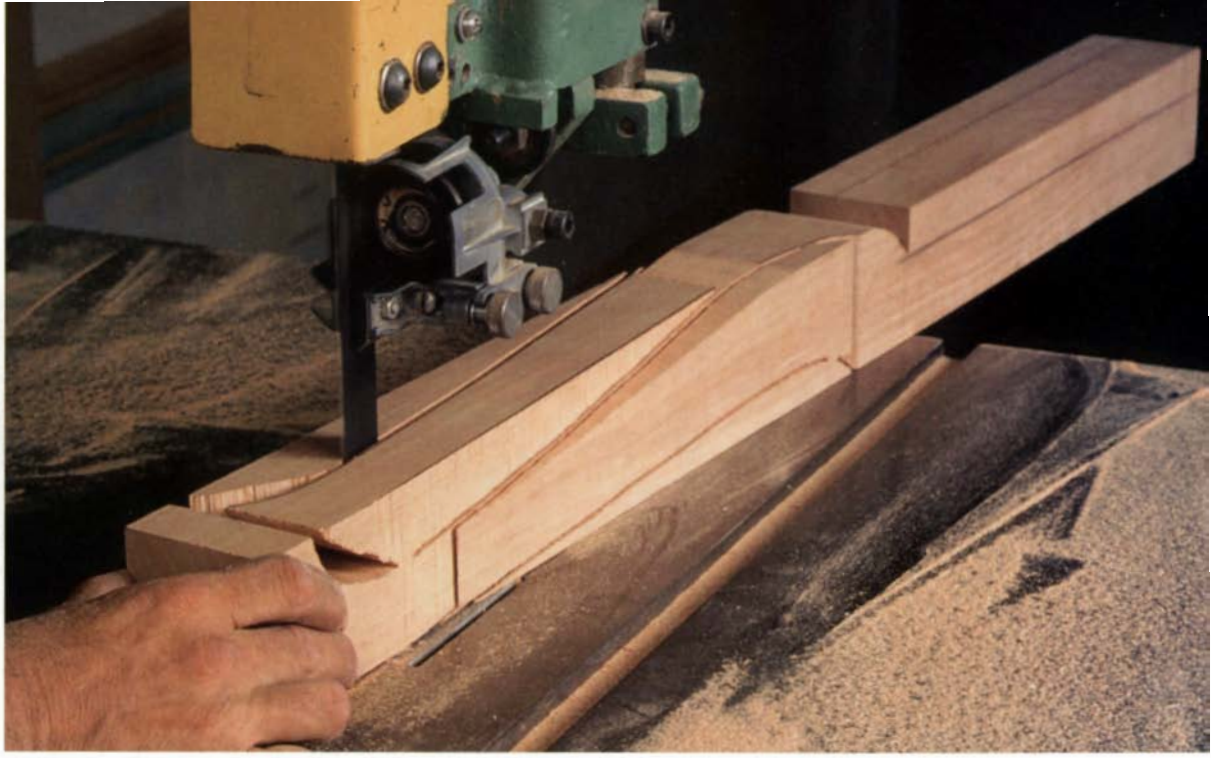


Templates for curved pieces

Rigid templates made from thin plywood or hardboard help when laying out the curved surfaces.

Drawings: Bob La Pointe

***Run the growth rings diagonally** from the inside corner to the outside corner when laying out the legs. With this orientation, the grain flows with the cabriole curve.*



***Don't cut the waste completely free of the blank.** Leave a small connecting bridge so waste pieces don't need to be taped or nailed back into place when the stock is rotated to saw the other face.*

tasks. As an independent craftsman, my apprentices are machines that prepare stock quickly so that I can devote my time to the critical hand skills that set this piece apart from factory-made furniture. Fine carving, hand-cut dovetails and handplaned surfaces remove any trace of the machines that did the grunt work before me. Economic reality has taught me that even though I can replicate a period piece of furniture, I can't slavishly follow every method of the Colonial makers.

Building this highboy is well within the abilities of the serious amateur cabinetmaker. (This article deals with the lower case. In the next two issues of *FWW*, we'll build the rest of the highboy—see the box on p. 85.) Although it may appear daunting, much of the work amounts to executing just a few traditional joinery techniques over and over. With so many pieces to cut and assemble (see the drawing on p. 81), organization is as important as technique.

Select stock carefully

All the curly cherry flat stock needs to finish out at ⅞ in. thick, so I usually start with roughsawn, 1⅛-in. stock. The gooseneck molding and lower finials are made from 8/4 curly cherry stock, and I use sound 12/4 straight-grained stock for the legs and the top finials.

All secondary wood is poplar, except drawer bottoms. All internal frame parts are ⅞-in.-thick stock to match the cherry. Drawer sides and backs are ⅝-in.-thick poplar, back boards are ½ in. thick and drawer bottoms are ⅜-in. aromatic cedar.

Before cutting any wood, select the best figured stock for the most prominent areas: the drawer fronts, the front apron and the wide scroll board at the top of the upper case. Careful stock selection provides a kind of visual rhythm to the piece, uniting upper and lower cases. If I can, I use boards from the same log.

Start by shaping the legs

Even when empty, this is a heavy piece of furniture. Leg strength is important. That's why I look for sound, straight-grained stock to rip into 2¾-in.-sq. leg blanks. Make the blanks an inch longer at the upper end so the lathe drive center has material to bite into. This extra inch of stock will be cut off later, after the leg is shaped and mortised. When laying out the leg profile, align the blanks so the annual rings run diagonally from the inside corner to the outside corner (see the photo above left). This makes the strongest possible leg as well as the most attractive one. The grain lines flow with the contour of the cabriole shape.

First make a full-sized template of the cabriole leg profile on thin plywood or hardboard. Using this template, mark out the leg profile on all four blanks. Before bandsawing the cabriole profile, I define the shoulder line at the junction of the upper post and the curve of the knee. All I do is crosscut the two outside faces of each leg on the tablesaw to a depth just shy of the finished surface.

***Only the foot is turned.** With the leg still mounted in the lathe, shape it with a spokeshave and rasp.*

Photos except where noted: Dennis Preston

Careful bandsawing makes sculpting the leg much easier. When bandsawing the cabriole profile, I don't saw off the waste completely. Instead, I leave a small, connecting bridge between the leg and the waste. This gives the leg good support as I make the cuts on each face of the leg (see the photo at left). Finally, I return to the first face, and cut through the remaining bridged segments. This bridging method ensures perfect alignment of the sawn faces with the template and eliminates the fussy process of reattaching the sawn waste in some other way to make all the cuts.

Once the leg is sawn to rough shape, mark the centers on both ends of the blank, and turn the foot on the lathe. Be sure to make a crisp top edge on the foot (see the bottom photo on the facing page). This gives a nice reference edge from which to rasp and file the shape.

From this point, I shape the rest of the cabriole profile by hand, using the lathe as a vise to hold the stock. I start with a spokeshave to remove a lot of waste quickly. For shaping, though, a patternmaker's rasp gives the best results. Finally, I use files and sandpaper to finish the curved leg and foot. Leave edges at the knees sharp, and be careful not to round over any edges where the knee blocks will be attached.

Mortise the leg posts

At this point, the upper part of the leg has been laid out but is still 2¾ in. sq. This is when I lay out and cut the mortises for the back, sides and all three front rails. The full width of the leg stock (see the top photo at right) and the extra inch of length provide stable support for the router. I use a plunge router fitted with a spiral upcut bit. The bit diameter is slightly smaller than the finished mortise width so that I can shave the cut exactly to my scribed lines. After plunging the mortises, pare to the layout lines, and square up the inside corners with a chisel.

Once all the mortises are cut, rip and crosscut the upper leg posts to size. Stay outside the layout line by about 1/16 in. The excess will be planed flush with the sides after assembly. Also, be sure to mark and save the waste pieces from the upper part of the legs. These pieces will be used for making the knee blocks and will give the best possible grain match with the leg.

Prepare the stock for the carcase

Loggers in my area call me when they find an exceptional tree—one that is big, straight and, if I'm lucky, figured. I have to act fast, though, because it's always a race against the veneer-log buyers who also want dazzling wood. Midway through this project, I had to drop everything and dash off to the woods to check out a tip. But that's how I get the figured wood I need for my furniture.

Start by sawing the rough wood so that it's a few inches longer than needed and about ½ in. wider. Normally, I'd surface one face and true up one edge on the jointer and move to the thickness planer. Highly figured wood like this, though, is prone to tearout, so I do the final thicknessing on a wide-belt sander. Later, I'll handplane and scrape all the parts to clean up the fuzzy sanded surface and get the silky, hand-worked texture that's so essential to period furniture. Tool marks reveal an intimacy between wood and maker. But to me, it really doesn't matter whether the stock initially was thicknessed by a power planer or with scrub and jack planes.

Cut out the front rails, sides and back

Three tenons connect each case side and the back with the legs, making for some 17 in. of cross-grain construction. With seasonal

A plunge router with a spiral bit roughs out the mortises. *The full stock width of the blank provides support for the router.*

After the router, use a chisel *to pare and square the mortises to the scribed lines.*

Cutting tenons by the batch saves time. *Clamping the runners and kickers together also makes it easier to keep tenons uniform.*

Mark the shoulder line *on the narrow edge of each tenon. Cut the waste away on the bandsaw.*

Plane the upper leg posts flush with the front. *A file, chisel and scraper help to bring all the leg posts flush with the front, sides and back.*

Interior rails glued to the front rails *and back board reinforce the case and permit longer tenons to be used on drawer runners and kickers.*

Dry-fit all parts to find potential problems before glue is applied.

humidity changes, there's a strong possibility of a crack developing in the sides or the back. None of my furniture has developed any cracks, but it is quite common on original pieces. Because a crack along the grain of a side or back doesn't affect structural integrity and gives a look of authenticity, I don't worry about it.

With stock for the sides and back cut to their finished width and length, I use the router and edge guide to start the tenons by cutting a long tongue in each end of the sides and back.

Next lay out and cut the individual tenons with the bandsaw, and then use a chisel to pare the ragged bandsaw cuts to the shoulder lines. Don't cut the bottom scroll yet. Wait until the joints have been dry-fit.

The three horizontal front rails (including the apron) are cut from a single board. Mark the stock to keep the rails in sequence. For these parts, it's easier to lay out and cut the tenons first before ripping the stock into individual rails.

Sides, back and rails should be test-fitted to the legs. If all fits well, take the case apart. Using full-sized patterns, lay out the scroll on the bottom edge of the apron, sides and back. Bandsaw to shape, and clean up the sawn surfaces with a spokeshave and rasp.

The center area on the apron is recessed (or blocked) to align with the fan carving on the drawer above it. Remove the bulk of the waste in this area with the bandsaw, and then finish with a rasp and scraper. Drill the two ½-in.-dia. holes in the bottom of the apron for the turned tenons of the drop finials.

The two vertical dividers between the three lower drawers are milled to size and a dovetail cut on each end. The divider is ⅞ in. deep, but the dovetail only extends ½ in. deep. Fit these pieces to the middle rail and apron after the front legs and rails are glued up.

Make the interior framing members

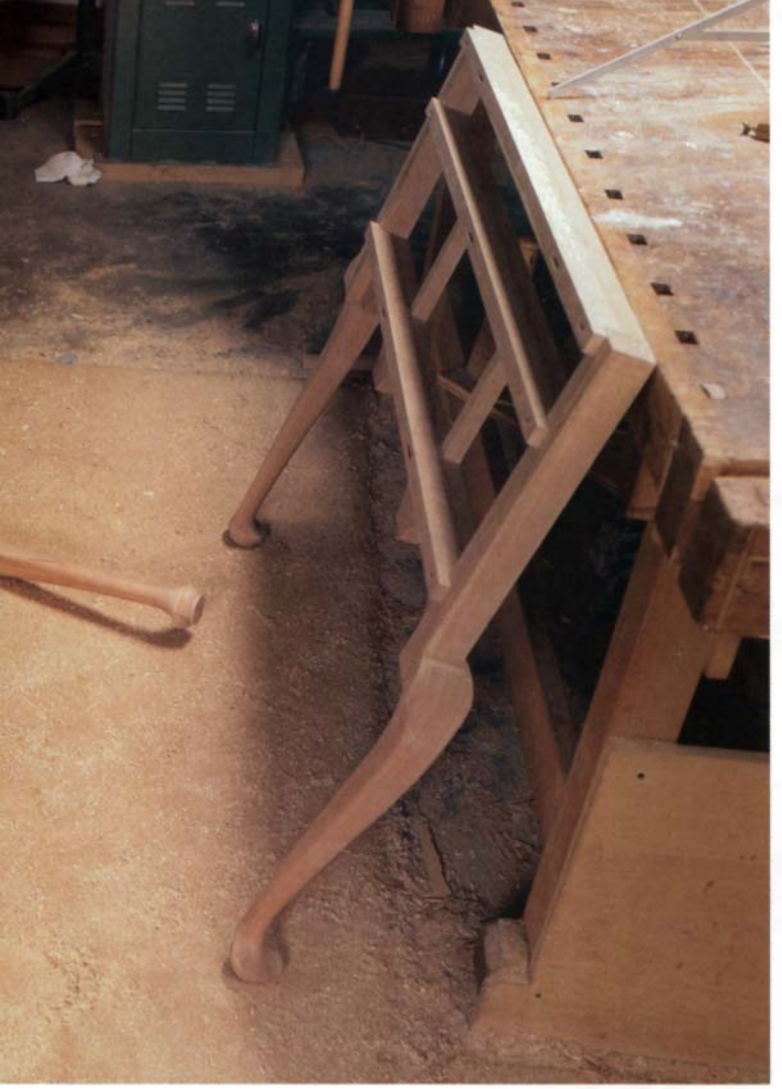
Along with the parts already made, the case needs additional framing to reinforce joints and support the drawers. The next step is to cut stock for the drawer runners and kickers. Collect all of these pieces, and cut the tenons on the ends at one time (see the third photo from the top on p. 83).

Leg post-to-rail joint strength is my chief concern, so I reinforce this area with interior rails that are notched around the inside corners of the posts. These pieces are glued to both the front rails and the back of the case.

There are three pairs of interior rails. The front interior rails are made of cherry to match the front rails. The back rails are made of poplar. With the exception of the wood species, they are identical. Group the rail pairs. Lay out and cut all the mortises first, and then fit the tenons.

Assemble the base in three stages

A sure way to induce a panic attack is by trying to glue all the parts at once. Having a bunch of glue-slathered parts dripping everywhere is bad enough, but with so many parts to handle, glue can



start to set before all the joints are seated and the case squared up. So I begin with just the front assembly. Glue up the two front legs and the three front rails. Be sure to check that the assembly remains square after the clamps are in place (for more on this, see *FWW* #113 pp. 68-71).

After the glue has cured, use a jointer plane, chisel and a rasp to fair the leg posts flush with the rails (see the top left photo on the facing page). Now position the two vertical dividers over the middle rail and apron, and scribe and cut the dovetails. The dividers can now be glued into place.

The backboard is glued up with the back legs, clamped and allowed to dry. Once the back assembly has been removed from the clamps, fair the back leg posts flush with the back.

Once you've glued the interior rails on the front and back assemblies (see the bottom left photo on the facing page), dry-fit the sides and all the drawer runners and kickers. If everything fits well, apply glue to all the mortises and tenons, and bring the whole assembly together and clamp. This operation may take extra hands. Two people certainly make the assembly less nerve-racking.

Be sure that the case remains square after the clamps are tightened. After the glue has dried, clean up any glue squeeze-out, and then fair the leg posts flush with the case sides.

Now install drawer-side guides, which prevent the drawers from cocking when pushed into place. The guides are pieces of poplar, glued and nailed (as was done on the originals) to the runners.

Glue the rough-shaped knee blocks in place. *After the glue dries, use chisels, rasps and sandpaper to blend the entire knee.*

Attach the knee blocks

Knee blocks provide a graceful transition between the legs and neighboring surfaces. You'll need six blocks: two each on the three sides that show. Using a template, lay out the profile on leg-post offcuts. Bandsaw the block profile, dress surfaces that butt against the leg and side or apron, and rough shape the curve. Now glue the knee blocks in place (see the photo above). Clamping pressure must squeeze the knee block into the flat on the leg blank and the apron and side. After the glue has dried, fair the entire knee area with carving tools, rasps, files and sandpaper. Some excess wood still must be removed on the inside curve of all four legs so that they'll blend with the apron scroll.

Fit the tenon pins

After sanding the case, drill holes in the leg posts for the tenon pins. They should be made of riven (split) oak. A riven pin is less likely to split or break. Spokeshave the pin with a slight taper to give a tight fit. Before driving them into place, test-fit the pins in a scrap block. Cut these pins slightly proud of the surface using a piece of sandpaper as a gauge, and peen the ends to give an aged look. □

Randall O'Donnell is a period furnituremaker living in the countryside near Bloomington, Ind.

Next issue: the upper case

With the lower case complete, the next step is building the graceful upper cabinet that crowns this highboy. Randall O'Donnell details that project in the May/June issue of *Fine Woodworking*. The last of the three articles in this series, which will appear in the July/August issue, covers the finials and carved fans.

WOODWORKER'S MART

WOODWORKER'S MART

Delta Sidekick

The Delta Sidekick 10-in. sliding compound miter saw (see the photo at right) is a winner in power and portability. It's the newest offering in Delta's growing line of miter saws—10 of them to date. This well-made saw, with a discounted price of about $500, is a good value.

The Sidekick has a large cutting capacity (11½ in. wide by 3⅝ in. deep at 90°), and it comes with an attached stand. A 13-amp motor gives the saw plenty of power. The slide assembly, bevel tilt and rotating miter table all worked smoothly. And the scales are easy to read. An adjustable depth-of-cut stop on the swing arm allows dado cutting. The electric brake stops the blade quickly once the trigger is released, although the saw makes an annoying squeal when it starts and stops.

The sliding-saw assembly mounts on a pair of steel tubes that ride on ball bearings below the saw table. The slide can be locked so that the saw assembly won't bang around when the saw is moved. This feature also allows the Sidekick to be used as a regular chop saw.

The saw arm tilts to the left for any bevel angle from 90° to 45°. Simple, rugged and adjustable stops are located at the end of travel. A quick-action lock allows the table to be set at any miter angle from 47° to the left to 57° to the right by gripping the clamp lever and rotating the saw table. Once the lever is released, the table is locked. Adjustable cursors on both the right and left side of the table indicate the miter angle. Although the saw is equipped with a dust bag, it captured only about half the chips generated.

The attached, folding steel stand has adjustable stock-support arms and adjustable cutoff stops. Although the stand seems strong enough, it is a little shaky. Hardware is included so that the saw can be removed from the stand and permanently mounted to a bench.

Three wrenches, stored on the stand, take care of all adjustments and blade changes. Aluminum castings for all the saw's main structural elements keep the total weight to just 59 lbs.

To maintain accuracy over the long haul, the saw has adjustments to compensate for wear on the sliding rails, table pivot, table

***The Delta Sidekick 10-in. sliding compound miter saw** has a large cutting capacity. It includes a folding table with adjustable stock-support arms.*

Photos except where noted: Dennis Preston

lock and bevel-bracket trunnion.

The fast-acting work clamp mounts to either side of the saw and easily adjusts to the stock thickness. But I wish the clamp had about 1 in. more reach so that it still could be used when an auxiliary wooden fence is attached to the saw fence.

The miter table has soft detents to locate the most commonly used angles. I found these detents to be unreliable. Unlike the detents on my old Delta miter saw, in which a pin solidly engages a notch, these use a spring-loaded ball and dimple like a cabinet latch. When I rotated the table back to the 0° position, the table was off by a degree or so. To set any miter angle or to return to the 0° mark, I had to use the cursor and miter scale.

The cut from the 40-tooth carbide blade that comes with the saw is too rough for fine work. Fortunately, a built-in arbor lock and conveniently stowed tools make changing blades a snap.

The Sidekick saw, model #36-250, is manufactured by Delta International Machinery Corporation. It is available from most major tool suppliers. *—Dennis Preston*

CMT Ultra-Cut sawblade

Intended for cutting double-faced laminated stock, CMT's Ultra-Cut circular sawblade also is great for cutting cabinet-grade plywood. The teeth on this sawblade (see the photo at right) have a high, alternate top-bevel grind. Grinding the teeth at a 40° angle produces a needle-like profile that slices through brittle, splintery stock. Chipping is virtually eliminated on both faces.

The blade was noticeably quieter than my other blades because the plate has a number of very fine laser-cut expansion slots (filled with a resilient, silicone-based material) to reduce vibration and noise.

I used the 10-in., 80-tooth blade for cutting white oak plywood and experienced none of the chipping that I was getting with a sharp, high-quality, 60-tooth carbide blade made for plywood. In my miter saw, the Ultra-Cut produced superbly finished cuts in solid stock.

The trade-off for this quality cut is a tooth that will wear more quickly. And because of the high grind angle, the teeth are more fragile, so extra care is required when handling and changing blades—a slight bump against the arbor or table of the saw will chip a tooth.

***Needle-like teeth** on CMT's Ultra-Cut blade slice through brittle, splintery material with little chipping.*

The Ultra-Cut sells for about $80 and is available from CMT Tools, 310 Mears Blvd., Oldsmar, FL 34677; (800) 531-5559. *—D.P.*

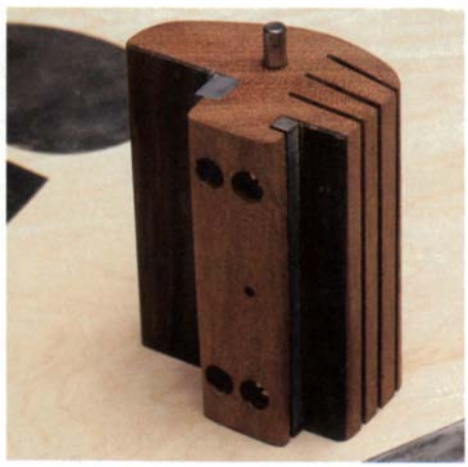
Harris cabinet scraper sharpening tool

A cabinet scraper is such a simple tool that my students are always surprised at how quickly it generates wispy, thin shavings. They are equally surprised at the finesse required to turn a uniform burr on the tool's cutting edge. Harris Tools' scraper-blade conditioner and sharpener may be just what they need.

The Harris tool (see the photo at right) combines everything for establishing a proper burr in one housing. The wooden body has a file and guide for jointing the edge square with the sides of the scraper, a honing stone to remove the file marks and a burnishing rod with guides for setting any of four hook angles: 0°, 5°, 9° and 13°.

For me, the tool is overpriced, and I'll stick with my trusty old burnisher and file. For the novice, the Harris cabinet scraper is an all-in-one tool that takes much of the frustration out of scraper sharpening.

Harris Tools' scraper-blade conditioner and sharpener sells for $49.95 and is available through Garrett Wade, 161 Avenue of the Americas, New York, NY 10213-0459 (800-221-2942); Highland Hardware, 1045 N. Highland Ave. N.E., Atlanta, GA 30306 (800-241-6748); or directly from Harris Tools, P.O. Box 837-1007, San Jose, Costa Rica (506-220-1266). *—D.P.*



***Harris Tools' cabinet scraper** combines file, honing stone and burnisher with angle guides.*

Koch sharpening system

German master carver and tool designer Kurt Koch is marketing a system to hone gouges, chisels and knives quickly. The heart of the system is two special buffing wheels and a proprietary sharpening paste (see the top left photo on p. 94). The surface of one wheel is firm for honing flat chisels and knives; the other wheel is more compliant to conform to the sweep of various gouges.

For touching up a dull tool, this combination of wheel and paste produces a superb edge in about three seconds. I sharpened a box of 30 gouges and whittling knives in a half-hour.

While the wheel is turning away from the cutting edge, press the tool hard against the wheel. Curved tools, like gouges, should be rotated. The honing paste heats up, liquifies and rolls over the back of the tool. Sharpening is complete. There is no burr whatsoever. The heat build-up is min-

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Photo: Phil Haggerty

A razor-sharp edge in three seconds. *The Koch system uses a proprietary honing paste and special buffing wheels.*

imal, so you can't burn the tool.

The combination of speed, safety and no burr is attractive to be sure, but for me, the selling point is the quality of the edge. These polished edges are amazingly sharp. They are as good or better than ones I labor to achieve with stones.

The product literature claims that this system can be used to sharpen a wide assortment of tools, but I think the system is best suited for gouges and narrow chisels.

The system can be purchased as an integrated sharpening unit with a high-quality 110v, 1,400-rpm motor for $512. Or you can buy just the arbor-mounted set of two wheels and sharpening paste for $92.50. The U.S. distributor for the system is Andrew Fairchock, 160 Hurley Ave., Kingston, NY 12401; (914) 339-2783.—*C. Michael Vogt*

Veritas burnisher for turning scrapers

Woodturning scrapers cut with a burr just like a cabinet scraper. A turning scraper is usually sharpened on a grinding wheel, but the resulting burr can be rough. The Veritas burnisher allows you to raise a fine, more consistent burr by burnishing the tool's edge against a hard pin.

Photo: Angelo J. Iafrate

Raising a burr by burnishing *gives turning scrapers a uniform edge.*

The burnisher (see the photo at left) consists of a cast-aluminum alloy plate with two pins. The straight pin is used as a fulcrum and a tapered carbide pin acts as the burnisher. The pins can be moved to accommodate different-sized scrapers. The aluminum plate is held in a vise or screwed directly to the benchtop.

The raised burr's size is determined by how hard the tool is forced against the burnishing pin. This is done by placing the scraper on the tool, against the straight fulcrum pin, and sliding the scraper through an arc until the edge has the desired burr.

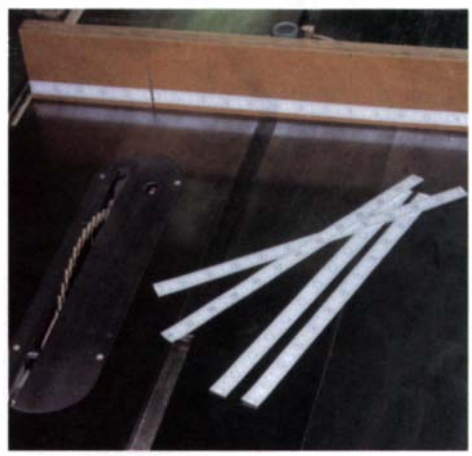
Because the only scrapers mentioned or shown in the instructions were round-ended, I was skeptical that the tool would be versatile enough to burnish my round-side and shear scrapers. I tested all three styles of scrapers and found that the tool did indeed produce a burr on all of them. It burnished the round scraper as well as I expected. The round-side scraper took some manipulation before all cutting edges were burnished; the shear scraper was actually the easiest to burnish.

The scraper burnisher sells for $29.95 and is available from Veritas Tools, 12 E. River St., Ogdensburg, NY 13669-0400; (800) 667-2986. —*Angelo J. Iafrate*

Briefly noted

Taylor Craft adhesive rules

When making cutoff jigs, it's more convenient to mount a scale directly to the jig. This eliminates fumbling with a tape measure. This is only one of a myriad of uses for a stick-down scale. The Taylor Craft Adhes-a-Rule (see the photo below) is made of a thin Mylar film with 1/16-in. graduations marked on the face. They are



available in 12 in. lengths. A package of 12 strips is $6 and is sold through many woodworking-supply houses.

Mold your own sanding pad

Dynabrade, the industrial abrasive power-tool manufacturer, has introduced a kit that allows the user to create a custom-fit urethane pad to match the exact contour of any molding profile for finish-sanding. The kit sells for $65, and refills cost $32. The kit contains liquid urethane, a mold box, release agent and other components for creating a custom pad.

The pads mount to Dynabrade sanders but should be adaptable to other makes. A hand-sanding block also is available. For more information, contact Dynabrade, Inc., 8989 Sheridan Drive, Clarence, NY 14031-1490; (716) 631-0100. —*D.P.*

Dennis Preston is an assistant editor of Fine Woodworking. *C. Michael Vogt is a woodworker in Saratoga Springs, N.Y. Angelo Iafrate is a woodturner in New Caanan, Conn.*

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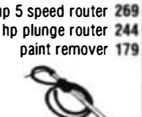

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6507 VS sawzall with case 154
6508 VS sawzall with case 154
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0229-1 3/8" vsr keyless drill 124
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0236-1 1/2" drill w/case 164
0244-1 1/2" vsr 0-600 mag. 144
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6758-1 0-4000vsr screwdriver 104
0380-1 3/8" keyless angle drill 174
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David White

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DW625 3hp vs plunge router 279
DW610 1-1/2 hp, 1/2" router 154
DW306K 8 amp, vs, recip saw 164

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DW675K 3-1/8" planer w/case 164
DW402 4-1/2" angle grinder 89

DW682K Plate Jointer Kit
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DW106 3/8" 4 amp keyless dr 74
DW250 0-4000 drywall driver 89
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BT35-2 5/8" to 1-3/8"brd tackr 179
RN45B-1 **New** roofing nailer 399
MIIIFS floor stapler 539

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1587VS **New** top handle jigsaw 149
1584VS barrel grip Clic j;igsaw 149
1587DVS top hdl dstlss jigsaw 179
1584DVS barrel dustless jigsaw 179
1632VSK vs recip saw kit 159

3107DVS Dustless Random Orbital Sander
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3283DVSK 5" rndm sander kit 119
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1608 laminate trimmer 104
1609 offset base laminate trmr 149
1942 heavy duty heat gun 79

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3054VSRK12v,3/8" vsr kt,2bat 189
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
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1608DW drywall cutout tool 94
1604 1-3/4 hp router 144
1606 1.75 D-handle router 189
1609K 3 in one trimmer kit 179
1003VSR 3/8" keyless 0-1100 dri 94
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1194VSRK 1/2" hmr drill w/cs 159

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SLS20 **New** finish stapler w/cs 279
SKS 1/4" crown finish stapler 279

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2708W 8-1/4" tbl saw w/brake 309
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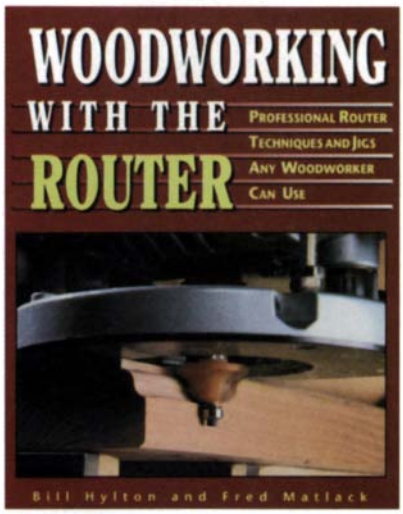
READER SERVICE NO. 173

Woodworking with the Router by Bill Hylton and Fred Matlack. *Rodale Press, 33 E. Minor St., Emmaus, PA 18098; 1993. $27.95, hardback; 352 pp.*



This book takes a comprehensive look at using the router in the workshop. It opens with a detailed examination of routers and router bits that covers everything from horsepower and amperage ratings to collet designs and how they work. The authors do not rate individual tools by brand, but they do offer general guidelines for buying one.

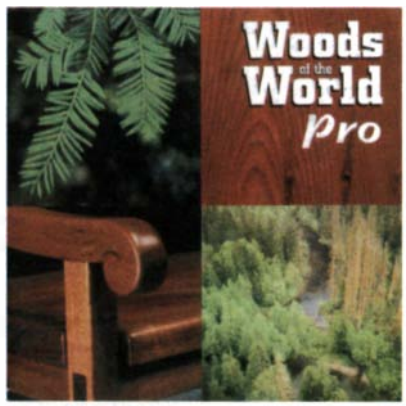
A chapter on the basics serves as an introduction for those not adept at working with this tool. You can find some good information here on tearout, jigs, proper feed direction for various cuts and maintenance.

The authors, Hylton and Matlack, devote several chapters to different router-table designs. Many of their thoughtful designs include scaled drawings with dimensions. They examine several special accessories, such as starting pins, guards and fences. I was particularly interested in what they had to say about various types of plastics used for baseplates and guards.

The rest of the book is devoted to using the router: edge treatments, template-guided work, frame-and-panel construction and dovetailing. There are more jigs in this half of the book than you can shake a stick at. You may not need some of the more esoteric designs, but they're still interesting.

Hylton and Matlack write in a humorous, personable style and pepper the book with anecdotes—a welcome change from some of the heavy tomes I've seen. The layout is pleasing, with tinted sidebars that emphasize tips and tricks of the trade, and clear, easy-to-follow photos and diagrams. The book ends with a page of sources and a thorough index. I think *Woodworking with the Router* can be a valuable reference guide for any woodworker. *—Ben Erickson*

Woods of the World Pro (Version 1.9). *Tree Talk, Inc., 431 Pine St., Burlington, VT 05402 (800-858-6230); 1994. $99.00*



Welcome to the future—*Woods of the World Pro* might just make the computer your next piece of shop equipment. This CD-ROM is an electronic encyclopedia covering more than 800 kinds of wood and wood products, their common uses, structural qualities, and most important, their availability and endangered status. Tree Talk Inc., a not-for-profit organization, developed *Woods of the World Pro* for both Macintosh and IBM compatible computers that run Windows. The organization's goal is to help professional and serious amateur woodworkers be more environmentally conscientious about the woods they use.

The people who developed *Woods* gathered information from many sources, including the USDA Forest Products Laboratory, the World Conservation Monitoring Centre and the Nature Conservancy.

Once inside the program, you can scan for woods based on genus, species or common names by using the search options. The criteria search is another, more specialized, function that will select a wood based on characteristics such as compression and bending strength or sapwood and heartwood colors.

After finding a species, you can browse several pages of information describing common uses, countries of origin, physical and mechanical properties and—true to the mission—the environmental rating. The most powerful feature this program offers is that it can find a suitable replacement for a threatened species based on a particular mechanical property or a similar color or grain pattern.

Woods full-color images are lifelike and detailed enough for accurate identification. Some of the program's tools deliver a wealth of information. But I found the program clunky and confusing to maneuver around in.

I had some trouble installing the Windows version because the program did not create a Window's group or icon. I had to hunt down the executable, or program, file in the *Woods* directory and launch it from there, which is a fairly simple process for a computer-literate user.

The search window was too small and cut off parts of words. The one piece of audio, an introductory message from one of the developers, sounded as if it had been recorded over a pay phone at a bus station.

First-time computer users may find this CD difficult to use. I would strongly encourage anyone to print out the tutorial, and keep it handy.

The information is there, but it's going to take some time to learn how to find it—a process not unlike that of other tools in your shop. *—Greg Mandas*

EDITOR'S NOTE: This review was based on the CD-ROM version 1.9, the only one available at the time. The publishers will soon release version 2.0, which they promise will include a number of improvements in the way that it looks (video will be added) and in the way that it works (search and compare functions will be simplified).

For the budget-minded individual or small business, a condensed version called *Woodmatch* ($29.95) is available. It has a data base of 435 species of wood or wood products.

Ben Erickson specializes in furniture and millwork in Eutaw, Ala. Greg Mandas is a CD-ROM developer at work and a woodworker at home.

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READER SERVICE NO. 89

Listings of gallery shows, major craft fairs, lectures, workshops and exhibitions are free, but restricted to happenings of direct interest to woodworkers. 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 p.m. on the fourth Monday of each month at the Anchorage Museum. For more information, call (907) 345-3077.

ARIZONA: **Workshop**-Arizona Designer Craftsmen presents Paul Sasso, March 22-25. Arizona State University, Tempe. For more information, call Joan at (602) 963-2965.
Show-Arizona Woodworking Show, March 1-3. Arizona State Fairgrounds, Youth Center, 1826 W. McDowell Road, Phoenix, 85007. For more information, call (310) 477-8521.

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. For more information, call (501) 565-1510.
Meetings-Ozark Woodturners meets the third Saturday of each month, Mountain Home. For more information, call Michael Kornblum at (501) 424-5893.
Workshops-Woodcarving, bamboo fly rod, wood-strip canoe, fly fishing accessories and more. For more information, contact White River Artisans School, P.O. Box 308, 202 South Ave., Cotter, 72626. (501) 435-2600.

CALIFORNIA: **Workshops**-Woodworking for women. Furnituremaking with hand tools using traditional joinery, weekends. San Francisco. For more information, contact Debey Zito (415) 648-6861.
Classes-Classes on wood finishing and decorative painting for furniture and cabinets. For schedule, write Studio 1829, 1829 Stanford St., Santa Monica, 90404. (310) 453-0230.
Workshops-Shaker bench, sofa table, Mission lamp table, Adirondack chair, more. Saturdays and Sundays. No experience necessary. Private instruction available. For more info, contact the Woodworkers Place at (818) 952-3177.
Workshops-Various workshops including Japanese woodworking, joinery and sharpening. Contact Hida Tool Co., 1333 San Pablo, Berkeley, 94702. (510) 524-3700.
Exhibition-Masterpieces from the Museum of Classical Chinese Furniture, thru March. Pacific Heritage Museum, 608 Commercial St., San Francisco, 94111. (415) 399-1124.
Show-Artistry in Wood '96, March 8-April 21. Sonoma County Woodworkers Association Museum, 425 7th St., Santa Rosa. For more information, contact Thomas Stockton at (707) 765-9885.
Lecture-Making and Marketing Furniture in 18th Century Newport, May 14. M.H. de Young Museum, Golden Gate Park, San Francisco. For information, call (415) 499-0701.
Show-Southern California woodworking show, April 19-21. Los Angeles County Fairplex, Buildings 7 & 7A, White & Mckinley Avenues, Pomona, 91768. For more information, call (310) 477-8521.

COLORADO: **Classes**-Woodworking and related classes, year-round. For info, write Red Rocks Community College, 13300 W. 6th Ave., Lakewood, 80401. (303) 988-6160.
Classes-Traditional hand woodworking, year-round. Contact Tom Larkin, Shadow Mountain School of Woodcarving, 32037 Stenzel Drive, Conifer, 80433. (303) 674-8560.
Classes-Hand-cut dovetails, finishing, tablesaw, cabinetmaking. The Woodworkers' Store, 1550 South Colorado Blvd., Denver. (303) 782-0588.

CONNECTICUT: **Classes**-Hands-on woodworking, finishing and lathe classes. For complete schedule, call Harris Enterprise Corp., 80 Colonial Road, Manchester, 06040. (203) 649-4663.
Exhibition-Featured artist: Dennis Elliott, thru March 15. University of Connecticut, Storrs. For further information, call (203) 354-9678.
Exhibition-One man show: Dennis Elliott, April 14 thru May 12. The Silo, New Milford. (203) 355-0300.

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 at 7:30 p.m. Woodcraft Supply Corp., 246 E. Semoran Blvd., Casselberry. For more information, contact Bob Elliott (407) 695-8960.
Meetings-Tallahassee Woodcrafters Society meets at 7:00 p.m. the second Tuesday of each month. For more information, contact Walt Behrle at (904) 668-6653 or Austin Tatum (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. For more info, contact Don Montgomery at (813) 898-0569.
Show-Central Florida woodworking show, March 1-3, Florida State Fairgrounds, Entertainment Hall, 4800 U.S. Highway 301 N. Tampa, 33610. For more information, call (310) 477-8521.

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.
Workshops-Japanese woodworking by Toshihiro Sahara. One Saturday each month. For more info, contact Sahara Japanese Architectural Woodworks at (404) 355-1976.
Symposium-Woodworkers Guild of Georgia's 4th annual woodworking symposium, April 13-14. Georgia Hardwoods, Buford. Featured speaker: Frank Klause (limited seating). For reservations and info, call (404) 299-3972.

ILLINOIS: **Classes**-Finishing, tablesaw, cabinetmaking, more. The Woodworkers' Store, 286 West Rand Road, Arlington Heights. (708) 253-8875.
Show-Chicagoland woodworking show, April 12-14. Odeum, North & South Halls, 1033 N. Villa Ave., Villa Park, 60181. For more information, call (310)477-8521.

INDIANA: **Classes**-Hands-on woodworking classes with Michael Van Pelt. Superior Woodworking Supply, Inc., 922 Ft. Wayne Ave., Indianapolis, 46202. (317) 635-5747.
Classes-Instructors include Brian Boggs, Kelly Mehler, Marc Adams and Marc Berner. For more information, contact the Marc A. Adams School of Woodworking, Route #2, Box 121A, Franklin, 46131. (317) 535-4013.
Workshops-Chair making, bed making with Jeff Miller. J. Miller Handcrafted Furniture, 1774 W. Lunt Ave., Chicago, 60626. (312) 761-3311.

IOWA: **Show**-International Woodcarvers 30th anniversary congress, June 20-23. Putnam Museum, Davenport. For info, contact Larry Yudis, Affiliated Wood Carvers, Ltd., P.O. Box 10408, Bettendorf 52772-8408. (319) 359-9684.

KENTUCKY: **Workshops**-Woodturning and joinery instruction. For further information, contact Jim Hall, Adventures in Wood, 415 Center St., Berea, 40403. (606) 986-8083.
Meetings-Kyana Woodcrafters Inc. meets the first Thursday of each month. Bethel United Church of Christ, 4004 Shelbyville Road, Louisville, 40207. For more information, call (502) 426-2991.
Workshops-Traditional Windsor chairmaking. One-week courses. For further information, contact David Wright at (606) 986-7962.
Workshops-Bowl turning with Abe Harper, Berea. All levels. For more information, call (606) 256-5443.

MAINE: **Workshops**-Two-week basic and intermediate furnituremaking courses. Faculty includes Peter Korn, Silas Kopf, Bob Flexner, Nora Hall, Michael Emmons. For more info, contact the Center for Furniture Craftsmanship, 125 W. Meadow Road, Rockland, 04841. (207) 594-5611.
Meetings-Guild of Maine Woodworkers meets the first Wednesday of every month. For time and location, call the Guild at (800) 805-5100.

MARYLAND: **Exhibition**-Bonnie Bishoff and J.M. Syron: A Collaboration. Art furniture and accessories. Meredith Gallery, 805 N. Charles St., Baltimore, 21201 (410) 837-3575.

MASSACHUSETTS: **Classes**-Woodworking classes, most of the year. For further information, 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.
Instruction-Full-time program in fine furniture construction. Complete facilities. For info, contact Wm. B. Sayre, Inc., One Cottage St., Easthampton, 01027. (413) 527-0202.
Classes-Woodworking, turning, carving, finishing, woodworking for women and more. For more information, contact One Cottage Street School of Fine Woodworking, One Cottage St., Easthampton, 01027. (413) 527-8480.
Workshops-Toolmaking for woodworkers. First three weekends of each month. Registration limited to two students per weekend. Contact Ray Larsen, Genuine Forgery, 1126 Broadway, Hanover, 02339. (617) 826-8931.
Workshops-One-week woodworking and related workshops, year-round. Contact The Heartwood School, Johnson Hill Road, Washington, 01235. (413) 623-6677.
Classes-Ongoing woodworking classes and one day seminars. Beginner thru intermediate. For information or brochure, call Michael Coffey at (413) 527-8480.
Workshops-Three day intensives. Sharpening, layouts, carving techniques, tool forging, design study. Taught by professional carver with 16 years experience. Calvo Studio, 17 Mill Lane, Arlington, 02174. (617) 648-5589.
Workshops-Carving, dovetail jig, finishing, furniture repair and restoration and more. Woodcraft Supply Corp., 313 Montvale Ave., Woburn, 01801. (617) 935-6414.
Classes-Year-round in a do-it-yourself woodworking club. For more info, contact Yankee Artisans, 201 Westfield St., W. Springfield. (413) 732-0404.
Classes-Trellises, gazebos, fences, building a canoe or kayak, April and May. Horizons, The New England Craft Program, Williamsburg. For more info, call (413) 665-0300.
Workshops-Woodcarving for all phases: sharpening, layouts, carving techniques, tool forging and design study. Calvo Studio, 17 Mill Lane, Arlington, 02174. (617) 648-5589.
Workshops-Router techniques, scroll saw, carving, tablesaw, jointer/thickness planer, thru March. For more info, contact Woodcraft Supply Corp., 313 Montvale Ave., Woburn, MA 01801. (617) 935-6414.

MICHIGAN: **Workshops**-Woodwrighting. Tillers International, 5239 S. 24th St., Kalamazoo, 49002. For more information, call (616) 344-3233.
Workshops-Woodworking basics, furnituremaking basics with Joseph Hoover, thru March. For more information, contact Woodcraft Supply, 42102 Ford Road, Canton, 48187. (313) 981-6808.

MINNESOTA: **Classes**-Woodcarving classes, year-round. For info, contact Wood Carving School, 3056 Excelsior Blvd., Minneapolis, 55416. (612) 927-7491.
Meetings-Minnesota Woodworkers Guild meets the third Tuesday of each month at 7:15 p.m. Demonstrations presented each month. For more info, contact Richard Gotz at (612) 544-7278.
Classes-Ongoing classes. Wild Earth Woodworking at a Minneapolis/St. Paul facility. For info, contact Wild Earth Woodworking, 401 Hunter Hill Road, #3, Hudson, WI 54016. (715) 386-3186.
Show-Turned wood show by the Minnesota Woodturners Association, thru March 31. The Duluth Art Institute, 506 West Michigan St., Duluth, 55802. (218) 727-8013.
Classes-Routers, refinishing, finishing avoiding and repairing mistakes and more. The Woodworkers' Store, 3025 Lyndale Ave., South, Minneapolis. (612) 822-3338.
Show-Northern Minnesota wood show '96: woodworkers exposition, April 27-28. Brainerd Armory. Sponsored by the Northern Minnesota Woodworkers Guild. For more information, call (218) 829-3515.
Exhibition-Turned North: Woodturned objects, thru March 31. Balcony Gallery, Duluth Art Institute, 506 W. Michigan St., Duluth, 55802. (218) 727-8013.

MISSISSIPPI: **Classes**-Various woodworking classes. For more information, contact Allison Wells School of Arts & Crafts, Inc., Canton. (800) 489-2787.

MISSOURI: **Seminar**-Ornamental turning, May 10-12. University of Missouri-Kansas City Campus, Kansas City. For more information, contact Ted Crom, Route 2, Box 212, Hawthorne, FL 32640. (904) 475-1609.

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.

NEVADA: **Show**-Las Vegas woodworking show, March 22-24. Cashman Field Center, Hall A, 850 Las Vegas Blvd. N. Las Vegas, 89109. For more information, call (310) 477-8521.

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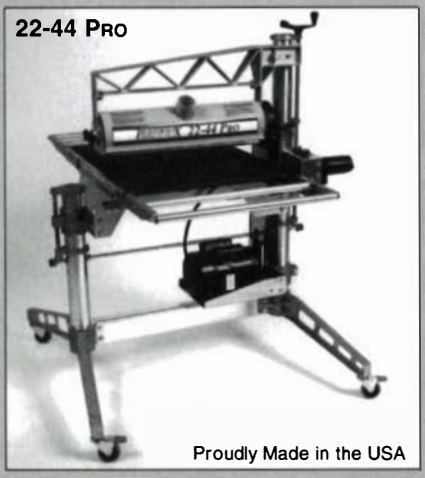
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For info, contact Mary Sweet, Dana Robes, Wood Craftsman, Lower Shaker Village, Enfield, 03748. (603) 632-5385.
Classes-Fine arts and studio arts. For more information, contact Manchester Institute of Arts and Sciences, 114 Concord St., Manchester, 03104. (603) 669-2731.
Classes-Various woodworking classes. For more info, contact The Hand & I, P.O. Box 264, Route 25, Moultonboro, 03254. (603) 476-5121.
Auctions-Antique and craftsman's tool auctions, yearround. Contact Richard A. Crane, Your Country Auctioneer, 63 Poor Farm Road, Hillsboro, 03244. (603) 478-5723.
Classes-Make a Windsor chair with Michael Dunbar. Also, sack back, continuous arm, fan back, writing arm. For more info, contact Michael Dunbar, P.O. Box 805, Portsmouth, 03802. (603) 431-4676
Show-Wood Day at Canterbury Shaker Village, May 4. Canterbury Shaker Village, Inc., 288 Shaker Road, Canterbury, 03224. (604) 783-9511.

NEW MEXICO: **Classes**-Woodworking classes. For information, contact North New Mexico Community College, El Rito, 87520. (505) 581-4501.
Classes-Woodworking classes. For info, contact Santa Fe Community College, Santa Fe, 87502. (505) 438-1361.

NEW JERSEY: **Auction**-Collectors of Rare And Familiar Tools (CRAFTS) annual tool auction, Saturday, April 27. Flemington Elks Club, north of Flemington on Route 31. For more information, send a SASE to Crafts of New Jersey, 85 Brunswick Ave., Lebanon, 08833.

NEW YORK: **Classes**-Traditional 18th-century woodworking techniques with Mario Rodriguez. For more info, contact Warwick Country Workshops, P.O. Box 665, Warwick, 10990. (914) 986-6636.
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, turning, finishing and refinishing, tablesaw techniques and more with Maurice Fraser, Bill Gundling, Jack Van Deckter and Susan Perry. All levels. The Craft Students League at the YWCA, 610 Lexington Ave., New York City. (212) 735-9731.
Classes-Wood inlay, routing, woodcarving, veneering, finishing, tablesaw techniques and more, Saturdays thru April. For more info, contact Albert Constantine & Son, Inc., Woodworking Classes, 2050 Eastchester Road, Bronx, 10461. (718) 792-1600.
Meetings-The Long Island Woodworker's Club meets the first Wednesday of every month, September thru June at 7:30 p.m. Brush Barn, 211 Jericho Turnpike, Smithtown. For more information, call (516) 360-1216.
Classes-Intermediate Woodworking & Furniture Design, thru May 14, Purchase College, Purchase. For more information, contact Olene Duncan at (914) 251-6503.
Show-Wendell Castle, James Schriber, James Carpenter, March 7-April 20. For more information, contact Peter Joseph Gallery, 745 Fifth Ave., Fourth Floor, New York City, 10151. (212) 751-5500.
Show-Woodworkers Exposition 1996, March 23-24. Saratoga Springs City Center, Saratoga Springs. For more information, call Fran Finkbeiner at (518) 371-9145.
Call for entries-The Second Handmade Home show, Nov. 15-19. Deadline: April 2. Lexington Ave. Armory at 26th St., New York City. For more information, call Richard Rothbard (800) 834-9437.
Exhibition-Northeast fine crafts exhibit, March 3-May 4. Designer Crafts Council of the Schenectady Museum and Planetarium, Nott Terrace Heights, Schenectady, NY 12308. (518) 382-7890.
Show-Greater Buffalo Woodworking Show, March 15-17. Erie County Fairgrounds, International Agri-Center, 5820 S. Park Ave., Hamburg, 14075. For more information, call (310) 477-8521.

NORTH CAROLINA: **Meetings**-North Carolina Woodturners meets the second Saturday of each month. For more information, contact North Carolina Woodturners, P.O. Box 1833, Hickory, 28603. (704) 324-5960.
Classes-Pencil-post bed, bedside table, hanging corner cupboard, thru April. Benjamin C. Hobbs, Route 1, Box 517, Hertford, 27944. (919) 426-7815.
Symposium-The American Association of Woodturners 10th annual national symposium, June 22-24. Koury Convention Center, Greensboro. For more information, contact Mary Redig, 3200 Lexington Ave., Shoreview, MN 55126. (612) 484-1724.
Workshops-Windsor chairmaking, Welsh stick chairs, Swiss cooperage. For information, contact Country Workshops, 90 Mill Creek Road, Marshall, 28753. (704) 656-2280.
Classes-Woodcarving, whittling, bent willow furniture, April thru December. For more info, Southern Highland Craft Guild, The Folk Art Center, P.O. Box 9545, Asheville, 28815. (704) 298-7928.
Show-Charlotte woodworking show, March 8-10. Merchandise Mart, Freedom Hall, 2500 E. Independence Blvd., Charlotte, 28205. For more information, call (310) 477-8521.

OHIO: **Workshops**-Windsor chairs, taught by Joe Graham. For more information, contact Lenox Workshops, 1192 Webster Road, Jefferson, 44047. (216) 576-0311.
Workshops-Various workshops, year-round. Conover Workshops, 18125 Madison Road, P.O. Box 679, Parkman, 44080. (216) 548-3491.
Classes-Bandsaw techniques, veneering, cane weaving, marbleizing wood, wood identification, furniture design and more. The Woodworkers' Store, 2500 East Main St., Columbus. (614) 231-0061.
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. For info, 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.
Classes-Bowl turning, chip carving, router techniques, finishing, thru March. The Hardwood Store, 1695 Dalton Drive, New Carlisle, 45344. (513) 849-9174.
Workshops-Build a Queen Anne tea table, June 10-14; professional results with the shaper, June 15. Rio Grande. For more information, call Lonnie Bird at (614) 245-7325.

OREGON: **Exhibition**-With the Grain II, Works in Wood, April 27-May 28. Cook Gallery, 705 Oregon St., Port Orford, 97465. (503) 332-0045.
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.
Classes-Oregon School of Arts and Crafts, 8245 S.W. Barnes Road, Portland, 97225. (503) 297-5544.

PENNSYLVANIA: **Show**-20th annual mid-Atlantic woodcarving show and competition sponsored by the Pennsylvania Delaware Valley Wood Carvers Association, April 13-14. Pennsylvania State Abington campus gymnasium, Abington. For more information, call (215) 757-2152.
Classes-Windsor chairmaking, weekly and weekends. For more information, contact Jim Rendi, Philadelphia Windsor Chair Shop, P.O. Box 67, Earlville, 19519. (610) 689-4717.
Meetings-Black Hills area woodworkers interested in organizing for purposes of sharing information and working toward a show. For more information and to be on mailing list, call (605) 343-1878.
Classes-Bowl turning with David Ellsworth. Three-day weekend classes in private studio, beginner to intermediate. For further information and schedule, contact David Ellsworth, Fox Creek, 1378 Cobbler Road, Quakertown, 18951. (215) 536-5298.
Show-Lancaster County woodcarving and wildlife art festival and competition, March 16-17. Millersville University Student Union Building, Millersville. For more information, call (610) 926-3692.
Call for entries-Third annual Wharton Esherick Museum woodworking competition/exhibition. The theme is jewelry boxes. Deadline: July 1. For further information, send SASE to Wharton Esherick Museum, P.O. Box 595, Paoli, 10301-00595.

RHODE ISLAND: **Call for entries**-Annual outdoor chair and furniture fair, June 1-2. Deadline: April 15. For more info, contact South Country Center for the Arts, Box 109 West Kingston, 02892. (401) 782-1018.

TENNESSEE: **Workshops**-Turning, carving and more, year-round. For more info, contact Arrowmont School of Arts and Crafts, P.O. Box 567, 556 Parkway, Gatlinburg, 37738-0567. (615) 436-4101.
Classes-Lumber selection, grading, stacking, drying, kiln operation, sawmilling and more. For more information, contact Tennessee Valley Authority, 17 Ridgeway Road, Box 920, Norris 37828-0920. (615) 632-1656.
Workshops-Spring workshops include turning, carving, Windsor chairmaking, fretted dulcimer making. For more information, contact Tennessee Technological University, Appalachian Center for Crafts, 1560 Craft Center Drive, Smithville, 37166. (615) 372-3051.

TEXAS: **Meetings**-Woodturners of North Texas meets the last Thursday of every month, 7:30-10:00 p.m. For more information, contact the Paxton Beautiful Woods Store, 1601 W. Berry St., Fort Worth, 76110. (817) 927-0611.
Classes-Carving classes with Don Schol, every Thursday, 6:00-9:00 p.m. For more information, contact the Paxton Beautiful Woods Store, 1105 Sixth St., Carrollton, 75006. (214) 245-1192.
Meetings-North Texas Woodworker's Association meets the third Tuesday of each month. For more information, contact Bruce May, P.O. Box 831567, Richardson, 75083. (214) 271-0125.
Show-Houston Woodworking Show, March 15-17. Pasadena Convention Center, 7902 Fairmont Parkway, Pasadena, 77507. For more information, call (310) 477-8521.

VERMONT: **Courses**-Yestermorrow Design and Building School, Route 1, Box 97-5, Warren, 05674. For information, call (802) 496-5545.

VIRGINIA: **Classes**-Fundamentals of woodworking, router techniques, bowl turning and more. Classes offered year-round. For class schedule and information, contact The Woodworkers Club, 216 Dominion Road, N.E., Vienna, 22180. (703) 255-1044.

WASHINGTON: **Workshops**-Build a sea chest, small boat construction, handplane repair and construction, paddle carving, woodturning. For more info, contact Northwest School of Wooden Boat Building, 251 Otto St., Port Townsend, 98368.
Classes-Woodcarving, lathe, router, tablesaw, furniture and cabinetmaking. Individual and small group classes available. For further information and a schedule, contact Common Sense Woodwork, 8231 S.E. 67th St., Mercer Island. (206) 232-1714.
Show-12th Annual Artistry in Wood Show May 4-5. Yakima Valley Museum, 2105 Tieton Drive. For more information, contact Marti Moross, 612 W. Fremont Ave., Selah, 98942. (509) 697-3003.
Workshops-Basic woodworking, plane making and chisel use, Maine guide canoe workshop, canoe restoration, March thru April. For further information, contact the Center For Wooden Boats, 1010 Valley St., Seattle, 98109. (206) 382-2628.
Classes-Ongoing, hand tools, dovetails, router basics, boat building, marine finishes. For further information, contact The Wooden Boat Shop, 1007 N.E. Boat St., Seattle, 98107. (800)933-3600.

WEST VIRGINIA: **Workshops**-Molder tooling and operation, CNC machining workshop, management orientation to CNC, thru April. For more info, contact Robert C. Byrd Harewood Technology Center, Route 2, Box 556, Princeton, 24740. (304) 487-1510.

CANADA: **Workshops**-Traditional Windsor chairmaking. Weekly courses. For more information, contact David Goodwin, Village Chairmaker, Sparta, Ont., N0L 2H0. (519) 775-2751.
Association-Canadian Woodturners Association, Markham, Ont. For more information and quarterly 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. For more information, contact Vic Germaniuk at (807) 767-5964.
Show-Eighth annual wood and wood products exposition and sale, March 1-3. Lansdowne Park Civic Complex, Bank St. at Holmwood. For further information, contact John Cryderman, 136 Thames St., Chatham, Ont., N7L 2Y8. (519) 351-8344.
Show-The Ancaster wood show, June 14-16. Ancaster Fairgrounds, 625 Highway 53 East. For more info or entry forms, contact John Downes, Oak Leaf Productions, 35 Ingrid Court, Hamilton, Ont., L8W 2V4 (905) 575-0450.

ENGLAND: **Workshops**-Restoration, hand finishing, cabinetmaking for beginners, marquetry, furniture design, year-round. Bruce Luckhurst, Little Surrenden Workshops, Bethersden, Kent TN26 3BG. 0233-820-589.

SCOTLAND: **Workshops**-Ongoing workshops. For more information, contact the Myreside International School of Antique Furniture Restoration, Myreside Grange, Gifford, East Lothian, EH41 4JA. (062 081) 0680.

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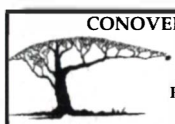

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Fine Woodworking back issues 1-116. $350. plus shipping. Robert, (802) 263-5402. (VT)

PARTS AND CUTTERS for older planes, Pete Niederberger, Box 887, Larkspur, CA 94977. (415) 924-8403 after 6 PM.

Fine Woodworking back issues 1-95. $250 plus shipping. *Woodsmith* back issues 1-82, best offer plus shipping. (714) 661-9009. (CA)

Wanted To Buy

WANTED: MAKITA 9804 blade sharpener saw (808) 487-8300. (HI) (Carl Nevarro—please call again!)

DELTA WOODWORKING tool catalogs especially 1934 and older. Also late 1930's Unisaw. Write Collector, PO Box 615, Clinton, MA 01510 or FAX (508) 368-3313.

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WANTED: CABINETMAKERS tools, young apprentice seeks Stanley, Record, (etc.) planes. Also bench & vises, chisels hand saws & carving tools. Good prices paid for quality tools. Gary Caprara, 455 Tannery St., Buford, GA 30518. (770) 945-8322.

Monster lathe

After reading about Ron Fleming and the beautiful vessels he turns (*FWW* #99), I was no longer happy with my 12-in. lathe. I spent a few months looking at every lathe on the market. After carefully analyzing my options, I had a long list of problems that plague factory-built lathes.

All that was left was for me to design and build one myself. After eight months of working nights and weekends (I have a very forgiving wife), and an unknown quantity of money, my "monster machine" was up and running (see the photo at right).

The lathe is 8 ft. long and when filled with sand weighs 4,500 lbs. It's powered by a 5-hp motor that drives a hydraulic transmission with speeds from 0 to 1,800 rpm, forward and reverse, with constant torque. The tool rest and tailstock are gear driven and can lock to the main frame, which is made from two 12-in. I-beams. The lathe has a built-in back tool rest that is fully adjustable and allows me to use the long, heavy tools necessary for hollowing deep vessels.—*Dale Robbins, Elkhorn, Neb.*

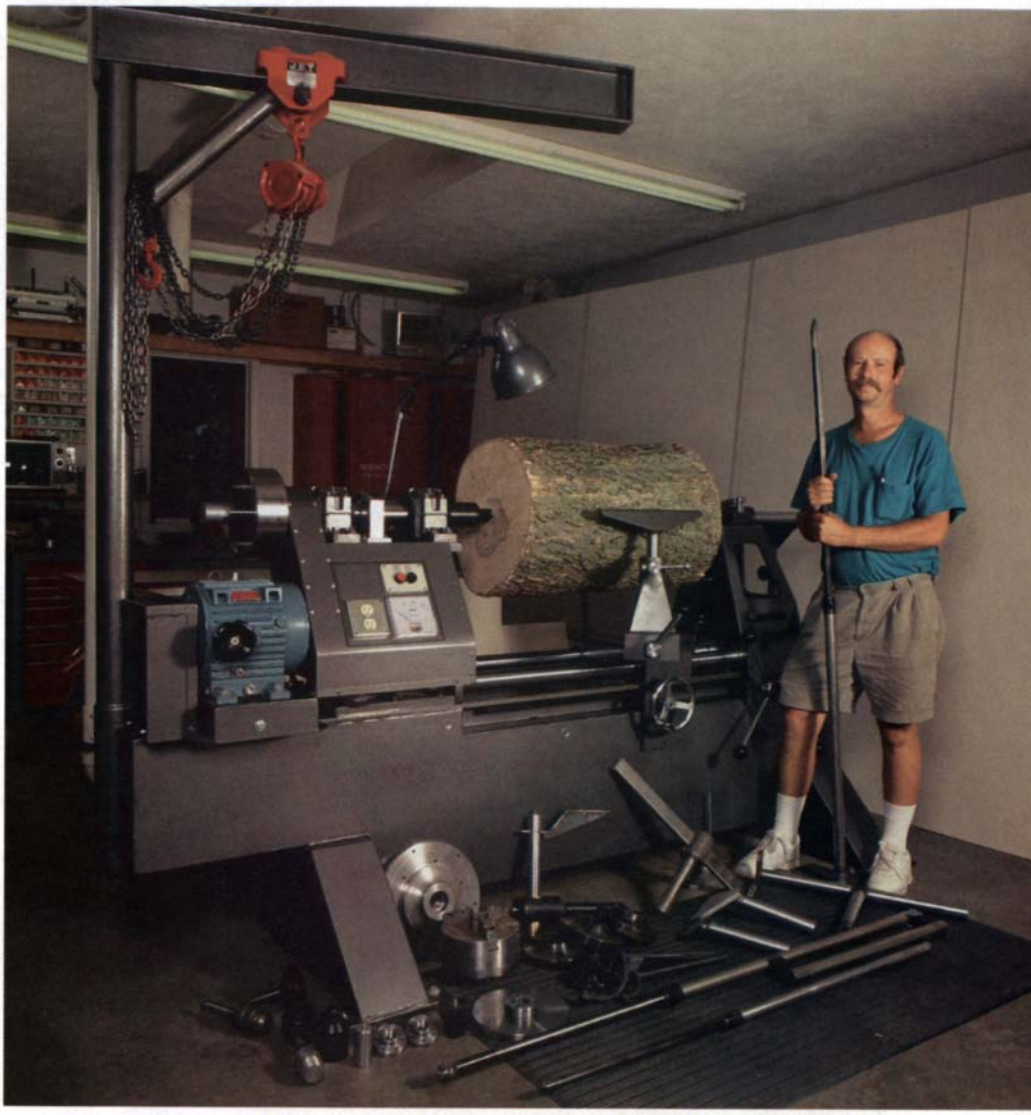

Photo: Hamilton Color Lab

Turn a pen and pencil set or a 1,000-lb. log. *With this shop-built lathe, Robbins can handle either with equal precision. The lathe will swing 37 in. by 50 in. between centers.*

Desk from a 200-year-old plank

The classified advertisement in *FWW* #109 said that the Cuban mahogany had been in storage since 1875. But when Phil Lipton, a furnituremaker from Ladner, British Columbia, called, he learned the wood was considerably older. The seller had about 30 planks of all sizes, but the one that appealed to Lipton was 2½ in. thick, 4 ft. wide and 7 ft. 8 in. long.

The first paperwork associated with the lumber was dated 1887. But an Early American furniture expert examined the planks and thought that, given their size and quality, they probably had been harvested

The planks were black with coal dust *when they arrived at Lipton's shop after spending decades near a railroad yard. Handplaning revealed clear grain and lovely figure.*

"The initial cut was nerve-racking," *says Lipton of dimensioning the 200-year-old Cuban mahogany plank. "But once that was done, the rest was painless."*

Bottom photos: Phil Lipton

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Sale prices good thru 4/30/96.

FREE $45 IN SHARPENING COUPONS

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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 tabie 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

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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" ROCKHARDS and SOFTWOODS 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 Proof Is In the Cutting

Both Woodworker II blades performed very well, whether cutting through butter-soft ¾"-thick pine or iron-hard 1¾"-thick ash. The 20° positive hook angle and 15° alternate top bevels give the blades an aggressive attack; we maintained a brisk, uniform feed rate while ripping a variety of woods on the powerful Unisaw and experienced no discernible resistance or slowing. On the smaller saws, switching to the thin-kerf blade allowed very similiar feed rates, again with barely noticeable resistance.

Although we've used blades that cut faster, their cut quality couldn't touch what we got with the Forrest blades. On solid stock, ripped edges came off our saws jointer-finished, smooth and slick with no visible teeth marks—good enough to edge-glue without additional machining. Crosscuts came out crisp and clean with no fuzzing or tiny splintering.

The Bottom Line

Performance of the Woodworker II is impressive enough that you could bolt this versatile, general-purpose blade on your saw and use it for virtually all of your cutting operations.

SHOP TEST, Woodworker's Journal Nov./Dec. '95 pg.78

THE ONE BLADE THAT LEAVES A SMOOTH-AS-SANDED SURFACE!

BUY OUR BEST SELLER 10" X 40T FOR ONLY $119 PLUS EXTRA 10%–20% OFF FOR COMBO SALE!

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!

NEW DELUXE DADO-KING!

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.

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somewhere between 1790 and 1820.

The planks had had five owners since they were imported in an unspecified year by the E.D. Aldros Co. of Cincinnati. In 1887, Leland G. Banning, who billed himself as a "Manufacturer of Walnut and Hardwood," bought the planks for his private stock. When he died, he willed the wood to his chauffeur, who sold them to a relative, who in turn sold it to the advertiser.

Lipton had a design perfectly suited to the wood. He wanted to build a desk inspired by the work of New York cabinetmaker Duncan Phyfe (1768-1854) from wood harvested during Phyfe's lifetime.

A long-time customer was equally taken with the romance of building a period desk from period lumber, and Lipton was soon on a plane to see the wood. He bought the wide plank on the spot (about $5,000 Canadian, or $65 per board foot, delivered) and built the desk shown in the photo at right.

Since then, another long-time customer has commissioned a Cuban mahogany table for his yacht, so Lipton has purchased another spectacular plank. This one is 5¾ in. thick, 2 ft. wide and 14 ft. long.

—Aimé Fraser, assistant editor

Photo: Waddell/Danforth

***Inspired by the furniture of Duncan Phyfe,** this table was built from a plank of Cuban mahogany cut at the beginning of the 19th century.*

Escape from the pressures of work

Kent Ezzell of Hood River, Ore., built this curly maple and bubinga office for a busy California executive. The owner likes a clean desk, so Ezzell built paper trays that slide out of the curved edges, and he put the computer monitor under glass. There are a number of secret compartments locked by remote control.

The client also wanted a distant view to relieve tired eyes, so Ezzell invented a glass "escape portal" in the center cabinet door. For realistic depth, the scene is airbrushed in three layers on the back of a piece of deeply etched ½-in.-thick glass. The scene is lit with an argon-tube light.

Ezzell used the iron-down veneer technique and got what he says are the tightest seams possible, despite bubinga's tendency to move more than any other wood he's used before.*—Alec Waters, associate editor*

Photo: Alec Waters

Photo: Jeaneen Bauer

***A scene airbrushed on the back of an etched glass panel** forms the focal point of this curly maple and bubinga office suite. The view in ambient light ("sunrise") is shown above. When the argon tube is lit (right), the view becomes "sunset."*

Krenov at 75

Last Halloween, on his birthday, James Krenov spent the day as he spends most others—working in his shop at the College of the Redwoods in Fort Bragg, Calif.

After the morning ritual of greeting students, he took his place at his bench in the corner and worked on a small pearwood cabinet. At the end of the teaching day, friends, students and colleagues gathered to celebrate with the man who had affected their lives so deeply (see the bottom photo on p. 114).

Wizard, enigma, philosopher and teacher, Krenov is modest and self-deprecating. "I make things," he says. "I just keep working. In the last five years, I've made things that are different from anything I've ever done. Maybe I'm getting old, and I don't have to be afraid of anything. It's a new freedom."

Sixteen years ago, at an age when most consider retiring, Krenov moved to the College of the Redwoods to teach the ideas and skills outlined in his influential books, *A Cabinetmaker's Notebook, The Impractical Cabinetmaker and The Fine Art of Cabinetmaking.* Woodworkers clamored to get into the program.

Being a student of Krenov's is more than a matter of style or method. It's a philosophy or a life choice. The students describe it with different voices, but echoes of

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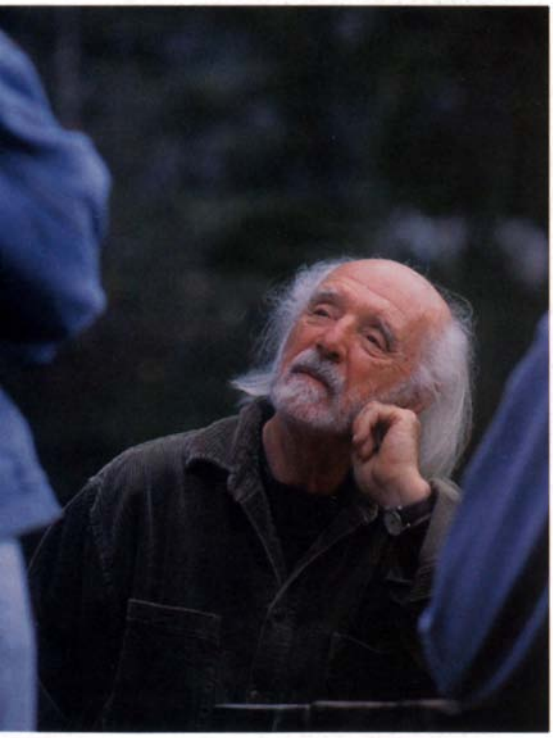
Krenov's voice ring through. They talk about clean lines, attention to detail and quiet simplicity on the outside with complexity hidden. "Letting the wood speak" is a code phrase of the Krenovians.

Ejler Hjorth-Westh a carpenter, boatbuilder and cabinetmaker says, "This school is point zero in our lives. It's where our references start. This is where we learned to go all out and not fear perfection. It may not be what we can do in commercial work, but we know what the best looks like."

The path for Krenov's students isn't easy. "Quiet work is comfortable in museums but not necessarily in Beverly Hills homes," Krenov says. "They want cheesecake and neon lights. If you are doing quiet work, it is tough."

He worries about his students. "If someone could bridge the gap to the buying public and teach them to appreciate sensitivity and quiet work, then quiet craftsmen could live a little better and struggle a little less. That would be my final happiness."

—Bill Juhl, Fair Oaks, Calif., who studied with James Krenov last year at the College of the Redwoods.



***James Krenov at 75**—On his birthday, Krenov stopped teaching long enough to serve chocolate cake to students, friends and colleagues who had gathered to honor him.*

A traveling reading table

***An intimate reading table** for a traveling exhibit of Arkansas literary history built by Douglas Stowe. One leg rests on a little rock.*

As director of a traveling multimedia exhibit of Arkansas literary traditions, my goal was to create reading space that would draw people into the written word.

I wanted a setting that held reading as an intimate, private activity. But I knew that no matter how engaging the writing or how beautifully it was presented, people needed to be encouraged to linger and read. I commissioned Douglas Stowe of Eureka Springs, Ark., to build a reading space for the exhibit—a table and two benches that could be taken apart for shipping.

Stowe designed a lean, unforgettable piece of woodwork titled *We Traveled Rivers* (see the photo above). Built of sugar maple from the Arkansas Ozarks, the piece has a sinuous cutout in the center filled with loose rocks Stowe collected from Ozark rivers.—*C.D. Wright, Barrington, R.I.*

New warnings on wood dust

The World Health Organization (WHO) says that breathing wood dust increases the risk of cancer of the sinuses and nose.

On the strength of the findings, the American Conference of Governmental Industrial Hygienists has recommended that wood dust be named a class A1 carcinogen, a designation it would share with the likes of asbestos, benzene and uranium. The panel also recommends that the Occupational Health and Safety Administration (OSHA) reduce exposure levels from the current 5 mg. of hardwood dust per cubic meter to 1 mg.

In addition, wood-dust Material Safety and Data Sheets now include a cancer warning. Any shop that's subject to OSHA regulations can get the updated sheet for wood dust from its wood supplier.

Some time must pass to allow public comment before wood dust can be officially classified as an A1 carcinogen. In the meantime, OSHA has no plans to lower the permitted exposure levels.

Wood & Wood Products magazine did a thorough two-part report on WHO's findings and its affect on woodworkers and the woodworking industry. For a copy, send a note and a self-addressed, stamped envelope to Editor, *Wood & Wood Products*, P.O. Box 1400, Lincolnshire, IL 60069.—*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 06740-5506.***

Top photo: Douglas Stowe; bottom photo: Bill Juhl

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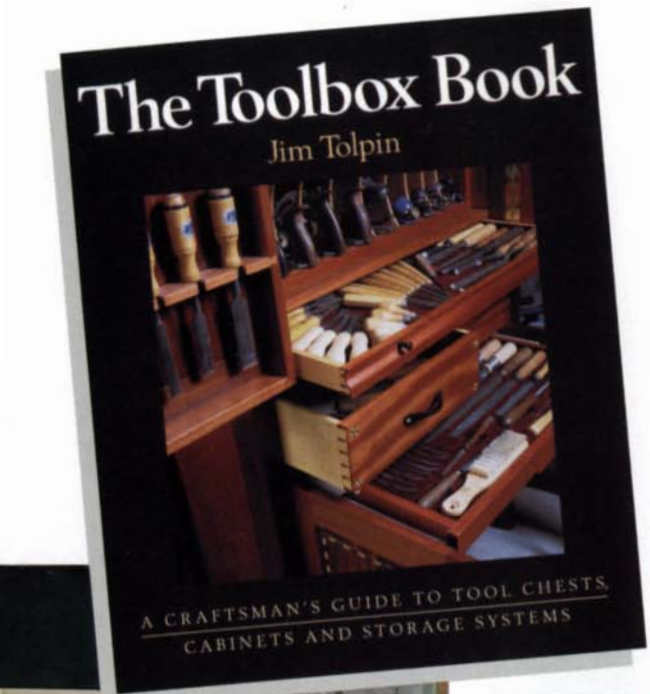

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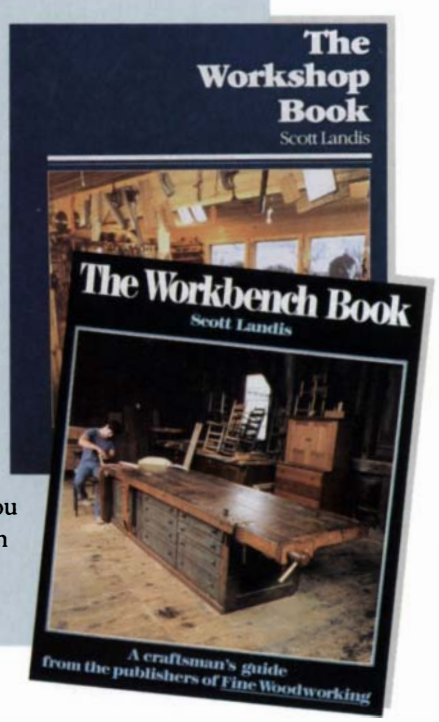

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Design based on a leaf

The leaf of a lime tree helped inspire this Art Deco-style desk and chair by English furniture-maker Stephen Owen. The desk (in English plane, similar to sycamore) and chair (in English walnut) now grace an apartment overlooking a stand of lime trees. Drawer fronts are made of veneers laminated in a mold and then lipped in solid wood and veneered again with show wood. The top drawers have hinged, flat tops that provide space for a computer mouse. Tops lift up to provide access to the drawers. Owen's furniture studio is in Surrey, England.

Photos: Stephen Owen