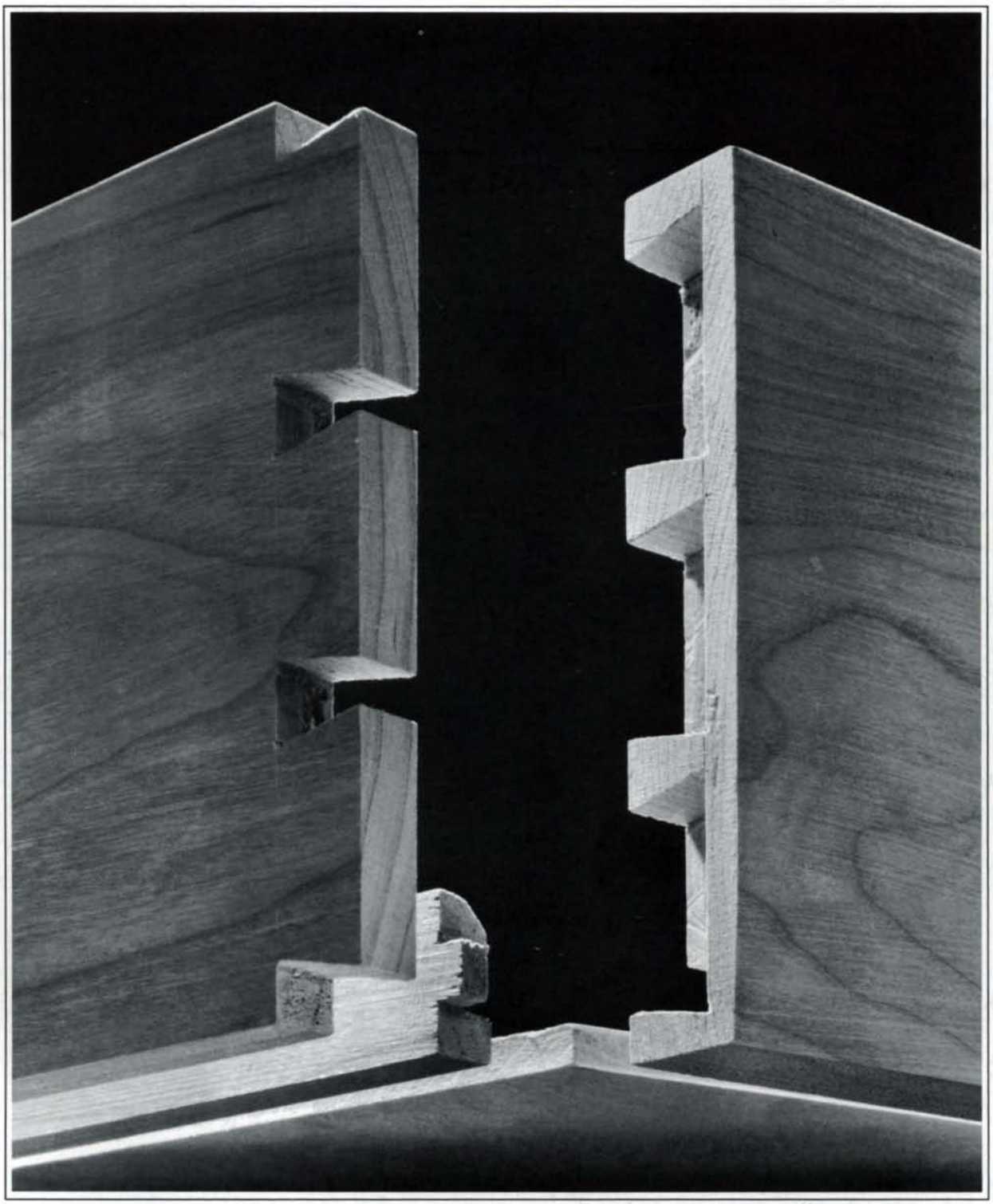
Fine WoodWorking

MARCH/APRIL 1984, NO. 45, $3.50



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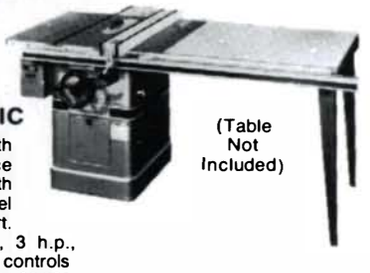

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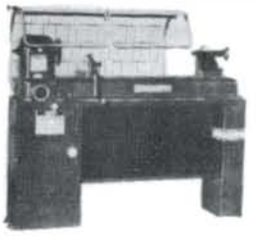

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Fine WoodWorking®

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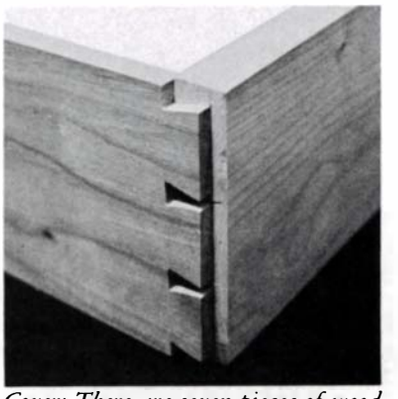


Cover: There are seven pieces of wood in a traditional drawer. The trick is, you fit the parts to the opening before you join them together. Tage Frid explains how on p. 32.

DEPARTMENTS

ARTICLES

Letters

Recently, *Fine Woodworking* has published photographs of work that is obviously flawed. It is most disturbing to see detail such as in the color photograph on p. 81 of issue #43 (November), because it would appear as if boxwood stringing with tension failures from bending represents an acceptable level of quality in workmanship. People correctly or incorrectly assume that if *FWW* publishes it, it therefore must be the best, or at least more than just acceptable. Neither would open miter joints (#43, p. 33) be deemed appropriate joinery. Even though the emphasis of that article is on speed, haste should not be an excuse for a lack of quality.

For *Fine Woodworking* not to take a firm, perhaps controversial, position on the issues of quality, by explicitly showing what quality entails, may prove to be exceedingly detrimental to the continued revival of the stirring corpse that once represented the craft of woodworking in North America. It is not enough to say that design can be assessed in a photograph; craftsmanship needs to be seen and touched. The photographs in *FWW* and other Taunton Press publications are perceived as pieces of woodworking, not as photographs of designs. Because of this, and because of the inherently deceptive nature of photographs, it is very important that only work of the highest quality be illustrated in *Fine Woodworking,* especially since it purports to contain fine things. . .

—John Perkins, Halifax, N.S.

Re Jim Cummins' article on boxes in *FWW* #43. First, I am always bothered by any suggestion to use metal, regardless of the configuration, as a push stick. Embedded in the ceiling and walls of my workshop are parts of 18 carbide saw teeth that came into contact with a spring-metal hold-down. The ice-pick suggestion makes me cringe.

Also, the tone of the article presents a sort of slapdash approach to woodworking. I could cite a number of examples, but the slippery-glue comment on p. 36 should make my point. In the next paragraph, the idea of having a sturdy box with open corners makes me wonder why bother mitering at all; butt joints and nails should do nicely. Of course, it's easy to criticize, and on the plus side I suspect that Cummins' casual approach is inviting to some inexperienced woodworkers who would be turned off by more precise instruction. But my own feeling is that even a rank amateur should be shown the bull's eye; he or she can then decide on what to shoot for as a function of skill level and patience.

—Allan J. Boardman, Woodland Hills, Calif.

The story by Peter Pennypacker (*FWW* #44, "Making 50 Tables") reminds me of the argument over handmade versus machine-made guitar necks. It was thought that the machine-made were not as good as the handmade, but the fact of the matter is, if the craftsman running the machine was interested in the quality of each and every piece, the quality of the instrument would not suffer.

—Peter B. Rock, Mt. Pleasant, S.C.

Re the article on Wendell Castle in your September issue (*FWW* #42). I think those experiments of his in the Post-Modern vein are hideous beyond belief. I have a lot of admiration for the man, and nothing but awe when considering the amount of work that goes into those pieces. But it is a mistake to consider any piece of furniture to be art. Woodworking, even at his level, is still a craft. Its main purpose is function. If at the same time it pleases the eye or tickles the funny bone, great. But art is different. Whatever it is, it serves no practical function. It makes its appeal purely to the spirit, not to the seat of the pants.

I don't mean to imply that the crafts are an inferior pursuit. One does what one does best. The thing Castle does best is make furniture. But somewhere along the line he, or his dealer, got their semantics crossed up. No one in his right mind would lay out $40,000 for a table, and then actually eat linguine off it. So why build such an object in the first place? You are doomed to resort to hype to get it sold, rather than letting it stand on its merits as an honest piece of work.

—Jack Spiegelman, Glendale, Calif.

Here's a suggestion that might be of value to your readers. Make friends with the local typewriter repairman. He probably throws away the platens (rollers) for any number of old typewriters, and I'm sure he'd be glad to see them put to good use. They make good outfeed rollers for tablesaws, jointers and planers. They come in several lengths, and so could find other shop uses, too. Make supports for the rollers by boring or dadoing slots into maple or oak brackets. Dadoing is the best technique if two or more rollers are to be in line.

—Tom E. Moore, Springfield, Va.

Regarding Japanese chisels, Toshio Odate says in *FWW* #43, p. 16, "The very fine edge becomes extremely hard when the blade is tempered." It does? Tempering is the process of controlled reheating (at some temperature between 300°F and 1000°F) of hardened steel, to increase toughness at the cost of some hardness. I should like very much to know how Odate generates at least a 300°F temperature in the edge of a blade by wiping it across a waterstone.

It has been my experience in knifemaking that during the heat-treating process, an edge that is ground very thin will, during the quench, become quite hard and brittle, while the main body of the tool is still very hot. As the main body of the tool cools and shrinks, the thin, brittle edge must conform. The result is waves, cracks and much stress. Hence, the blacksmiths' adage: forge thick and grind thin. Mr. Odate is grinding off this stressed edge—no tempering occurs at all.

—Vernon Raaen, Oak Ridge, Tenn.

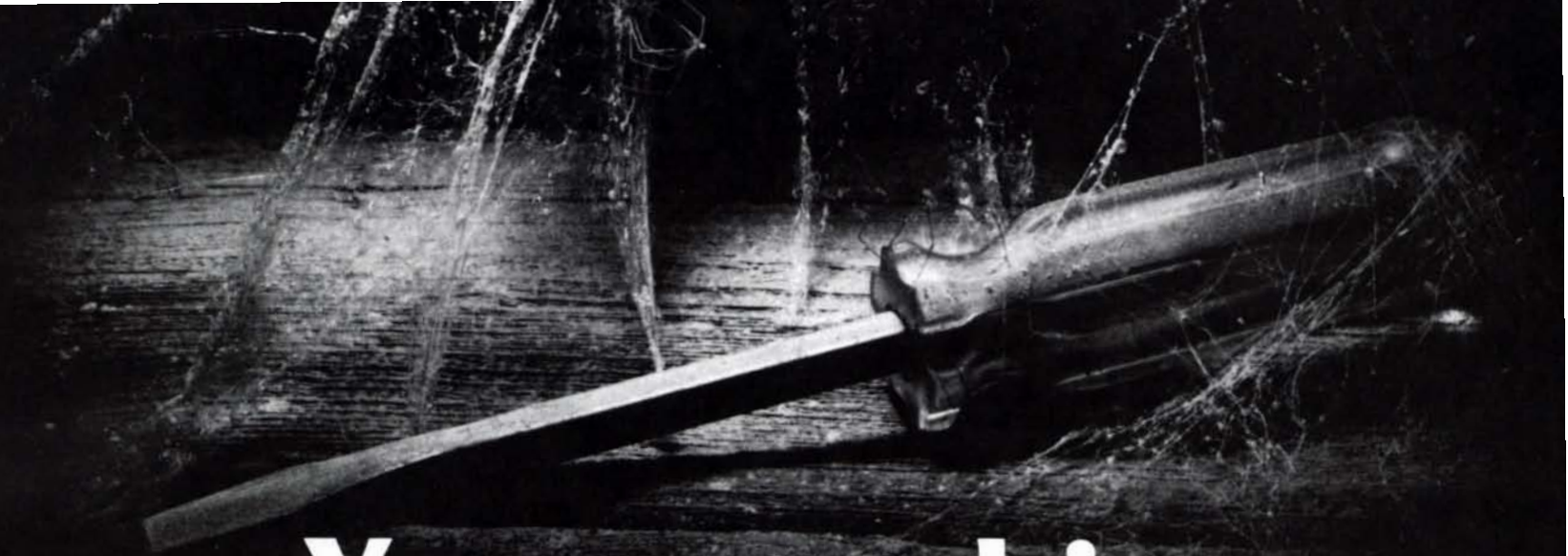
TOSHIO ODATE REPLIES: My knowledge of blacksmithing and metallurgy is not great, so my choice of the word "tempering" was perhaps unfortunate. Your explanation of what actually happens during the "taming" process seems correct, but I do believe that the tremendous friction of sharpening and cutting can heat the extremely fine edge of a tool hot enough to affect the metal. This heating does not change the steel in the body of the tool, but it does take the harshness out of a new blade.

For readers looking for a local supply of potassium dichromate (used in wood finishing), you might check with camera stores stocking film-developing supplies. Kodak sells it in 1-lb. jars under catalog number 146 3231 for about $7.

—Julian Case, Los Osos, Calif.

An important addition to the reading list in Mack S. Headley's "Applying Classical Proportions" (*FWW* #43 pp. 77-79) is *The Geometry of Art and Life,* by Matila Ghyka (Dover, 1977). Ghyka describes how thousands of reported measurements of the proportions of ancient and Renaissance structures can be summarized in the forms of certain regular geometric figures. The most compelling of these relations is known as the Golden Section. In simple linear form, this rule states that the longer of two segments of a divided straight line should have a ratio of 1.6818 to the shorter segment.

Astounding to me, expansions of the Golden Section proportions yield figures that Ghyka shows are consistent with the proportions of natural objects—plants, animals, and the



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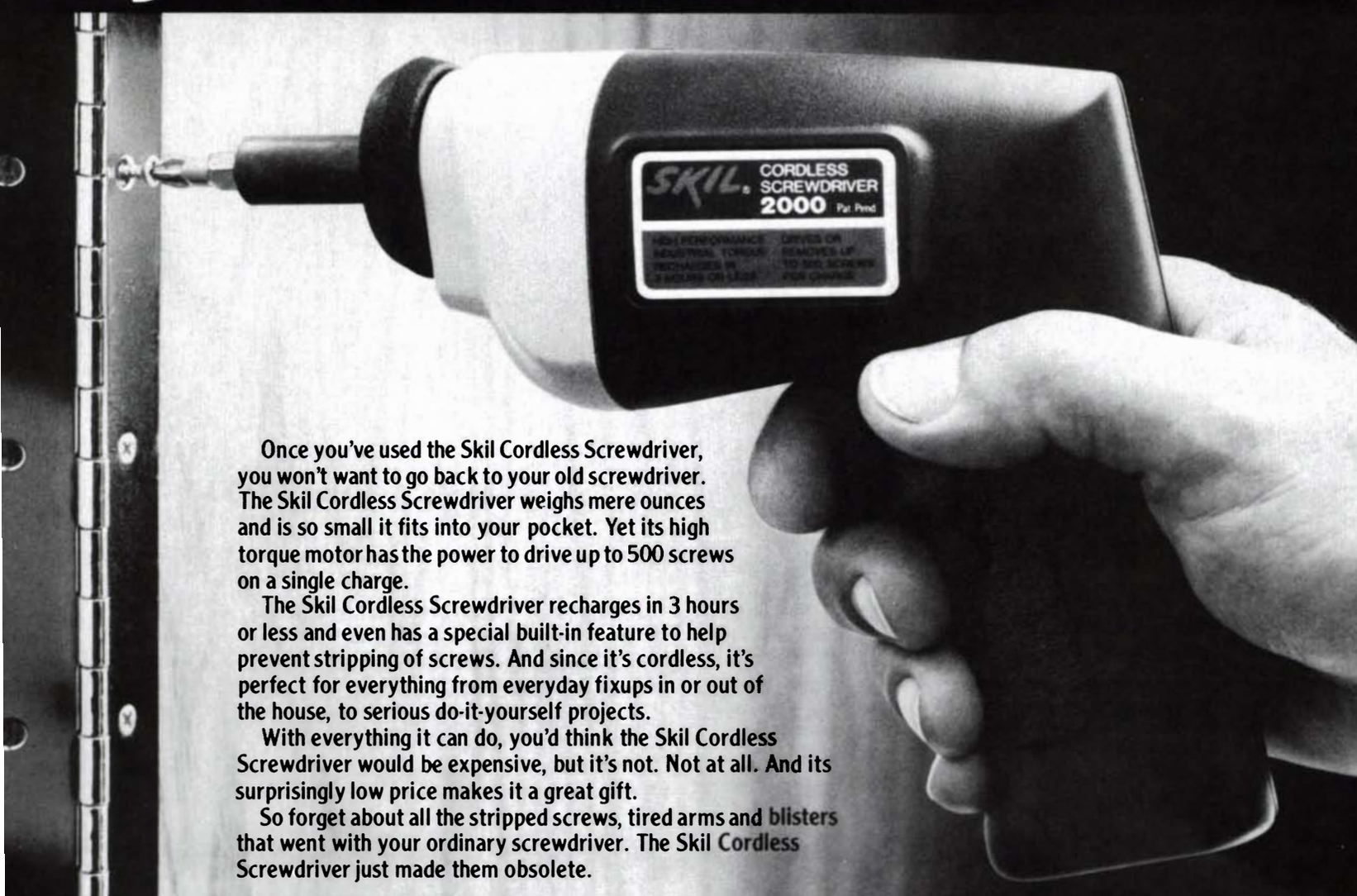

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human figure. Perhaps, objects built according to the Golden Section are pleasing to man, and considered beautiful, because they reflect these natural proportions.

—James C. De Haven, Pacific Palisades, Calif.

I'd like to add to the discussion of cabriole legs in *FWW* #42 and #43. For any cabriole leg to have strength, there must be some wood that carries uninterruptedly straight down through the post, knee, ankle and foot to the floor. Adherence to this principle will not only give you a leg that won't crack in a year or two, but it will also help avoid the bandiness in leg design which Phil Lowe correctly cautions against. That caution ought be on grounds not only of aesthetics but also of proper construction. . . . A cabriole leg will acquire added grace if, after the lathe and bandsaw, the ankle is carved back somewhat from the side of the pad to the back of the leg. Without this refinement, the leg, as it comes from the bandsaw, is dull and clunky, uninteresting. A fishtail gouge works wonders here. *—Bill Pease, Lancaster, Pa.*

I find only passing references in *FWW* to various fruitwoods, the notable exceptions being cherry and pear. The fruitwoods I have in mind are lemon, orange, lime, grapefruit, kumquat, loquat, mulberry, pomegranate, avocado, even older grapevines.

Here in California, these woods are grown for the fruit crops, and an aged orchard is often bulldozed, burned and cleared, and the field replanted with young trees. It pains me to see these trees put to the torch, but I don't know how these woods behave once cut and prepared as lumber. Do any of your experts or readers have any experience with these woods? Do these woods check, split and warp—to what degree? How do they join? Glue? Finish? There are a lot of trees out there being burned . . . most are available for the asking.

—J. Robison Krup, Oxnard, Calif.

George Mustoe deserves compliments for a well-written article on wood adhesives in *FWW* #43. He has rendered a public service by busting two marketing ploys: first, that of the "concentrated" adhesive which actually is less concentrated (lower solids) but more expensive, and second, the use of the word "aliphatic" to differentiate two adhesives which are both aliphatic. Pure folly when you realize that Vaseline, propane and Christmas candles are also aliphatic.

I'd like to add that tacky, or yellow, polyvinyl acetates (PVAs) are not born that way—the color is added. They do perform differently, as Mustoe said, but the price comparisons in the photo and captions left the reader to conclude that the price differential between white and yellow glue was artificial and unfair. Color and name are artificial, but tacky PVAs do cost more to produce. . . .

Finally, on shelf stability and resistance to freeze damage, it pays to shop around. Some brands, ours among them, are guaranteed not to be damaged by freezing, and our tacky PVA has a shelf stability of two years plus.

—Julio A. Fernandez, LePage's (Canada) Limited, Bramalea, Ont.

. . . Mustoe mentions Aerolite #306 only briefly. This two-part glue, developed by CIBA, has some solid advantages and deserves wider use. The white powder is mixed with water to the consistency of heavy cream and in this state can be kept in

(continued on p. 8)

On testing jointer-planers

Your article comparing jointer-planer combination machines (*FWW* #43) was most timely for me, as I am shopping for one. Reading the article prompts me to suggest ideas for future tests. First, a standardized list of criteria should be included for all machine comparisons. I am told, for example, that the Hitachi F-1000A is "built like a tank," but I am not told whether it has tables riding on gibbed dovetail ways. I'd like to see an objective statement of construction details rather than a nondefined, qualitative judgment . . .

I realize that amateur contributors aren't in a position to act as a testing lab like *Consumer Reports*. But the kind of information I'd like to see wouldn't need elaborate equipment or vigorous experiments. How about a user survey?

—Tom Whitlow, Ithaca, N.Y.

The Hitachi is crude cast-iron next to the Inca. The Hitachi table extensions never align, nor can they be adjusted—you have to file and shim. The Hitachi is made to an accuracy of 0.008 in., the Inca to 0.004 in. Several aspects of each machine were not judged. For instance, Inca has a five-year warranty, Hitachi one year. Most makers void their warranties if the machine is used professionally, Inca does not. Also, Inca parts are guaranteed to be replaced within three days. I sell both Hitachi and Inca, and waited nine months for parts for my own Super Surfacer. *—Robert Major, Suncook, N.H.*

The article by James Rome was very unfair to Makita's service department, and to your readers for creating such a misleading impression. An incident of customer dissatisfaction, while always regrettable, does not in itself constitute a lack of service. Rome's anger at himself for destroying his jointer tables should not have been allowed to be projected toward Makita in your pages. While acknowledging that Makita's service system is not perfect (no company staffed by human beings ever will be), I can report that we at Highland Hardware have experienced excellent service from Makita in the four years we have been their dealer. . . .

Incidentally, Rome is wrong about having to dismantle the Makita jointer to change a belt. Just remove the two screws holding the belt guard, loosen the setscrew on the shaft coupling, and pry the coupling apart with a screwdriver, tapping the screwdriver with a hammer to get it started. The belt can be slipped off through the space created. It took me ten minutes the first time I tried it. *—Chris Bagby, Atlanta, Ga.*

Re Jim Rome's accident with his Makita jointer-planer: One of my safety rules is always pull the plug when changing a cutter on any tool. This applies to everything from tablesaw blades and shaper cutters right down to drill bits. Whenever I'm tempted to disregard this rule, I think back to all the men in mills and yards I've met who were missing a finger. In Rome's case, the simple operation of having to plug in his jointer could have jogged his memory, reminding him that his knife installation was incomplete.

—Randolph Mateer, Detroit, Mich.

James Rome complained about the difficulty of rigging a dust-collection system for the Inca 343-190. We made wood filler blocks that fit between the planer table and the underside of the jointer. We then placed the shop-vac nozzle into a hole cut through the outboard-side filler block. To hold the blocks, raise the planer table until it's snug against the blocks. Don't tighten too much, or something drastic may happen.

—John Congdon, Philadelphia, Pa.

the refrigerator. The hardener, or catalyst, is acetic acid (actually extra-strength vinegar) and is spread on one surface, the glue on the other. Only when the two surfaces are brought together does the reaction begin. This makes Aerolite ideal for complex lamination requiring lengthy assembly time.

Aerolite is also a gap-filling glue needing only moderate clamping pressure, and I have found it more tolerant of low temperatures than either resorcinol or plastic resin. I've used it in small boats for 30 years and have never had a joint fail. One caution: Cured Aerolite gets so hard that it will chip plane irons and rapidly dull knives. Also, they never give you enough hardener. You can mail-order the glue from Woodcraft in Woburn, Mass., or from the WoodenBoat Shop at 1007 N.E. Boat St., Seattle, Wash. 98105.

—Simon Watts, Berkeley, Calif.

I would like to qualify Jim Cummins' remarks about the bottom board of banjo clocks (*FWW* #41). Simon Willard was not so naive as to think that a free-falling lead weight could be stopped cold by a dovetail joint in thin wood. Rather, he designed the bottom for easy breakout to avoid more serious damage, since failure of the catgut cord was, unfortunately, rather likely. He, or his cabinetmaker, used a blind dovetail, with a few very small pins cut into the clock sidepieces. Thus the dovetailing provided absolutely no strength vertically. Simon's brother, Aaron, and their apprentices and successors, made an even more easily broken miter joint. None of these clocks was reinforced with glue blocks between the bottom board and the strong back, but used two glue blocks cross-wise of the bottom board, so that cracking loose would not cause splitting. *—Al Root, Newark, Del.*

Readers talk back about tablesaws

Re your tablesaw discussion, *FWW* #43, p. 102. For many years I owned a Sears tablesaw with a 1-HP motor. With very little maintenance and a good sharp blade, that saw ripped 2-in. oak and walnut, and cut all manner of joints very accurately. I never replaced any bearings. I almost never blew the thermal-overload protector. During the time that I owned my Sears saw I worked daily making furniture and cabinets, and that saw worked right along with me.

I now own a Unisaw and am totally happy with it, despite the price. Its resale value is more than I paid for it. People look askance at my Sears jointer and radial-arm saw, until they see the furniture. Tools are only tools. Learn their likes and dislikes, and make furniture with their help.

—George Breck, Sebastopol, Calif.

I, too, began my woodworking adventures with Sears "best" 10-in. tablesaw. I was 24 years old, moving into my first house and had planned for the Sears delivery truck to meet me at the new house early on the morning of the move. As I look back seven years later, I think I was as excited about getting the saw as I was about buying the house.

After many hours that week, I managed to assemble the machine—not an enjoyable task. I, too, had problems getting the sawblade to stay parallel to the groove, and never really got it totally corrected. Other major problem areas included the vastly underpowered and overrated motor, the ridiculous fence which could always be expected to move when a corner of a 4x8 panel hit it, the burnout-prone plastic on/off switch, the flimsy legs, and the motor-belt cover secured by thin metal clips. In addition, the long screw mechanism that adjusts the blade angle frequently clogged with resin, making blade-tilting impossible.

Finally, I decided to buy a used Rockwell 12-in. contractors' saw. The rack-and-pinion fence was a joy and the 2-HP motor couldn't be jammed. The saw's stamped table extensions were warped, however, and I traded up again. Now I own a 10-in. Rockwell tilt-arbor bench saw and I'm pretty well pleased. Its solid, cast-iron table is much better, its miter gauge fits in a T-slot instead of just a groove, and its adjustment wheels are sturdy metal instead of plastic. My old saw had an optional 2-HP motor, though, and my new saw's 1½-HP motor just doesn't seem to have any reserve power.

—Ray Arouesty, Reseda, Calif.

After examining the Rockwell contractors' saw, I purchased the 10-in. Sears saw. I found it hard to justify an expenditure of almost 2½ times more for what appeared to be a similar piece of equipment. Would the substitution of a 1½-HP motor be helpful or advisable on the Sears saw?

—Marshall G. Baldwin, Westport, Conn.

EDITOR'S NOTE: Yes. Sears sells one for about $125. It's worth changing to double pulleys and two drive belts, also from Sears.

You mention paying $9 for a new tablesaw bearing. In my 15-plus years as a mechanic (automobile, motorcycle and aircraft), I have learned a thing or two about bearings.

Approximately 99.9% of all bearings and seals are standard, and a good bearing-supply house can sell you an exact duplicate of equal or better quality for about half to two-thirds the price of one purchased from the tool dealer. See the Yellow Pages under "Bearings." These supply houses can cross-reference the part numbers of Japanese, Swiss, Spanish or other foreign-made bearings and seals to U.S.-made counterparts. "Made in U.S.A." means something when it comes to bearings. Few foreign makers use vacuum-degassing, a process that eliminates tiny air pockets in the balls, rollers, needles and races, thus reducing uneven loading and early failure.

When you change a bearing, change its seal—always. Nothing makes permanent lubrication more temporary than sawdust where it does not belong.

—Tim McCarthy, Oak Harbor, Wash.

I outgrew three tablesaws before I finally got it right. If you are a professional cabinetmaker, the name of the game is panel-handling. I shopped around for several months and finally selected a ten-year-old Martin T-17 from Rudolf Bass, Inc., for $6,250, reconditioned. After working with it for over six months, I can no longer imagine how I ever functioned without it. *—Edward V. Crescimanni, Middle Village, N.Y.*

Trunnion bolts clarified

Several readers asked how to cure blade-alignment problems with Sears tablesaws. The fix, which came from John Hallam of Livermore, Calif., is to substitute better bolts for securing the trunnion—the cast-iron frame that holds the arbor assembly to the table. Most hardware, auto-parts and industrial-supply stores stock bolts in three grades. Low-carbon-steel grade 2 bolts are for general applications. Grade 3, which are heat-treated and marked with three radial lines on the bolt head, are for more demanding work. Grade 8 bolts, marked with six radial lines, are alloyed to withstand stress and high temperature. Bolts with no radial markings but a manufacturer's symbol (usually a string of letters) are likely grade 2. Sans symbol and radial lines, they could be anything. Choose a grade 5 bolt (three radial lines) to hold the Sears trunnion, and add lock washers to resist vibration. □

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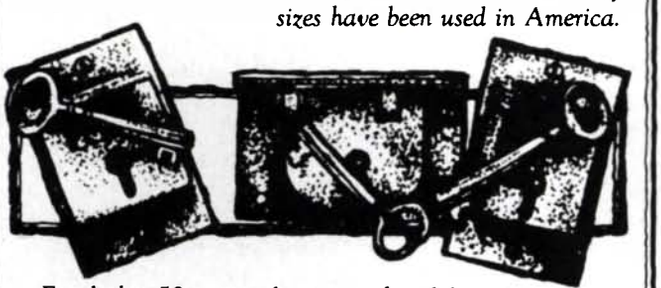

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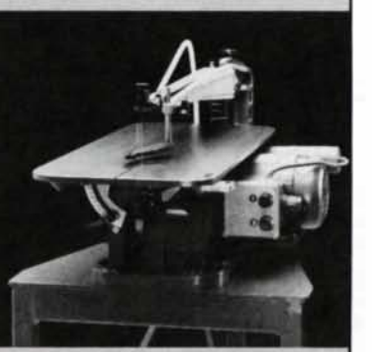

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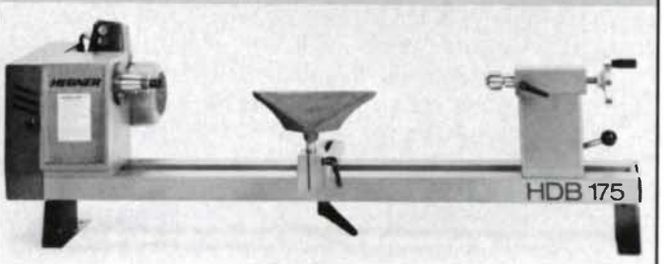

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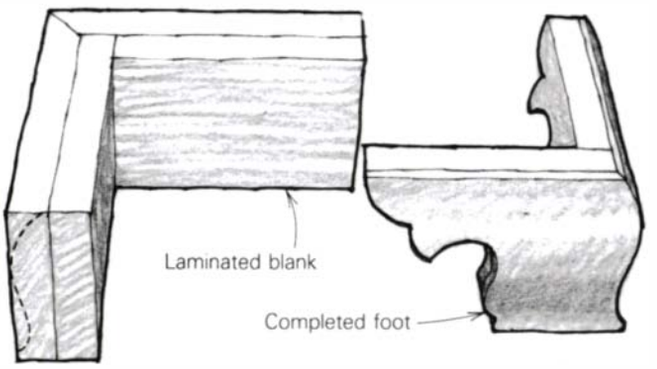
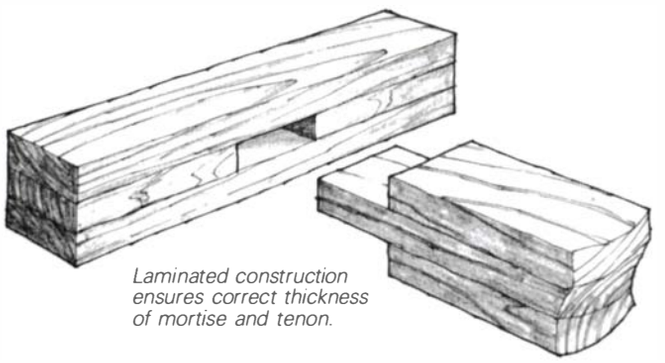
Laminated bracket foot



The traditional bracket-foot construction calls for hard-to-get thick (1½-in.) wood and tricky spline-miter joinery. Here is an alternative approach that laminates ¾-in. material into the equivalent of a strong rabbeted-miter joint. After the corner has been laminated, I cut the profile on the bandsaw, taking care not to saw off the two high spots, one at the base and the other at the maximum swell of the foot. This keeps the foot flat on the bandsaw table, eliminating the need to tack the waste back on for cutting the profile on the second side. When it's on the piece, the foot looks just like a solid one.

—John B. Comstock II, Essex, Conn.

Laminated mortise-and-tenon



Laminating can eliminate tedious chopping and sawing when making mortise-and-tenon joints. Simply glue up the parts to be joined in three layers. Leave slots in the middle layer to form mortises and projections to form tenons.

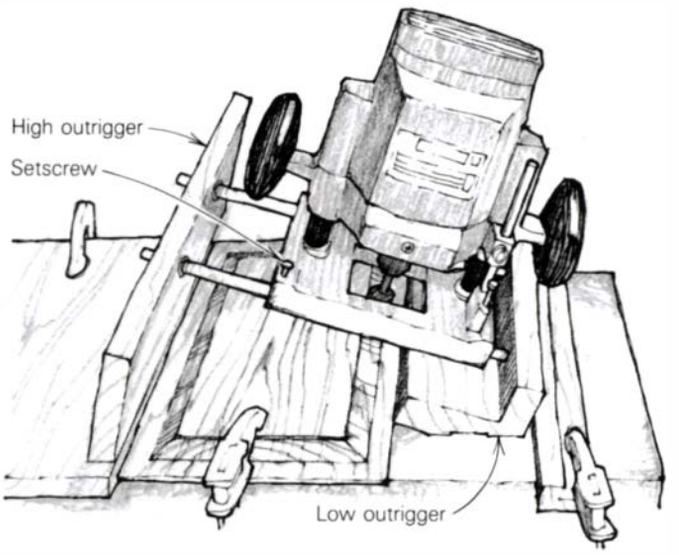
There are several things to watch for. First, leave the tenon shoulders a little long and saw them off square after laminating—it is virtually impossible to line up the shoulders exactly when gluing. Use temporary spacer blocks to help hold the mortise dimensions during glue-up.

Because you use thinner stock, you save some wood with this method. You also get a near-guarantee of a perfect fit in the thickness, which is critical to joint strength. One additional advantage is the ease with which you can make the mortises fishtailed in shape by crosscutting the ends of the middle lamination at 5° or so. That way, the tenons can be wedged in the final assembly, yielding a strong, permanent joint.

—Sam Bush, Portland, Ore.

Raising panels with the router

I wanted to make some raised panels, but I didn't want to invest in a shaper and special cutters. My solution was to raise the panel with a ¾-in., 2-flute helical end mill in my router. All that's needed is a simple jig to tilt the router base to 15°. I fitted a length of 15/32-in. drill rod through each of the two existing holes in my Makita router base and epoxied two outriggers to the ends. The low outrigger acts as a fence against the edge of the panel. In the sketch below, the tongue that will fit the frame's groove has already been milled on the tablesaw, but you could just as well do this step afterward.

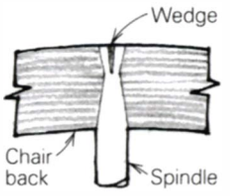


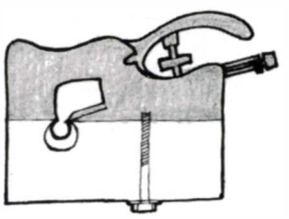
The high outrigger rides atop the panel or, if the panel is narrow (as in the sketch), atop a board of the same thickness clamped to the bench. I saw the panel project as a one-shot job, so I didn't make provision for removing the jig from the router without breaking the epoxy joints at one outrigger. Maybe next time I'll pin things instead.

—Edward M. Rosenfeld, Gunley, Ala.

Hammer-eye joint for chair spindles

The best way to join brace spindles to back bows in Windsor chairs is a hammer-eye joint, shown at right. This joint is tapered top and bottom, glued, and wedged from the top. Flare the bottom of the hole with a taper reamer and the top with a round file, taking care to enlarge the top hole only with the grain, so it will fit the elliptical shape of the wedge-expanded spindle. To taper the ends of the spindles, I use a "precision pencil sharpener" made from a rabbet plane clamped or screwed to a block of wood, as shown at left. Drill a hole through the block and ream the hole at an angle, so the reamed edge is parallel to the surface of the block. Now plane down the block until about 1/16 in. of the hole is exposed. Screw or clamp a rabbet plane over the reamed part of the block so that the plane's blade will shave the spindles to shape. Run each spindle about ½ in. beyond the blade, so its tip will be round, ready for wedging, rather than tapered.





—David Sawyer, E. Calais, Vt.

Two shopmade router subbases

In the woodworking shop at Edinboro State College, we've developed two router subbases that do away with much of the trauma associated with routing dadoes across wide boards and grooving the edges of narrow stock. The subbases all but eliminate wavering cuts, plunge-cut kickouts and awkward balancing acts. Subbase No. 1 is made from ¼-in. Masonite

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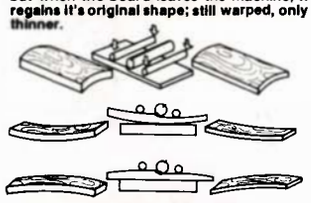
The illustration below shows what happens to a rough or irregular board which is run strictly through a thickness planer.

The warped board is pressed flat by the infeed and outfeed rollers of the machine. The upper surface of the board is planed, but when the board leaves the machine, **it regains it's original shape; still warped, only thinner.**



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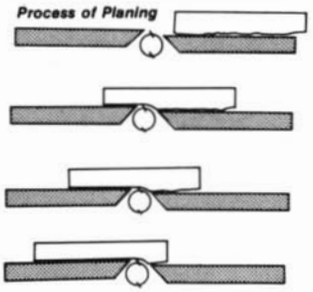
Process of Planing



Planing ▶

▼ *Thicknessing*

STEP TWO: THICKNESS PLANING—
When placed face down on the thicknessing table, the flat surface of the board will now guarantee an exact and matching dimension for the opposite side when the board is thickness-planed. By utilizing the proper techniques in surface-planing and thickness-planing, it is not uncommon to achieve exacting tolerances of .003—.005 inches; more than acceptable to even the most critical woodworking craftsman.

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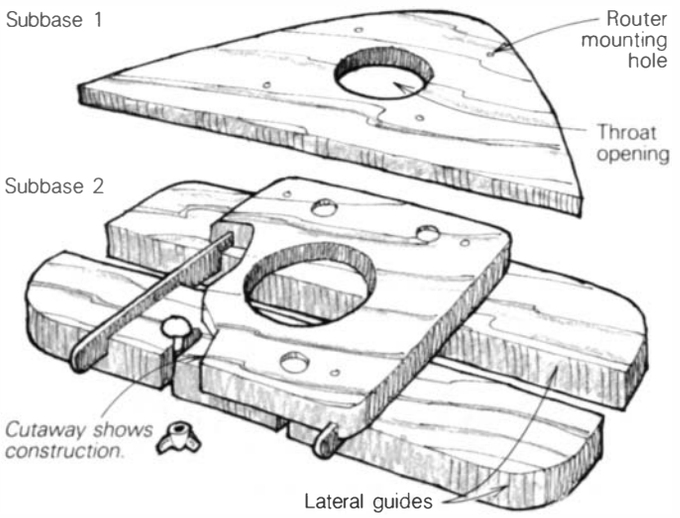
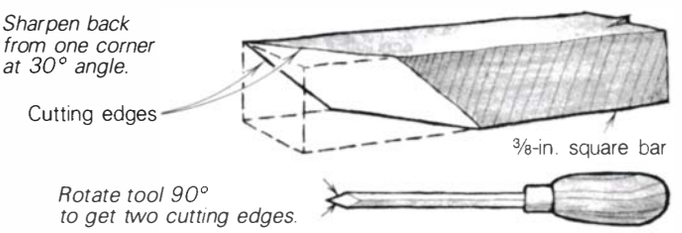


or hardwood plywood. Mounted to the router in place of the regular base, the straight side of the subbase allows uniform fence pressure for rabbeting and positive control even after the bit has left the workpiece. I curved the other two sides to avoid confusion about which side of the triangle was indexed to the bit.

Subbase No. 2 sits saddle-like atop narrow-dimension stock. The lateral guides are completely adjustable to various stock and groove locations. A simple system of slots with slides ensures rigidity and perpendicularity during use. Hefty ⅜-in. carriage bolts and wing nuts make tightening easy and positive. The lateral guides eliminate plunge kickout and balance problems. *—Bernard Maas, Cambridge Springs, Pa.*

Tool for scraping beads

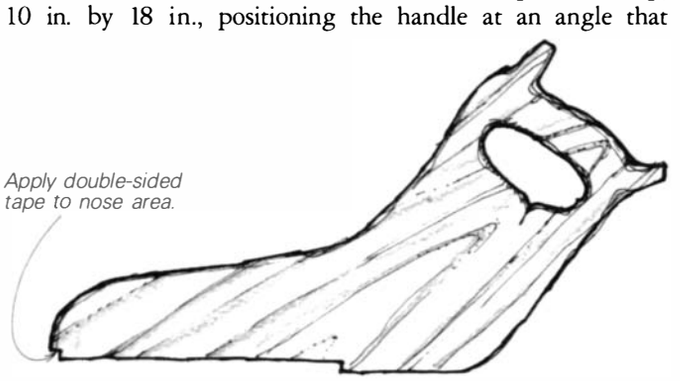


This homemade lathe tool is handy for making scraping cuts on beads. Start with a ⅜-in. square bar of tool steel and grind a 30° bevel from one corner back, as shown above. By rotating the chisel 90°, you get two angled cutting edges, one for each side of a bead. *—James F. Dupler, Jamestown, N.Y.*

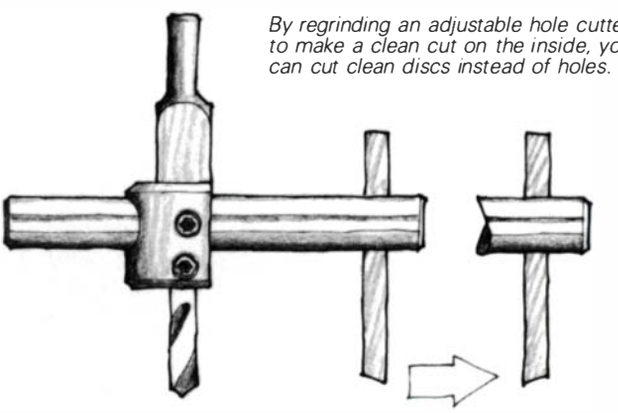
Improved tablesaw push stick

The notched push sticks used in many shops seemed unsafe and unwieldy to me. So I designed a push stick that lets me concentrate on sawing boards instead of fingers. First I traced the handle from a comfortable handsaw onto a piece of scrap, 10 in. by 18 in., positioning the handle at an angle that keeps my fingers away from a fully raised blade. I made a notch and ended it well ahead of the heel. This positioning contributes to the push stick's safety: if you carelessly lower your hand, the end of the stick will bottom out on the saw table, pivoting the notch up and releasing its grip on the end of the board. It will still hold the work, but it's a reminder that you're courting trouble. Two push sticks are better than one. With a second small notch at the end of both, either can be used to hold stock against the rip fence while you push with the other. I applied non-stick stair tape to the end notch to improve the grip on the work.

—David L. Wiseley, Waters, Mich.



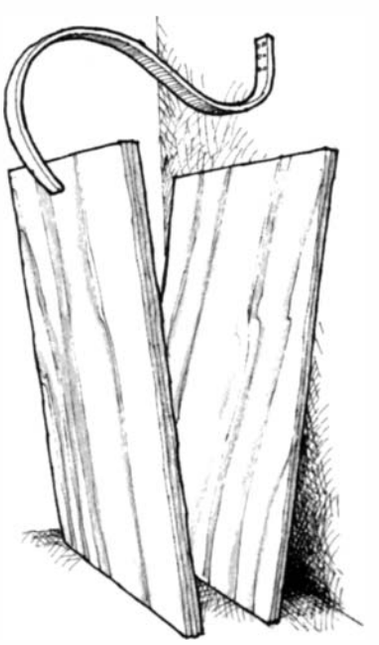
Reground hole cutter



By regrinding an adjustable hole cutter to make a clean cut on the inside, you can cut clean discs instead of holes.

You can use an adjustable hole cutter and a drill press to make smooth toy wheels and small wooden discs. Simply regrind the cutter so that its inboard side enters the material first. Regrind the tip slowly on a bench grinder, pausing frequently to dip the metal in water so that it doesn't overheat. Be sure to maintain the proper front-to-back bevel on the cutter. *—Bob Raiselis, White River Junction, Vt.*

Laminated plywood storage bracket



To store plywood in our new shop, we built a laminated bracket that doesn't take up floor space, and is a pleasure to look at besides. The curve, which is sized to hold 34 in. of material, was drawn full-size on brown paper. To make the 6-in. wide laminations, two ash planks, 2 in. thick by 12 ft. long, were resawn on the bandsaw. To achieve the final 1-in. thickness required ten strips, planed to about 1/10 in. thick. We bent and clamped the laminations directly over the drawing, with no clamping form except for a short fence that ensured that the part to be screwed to the wall would be straight. Using rollers, we coated each lamination with plastic resin glue. Next, three of us clamped the laminated stock first to the fence, then every 3 in. along the lines of the drawing, using 54 clamps in all. The laminations easily aligned to the curve.

One final and important note: Our choice of ash, a long-

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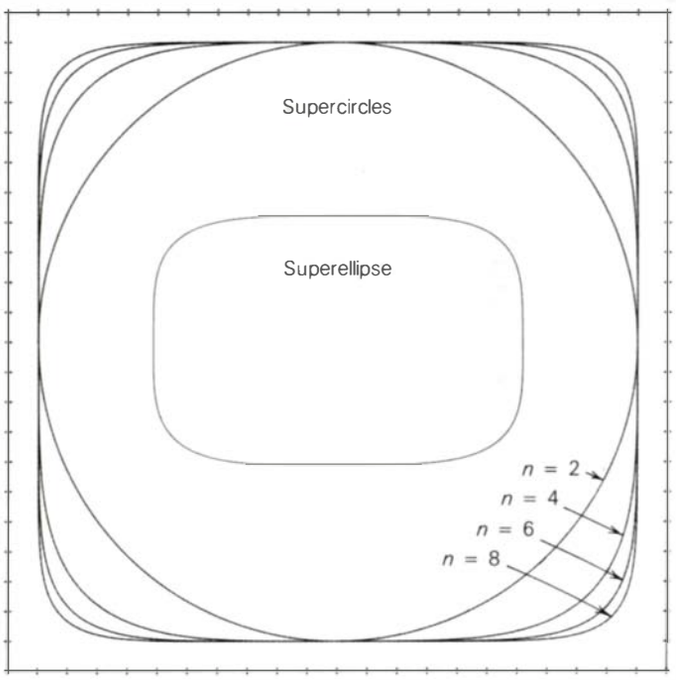
fiber, springy hardwood, came from experience. On our first attempt we used hemlock, which failed when it was loaded up with plywood. The break was fast, noisy and spectacular!
—John Grew-Sheridan, San Francisco, Calif.

Superellipse



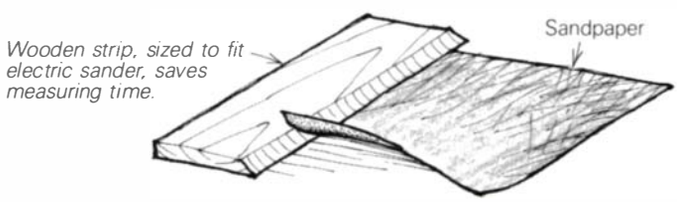
The superellipse is a contemporary classic curve of unusual grace used on some Scandinavian tabletops. Its simple geometric derivation enhances its aesthetic appeal. The superellipse has the equation:

$$(x/A)^n + (y/B)^n = 1$$

A is half the width and B is half the length of the superellipse; n is a constant of 2, 4, 6, 8, etc. If n is 2, the equation produces a standard ellipse or a circle (if A equals B). As you increase n, the superellipse tends to become rectangular, yet there are no straight segments. Thus you can mathematically generate intermediate shapes between an ellipse and a rectangle by choosing an appropriate value for n.

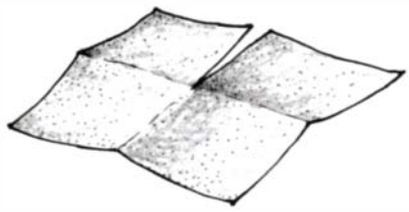
The easiest way to apply supercircles and superellipses to an actual tabletop is by the squares method. Use the grid marks on the drawing to divide it into a number of squares. Mark the length and width of the tabletop with the same number of divisions, which will form a grid of rectangles. When you copy the supercircle to the rectangular grid, it will stretch the supercircle into a scaled superellipse.
—James Potzick, Potomac, Md.

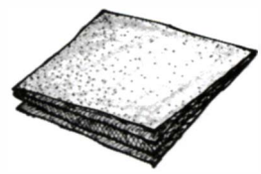
Sandpaper sizer



Everybody may know this one already, but you don't need scissors and a ruler to cut up sandpaper to fit your electric sander—just make a sharp-edged wooden strip the size of your sander's paper, place it on the sandpaper, and tear the sheet to size. *—Harry D. Stumpf, West Point, N.Y.*

How to fold sandpaper

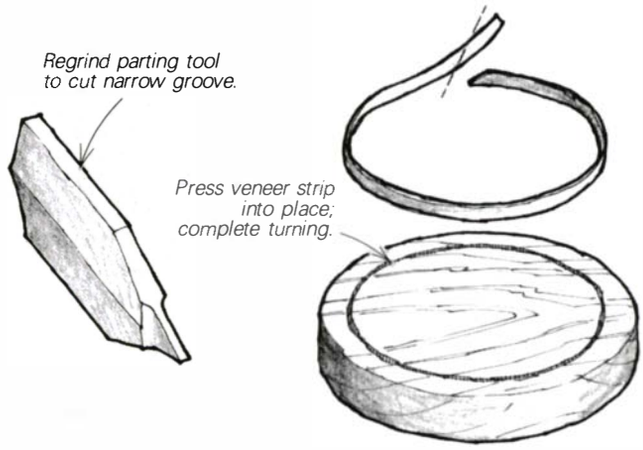




An old paint salesman showed me how to get the most out of a sheet of sandpaper. Fold the sheet in half in both directions. Then tear the sheet halfway through on the short fold line. Now fold the sandpaper up into a four-layer sanding pad. The sheet can be refolded different ways to expose a fresh surface. None of the sanding surfaces rub against each other, which results in a longer-lasting sanding pad.
—Steve Chastain, Bellingham, Wash.

Inlaying veneer in turnings

I use a simple method of inlaying veneer to enhance bowls, jars, lamps and other turned work. This method works for both faceplate and between-center turnings. As shown in the sketch below, start by regrinding an old parting tool or the hardened tang of an old file. Grind the width of the point to the thickness of your veneer, and lengthen the top bevel so that the tool won't bind. Now use the tool to cut a groove ⅛ in. deep where you want to put the veneer.



With a straightedge and an X-acto knife, cut a strip of veneer slightly more than ⅛ in. wide and longer than the circumference of the groove. Bevel one end of the strip and soak it in hot water until it's pliable enough to bend around the entire groove. Place the toe of the bevel in the groove and press in the veneer with your fingers. If the water swells the veneer so that it doesn't fit the groove, enlarge the groove slightly with your parting tool. To complete the fitting of the veneer, cut a reverse bevel so that the ends overlap exactly.

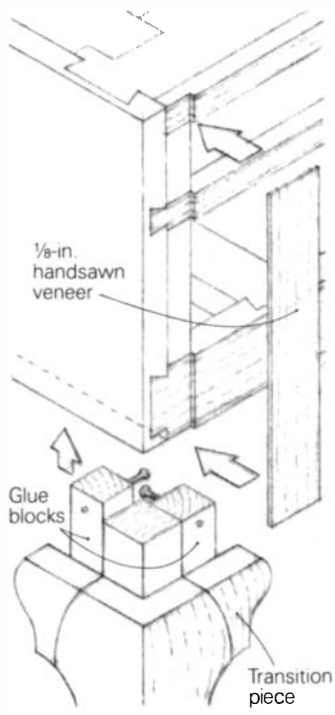
Once the veneer is in place, let it dry, then sand or turn it flush with the surface. A coat of shellac or lacquer will cement the veneer into the groove. If your pattern calls for multiple inlaid rings near each other, install the first strip before you cut the groove for the next strip. Otherwise, the wood between the grooves will tear out. *—Bill Vick, Richmond, Va.*

Methods of Work buys readers' tips, jigs and tricks. Send details, sketches (we'll redraw them) and photos to Methods, Fine Woodworking, *Box 355, Newtown, Conn. 06470.*

Detachable highboy legs—*I want to reproduce a highboy made in Newport, R.I., circa 1760, but I can't figure out how the cabriole legs were mounted. On this piece, the legs are detachable. I can't inspect the original, and would appreciate any help on this construction technique.*

—Robert T. Granger, Mustang, Okla.

PHILIP C. LOWE REPLIES: Detachable legs were probably used so that a piece could knock down easily for shipping. When the highboy was delivered to its owner, the legs were attached with glue and screws.



The legs are rabbeted at the top where the knee meets the case. For the front legs, the rabbet across the front of the leg is as thick as the apron; the rabbet across the side is as thick as the case end. For the rear legs, it's the case end and back that determine the rabbet edges. Glue blocks are attached to the legs after rabbeting, then the transition pieces are glued on, shaped and carved.

To give the illusion of a stronger leg-post construction (*FWW* #42, pp. 32-39), a piece of ⅛-in. thick veneer is glued in the rabbet cut in the front of the case, to cover the joinery.

[Philip C. Lowe is a cabinetmaker and an instructor at the North Bennet Street Industrial School in Boston, Mass.]

Combining reactive and solvent-release finishes—*I've worked in shops that use shellac as a sealer under alkyd varnish. It seems to work well, but all my research suggests that reactive finishes like varnish shouldn't be used over solvent-release finishes, and vice versa. What's the deal?*

—Jon Brandon, Amissville, Va.

DON NEWELL REPLIES: Shellac is a solvent-release finish, which means that when its alcohol solvent evaporates, it leaves behind a glossy, solid film that remains resoluble in alcohol. A second coat partially dissolves the first, resulting in a strong bond between consecutive coats.

A reactive or polymerizing finish like varnish reacts with oxygen and forms a strong cross-linked chain of molecules which, once dry, is no longer soluble in the original solvent. With reactive finishes, the second coat doesn't dissolve the first coat but adheres via a mechanical bond. Also, because there's no alcohol or other strong solvent, reactive finishes won't soften a base coat of solvent-release finish.

Varnish works well over a thin sealer coat of shellac or lacquer because the wood surface still has enough irregularities for the varnish to develop a mechanical bond. It won't adhere to a slick, heavy coating of shellac unless the surface is first roughened with sandpaper. Don't, however, apply lacquer over a varnish, because lacquer solvents will soften most varnish finishes.

[Don Newell is a former paint and varnish chemist who lives in Farmington, Mich.]

Gluing exotic woods—*I've been laminating African and Indian rosewood, ebony, and cordia with yellow glue, and the joints don't hold. Ebony-to-ebony seems to be the worst. Any suggestions?* *—Glenn Lessenden, Lawrence, Kans.*

R. BRUCE HOADLEY REPLIES: Rosewood and ebony are often difficult to glue, possibly because of the high resin and oil content of these woods. Surface contamination results when these resins and oils, called extractives, migrate onto surfaces exposed by machining.

Try gluing right after you machine the surfaces. If this isn't possible, give the wood a light sanding with 220-grit to 280-grit paper just before spreading the glue. Some people report good results from a quick sponge rinse with alcohol or acetone before gluing. You may also get better results with epoxy instead of yellow glue.

[R. Bruce Hoadley is professor of wood technology at the University of Massachusetts at Amherst.]

Dashboard restoration—*I'm doing some restoration work on 1940s Jaguars and Bentleys, and I'd like to know what manufacturers used to glue and finish the veneered dashboards. This finish has to be glass-smooth, withstand extreme fluctuations in temperature and humidity, and protect the wood against ultraviolet light.*

—Richard W. Morton, Redwood City, Calif.

DONALD STEINERT REPLIES: In the 1940s, hot hide glue was used to attach the veneers (*FWW* #10, pp. 52-54). A modern alternative is hot-melt glue sheets (available from Bob Morgan Woodworking Supplies, 1123 Bardstown Rd., Louisville, Ky. 40204), which are heated with a household iron. Don't use contact cements for veneering.

The dashboard veneer was finished with either varnish or lacquer, neither of which is immune to the effects of temperature, humidity and ultraviolet rays. Even today, there is no clear finish that will stand up to the extremes a dashboard can experience. I refinish the woodwork in many $120,000 Rolls-Royces that are less than three years old!

In my restoration work, I spray on a catalyzed polyester resin, but this is pretty toxic stuff, and tricky to work with because of its 20- to 40-min. pot life. You can use a varnish product such as McCloskey's Bar Top Varnish, or a bar-top lacquer. Both require many light coats, followed by wet-sanding with very fine-grit wet-or-dry paper. Finish up with rubbing compound. If you follow the procedure in George Morris' article on lacquer finishes (*FWW* #31, pp. 90-94), you'll get good results.

[Donald Steinert restores Rolls-Royce automobile woodwork in Grants Pass, Ore. He wrote about piano finishing in *FWW* #44.]

Harpsichord-soundboard finish—*In* FWW *#10, pp. 27-28, George Frank recommended shellac as a finish for harpsichord soundboards. I've examined old piano soundboards with shellac finishes that have become crumbly and dry. Is there an alternative finish that would be more durable?*

—Oliver Finney, Lawrence, Kans.

MICHAEL DRESDNER REPLIES: Although shellac could be used as a finish for a harpsichord soundboard, it would be neither the best choice nor the one most likely to have been used by the old builders. They used a sealer called glair (also called *vernice bianca,* or white varnish), which was made from egg whites, gum arabic, water, honey (for elasticity) and sometimes sugar. This formed a very thin, hard, transparent coating that hugged the wood tenaciously. Glair also provided an excellent base for the tempera paints that were used to decorate some harpsichord soundboards.

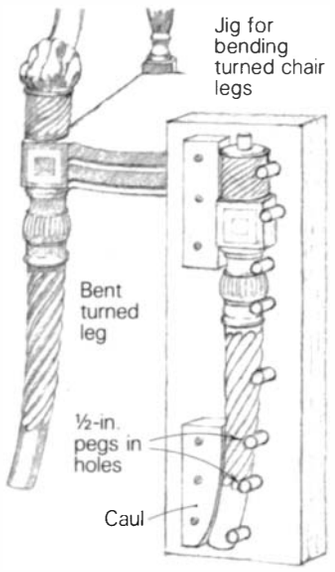
Here's a typical recipe: Beat egg whites and collect the clear liquid that settles to the bottom. Dissolve 10 grams of

Drawings: Ken Daniel

gum arabic (available from art supply stores) in 40 cc of water, and add 20 cc of egg-white liquid and a gram of honey. [Michael Dresdner has a musical-instrument repair shop in Red Bank, N.J.]

Making period legs—*The turned front legs on some late-Sheraton chairs and the square tapered legs on some Hepplewhite tables are bent at the bottom. What's the best way to make these legs? —Kenneth Glover, Mt. Pleasant, S.C.*

CARLYLE LYNCH REPLIES: The best way to make the round Sheraton chair legs is to bend them after turning and reeding. Bending isn't difficult, especially when the legs are turned from green stock riven from the log. Because there is no grain runout, riven wood is less liable to break while bending.



Make a bending form from a piece of 2x6 with two cauls to form the curve, and holes and pegs to wedge the leg to the cauls. Make the cauls with a radius slightly smaller than the one desired, as the leg will spring back when removed from the form.

Steam the leg until it's pliable (*FWW* #8, pp. 40-45), then place it on the bending jig, put in the first peg, and test the wood's pliancy. A piece that's ready for bending will be soft and yielding. If the leg is hard to bend, steam it a little longer. Bend the leg around the form, put in all the pegs, and let the piece dry for a few days.

Cut the curve in the square, tapered Hepplewhite table legs on the bandsaw. You'll need two patterns: one for the sides, and one for the front and back.

[Carlyle Lynch, of Broadway, Va., is a retired furnituremaker.]

Non-allergenic floor finish—*Is there a non-allergenic finish with no petroleum distillates suitable for refinishing an oak floor? Would pure tung oil be durable enough? —Evan Fales, West Branch, Iowa*

DON NEWELL REPLIES: Shellac contains no petroleum distillates and would be a durable floor finish.

Apply two thin coats, scuff-sanding between coats to remove whiskers. You'll get maximum durability if the shellac penetrates the wood rather than builds up on top of it.

In my view, tung oil would not be suitable. While it is extremely durable and resistant to liquids, it is probably not as wear-resistant as you need. Also, pure tung oil dries flat—another reason I wouldn't choose it for finishing a floor.

[Don Newell is a former paint and varnish chemist who lives in Farmington, Mich.]

Defunct tool companies—*My husband recently purchased an 8-in. tilting-table saw. It's marked Delta "Grey Line," and was made in Milwaukee, Wis. It came with lots of accessories, but there's no instruction manual, so we can't figure out how to use them. Do you have any information on this company? —Jean M. Yberg, North Merrick, N.Y.*

D.E. FLEDDERJOHN REPLIES: The Delta Manufacturing Company of Milwaukee (formerly the Delta Specialty Company) was started during the early years of the Great Depression, and their first product was a simple jigsaw. The company was purchased in 1945 by Rockwell International, and the Delta name is still used on some of Rockwell's machinery.

Rockwell International has purchased many other woodworking-machine companies since 1945: Walker-Turner, Crescent, Porter-Cable, and Invicta, to name a few.

In addition to Rockwell and Delta machines, parts and accessories for the following brand names may be available, depending on the age of the machine, from Rockwell International, PO Box 18617, Memphis, Tenn. 38118 (contact their customer-service department):

Delta/Milwaukee, EFI, Handi-Shop, Invicta, Multi-Drill, Qualters & Smith (Q&S), Tauco, and Yates-American (18-in. planer only).

For parts and accessories for the following brands, write to the address shown:

Beaver—Rockwell International of Canada, Ltd., 40 Wellington St., PO Box 848, Guelph, Ont. N1H 6M7.

Buckeye—Rockwell International, Power Tool Division, 3050 S. Kettering Blvd., Dayton, Ohio 45435.

Commander—Rockwell International, PO Box 1765, Columbia, S.C. 29202.

Porter-Cable—Porter-Cable Corp., Youngs Crossing at Highway 45, PO Box 2468, Jackson, Tenn. 38301.

Precise—Precise Corporation, 3700 Blue River Rd., Racine, Wis. 60617.

[D.E. Fledderjohn is product specialist with the Power Tool Division of Rockwell International.]

Tablesaw-blade runout—*The blade runout on my Sears 10-in. tablesaw seems excessive. With a dial indicator, I measure runout of 0.011 in. I've tried a new blade, with no improvement, and when I rotate the blade on the arbor I still get 0.011 in. at the same point with respect to the arbor. Is this arbor defective, or is this just sloppy machining? What are the standards for runout on these saws? —Michael Murray, Xenia, Ohio*

RICHARD PREISS REPLIES: I, too, would become suspect if my saw had an 0.011-in. blade runout, but the manufacturer of your Sears tablesaw, Emerson Electric Co., considers runout of as much as 0.015 in. to be "normal and within our production standards."

Part of the problem is that there are no industry-wide standards for woodworking-machine production, either in this country or abroad. It seems that the consumer market, by its acceptance or rejection of the product, determines whether a manufacturer's standards are "close enough."

[Richard Preiss runs the woodworking shop at the University of North Carolina at Charlotte.]

Airbrush finish repair—*I have a mahogany-veneered card table with a ⅛-in. wide split across the top in both the veneer and the core board. The finish looks like gloss varnish. I repaired the split and sanded with wet 400-grit paper, but this dulled a strip of varnish on each side of the repair. How can I restore the finish without redoing the whole top? —Malcolm Garrett, Steelton, Pa.*

GEORGE FRANK REPLIES: You need some fast-drying gloss varnish, thinner, and an artists' airbrush. A mouth-sprayer (available at art supply stores) is a less expensive alternative to the airbrush, and I've had good results with one.

Spray a light coat of thinned varnish on the strip and allow it to dry. A little varnish will spray over and build up on the old finish. When this is dry, gently level the overspray with very fine sandpaper. When you've built up enough varnish in the repair area (from 5 to 15 very thin coats), and it's dry,

rub with a damp rag and pumice, then switch to rottenstone. [George Frank is a master European wood finisher, now retired.]

Powdery fungus—*I have a problem with some rough-cut white oak. In certain places, such as the corner of the plank, it disintegrates into a fine powder. I can't find any insects, worms or holes. What could cause this problem, and how can I treat it? —Charles R. Reints, Rochelle, Ill.*

R. BRUCE HOADLEY REPLIES: It sounds like your boards were cut from trees that were dead before they were felled, or remained in the log for a long time before being sawn. Fungus developed in the sapwood, and when the lumber dried, the decayed wood became powdery. Although white-oak heartwood is highly resistant to decay, the sapwood has virtually no fungal resistance.

As long as the wood is dried below 18% to 20% moisture content, the fungus won't spread, but you'll have to cut off the deteriorated sapwood before using the boards.

[R. Bruce Hoadley is professor of wood technology at the University of Massachusetts at Amherst.]

Follow-up:

With all due respect to my good friend Tom Miller, owner of Winchester Carbide Saw, I'd like to get in on this sawblade discussion (*FWW* #43, p. 14). Tom made the statement, "Only the better-quality blades are hand-tensioned in the first place." He's absolutely correct, but he didn't go far enough.

Hand-tensioning, properly done, is an art. And there are very few fellows left who can actually hammer-tension to achieve a minimum of runout at a certain RPM. But hammer-tensioning, at best, can't be consistent, and can't produce two blades that perform exactly the same at a given RPM.

Here at Forrest Mfg. Co. we have a process that eliminates the runout that hammer-tensioning can't, at any RPM. The plates for our blades are purchased thicker than final dimension. The supplier has roll-tensioned each plate, and the plate is "warped" or bellied like the bottom of an oil can. It is first ground perfectly flat, then ground to final thickness. The surface is checked with a straightedge, and any remaining undulations are pressed out. The result is runout of not more than 0.001 in. (with perfect arbor and collars). A dampener (not a stiffener) should be installed with the blade to kill harmonics from outside sources (motor, belts, etc.), so the blade will run true from 1 RPM to 6500 RPM.

—Wallace M. Kunkel ("Mr. Sawdust"), marketing consultant for Forrest Mfg. Co.

Sources of supply:

—Reproduction 18th-century sheet glass is available from Blenko Glass Company, Inc., Milton, W.Va. 25541.

—Replacement parts for old Stanley planes are available from Sterling Woodcraft, Box 335A, RD 3, Highland, N.Y. 12528.

Readers can't find:

. . . flexible metal tubing for gooseneck lamps.
—Russell Pals, Ft. Bragg, Calif.

. . . springs for a child's platform rocker.
—Norman Metcalf, Princeton, Minn.

. . . plans for a marimba. *—C. Burchard, Ashland, Okla.*

Send queries, comments and sources of supply to Q & A, Fine Woodworking, *Box 355, Newtown, Conn. 06470.*

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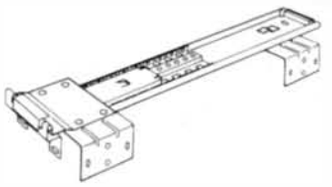
C1313 Flipper Door Slides

Most often used for horizontal and lateral files, horizontal doors and vertical single and double door cabinet applications. The C1313 is designed for use with doors of 3/4" thickness, available unhanded in 11", 14", 18", and 24" lengths. Two flipper door slides, with two mounting bayonet brackets per slide, are usually required for each door application.

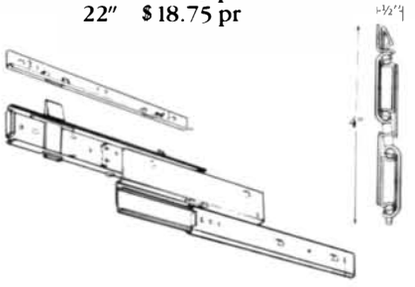
11" $16.30 pr
14" $16.80 pr
18" $17.80 pr
24" $19.50 pr



C4017 Full Extension

For full extension use — a heavy duty side mount right or left handed slide with an additional 1 1/2" extension — often used where case top overhang requires slide over-travel for ease in removing files. Functions smoothly in 1/2" minimum slide space and carries loads up to 110 pounds. Available in both zinc and black plated finishes. Add 10% to these prices for black plated finish.

12" $15.18 pr
14" $15.54 pr
16" $16.22 pr
18" $16.95 pr
20" $17.83 pr
22" $18.75 pr



C2037-A Three-Quarter Extension

For desk and credenza box drawer applications. This is the precision three-quarter extension slide — light duty, side mount — featuring new super silent polymer ball bearings. C2037A is unhanded and easy to install. It is designed to function smoothly in 1/2" minimum slide space and to carry up to 50 pounds. Available in both zinc and black plated finishes — add 10% to these prices for black plated finish.

14" $ 9.70 pr
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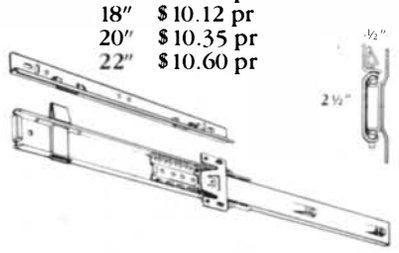
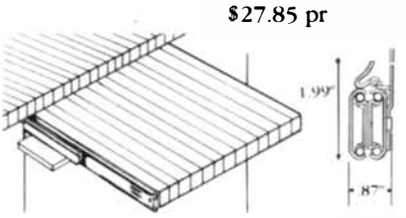
18" $10.12 pr
20" $10.35 pr
22" $10.60 pr



C340-176 Butcher Block

Used in kitchens for cutting boards. Available in 22" length, full extension. Locks into extended position for a non-moving work surface.

$27.85 pr



C2002–22" Two-Way Travel

Offers the popular feature of both front and back travel for access to drawers from either side of cabinet unit. Mounting tabs are formed out of the drawer member for simple drawer mounting or removal. The slide is provided with 3/4" extension, requires 3/8" slide space and is rated up to 65 pounds load capacity.

$18.50 pr

C1029 Center Mount

A precision three-quarter extension slide. Mounts to existing drawer bottoms and cabinet frames. No adjustments are necessary. This slide is center-mounted so the available side space between drawer and cabinet plays no part in installation. It eliminates wooden guides, supporting members and brackets. You're assured precision smooth drawer movement.

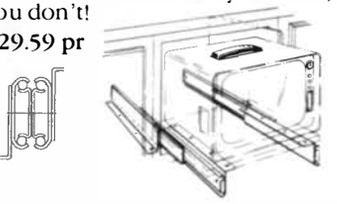
#12 $4.10 ea
#14 $4.10 ea
#16 $4.16 ea
#18 $4.37 ea
#20 $4.54 ea
#22 $4.79 ea
#24 $5.06 ea
#26 $5.40 ea

Slide Number	Fits Drawer Lengths	Fits Cabinet Depths	Drawer Extension
12	10⅝" – 12½"	13" – 14½"	8½"
14	12⅝" – 14½"	15" – 16½"	10½"
16	14⅝" – 16½"	17" – 18½"	12"
18	16⅝" – 18½"	19" – 20½"	12½"
20	18⅝" – 20½"	21" – 22½"	14½"
22	20⅝" – 22½"	23" – 24½"	16½"
24	22⅝" – 24½"	25" – 26½"	17½"
26	24⅝" – 26½"	27" – 28½"	19½"

301-1590 TV Shelf Slide

Heavy duty, holds up to 120 lbs per pair. Positive stop at full extension — which is 3/4" more than length. Easily used with swivel base. Now you see it, now you don't!

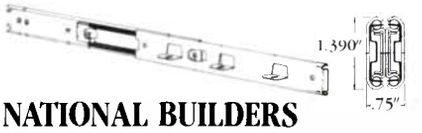
16" $29.59 pr



C-322 Pull-Out Shelf Slide

Designed for heavy duty shelf and drawer applications. Features full extension, rated up to 120 pounds load capacity. Noise abatement felt pads included. Mounting tabs are formed out of the drawer member for simple mounting or removal. Minimum side space required is 3/4".

10"	$19.64 pr	20"	$23.35 pr
12"	$19.80 pr	22"	$24.19 pr
14"	$20.45 pr	24"	$25.07 pr
16"	$21.59 pr	26"	$26.44 pr
18"	$22.81 pr	28"	$27.49 pr



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Books

In Harmony With Wood by Christian Becksvoort. *Van Nostrand Reinhold Company, 135 West 50 St., New York, N.Y. 10020, 1983. $22.50, hardcover; 134 pp.*

The woodstove boom has greatly increased the number of amateur lumberjacks around, and this book may tempt a lot of them to use our timber resources for something other than burning—the author points out that $30 worth of firewood may be $300 worth of lumber. The heart of the book is 60 pages on the identification and working characteristics of native American woods, including many fine trees and timbers neglected by commercial loggers. Peripheral chapters discuss wood technology, timber management, harvesting, drying and joinery. The text is fast-reading and necessarily a little sketchy, but it certainly whets the appetite. Becksvoort includes technical charts adapted from numerous sources, and provides an excellent bibliography. *—Jim Cummins*

Wooden Puzzles and Games by Kenneth Wells. *Sterling Publishing Co., Two Park Ave., New York, N.Y. 10016, 1983. $7.95, paperback; 142 pp.*

A puzzle or game made from wood is twice as enticing as one made from plastic or metal. Placed strategically on a coffee table, an attractive wooden puzzle will invite all but the most unobservant, soon snaring them in a mind-boggling conundrum.

You'll find real puzzles in this British book. The first is a sliding-letter teaser where the words "black" and "white" change places—the solution requires at least 160 moves. Other puzzles are even harder to beat (the author gives solutions). Although the 21 projects are fashioned from exotic hardwoods, their small size should keep costs down, and most can be made with hand tools.

I found the directions for some of the more intricate projects hazy, though, and the photos didn't help to explain the complexities. The space devoted to pictures of such things as a chisel paring could have been put to better use. I liked the cube sanding jig and miter planing board at the beginning of the book, but the section on hand tools and finishes could have been done away with. Nevertheless, Wells provides fresh and fun territory to explore. *—Roy Berendsohn*

Basic Whittling and Woodcarving by E.J. Tangerman. *Sterling Publishing Co., Inc., Two Park Ave., New York, N.Y. 10016, 1983. $6.95, paperback; 128 pp.*

E.J. Tangerman probably has done as much as any single person to popularize woodcarving as a hobby. His new book (he's written at least six others) is aimed at beginners. It reads well, and it tells you what you need to know to get started. Projects and patterns are mostly very simple, just right for practicing basic techniques, but the photos are murky. There are, however, magnificent examples of folk carvings from other cultures. *—J.C.*

Decoys, The Art of the Wooden Bird by Richard LeMaster. *Contemporary Books, Inc., 180 North Michigan Ave., Chicago, Ill. 60601, 1982. $22.50, hardcover; 156 pp.*

In his earlier book, *Wildlife in Wood,* Richard LeMaster concentrated on the art of observation. His goal at the time was to make his carvings as close to the living model as possible. He even showed photos of duck body language, the postures that indicate whether a bird is alert and curious, or frightened, or musing. He zealously condemned all decoys that didn't look exactly like living ducks.

In his new book, LeMaster has grown beyond perfectionism. He says that his criticisms of the old-timers were wrong, made out of ignorance, of not knowing the whole story. He is now conscious of an art in decoys, rather than just a science.

His new book lacks the strident tone of the first and is very different from it. It contains much more practical carving. The first pattern is a miniature, a simplified generic duck painted as a mallard. His step-by-step procedures, with one large drawing to a page, can help anybody turn a wooden block into a sort of wooden bird. Tools? A bandsaw would help at the start, but you can get by without one. LeMaster apparently roughs out with a drawknife and gouges, but the steps show an X-acto knife instead, and because it has replaceable blades you don't even have to know how to sharpen. He shows how to tame three-dimensions with a series of templates and index lines scribed on the work. The process is straightforward and methodical, and there is plenty of good advice about how to avoid mistakes. The most important things, such as exactly where to put the eye, are handled in great detail.

In addition, LeMaster, after his many years of painstaking observation, has arrived at a set of general rules and proportions that guarantee you a pretty good duck every time—by concentrating on each detail separately, complexity becomes simplicity. The chapters on painting explicate color relationships as well as any I've ever seen. The book is a fast read, and it makes me itch to get out and carve, which the first book didn't. But the first book is still required reading for its inspirational fervor, and for its concentration on the birds themselves. *—J.C.*

Wooden Planes in 19th-Century America, Vol. II: Planemaking by the Chapins at Union Factory, 1826-1929, by Kenneth D. Roberts. *Ken Roberts Publishing Co., Box 151, Fitzwilliam, N.H. 03447, 1983. $55.00, hardcover; 452 pp.*

Several years ago I had the opportunity to examine an incredibly extensive collection of wooden planes, all manufactured by the Chapin factory of Pine Meadow, New Hartford, Conn. Ken Roberts, a collector and prolific publisher of books and trade journals relating to old woodworking tools, was proud of the assemblage, and he has now completed a volume of material related to this collection.

Wooden Planes, Vol. II, is an exhaustive study of the 19th-century planemaking industry as viewed through the historical documents, contracts, inventories, business agreements, trade catalogs, patents and photographs of the Chapin firm. This vast assemblage of original material is being preserved by the Connecticut Historical Society, and is here presented by Roberts in a chronological narrative of the inception, prosperity and fall of a giant in the industry. Seldom are such documents assembled in so straightforward a manner as to give us as vivid a picture of the way it was.

Chapter III, "Making Wooden Planes," is not directly related to the Chapin theme, but fills a void that otherwise would have existed, as the Chapin materials lack hands-on planemaking information. Ed Ingraham, III, himself a proficient contemporary planemaker, adds greatly to the chapter by sharing his craft unselfishly. Photographs of some of the processes in making both bench and molding planes invite the reader to give it a try. Missing, however, is sufficient information on the treatment of plane irons, i.e., tempering, annealing and shaping. Included in the chapter appendix is a reprint of an original article on planemaking, "Practical Plane Making," by W.J. Armour, taken from an 1898 trade journal. This is the only original material I have ever seen on the

trade, and its addition enhances the value of this section of the book as it relates to the woodworker.

This is not a pretty picture book. The 16 color plates are well done, but will not in themselves excite you to purchase. There are many other interesting photos, mainly of the Chapin collection, which provide direct visual reference supporting the text, though making this correlation can be confusing. Roberts edits and publishes his own material, and thus the book lacks the sort of polish a large publishing house can apply. But as the purpose is to present historical information, which the book does well, its homemade character can easily be forgiven.

There is a movement among tool enthusiasts to research and catalog their artifacts, and collectors will undoubtedly find Roberts' book invaluable. Woodworkers in general, however, will find little useful information here. But to those who have a side interest in collecting wooden planes, I can recommend this volume highly. And if you want to have a go at making your own planes, you will not find a more thorough treatise elsewhere. *—Norman Vandal*

Classic Rods and Rodmakers by Martin J. Keane. *Classic Publishing Co., Box 888, Stockbridge, Mass. 01262, 1976, reprinted 1983 (1,000 copies). $50, hardcover; 246 pp.*

Judging by the steady flow of mail we've received about Les Beitz's article in *FWW* #34, a lot of woodworkers have been enticed into making a split-bamboo fly rod. Martin Keane's book, which had been out of print, is back—and worth a look.

Keane is a dealer in used fly rods, specializing in the classic rods of the famous makers. He's also a fisherman, a collector himself, and an aficionado—expert and passionate about the legends and the lore. His book is filled with biographical data on the companies and individuals who satisfied changing tastes—and the demands of new fishing grounds—with ever more sophisticated and precise tools for casting a fly.

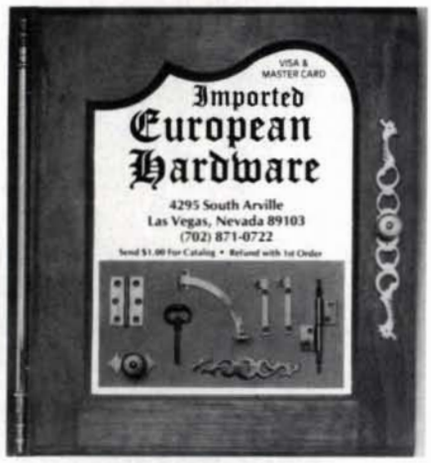
It's not a book aimed at a beginning maker, however, except as inspiration. There are no designs for rods, no sources, no hard data about why one rod works and another doesn't. Still, it's nice to know about these makers, and that the real drive behind each of them is an uncompromising will to produce outstanding work, regardless of tool limitations and any compromises by the competition.

New materials, graphite in particular, have bested bamboo's lightness-to-strength, but they can't match its woody charm. Tonkin cane, the best bamboo, is still available, although the supplier recently moved: Charles H. Demarest and Co. is now at Box 238, Bloomingdale, N.J. 07403, and $40 or so will get you started in rodmaking. *—J.C.*

How to Sharpen Anything by Don Geary. *Tab Books, Inc., Blue Ridge Summit, Pa. 17214, 1983. $12.95, paperback; 213 pp.*

This is a shoddy, halfhearted effort. If you want to indulge yourself in an evening of outrage, spring for the $12.95. Otherwise, steer clear—the book is oversimplified, incomplete and self-contradictory. *—J.C.*

Roy Berendsohn is a journalist and woodworker in Newtown, Conn. Norman Vandal makes period furniture in Roxbury, Vt. Jim Cummins is an associate editor of FWW.



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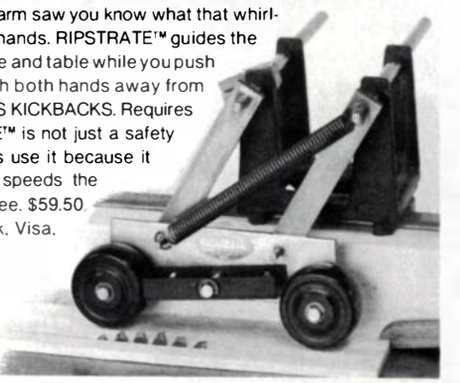

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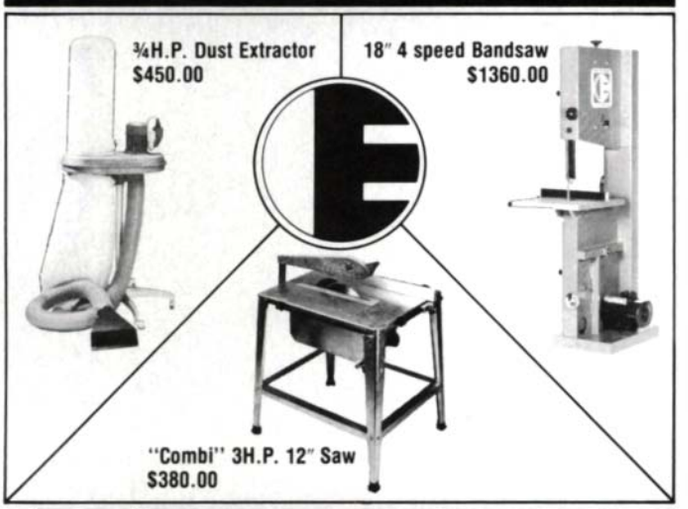

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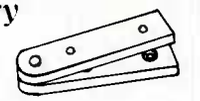

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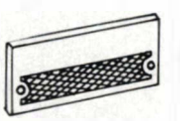

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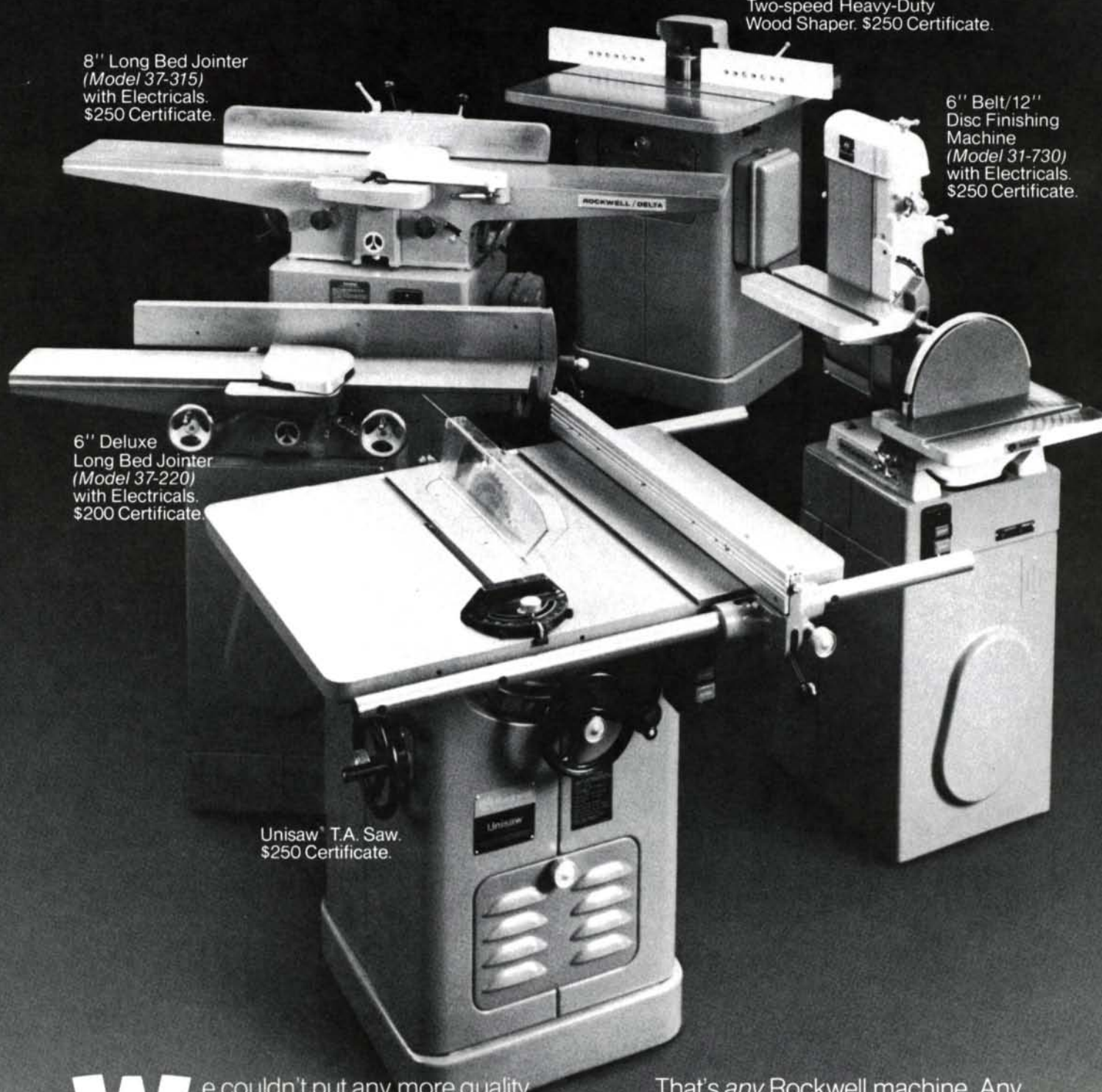

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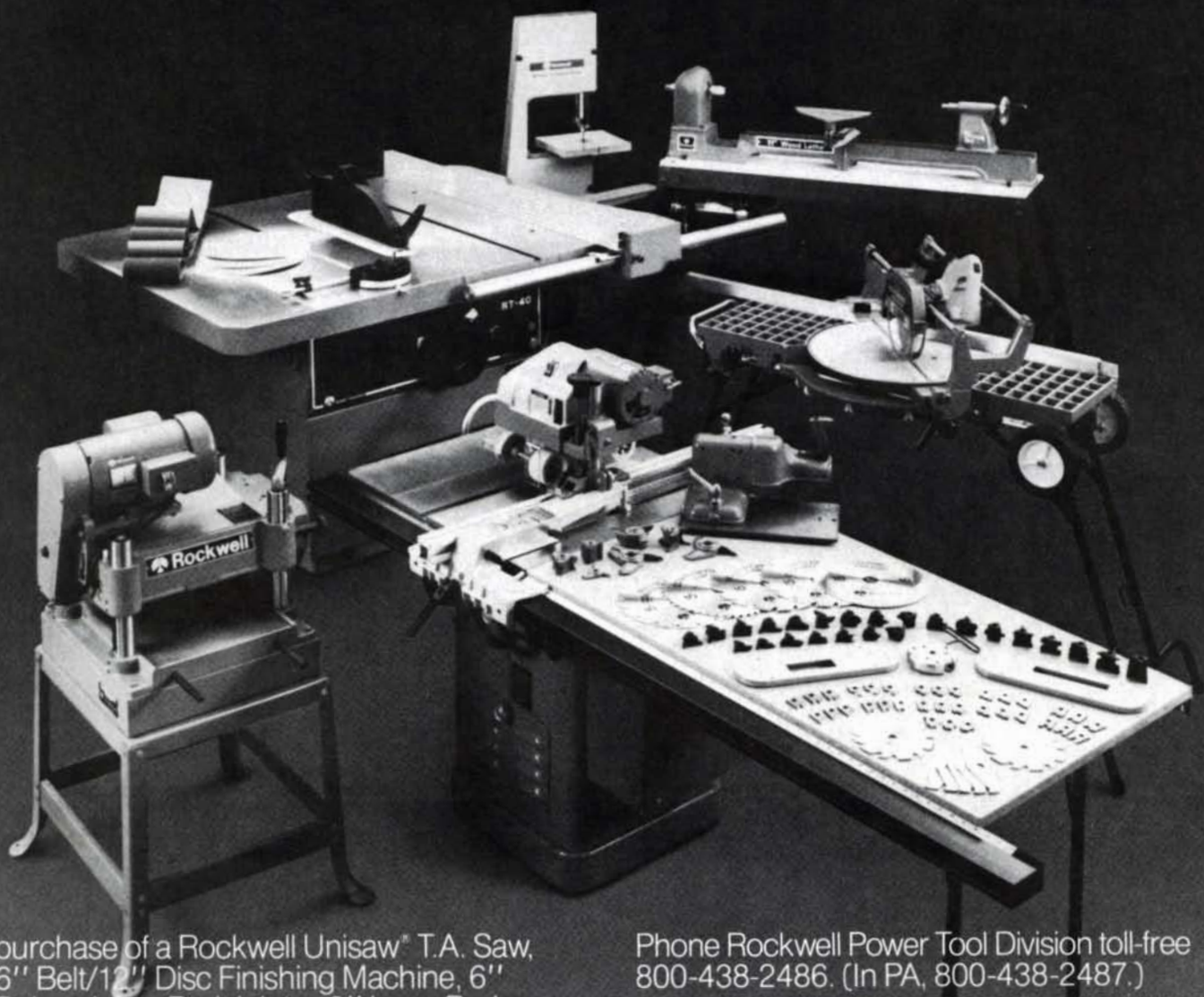

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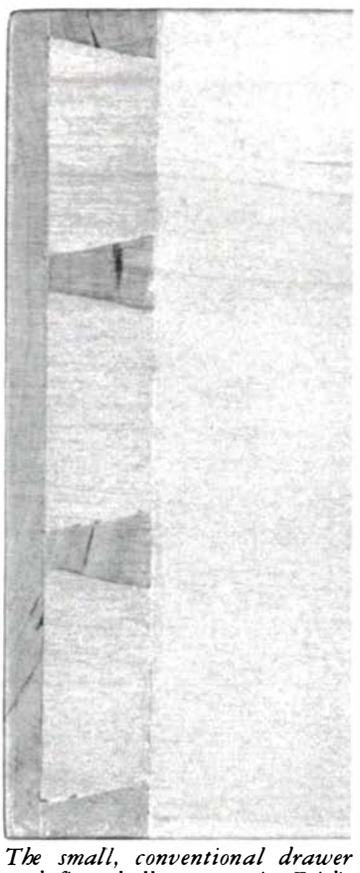


The small, conventional drawer and five shallow trays in Frid's compact, knockdown drawing table provide plenty of storage, and illustrate the basic drawermaking techniques that you can apply to any kind of furniture.

How to Make Drawers

Design for drawing table illustrates the principles

by Tage Frid

About twenty years ago, when I first started teaching at the Rhode Island School of Design, I was commissioned to make drawing tables for the school dormitories. The tables were to be plain and inexpensive, yet sturdy and able to withstand abuse. Because dormitory rooms are small, each table had to be space-efficient. This last requirement made the tables a good exercise in an important cabinetmaking skill—designing and building drawers.

When I design a piece with drawers, I first consider what will be put in them. This helps determine how I will build both the carcase (the body of the cabinet into which the drawers go) and the drawers, and of what materials. The overall size of the drawing table described in this article (see plans, p. 38), which is an improved version of the one I made twenty years ago, is based on standard sizes of drafting paper and parallel rulers. For storing big sheets of paper and finished drawings, I wanted an open compartment below the adjustable drawing surface. For odds and ends, I added a drawer to the right of the space where your knees go. For instruments, pencils and pens, I also included some shallow trays that slide in grooves milled inside the carcase.

Once I had decided on the drawer and trays, I worked out the construction details for the carcase. There are three basic ways to make a carcase that will contain drawers: with glued-up solid wood, or with a frame-and-panel system, or with cabinet-grade plywood. I used plywood for my drawing table because it's good for knockdown joinery, and because it's simple and fast to work with. Lately, though, I've been using more and more solid wood for my furniture because I can do more with it, such as shaping, carving and bending. Of course, solid wood shrinks and swells with the seasons, so you must account for this in your drawer-hanging. A frame-and-panel carcase, with a solid or plywood panel, isolates most of the wood movement, but it limits your shaping choices, and

Photos: Roger Birn; drawings: Lee Hov

complicates the joinery and drawer-hanging.

There are several ways to hang a drawer. When I was an apprentice in Denmark, I learned the method shown in figure 1, which is the one I used for the top drawer of my drawing table and in all of my best furniture. The drawer slides in and out of the carcase on two horizontal members called runners, which fit into grooves milled in the sides of the carcase. At the front of the carcase, the drawer rests on a stretcher or a rail, which also ties together the front edges of the carcase and provides a surface to which drawer stops can be glued. For a drawer to work correctly, it must have some sort of guide to keep it from tilting down when it is pulled out. This guide, which bears against the top edges of the drawer sides, is usually called a kicker. In a chest of drawers, the bottom edge of the runner above acts as a kicker. The top drawer usually kicks against the inside of the carcase top, but in some cases (my drawing table is one) you have to install a separate kicker because the carcase doesn't have a top, or because the top is too far above the drawer to act as a kicker.

This method, called bottom-hanging (figure 1A), is good for almost any kind of furniture, whether plywood or solid. The runners are very strong and will carry the weight of a drawer filled with heavy objects. If lubricated with paraffin and made of a hardwood, such as oak or maple, the runners (and drawer sides) will last a long time. The big disadvantage is that to work right, a bottom-hung drawer must fit snugly, making it liable to stick in humid weather.

A drawer can also slide on runners that ride in grooves in the drawer sides, as in figure 1B. You don't need stretchers and kickers for each drawer, but you do need to tie a big carcase together with at least one front rail in the middle to keep the sides from bowing outward. Side-hanging is best for small, light drawers, such as in writing desks and jewelry boxes. I wouldn't use it in a chest of drawers or a kitchen cabinet, though, because the sliding surfaces are small and they would wear out pretty fast.

Some people think that metal runners (figure 1C) are used only in cheap factory furniture, but for heavy drawers, such as a desk file drawer or a kitchen-cabinet flour bin, I prefer them. Good-quality metal ball-bearing runners will support a heavier drawer than wood will, and some kinds allow the drawer to be fully extended so you can get what's in the back without removing the drawer. These runners last forever, and they never stick, no matter what the weather. Always buy your runners—or any hardware, for that matter—before you make the piece. Some types of runners require a drawer that is 1 in. narrower than the carcase opening; others need 1½-in. clearance. Nothing is more frustrating than to build a piece, only to find that the hardware you want to use won't work.

Getting started—If you want drawers that fit well, you have to take your time and make an accurate carcase. My drawing table consists of a permanently joined plywood carcase which holds the drawer and trays. To this, I attached (with knock-down fasteners) the panels that form the sides, the back, the storage compartment, and the shelf under the drawing surface. A really fine carcase should be made about 1/32 in. wider at the back than at the front so that the drawer action won't stiffen up from increasing friction as the drawer is pushed in. There are a couple of ways to do this. If your carcase is solid wood, you can join it up square and hand-plane a few shavings off the thickness of the back inside third of each carcase

Fig. 1: Drawer-hanging methods

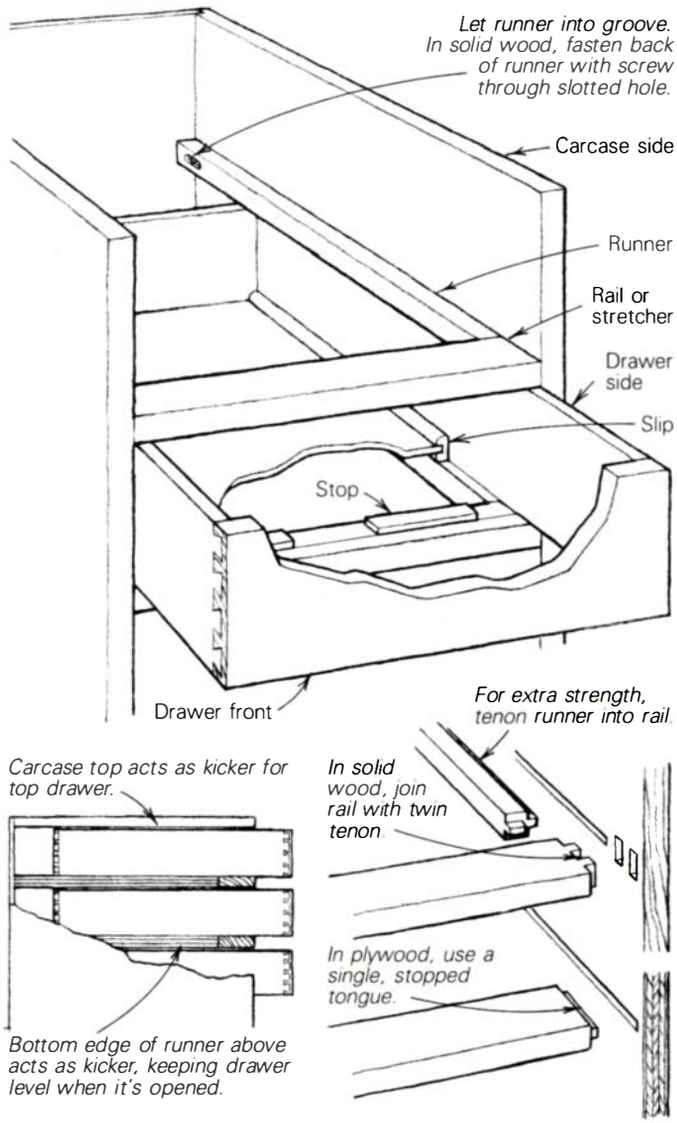


Fig. 2: Drawer details

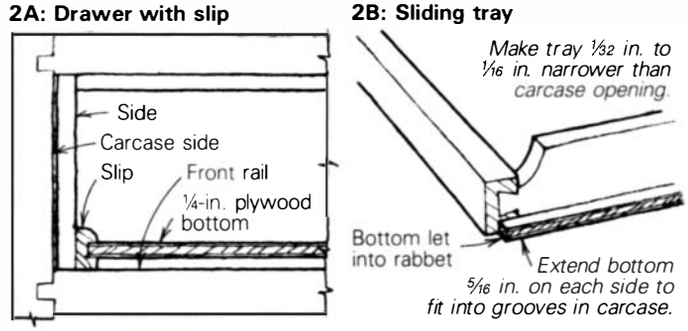
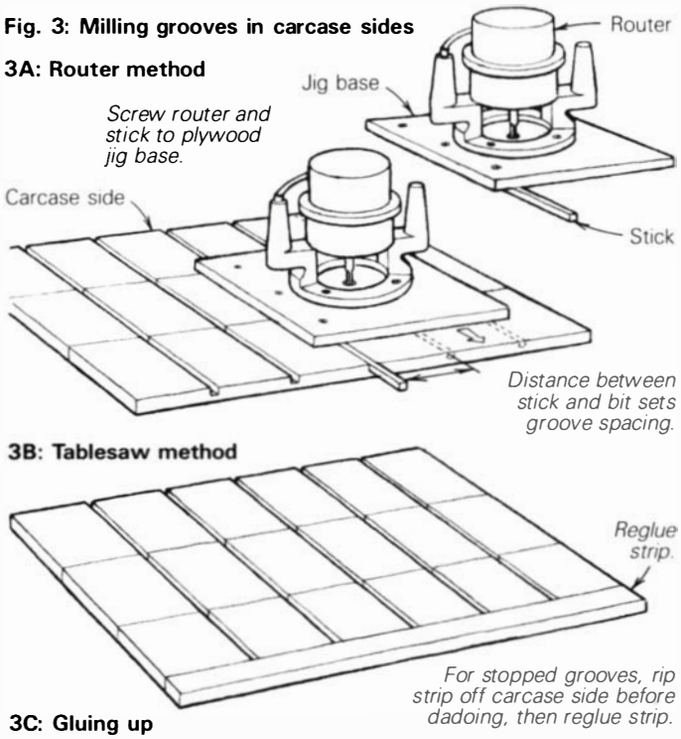
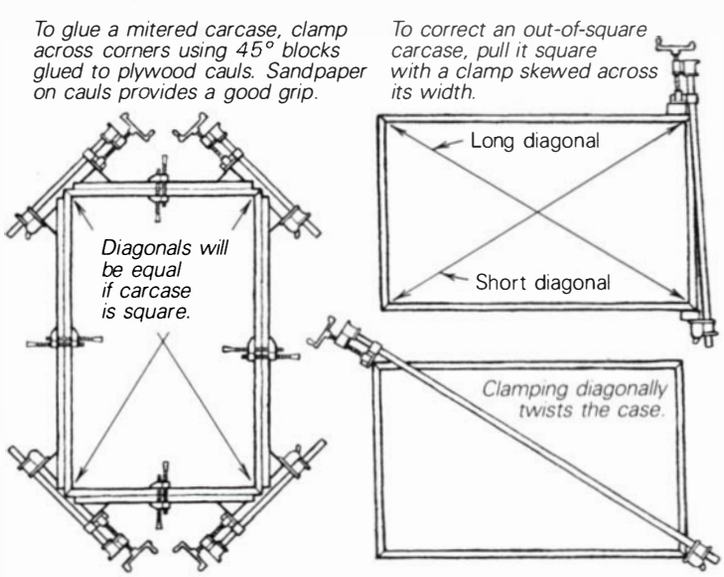


Fig. 3: Milling grooves in carcase sides





For a perfect fit, Frid fits the drawer parts individually before he assembles them, first trimming the drawer front to a tight fit in the carcase opening. If the drawer front's length can't be scribed from inside the case, mark it directly from outside.

side before final assembly. Or, in solid wood or plywood, you can cut each end of the carcase top and bottom slightly out of square. An article in *FWW* #21, pp. 73-76, tells more about this type of carcase construction.

The drawing table has only one drawer, so I didn't bother making my carcase wider at the back. I cut the parts I needed out of a sheet of ¾-in. veneer-core cherry plywood, squaring each panel carefully and joining the carcase with tongue-and-groove joints. Where the raw edges of the plywood would be exposed, I glued on a ¼-in. thick by ⅞-in. strip of solid cherry, planing it flush with the plywood and sanding it after the glue had dried.

Next I cut the grooves for the solid-oak drawer runners and the sliding trays. This step is a critical part of making the carcase—the runners (and so the grooves) must be square to the front edges of the carcase and spaced the same distance apart on both carcase sides. Some people mount the drawer runners in a sliding dovetail joint, which is stronger. But it's a lot of extra work, and since the load is all downward, you don't really need that much strength. You could avoid grooves altogether by screwing the runners directly to the carcase, though this method isn't as accurate. For the trays, I decided to make lots of grooves relatively close together so that there would be maximum flexibility in tray arrangement.

The grooves can be crosscut with a dado blade in the tablesaw, or with a router, using the jig shown in figure 3A. I usually use the router because it's easier for an old guy like me, and if I don't want the grooves to show at the front edge of the carcase, I can stop them short. If you use the tablesaw, be sure to mill each pair of mating grooves in both carcase sides before you change the fence setting. Figure 3B shows how to stop a tablesawn groove.

If I were making a chest of drawers, I'd cut the joints for the front rails at this point. In solid wood, I'd join the rails to the sides with a twin tenon, as shown in figure 1. I usually mill the twin mortises with a router. Then, with a marking gauge, I lay out the tenons on the rail and cut them (by hand or on the tablesaw) to a tight fit. A rail can be joined to plywood with a tongue that stops short of the front edge of the carcase, so it won't be seen. For extra strength, you can tenon the runner into the back edge of the rail.

Assembling the carcase comes next. A tongue-and-grooved plywood carcase, such as my drawing table, is easy to glue up with clamps and battens. When I'm joining solid wood, I usually use dovetails or splined miters. If they fit right, dovetails don't need to be clamped at all. You just put some glue on and tap them home. Miters should be clamped across the corners, or else the pressure of the clamps might distort the case. I use the clamping fixture shown in figure 3C, and I check the carcase for square by measuring diagonally from corner to corner. If both diagonals measure the same, it's okay. Don't try to correct an out-of-square carcase by clamping the corners diagonally, or else you'll twist it. Instead, clamp across the width of the carcase, with the clamp angled slightly to pull in the long corner.

When the carcase comes out of the clamps, you can install the drawer runners. Plane or sand them smooth first, otherwise the little ripples left by machine-planing will make your drawers noisy. Because the drawing-table carcase is plywood, which won't shrink and swell, you can glue the runners right in, all the way across. If the sides of your piece are solid wood, runners should be glued only at the very front.

Fitting the drawer—Getting a wooden drawer to work like it's gliding on ball bearings is not all that difficult if you take the time to do it right. The trick is to fit the drawer *before* you make it. First, rough-mill all the drawer parts you will need. I like to use maple, oak, cherry and walnut for drawer parts. Pine and poplar are too soft. For drawer sides higher than 10 in., ½-in. Baltic birch plywood is good because it is less liable to warp. I make the sides and backs of small drawers ⅜ in. thick, and their fronts ⅝ in. thick. Larger drawers should have ½-in. sides and backs, with ¾-in. fronts.

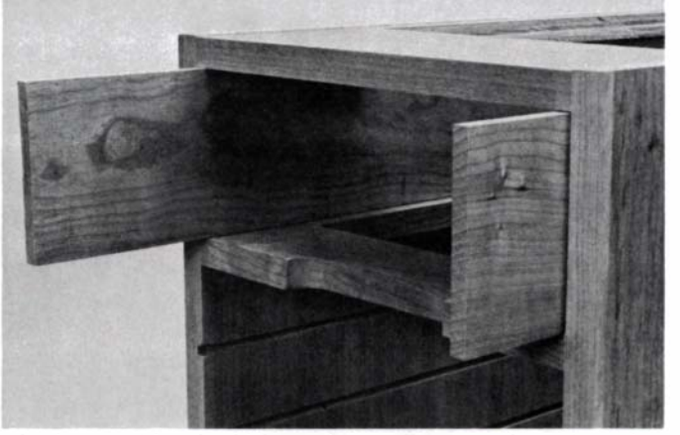
The drawer front should be fitted first. Cut the wood to width so that it will just about go into the opening, then finish the fit with a hand plane. Now cut the front to length: Square one end (if it isn't already) and fit it into the opening, then mark the other end by scribing the back of the drawer front from inside the case. Cut it a hair long at first, then trim it to fit. If for some reason you can't reach inside, mark the length by holding the front outside the case, as shown in the photo on the facing page. The drawer front should fit so snugly that it can be just pushed in halfway. Mark and cut the drawer back exactly the same length as the front, but make the width less, to leave space for the drawer bottom to slide in and also to allow a little space to make fitting easier later on. I usually make the back about ¾ in. narrower than the front.

Fit the drawer sides the same way as you did the front, by planing the width until they will just slide in snugly. Crosscut the back ends square, then push the drawer sides back as far as you want them to go. Drawer sides should not go all the way to the back of a solid-wood carcase because when the carcase sides shrink, the drawer will pop out a little. Also, I don't like to stop a drawer against the back of the carcase unless I have to—it sounds clunky. I allow about ¼ in. between the back of the drawer and the carcase. One way to make sure the clearance is right is to place a scrap shim temporarily against the case back as you push the sides in.

When the drawer front, back and both sides have been fitted, the drawer is ready to be assembled. But before I do that, I mark the parts as shown in figure 4.

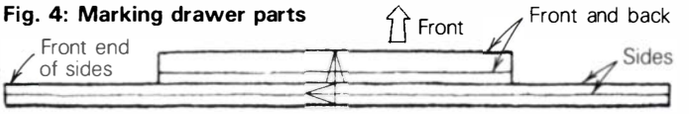
Assembling the drawer—The traditional joint for a drawer is a half-blind dovetail at the front and a through dovetail at the back. Other joints will do, but they aren't as strong. The box on p. 36 shows some examples. Some craftsmen use solid wood for drawer bottoms, but I think that ¼-in. hardwood plywood is better. It's more than strong enough and quite stable. Although it doesn't really matter, running the grain of the bottom in the same direction as that of the front looks nicest. In my best furniture, I mount the bottom in grooved strips, called drawer slips, which are glued inside each drawer after assembly, as shown in figure 5. This technique allows me to work with thin drawer sides, which are better-looking, and still leave a wide wearing surface for the drawer to slide on. To prevent the bottom from sagging in really wide drawers, use thicker plywood, or make the bottom in two pieces and support it with a rail down the middle of the drawer.

Normally, I put slips only on the sides, letting the bottom into a groove cut in the drawer front. But on my drawing table, the finger pull routed in the bottom edge of the drawer front would have exposed the groove, so I glued a slip on at the front as well. For quick drawers in kitchen cabinets, I just mill a groove directly in the drawer sides and fronts. Cut the grooves before you lay out your joints, so a groove



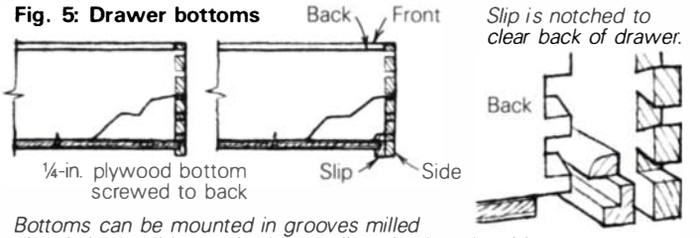
The drawer sides should be made equally snug, then trimmed to a length that will stop them from banging against the back of the carcase.

Fig. 4: Marking drawer parts

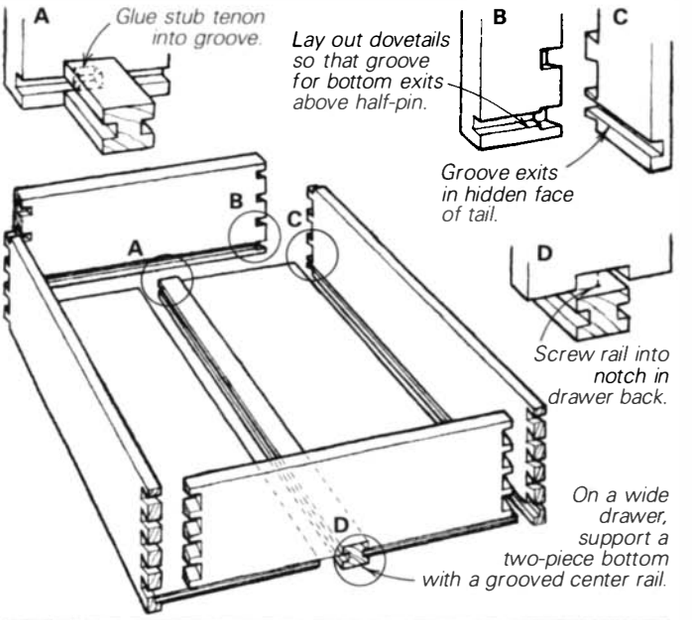


Points of triangle always face forward or upward. Put numbers on triangles to distinguish parts of multiple drawers.

Fig. 5: Drawer bottoms

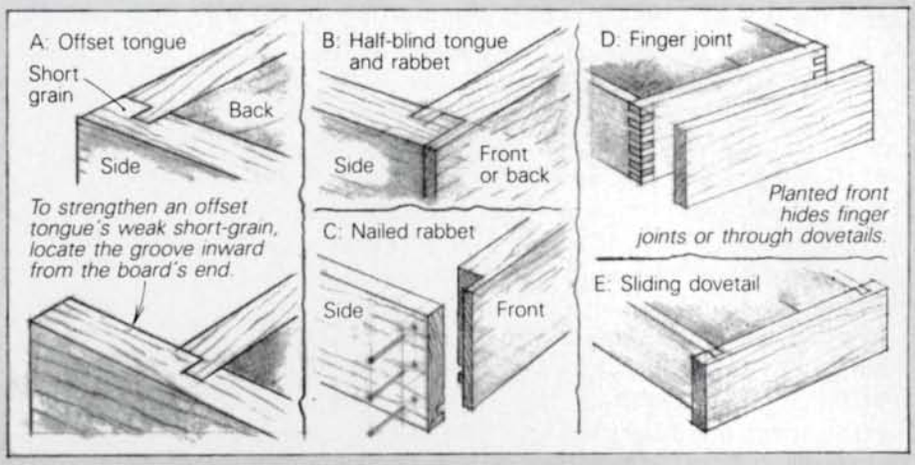


Bottoms can be mounted in grooves milled directly in the sides, or in drawer slips glued to the sides.



A finger pull that Frid routed in the drawing-table drawer front would have exposed the groove into which the plywood bottom is normally let—a problem Frid solved by gluing a slip to the front, as well as to the sides. The carcase rail, visible at the bottom of the photo, is relieved to give access to the pull.

Instead of dovetails . . .



Whenever I can, I prefer to join a drawer with handcut dovetails, half-blind at the front and through at the back. This combination of joints is mechanically strong against all the pushing and pulling that happens to a drawer, and it's quite attractive, especially if you use different colored woods for the drawer sides and front.

Other easier-to-make joints are okay for drawers, too. But remember that when a drawer is pulled out, the front-to-side joint bears most of the load, so it must be designed to resist this stress and should be strong mechanically, without relying entirely on glue. You could, for example, use dovetails at the front and a tongue-and-rabbet or a half-blind tongue-and-rabbet at the back. For quick drawers in a set of kitchen cabinets, the half-blind tongue-and-rabbet would also be okay for the drawer fronts. But if you use it, stop the drawer at the back instead of at the front, otherwise the weak short-grain of the grooved piece might crack off. Both of these joints can be made on the tablesaw. Remember to allow for them when you cut the drawer sides to exact length. A rabbet reinforced with Swedish dowels (nails) is fine for quick drawers, too.

A box or finger joint is another good drawer joint that can be cut on the tablesaw. I might use this joint for drawers in a tool chest, but I wouldn't want it in furniture because I think that the end grain of the exposed fingers is ugly. To hide the fingers, or the end grain of through dovetails used on a drawer front, you could glue on a planted front.

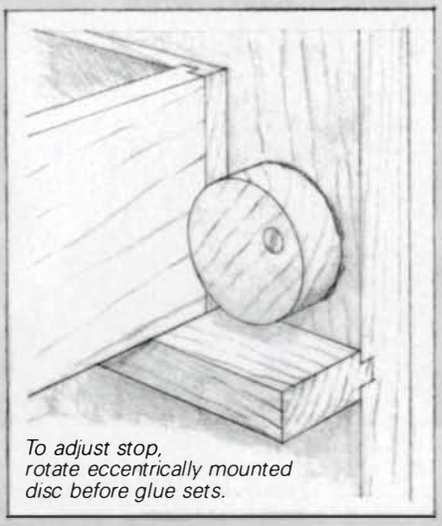
If a drawer is narrower than the inside of the carcase—as it would be if you were using ball-bearing runners—or if you wanted the drawer front to overhang and cover the front edges of the carcase, a sliding dovetail is a good choice for joining the drawer front to the sides. Sliding dovetails work well in both solid wood and plywood. If you set up to make this joint, you can also use it to join the back to the sides. *—T.F.*

For more on joints, see FWW *#5, pp. 30-36, and #27, pp. 68-75.*

Drawer-stop ideas from three makers

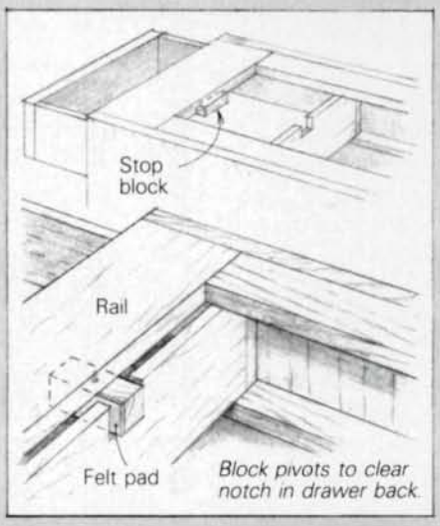
Sometimes it's not practical to install a stop that works against a drawer's front, as Frid does. In this case, I stop a drawer at the back by gluing and screwing small wooden eccentrics inside the carcase, as shown in the drawing below. Before the glue dries, I rotate the eccentrics so that the drawer stops just where I want it to.

—David Hannah, Newtown, Conn.



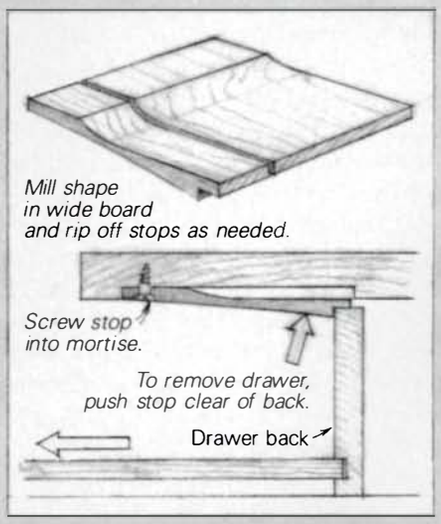
Drawers in really well-made furniture should have outward stops, but I don't like to spend a lot of time making them. Usually, I use the method in the drawing below, which works for practically any style drawer. The stop is a small block screwed to the rail (or to the inside of the carcase top) above the drawer. As the drawer is opened, its back strikes the block and stops. So that the drawer can be inserted, the block pivots to align with a notch cut into the back. A felt pad glued to the block gives the stop a quieter action.

—Ben Mack, Mt. Tremper, N.Y.



I learned about the outward drawer stop shown below from Stephen Proctor, my teacher at the Wendell Castle workshops. It consists of a notched wooden leaf spring let into a mortise in the rail above the drawer. If you need a lot of stops, it's easy to mill the shape into a wide board, ripping the leaves off to the required width. For strength and springiness, ash is the best wood to use. Locate the stop where you want the drawer to stop, then scribe and cut the mortise. A countersunk wood screw holds the stop in place.

—Wendy Stayman, Scottsville, N.Y.



won't come out in middle of a dovetail pin.

I had only one drawer to dovetail for my drawing table, so I did it by hand. If there are a lot of drawers to do, I use a dovetail fixture with my router, sanding or planing the inside of the drawer parts before the joints are cut. I don't dry-assemble drawer joints because if they are as tight as they should be, testing them will compress the wood fibers and the joint will be too loose later. Put just a little bit of glue on the top of the pins and front edge of the tails, and tap the joint together with a hammer. Check your drawer for square and put it on a flat bench to make sure it isn't twisted. When the glue is dry, cut the drawer slips to length and glue them in.

Next, I clean up the joints by sanding lightly with a belt sander, and planing or scraping the top and bottom edges of the sides and front. To hold the drawer for sanding, I prop it over a wide board clamped between two bench dogs, as shown in figure 6. After sanding, I try the drawer. Usually it will slide right in. I move it in and out a few times and remove it. Where the drawer binds against the runner, kicker or carcase side, there will be a shiny spot on the wood. I scrape or plane off these spots until the drawer fits perfectly.

If I'm making a drawer in January, I'll make the fit a little loose so that the drawer will still work when the wood swells up in August. Don't take too much off, or the drawer will end up too loose and will bind instead of sliding. To plane the top of a drawer, start at one end of the front and plane toward the back. When you get to the joint between the front and side, just turn the corner in one continuous motion. If you want to finish the inside of the drawer, you can do it at this point. I use two coats of 2-lb.-cut shellac. I wouldn't use oil—it smells too strong and will bleed out of the wood later.

When everything fits, slide the bottom in and fasten it with screws driven into the drawer back. To locate the drawer stops, set a marking gauge to the thickness of the drawer front and scribe a line on the top surface of the rail. Glue two 3-in. by 1-in. by $\frac{3}{16}$-in. blocks to the rail. Don't make the stops smaller, or someone slamming the drawer might knock them off. I don't use outward stops, but many woodworkers like them. The box on the facing page shows some good methods.

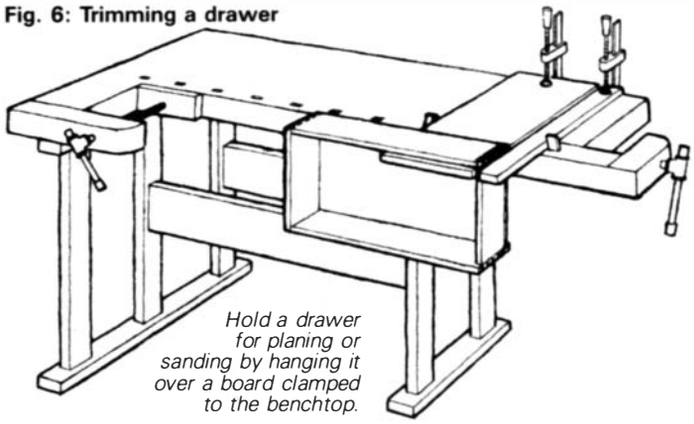
Rub paraffin on the runners, kickers, slips and inside of the carcase. Don't put any other kind of finish on the outside of a drawer or the inside of a carcase where drawers will go, unless you are using ball-bearing runners. The finish will just gum up the works and might cause the drawer to stick.

Making the trays—Making the trays is a lot easier than making the drawers. The tray parts can be kept small in dimension because the assembly is solidly glued and screwed to the plywood bottom. You don't have to fit the parts first, just cut them so that there will be $\frac{1}{32}$ in. to $\frac{1}{16}$ in. between the side of tray and the inside of the carcase (figure 2, p. 33). No grooves or slips are needed for the bottom, but you should let it into a rabbet milled in the tray front.

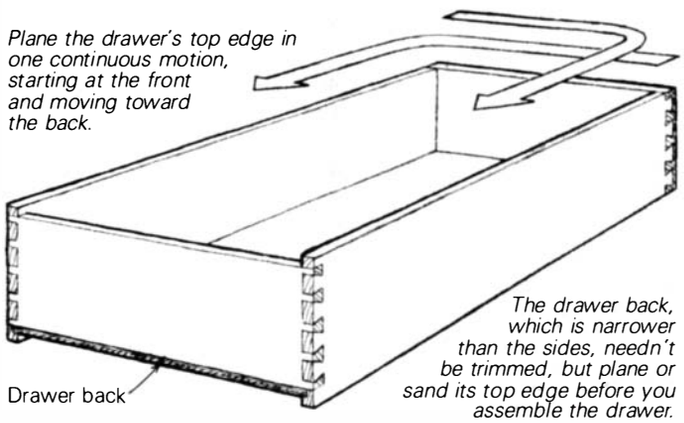
When you assemble a tray, make sure that it is square and that the bottom overhangs equally on each side. Complete the final fitting by testing the trays in the grooves and sanding the plywood lightly where necessary.

Correcting problems—Sometimes drawers won't work right, no matter how careful you are. Bowed sides are one reason. If you notice this before you assemble the drawer, position the

Fig. 6: Trimming a drawer



Hold a drawer for planing or sanding by hanging it over a board clamped to the benchtop.

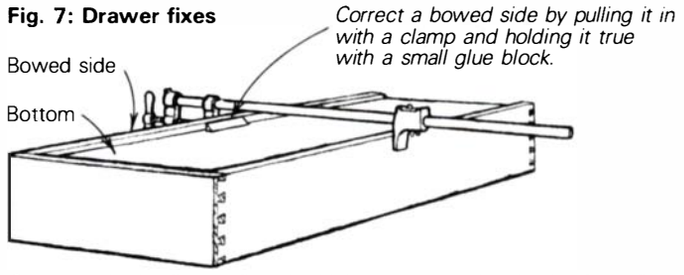


Plane the drawer's top edge in one continuous motion, starting at the front and moving toward the back.

Drawer back

The drawer back, which is narrower than the sides, needn't be trimmed, but plane or sand its top edge before you assemble the drawer.

Fig. 7: Drawer fixes

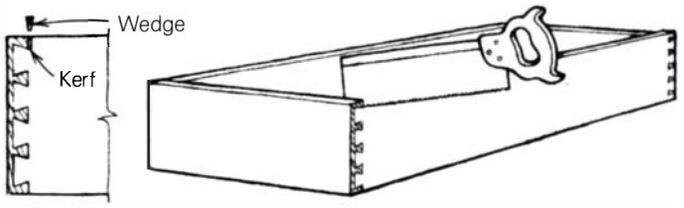


Correct a bowed side by pulling it in with a clamp and holding it true with a small glue block.

Bowed side

Bottom

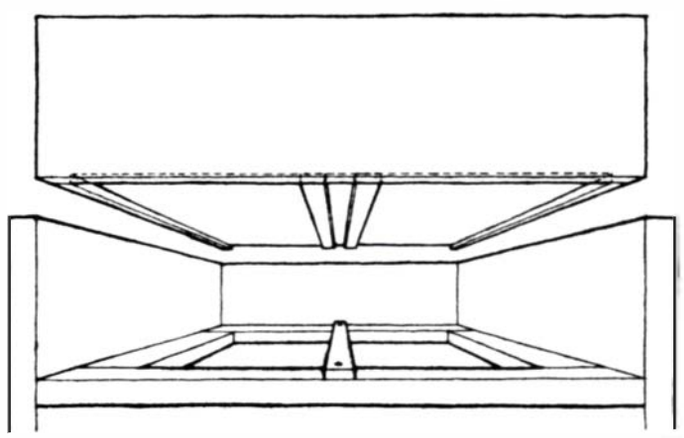
Correct twist by first kerfing the high corners to the depth of the first tail. Then insert wedges to partially flatten the drawer, planing the rest of the twist out of the bottom.



Wedge

Kerf

Excessively sloppy drawers can be corrected with a center guide, which fits into a track glued to the drawer bottom. Mount the guide between the front rail and a rail added to the back of the carcase.



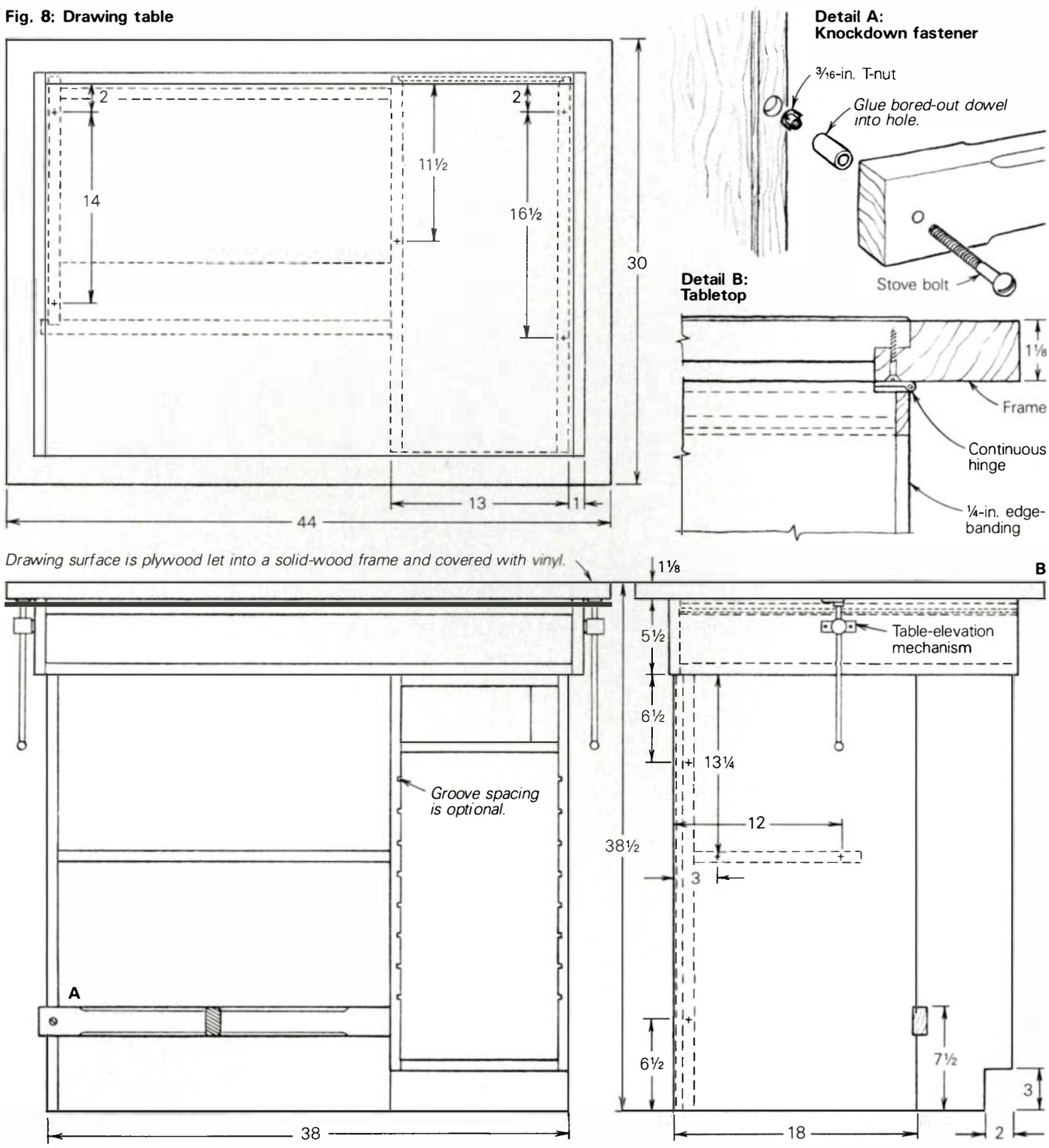
bulge of the bow to the inside of the drawer. That way, when you slide the bottom in, the side will be pushed straight. If a drawer side bows out after you put it together, pull the bow in with a clamp and hold it with a small glue block, as shown in figure 7, p. 37.

A slightly out-of-square drawer will usually be forced into true when the bottom is put in. Just make sure the bottom is truly square and fits exactly to the bottom of the grooves, and put the bottom in before you do final-fitting. A twisted drawer, which won't sit flat but teeters on two corners, is more difficult to fix, but it isn't hopeless. Take some of the twist out by driving small wedges into kerfs sawn at opposite corners in the joints between the sides and the front and back. The kerf should go down just to the first tail of the joint. Plane the remaining twist out of the bottom edges.

A drawer that really rattles around—either because you planed too much off or because the carcase is too wide—can be fixed with a center guide, or by gluing veneer shims inside the carcase. Shims work best when the looseness is mostly at the back of the drawer. I don't like to use the center-guide method unless I have no other choice. □

Besides teaching one day a week, Tage Frid is building furniture which he'll write about in his third book for The Taunton Press. For more on drawers, see FWW *#9, pp. 49-51, and #11, pp. 50-53.*

Fig. 8: Drawing table



Varnish Finish That's Rubbed On

Sanding is the way to a glass-smooth surface

by Joe Thomas

When I first started working wood, I read a lot about finishing. The more I read, the more confused I got. There are literally hundreds of stains, dyes, varnishes and fillers around—some soluble in water, some in alcohol, others in oil. It seems to me, you ought to have fun working with wood without having to build a chemical processing plant. So I experimented and developed my own finishing method using paste rubbing stains and varnishes. I'm sure it's not the most sophisticated in the world, but if you follow my procedure, you'll get a silky smooth, alcohol- and water-resistant finish.

The secret to good finishing is to prepare the wood properly by careful sanding. Actually, wood preparation should begin even before you reach the sanding stage. I carefully choose the wood for a piece I'm building. I love distinctive grain and knots, so I try to use them to good advantage. If you prefer clear wood, work around the defects, or position them where you won't have to give them extra sanding later. If possible, don't use wood with planer snipes—ugly gouges caused by improperly adjusted planers. Even if sanded smooth, the glazed wood of a snipe will sometimes show as a streak. Another way to save sanding time is to chisel off the glue squeezed out of joints instead of wiping it off with a damp rag, which just smears it around. Let the glue set for about half an hour, until it's rubbery, and it will slice right off with a sharp chisel.

You will need a good-quality finishing sander. I have a Rockwell orbital that isn't made anymore, but of the half-dozen other sanders I've tried, I think the Black & Decker #7430 (which takes a third of a sheet of sandpaper) and the Makita block sander (a quarter of a sheet) are both good buys. Whichever sander you use, cut a stack of sheets to fit it at one time, so you won't have to stop sanding in the middle of a project to cut more paper. For inside curves, tight spots and end grain, I have a drum sander that fits my ¼-in. portable drill and accepts small sheets of regular sandpaper instead of sleeves. I got it from Singley Specialty Co. Inc., PO Box 5087, Greensboro, N.C. 27403.

Before I begin sanding, I clear my bench of all tools—if you drop a sanded piece on a sharp tool, the small nick that results will look like the Grand Canyon when you stain. I start orbital-sanding with 180-grit aluminum oxide paper until all the scratches and tool marks are gone. To check for missed blemishes, I view the wood obliquely, with the light in front of me. If none are visible, I give the piece a thorough once-over with 220-grit. What do I mean by thorough? It's no 15-minute ordeal. If you're working a 5-in. by 12-in. piece with 220-grit, for example, you ought to see the surface improve after 30 seconds to one minute of sanding. More sanding at that grit won't give you a smoother surface. Switch to a finer grit. Once you learn to find flaws by viewing the wood correctly, you'll know when to stop. If you're progressing too slowly, start with 120- or 150-grit, working up to 220. If you must, use a belt sander to smooth large flaws, but never use a belt coarser than 100-grit.

Now I'm ready to raise the grain for the first time. Raising the grain causes loose wood fibers to stick up from the surface of the wood so that they can be removed with steel wool. Dampen an old washcloth—not dripping but wet—and wipe the wood surface with it. After the wood dries, the surface will feel fuzzy. Now with a loose ball of 0000 steel wool, take a swipe over the wood in each direction. The wool will hook the loose wood fibers and pull them free. Vacuum away any strands of loose steel wool that may remain.

With a fresh piece of 220-grit on your sander, sand the surface again, checking for defects as before. Repeat the grain-raising process, hit the piece again with steel wool, vacuum, then switch to sanding with 320-grit paper. At this point, I protect the wood from marring with an old towel on my bench. By now, the wood should feel smooth as glass. Give it a quick polishing with 600-grit wet-or-dry paper and then wipe off the sanding dust with a tack rag, a sticky cleaning cloth sold by paint stores.

Next comes the exciting part: staining and finishing. I don't always stain, though. If the wood is already the color I want, I just go ahead and finish it. When I do stain, I prefer oil paste wiping stains. The Bartley Collection Ltd., 121 Schelter Rd., Prairie View, Ill. 60069, is one good source for these stains. I've been happy with the finish I get without using any of the paste wood fillers that are on the market, but I don't see why they wouldn't work.

I use the stain right out of the can. Spoon a few blobs into an aluminum pie tin, dip a terry cloth pad into it, and rub the stain firmly and briskly into the wood, going with the grain. When you run out of the small amount of stain on the pad, briskly polish the stained area with a larger piece of terry cloth. Now go back for more stain, blending it into the already stained area and polishing again. Continue this way until you're done, allowing the work to dry for 24 hours.

I use either of two kinds of varnish: the paste varnish sold by Bartley, or McCloskey antique polyurethane. Both are rubbed on and polished just like the stain. If you prefer the McCloskey, or any other store-bought polyurethane, thin it 1:1 with mineral spirits. Apply four or five light coats, allowing 24 hours' drying between. Don't try to get away with one or two thick coats, or you'll wind up with a blotchy, ugly film that you'll just have to sand off.

When the final coat has dried, polish it with 600-grit wet-or-dry paper lubricated with mineral spirits. Wrap the paper around a scrap-wood block and wet the grit with spirits, dribbling a few drops on the varnished wood while you're at it. Now begin sanding, with the grain. On the first pass, you'll feel the paper sort of bumping along the relatively rough varnished surface. On the second or third pass, it will feel like a vacuum is sticking the paper to the surface. At that point, quit. You're done. Buff the surface with a soft, dry rag, and sit back and admire the beautiful finish you've created. □

Joe Thomas works wood in Tucker, Ga. He published his own book about finishing called Silky, Sensuous Wood Finishing *($13, 61 pp.), which is available from him at PO Box 1158, Lilburn, Ga. 30247.*

A Dehumidifier Kiln

Home-dried lumber with no frills

by Donald Klimesh

For the past few years, I've been drying my own lumber in a kiln that I designed and built around a 22-pint/day Montgomery Ward dehumidifier. It will dry 300 bd. ft. of lumber in 8-ft. lengths, at a cost of about 10¢/bd. ft. for electricity. The dehumidifier cost me about $170, and the rest of the materials for the kiln totaled another $75.

The skeleton of my kiln is a wood frame of 1x6s covered with 4-mil clear plastic sheet, overlapped at the seams, and attached to the frame with wood strips and staples. I covered the plastic with 3½-in. fiberglass insulation. Don't fasten the insulation to the lid, because the insulation's removability is part of the kiln's temperature control. The dehumidifier sits inside, with its drain hose passing through a hole in the plastic and emptying into a catch pan outside the kiln. The water that collects here must be weighed daily to monitor the operation of the kiln. There is also a small electric fan inside, which runs continuously to circulate the air. I used a fan from an old appliance, but a small household fan would work fine.

The lumber to be dried is loaded on 4x4 supports, which for 1-in. lumber should be spaced no more than 2 ft. apart. To prevent the end grain from drying faster than the side grain—the main cause of checking—I liberally coat the ends of the boards with oil-based enamel paint. I use ¾-in. stickers to separate the layers of boards and to allow air to circulate. Space the stickers about 18 in. to 20 in. apart, and keep them one above another to minimize kinking.

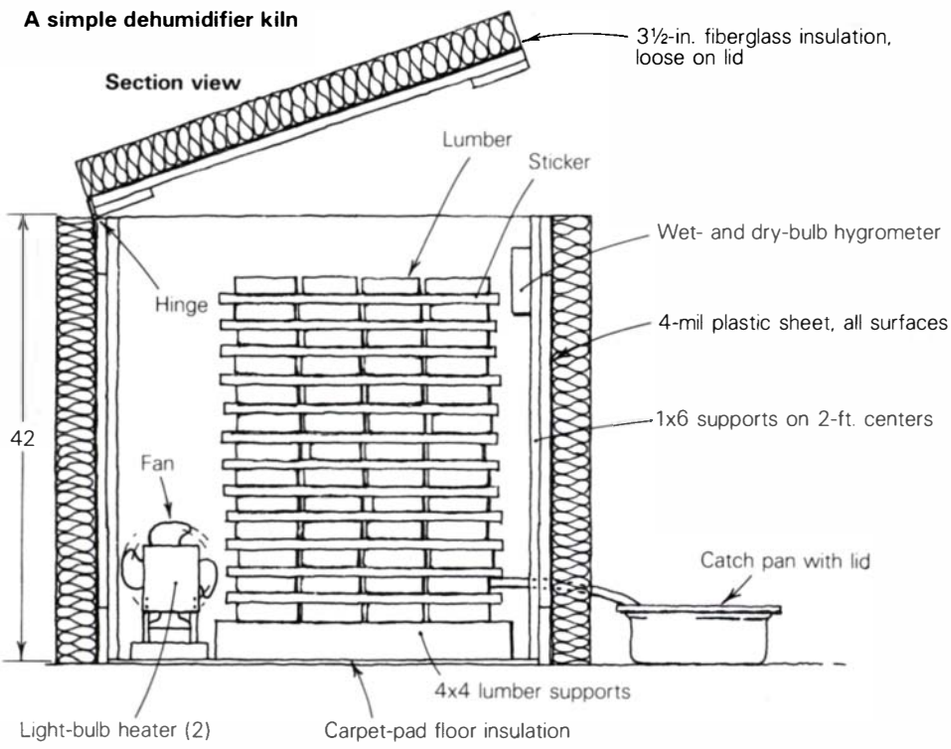
It's easy to dry wood, but it's relatively difficult to end up with useful lumber. The first time I used my kiln, I ran the dehumidifier full-tilt. The wood dried much too quickly. The boards bent badly when ripped, and many were filled with internal checks, a defect called honeycombing. I've since overcome these problems with controlled drying and conditioning.

Wood will gain or lose moisture depending on the relative humidity of the air that surrounds it. As long as the relative humidity remains the same, a piece of wood will eventually reach a point where it neither gains nor loses moisture. The moisture that remains in the wood when it has reached this balance with the air is called its equilibrium moisture content, or EMC (*FWW* #39, pp. 92-95). I operate my kiln until the wood reaches an MC of approximately 7%.

To measure the relative humidity inside the kiln, I use a wet- and dry-bulb hygrometer (available from Edmund Scientific Co., 101 E. Gloucester Pike, Barrington, N.J. 08007). It consists of a standard thermometer mounted side by side on the same base with a wet-bulb thermometer which has a cloth wick fitted over the bulb. The other end of the wick dips into a small reservoir, which I fill with distilled water to prevent mineral buildup and to ensure accurate readings. The hygrometer hangs inside the kiln, and I cut a hole in the fiberglass so that I can read it through the plastic. I cover this window with a piece of insulation when I'm not reading the hygrometer, so that condensation won't fog up the plastic.

To determine the equilibrium moisture content, you need to know the relative humidity, but since the EMC is a more useful number to me than the RH, I've eliminated the need for calculations by making a chart that gives me the potential EMC of the wood directly from the wet- and dry-bulb readings. Just remember that the hygrometer actually measures the condition of the *air* inside the kiln, not of the lumber. It takes some time at any given relative humidity for the wood to reach the EMC shown on the chart—how long depends on the species and thickness of the wood. To lessen drying time and minimize degrade, you should air-dry dead-green lumber to below its fiber saturation point (25% to 30%

A simple dehumidifier kiln



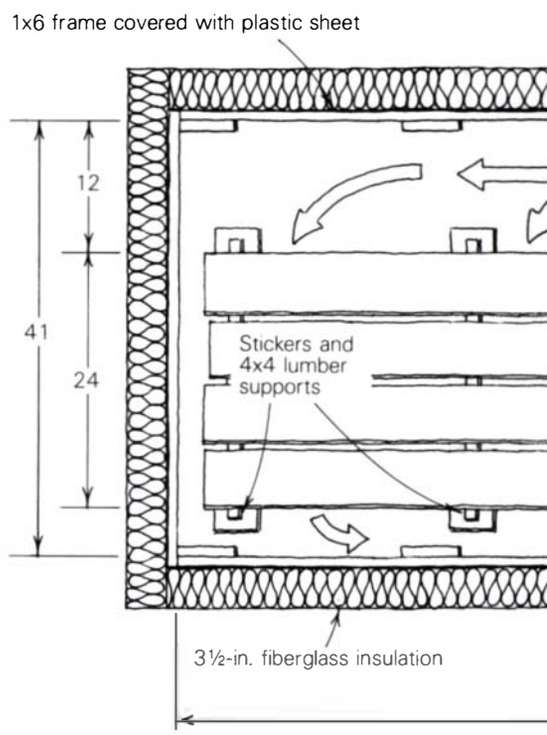


Photo: Jack Glaser; drawing: Ken Daniel

moisture content) before kilning it. An article in *FWW* #33, pp. 88-89, explains how.

To keep track of the drying process, I use a data sheet with the following headings: date, time, wet-bulb temperature, dry-bulb temperature, EMC, total weight of water collected, and rate of drying as measured by pounds of water per day. I start a fresh load with the humidistat control on the dehumidifier set about one-quarter of the maximum dry setting. Then I monitor the drying rate by daily weighing the water that collects in the catch pan, and I compare this to the maximum allowable weight of water listed in my drying schedule. If the daily catch of water exceeds the maximum recommended in the drying schedule, the wood is drying too fast, and I turn the humidistat down. If the catch is less than half the amount listed in the drying schedule, I turn the control up to speed the drying rate. Keep the catch pan covered, or else water will evaporate and weights will be inaccurate.

I maintain the kiln temperature at 105°F to 115°F throughout the drying cycle. Higher temperatures would speed drying, but might also harm the dehumidifier. In commercial kilns, dry-bulb temperatures go as high as 180°F, but these kilns must dry wood quickly to make a profit. I don't have to rush.

I can control the temperature in three ways: by changing the humidistat setting, by removing the insulation cover on the lid, or by adding auxiliary heat. Although the main function of the humidistat is to control the relative humidity inside the kiln, the dehumidifier motor also produces heat. If the temperature exceeds 115°F, I remove insulation from the lid to cool it down. If the temperature is below 105°F and the lid is totally covered, I add heat by turning on one or both of the two shielded light-bulb heaters (detail A, below).

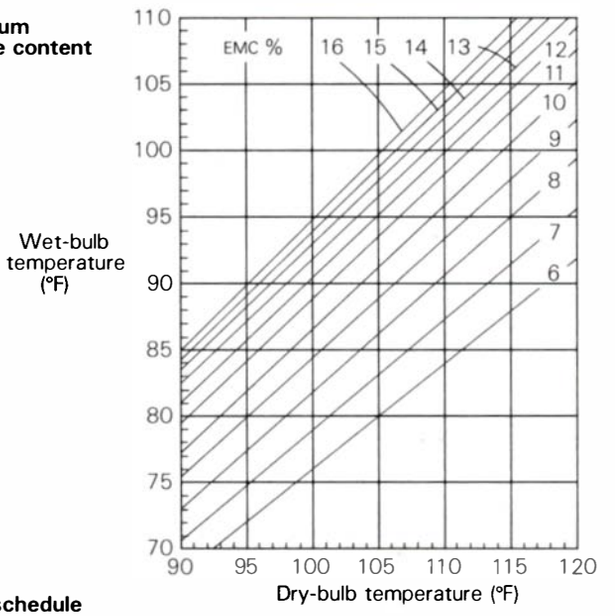
The lumber is dry enough for me when, with hygrometer readings of 7% EMC, the daily catch of water amounts to 0.2 lb./100 sq. ft. (not bd. ft.) of lumber, which indicates a moisture content of approximately 7%. You can measure the moisture content of the wood itself to be sure, but if you

Controlling the kiln

Regulate drying by monitoring EMC, which is indicated by the point at which the diagonal lines in the EMC chart intersect the wet- and dry-bulb temperatures. Find this EMC in the left-hand column of the drying schedule. The right-hand column shows the maximum *weight of water you can remove (per 100 sq. ft. of lumber) without degrade.* Turn down the humidistat if you get more; turn it up if you get less than half.*

* *These figures derive from experimentation, and your results may differ.*

Equilibrium moisture content (EMC)



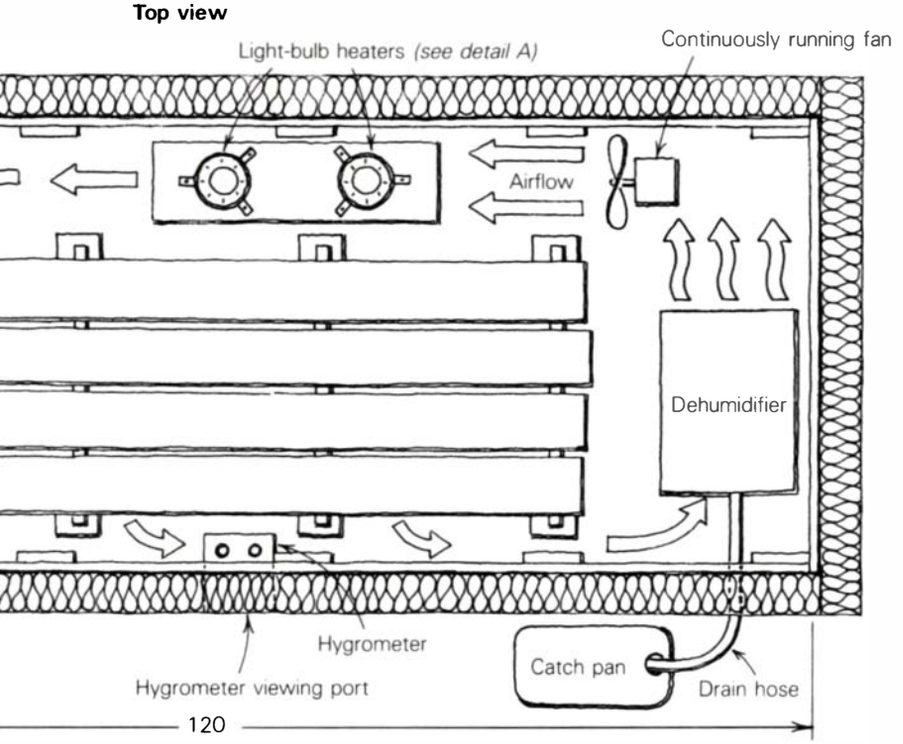
Drying schedule

Equilibrium moisture content (EMC) from chart above	Maximum water collected per day per 100 sq. ft. of lumber
16% and above	11.0 lb./day
15	8.0 lb./day
14	7.0 lb./day
13	6.0 lb./day
12	5.0 lb./day
11	4.5 lb./day
10	4.0 lb./day
9	3.0 lb./day
8	2.0 lb./day
7†	2.0 lb./day

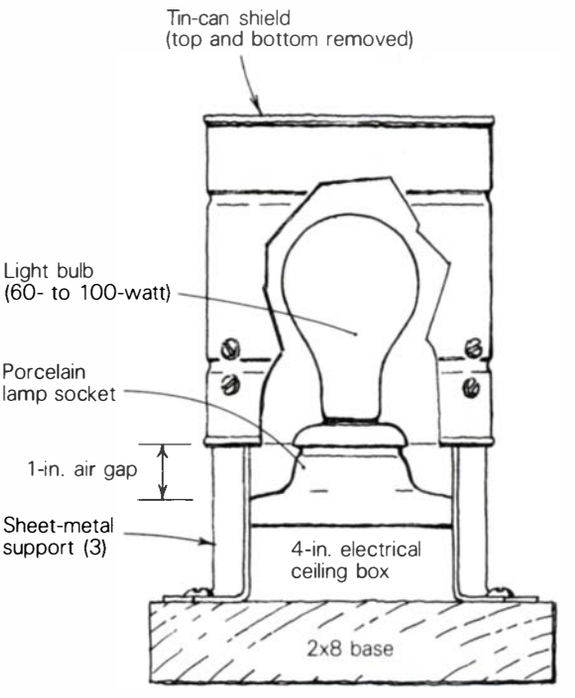
Note:
100 bd. ft. of 1-in. lumber = 100 sq. ft.
100 bd. ft. of 2-in. lumber = 50 sq. ft.

† *When water yield is less than 0.2 lb./100 sq. ft., lumber has reached approximately 7% moisture content.*

Top view



Detail A: Auxiliary light-bulb heater



don't have a moisture meter, you'll have to sacrifice part of a board. Here's how: Crosscut a strip 1 in. wide about 1 ft. in from the end of a board. Weigh this section on any sensitive scale—a gram scale, beam balance, food-portion scale or postage scale—anything that will give you an accurate reading in small increments. Write down the weight. Now bake the piece of wood in a 225°F oven for several hours to drive off all moisture. Weigh this dried piece and subtract its weight from the wet weight, to find out how much water it contained. Now divide the weight of the water by the oven-dry weight of the wood, multiply by 100 (move the decimal two places to the right), put a percent sign (%) after this figure, and you have the moisture content. But even if you've reached 7% MC, your wood isn't ready to use yet.

As lumber dries, it develops residual compression stresses in the outer fibers. This condition is called casehardening, a misnomer since the "case" is not really harder than the inside. It is most noticeable when you're resawing or ripping boards. Even if the board being cut is dry and straight, a casehardened board will bend when it is cut, sometimes severely. Commercial kilns solve the casehardening problem by adding a step called conditioning. Steam is introduced into the kiln to add moisture, which swells the outer fibers and causes them to yield, so they will be under less stress when they are redried. I also condition my dried lumber, but my process is less sophisticated. After the boards are dry, I remove them from the kiln and spray both sides of each board with warm water from a garden hose. Then I immediately restack the lumber in the kiln and redry, following the drying schedule.

The final drying step is called equalizing. When the lumber has dried again after conditioning (less than 0.2 lb. of water per day per 100 sq. ft. with hygrometer readings of 7% EMC, which is approximately 7% MC), I continue to operate the kiln for one week for each inch of lumber thickness, with the auxiliary heater lamps turned off. By this time I'm usually tired of the daily chore of weighing the water, so I just let the dehumidifier run with the humidistat set to give approximately 7% EMC, as measured by the hygrometer.

How long does it take? A batch of 320 bd. ft. of green, 1-in. red oak took me 60 days—46 days to dry and another 14 days for conditioning and equalizing. A total of 563 lb. of water was removed during the drying process. Drying time varies for different species, and thicker lumber takes longer.

So far, I've used the kiln and my drying schedule to dry oak, white pine, maple and cherry. While it may seem that the process is time-consuming, it takes only a few minutes each day to weigh the water, read the thermometers and occasionally adjust the humidistat. □

Donald Klimesh, of Birmingham, Mich., is an amateur woodworker and an engineer with Ford Motor Co. For more information on drying, read Dry Kiln Handbook *by J.L. Bachrich, published by H.A. Simons (International) Ltd., 425 Carrall St., Vancouver, B.C. V6B 2J6.*

Don't let that dry look fool you

Klimesh loads his kiln with green, 2-in. pine boards.

Wood is only as dry as the air that surrounds it, and once dried it doesn't necessarily stay that way. Instead, wood always seeks a moisture equilibrium with its environment.

No matter how long wood has been seasoned, whether or not it has been kiln-dried, lumber still contains some water. This is called its moisture content (MC), and is usually expressed as a percent. The moisture content changes as the relative humidity (RH) of the air around the wood changes.

An example: Two identical boards of, say, white oak are kiln-dried to a moisture content of 7%. One is shipped to the Northeast, where the relative humidity outdoors averages 75% year round. The other goes to the Southwest, where the relative humidity averages 38%.

In the 75% RH of the Northeast, the board picks up moisture from the air and eventually reaches a moisture content of 14%, where it stops absorbing moisture and stabilizes. The board has now reached the equilibrium moisture content (EMC) for that relative humidity, and will hold at 14% as long as the relative humidity stays at 75%.

In the Southwest, at 38% RH, the board loses moisture to the air until its moisture content stabilizes at about 6%. This board also has reached the EMC for that relative humidity.

When the relative humidity of the air changes, the moisture content of the wood changes, until it reaches a new equilibrium moisture content.

Wood should be dried to a moisture content close to the EMC it will reach in the environment in which it will be used. In the Northeastern winter, in a heated, non-humidified room, the relative humidity might average 25% or less. Wood exposed to this low RH would reach equilibrium around 5% moisture content. In summer, when windows are open, inside humidity levels are close to those outside.

Why is all this important? Because wood expands across the grain when the moisture content increases, and shrinks across the grain when the moisture content decreases. Furniture must be designed to allow for this movement.

Here are some terms woodworkers should know:

Moisture content (MC): The ratio (expressed as a percentage) of the weight of water in a piece of wood to the weight of the wood when it has been completely dried in an oven. To calculate, subtract the dry weight from the wet weight, and divide the result by the dry weight, as in the equation:

$$MC = \frac{W_{wet} - W_{oven\text{-}dry}}{W_{oven\text{-}dry}} \times 100$$

Relative humidity (RH): The ratio (expressed as a percentage) of the amount of water vapor in the air to the maximum amount the air could hold at a given temperature. Saturated air is said to be at 100% RH.

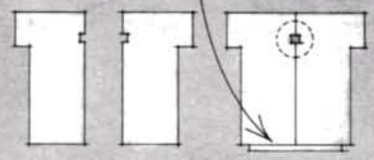
Fiber saturation point (FSP): The moisture content (which varies with the species) where all water has evaporated from the cell cavities, but the cell walls are still saturated. Wood shrinkage occurs only when the cell walls begin to dry. —*D.K.*

Pipe Clamps

Six versatile tips

Between glue-ups, the humble pipe clamp just gathers dust and gets underfoot. Here's how six readers coax double-duty out of these tools. So he always has one handy, Scott LeCocq of Arvada, Colo., uses a pipe clamp for his toolbox handle. Robert Harrigan of Cincinnati, Ohio, extended the grip of his vise with a clamp gizmo, while Philip Hahn of Blacksburg, Va., made a simple bench hold-down. Lyon McCandless of Bainbridge Island, Wash., Bernd Schroder of Half Moon Bay, Calif., and Maurice Harrington of Chicago devised pipe-clamp vises. Thom Lipiczky of West Stockbridge, Mass., suggested adding bench dogs for larger work. □

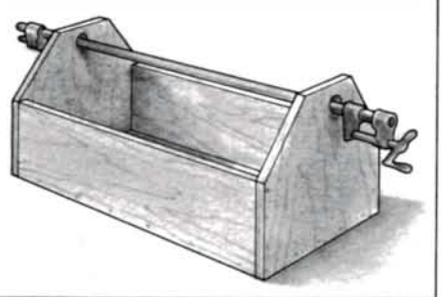
Harrigan's vise extender

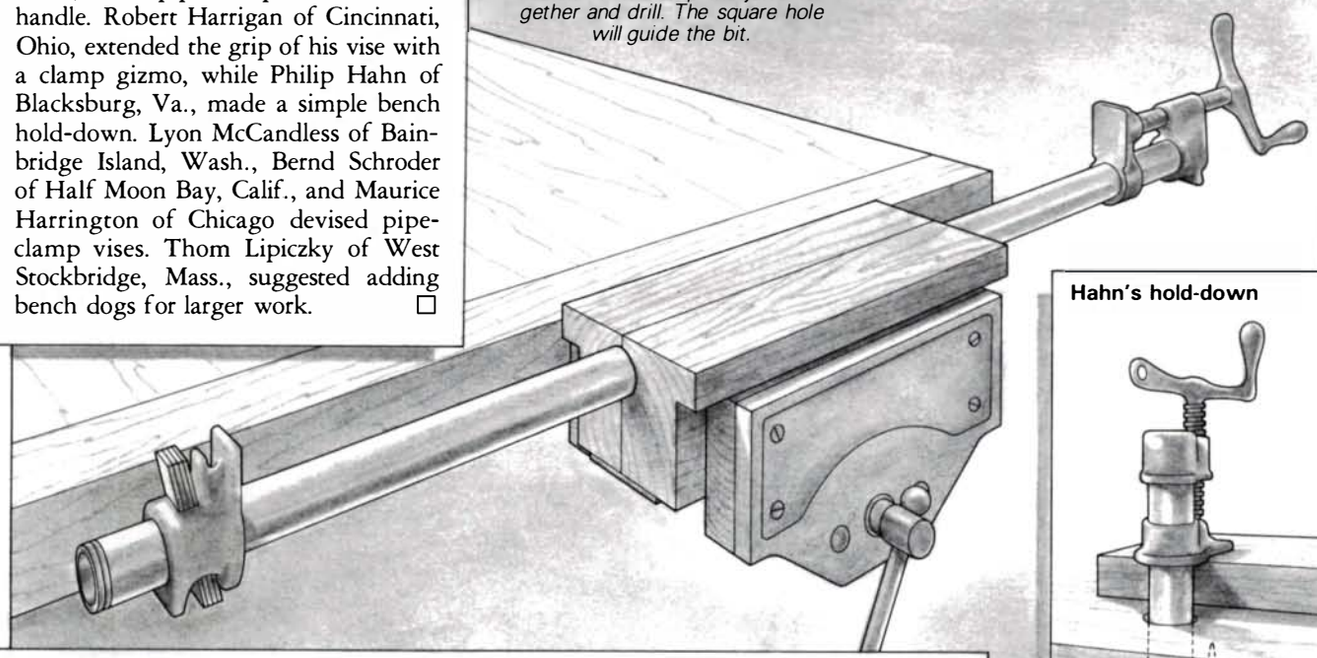


Leather hinge makes jaws manageable in vise.

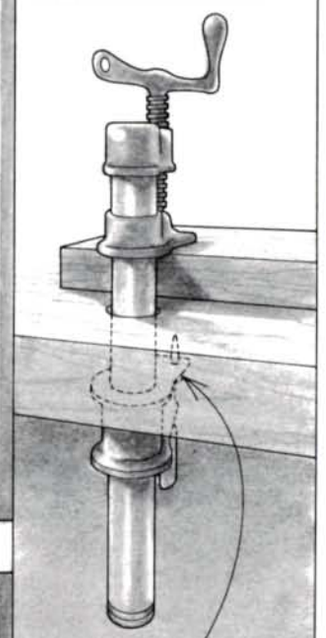
To drill a straight hole for the clamp, first mill grooves in the jaws on the tablesaw or with a router. Then clamp the jaws together and drill. The square hole will guide the bit.

LeCocq's toolbox handle



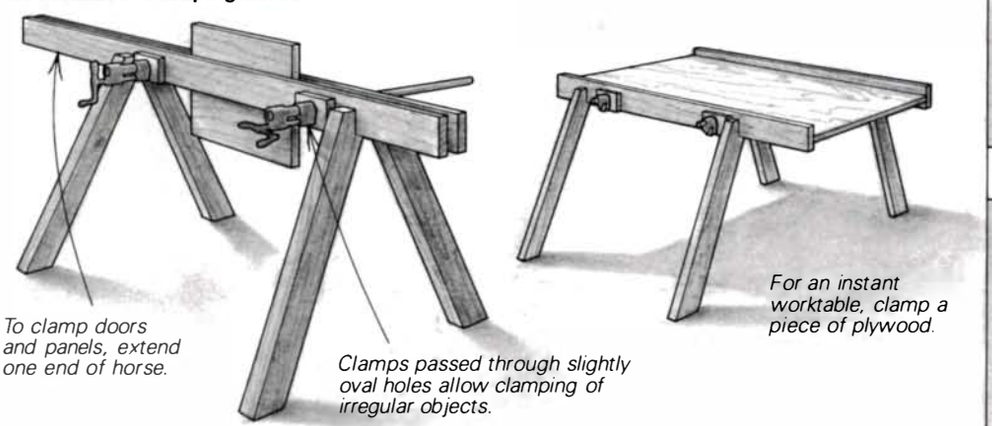


Hahn's hold-down



Hold the clamp fast with small wood screws driven through traveling pad.

McCandless' clamping horse

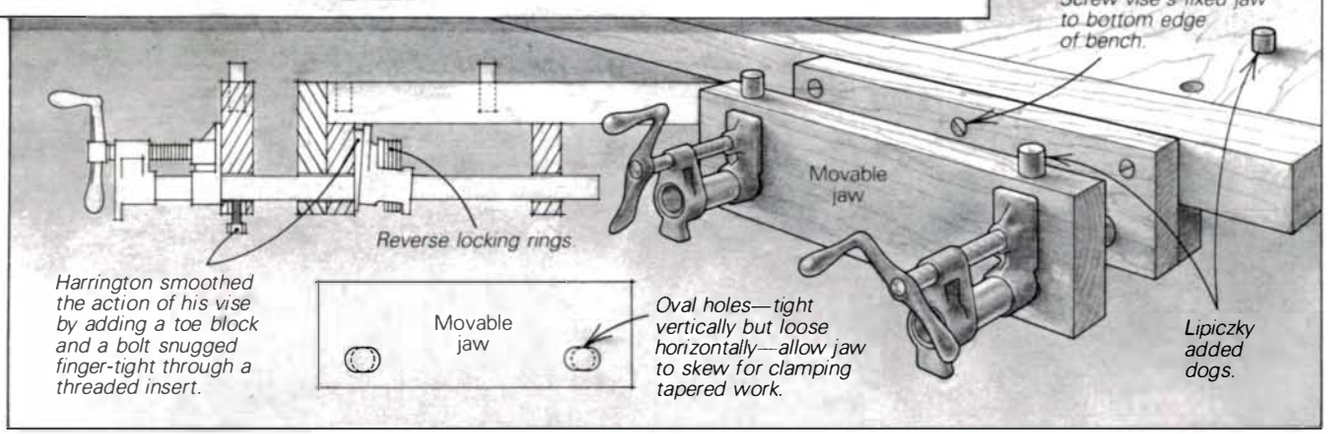


To clamp doors and panels, extend one end of horse.

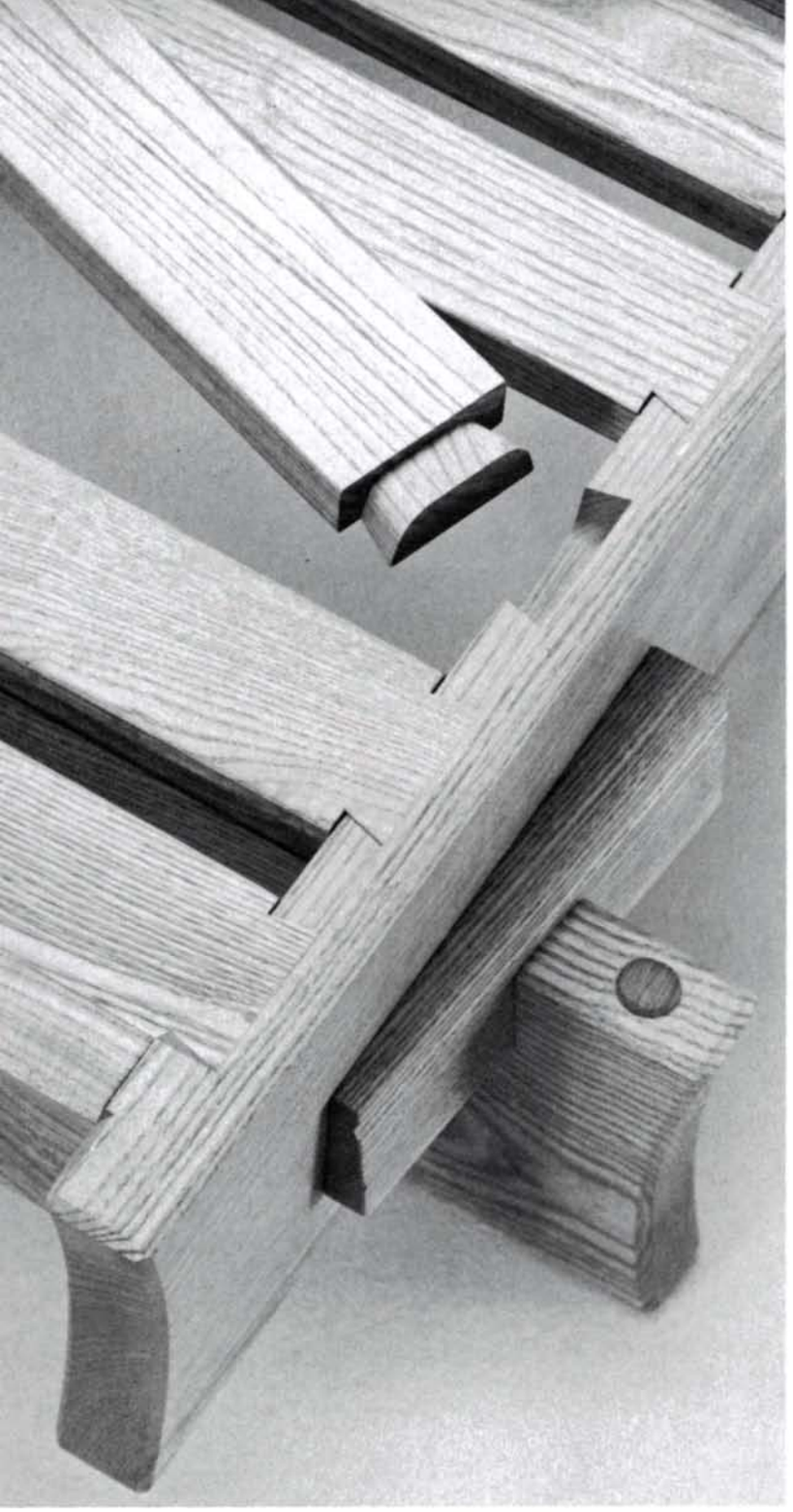
Clamps passed through slightly oval holes allow clamping of irregular objects.

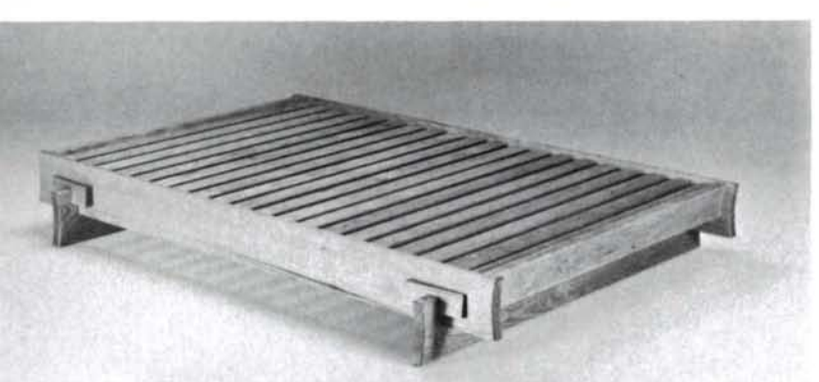
For an instant worktable, clamp a piece of plywood.

Schroder's bench vise



Drawing: David Dann





There's no glue and no screws in Erpelding's knockdown platform bed: well-designed joinery keeps all the pieces in place. A router-cut dovetail joins each bed slat to the side rail. A dowel driven into the floor rail prevents the wedge from breaking the weak short-grain at the corner.

Photos: Joseph Felzman Studio, except where noted

Knockdown Furniture

Form follows junction

by Curtis Erpelding

Although I design and make furniture for private clients, my pieces usually incorporate knockdown features. I like to devise designs suitable for mass production because I believe that functional, well-crafted furniture should be affordable. Because assembly time is eliminated, knockdown furniture is economical to produce commercially, and the pieces can be shipped disassembled, in compact packages. This economy and convenience are particularly relevant now, when people live in smaller spaces and move frequently. But the heart of my interest in knockdown design lies beyond function or practicality.

What interests me fundamentally is the concept that machined pieces of wood can lock together into a new form in ways that take into account the wood's physical properties. The basic problem becomes how to join (and later separate) two pieces of wood using gravity, friction and, occasionally, metal fasteners.

In 1980, the Design Arts Program of the National Endowment for the Arts (1100 Pennsylvania Ave. N.W., Washington, D.C. 20506) awarded me a one-year project grant to explore knockdown wooden furniture design. I had to satisfy three grant requirements: First, I was to continue my work in applying knockdown design to standard household and office furniture. Second, I was to develop three knockdown prototypes that would be suitable for mass production. And third, I was to research the possibility of having my designs commercially produced.

The three prototypes I decided on were a platform bed, a stacking chair with a circular seat, and a shelf system that leans against the wall. Each presented challenging design problems. In the beginning, I had intended to make detailed drawings and mockups to establish dimensions and proportions before building the actual prototypes. This goes against my usual practice. Normally I start with a fairly firm idea, work out the joinery details hastily on paper, cut a practice joint, and then plunge right into building the piece. When it works, this method saves a great deal of time. When it fails, the results are disastrous. Each procedure must be done correctly the first time, and design changes must be anticipated in advance, or they will interfere with the already completed part of the project. Sometimes I'm stuck with a half-completed piece of furniture and the prospect of having to start over again. For the grant project, I wanted to avoid this by doing drawings and mockups. Intentions may be noble, but bad habits die hard. As much as I tried, I kept reverting to my usual method. Somehow, for me, the design process has to involve this element of immediate risk. Either get it right the first time or blow the whole project.

Of the three projects, the platform bed, designed for a Japanese futon mattress, most closely approaches my notion of a pure knockdown design because it is built without glue or

metal fasteners. The rail-to-rail joint locks the parts and circumvents a troublesome characteristic of traditional bridle joints: an increase in humidity causes wood to expand across the grain, locking a tight-fitting bridle joint. This is fine for conventional furniture, but I had learned in earlier experiments with bridle-joint construction that knockdown structures would freeze solid in the middle of a humid summer. To solve this problem, I modified the bridle joint by tapering it (figure 1). This joint tightens under load, yet because of its geometry, it easily loosens when force is applied in the opposite direction. Simply wiggling one of the rails, or tapping upward lightly, breaks the assembly.

The tapered bridle joint wouldn't hold the pieces together by itself, so I added a wedge that fits into an angled notch in the floor rail. This wedge, which has a compound taper, locks the joint by forcing the side rail tightly against the side of the notch in the floor rail. The bed can be lifted and carried by the side rails, and the joint won't slip.

I cut most of the modified bridle joint on the radial-arm saw. To accommodate expansion, I cut both parts of the joint slightly wider than the thickness of the rails. The tapered face in the floor-rail part was surfaced with a router on an angled jig, and I feathered all sharp edges of the joint with a chisel.

The round cap that protrudes from the top edge of the floor rails is the end of a dowel, driven 4 in. into the rail. The dowel strengthens the weak short-grain, keeping the wedge from breaking it off.

In keeping with the solid-wood construction, I opted for slats, rather than plywood, to support the mattress. The soft, cotton futon mattress is used without a box spring, and traditionally it's unrolled right on the floor. The slats had to be thick enough and spaced closely to provide a firm platform for the futon, yet not so close as to interfere with ventilation. The obvious solution was to cut individual pockets in the side rails for the ends of each slat, while leaving enough space for the slats to expand without locking. I tapered both the sides of the pockets in the rails and the dovetails on the slats 15° so that the joint can swell without locking. I cut the joint with a 1-in. dovetail bit in a router using a jig that cuts both the pockets and the dovetails (figure 2). To cut the slats, I used a router with a smaller-diameter base.

The skirts at the head and foot of the bed are installed after the bed is assembled but before the wedges are driven in. The ends of each skirt are stop-slotted and slip over splines in the side rails. The outside face of the skirts is planed concave to match the radius on the ends of the rails.

With the bed, I suppose, I drifted furthest from the grant requirement that my design prototype be manufacturable. I don't pretend for a moment that this bed could be easily manufactured—although with simpler joinery it could, conceivably, be a production prototype.

While joinery was the major design feature of the knockdown bed, this is not true of the three-legged stacking chairs. Here, most of the joinery is straightforward and expedient—socket-head cap screws.

I was aware of precedents to this design. Finnish designer Alvar Aalto made spiral-stacking, circular-seat chairs, and Rudd International manufactures a stacking chair (*FWW* #30, p. 34), but both designs have four legs and don't knock down. Hans Wegner designed a three-legged stacking chair, but it does not stack on the rotational principle. I felt that my

Fig. 1: Platform-bed joint

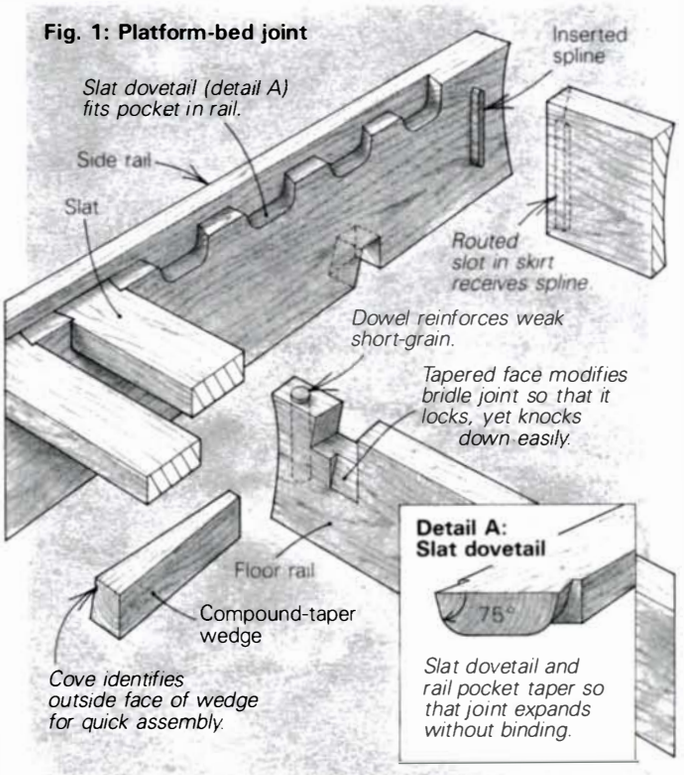
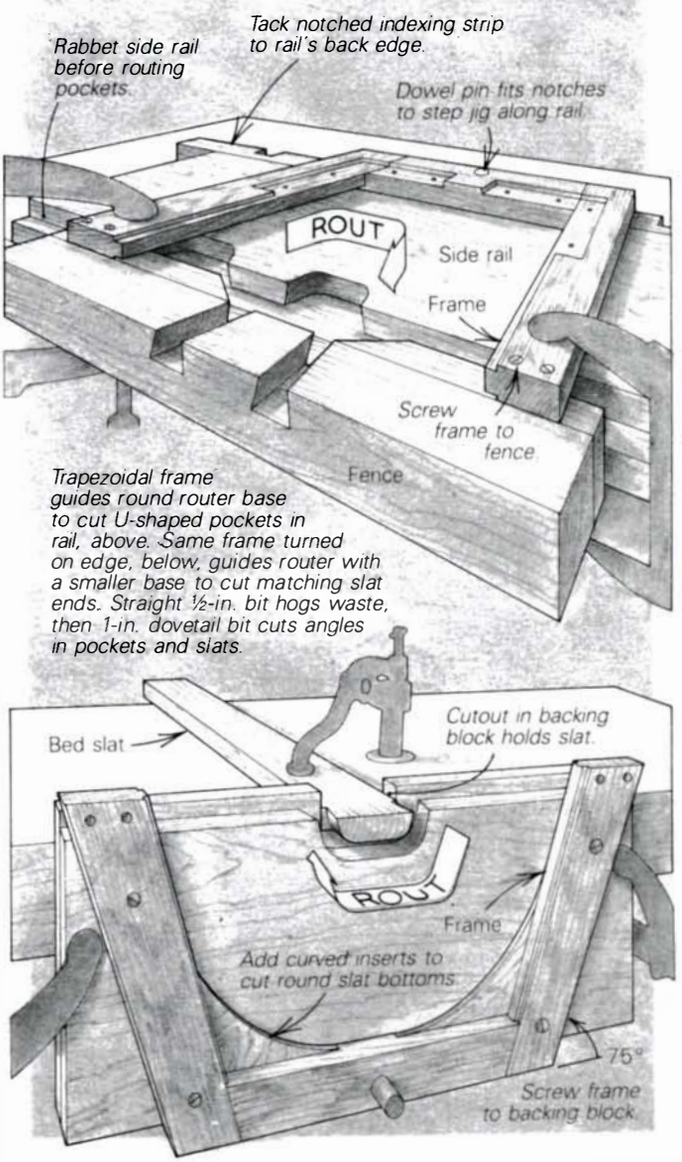
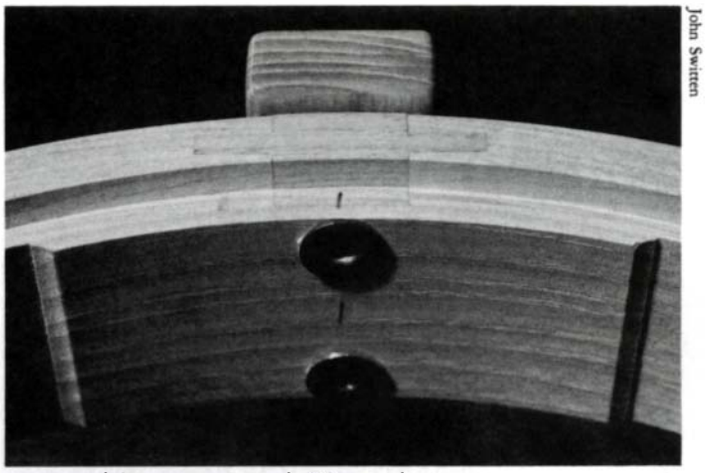


Fig. 2: Two-way router jig for pocket dovetails



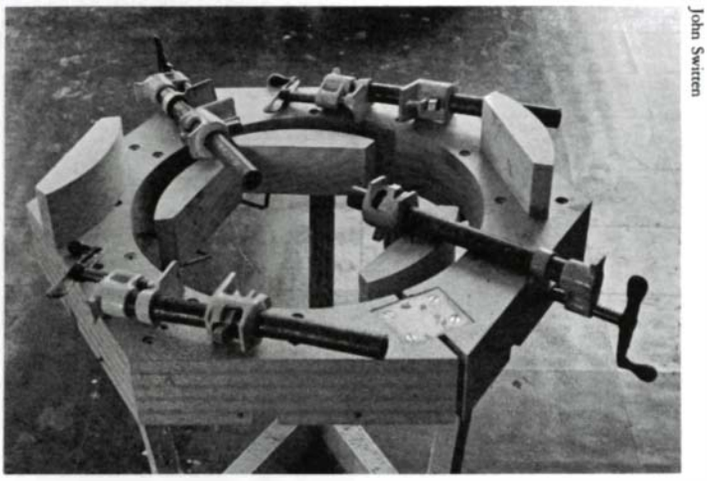
Drawings: David Dann

In these knockdown spiral-stacking chairs, every piece was laminated and bent, then joined together with metal fasteners.



John Switten

A splined key joins the ends of Erpelding's chair-seat rim at the rear leg, above. The legs are fastened to the rim with socket-head cap screws threaded into propeller nuts mounted in a reinforcing block inside the rim. The curved clamping blocks of the chair-seat rim-bending form, below, which fit inside the laminated rim when it's being glued up, are shown resting on the metal pins that align the laminates.



John Switten

design was different enough to justify pursuing.

The final chair design evolved after many paper incarnations. I built a few models, but the mockups only frustrated my thinking. So I put the chair project on the back burner, and returned to it nearly a year later, visualizing a circular seat rim with legs and back supports coming off at points of a circumscribed hexagon. With an idea of what dimensions the chair would need to stack, I began building the bending forms. I guessed, and hoped the calculations were correct, but I could perfect the design only by building the chair.

I bent the backrest by clamping $\frac{1}{16}$-in. ash laminates in a cone-shaped form. The curve of the backrest tapers in radius from top to bottom to follow the bend in the upright back supports. Since the human back also tapers from shoulder to waist, this makes a comfortable chair.

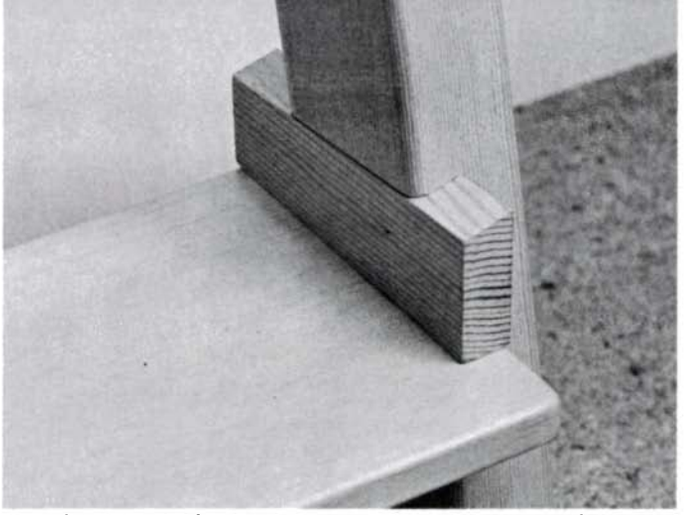
The outside diameter of every seat rim had to be identical, or at least within a $\frac{1}{32}$-in. tolerance, or the chairs might not stack. The rim could have been glued up around a circular form and machined true later, but my shop isn't equipped to do this easily. Instead, I built a peripheral bending form, clamping up the seat rim inside it with curved blocks on the inside surface of the rim. Metal rods projecting from the bottom position the laminates in the same plane during glue-up. To ensure color and grain continuity in the set of chairs, I cut the outside laminate of each rim from the same piece of wood. Planing each laminate before glue-up kept sanding to a minimum. I cut the laminates to a length just shy of the outside circumference. After removing the glued-up rim from the form, I slotted the break with a slotting cutter in a router, and fitted the joint with a key where it joins at the rear leg. I glued an additional reinforcing piece across the joint inside the rim. All of the rims have exactly the same outside diameter.

I drilled the rims and installed propeller nuts (available from Selby Furniture Hardware Co., 17 E. 22nd St., New York, N.Y. 10010) from the inside. Flat-head socket cap screws fasten the legs and back supports, which are also form-bent laminations, to the rim. I put an emery-cloth spacer between the rim and the legs to prevent slippage, and to serve as a shim so that the legs clear the seat rim of the chair underneath when the chairs are stacked.

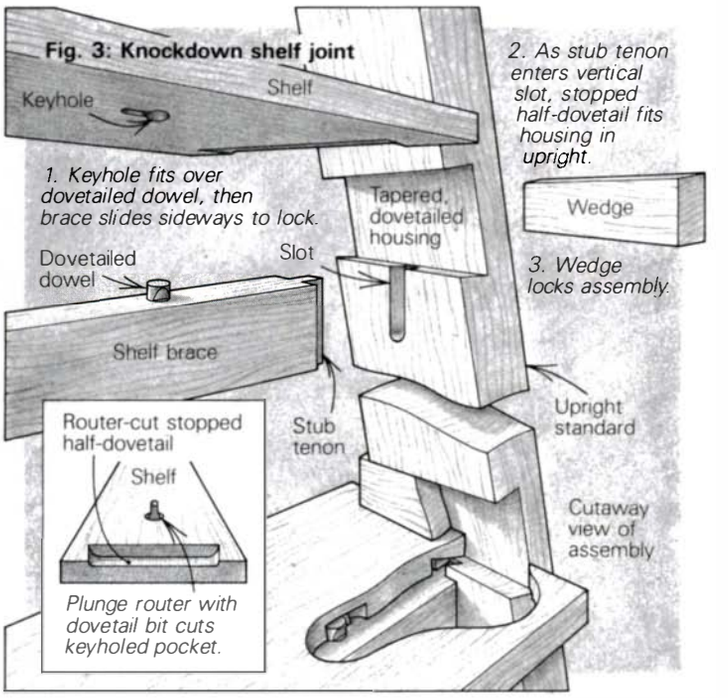
There were few aesthetic decisions in this chair's design. Having stated the problem—a three-legged, knockdown, stacking chair—the design evolved in a purely functional and geometric way. Nearly all of the design decisions—the thickness and width of the members, the radii of the bends, the choice of fasteners and seat cushion—were arrived at as the simplest solution to the stated problem.

The third prototype, a leaning shelf system, was a reworking of an earlier design inspired by Italian designer Vico Ma-

Knockdown leaning shelves are supported by both the wall and the floor. The horizontal braces under the shelves add strength and allow a longer shelf span.



A wedge joint holds the shelves together. The compound taper of the wedge in a dado forms a sliding dovetail and locks tight.



gistretti. With minimal material and no bracing, the bookcase is very sturdy because weight is distributed between wall and floor. The design eliminates the need for shimming or fastening where floors slope, and the piece lends itself well to knockdown design.

I had originally intended to use metal hardware—a bolt passed through the upright standard and threaded into a nut embedded in the end of the shelf. While doodling, however, I came up with the wedge joint which, because it involves wood alone, fit my design philosophy more neatly. At first I used a wedge with a narrow tongue on the top edge which slid into a groove in the upright, but now I use a simpler joint. I've replaced the tongue and groove with a compound-taper wedge that acts like a sliding dovetail (figure 3).

To cut the edges of the dovetailed dadoes in the standards, I used a router with a 1-in. dia. dovetail bit, after wasting the material between with a ½-in. straight bit. A router-cut dovetail pocket on the underside of the shelf end fits into the dovetail-shaped bottom edge of the dado.

The horizontal braces under the shelves add strength and make a longer unsupported span possible (for ¾-in. shelving, 30 in. is about maximum before sagging occurs under load). The braces also stiffen the assembly against racking, act as a stop for books on the shelf below, and center each shelf with respect to the upright standards. The brace attaches underneath the shelf with a keyholed-pocket dovetail. Dovetailed dowels are driven into the edge of the brace, and dovetail slots are cut into the bottom of the shelf with a plunge router. The dowels enter the slot in the hole where the router bit was plunged in. The assembly locks tight when the brace is slid toward one end. A stub tenon on each end of the brace fits into a slot cut into the upright.

I am just now entering the third phase of the grant—researching the possibility of mass-producing the prototypes. Although I received only a one-year grant, I spent more than two years, on and off, working on the prototypes, and I am by no means finished with revisions.

To make an object is to arrange components into a new system. The assembly of parts can be final, the intersections fixed with glue, or it can be temporary—knockdown design. For me, the intersection of the components, the joinery, defines the form—not the other way around. Form is significant only insofar as it is incorporated into the structural integrity of the whole. The knockdown approach focuses on the relationships between the structure's components, and adds a new dimension to form—reconstructability. □

Curtis Erpelding is a professional woodworker and designer in Seattle, Wash. He wrote about making slip joints with the radial-arm saw in FWW *#32.*

Doweling Jigs
Putting nine to the test

by David Sloan

When you're starting out in woodworking, the dowel seems like the perfect answer to every joinery problem. Drill a couple of holes, dribble in some glue and bang in those little wooden nails. If the dowels and holes don't quite line up, a little muscular persuasion will put things right. And if the surfaces aren't exactly in the same plane, the belt-sander offers a quick remedy.

Before long, however, the aspiring woodworker will learn that dowels won't do everything. They are mostly worthless where there is much cross-grain wood movement, or any amount of racking stress, as in chairs. Sure, dowels work well when glued into end grain, because the dowel's fibers line up, and move, right along with those of the main board. Dowels are also great for aligning edge-glued joints where long grain is being mated to long grain, and they keep things from sliding around while you're clamping. They're good for quick frame joints or for lightly stressed rail-to-leg joints, and they work fine in stable, man-made boards. But in most applications, to get the best results with dowels, you need some kind of jig to get the holes lined up and square.

The various doweling jigs on the market are designed to do just that: guide a drill to make accurate, perpendicular holes in the edge, end or face of a board. Most also provide a way to drill mating holes in two boards. A few jigs can make only one type of joint, others can make several, and some are extremely versatile. Deciding which one to buy can be tough.

I tested all the commercially made doweling jigs I could find, nine of them, by making as many different joints as I could with each. I used ⅞-in. thick, 3-in. by 12-in. poplar boards, factory-made birch dowels (both fluted and spiral—I found no obvious advantage to either type), brad-point bits and yellow glue. I evaluated each jig for accuracy, versatility, ease of operation and quality of construction.

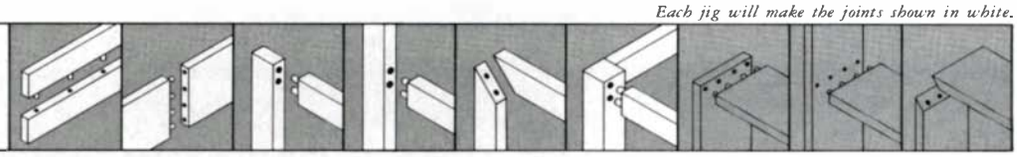
In addition to the jigs, I tested a dowel-former—a ¼-in. thick, hardened steel plate that produces a crude, but functional, dowel when you bang an oversize piece of wood through the appropriate hole (¼-in., 5/16-in., ⅜-in. or ½-in.). This $15 tool could be handy if you run out of dowels in the middle of a job, or want dowels made of your primary wood. I also tried dowel-centers—metal plugs with a point on one end. These are great for curved work that doweling jigs can't handle, and they also work well on flat stock. You drill a hole, insert the right-size plug and press the piece you want to join against the point, which leaves a nice clear center mark for the other hole. You may seldom need a dowel-center, but they're cheap enough ($4.50) to keep on hand.

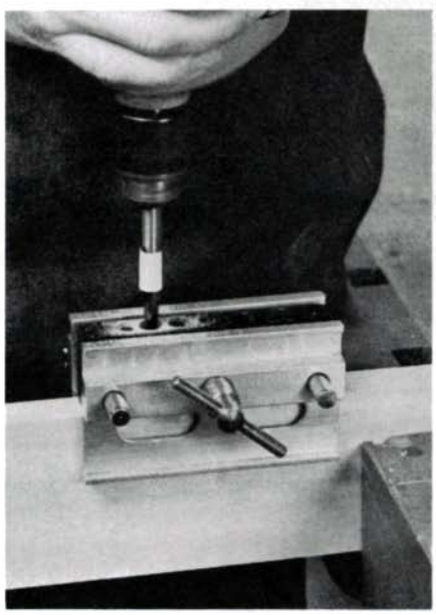
After finishing my tests, I had several favorites. The Dowl-it #1000 was hard to beat for speed and convenience on edge or end joints, and the Dowel-Master and Dowel Magic were really fast on corner joints. These jigs center automatically—I like that. Most times I want a dowel on center, and for the few times I don't, I can use a shim to nudge the Dowl-it off-center. With the Dowl-it and either of these other two, there aren't many jobs I couldn't tackle. But if I could have only one jig, I'd buy the Record. It takes a long time to set up, and its loose bushings are easy to lose, but no other jig can make as many different joints.

David Sloan is an assistant editor at Fine Woodworking. *For more information about dowel joints, see* FWW #7, *pp. 46-49, and* #21, *pp. 68-72.*

Each jig will make the joints shown in white.

Dowl-it #1000	Sugg. price $27.95	Dowel sizes ¼, 5/16, ⅜, 7/16, ½





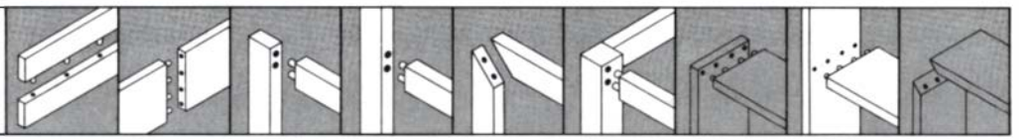
Dowl-it Model #1000—The Dowl-it jig I got didn't look like the one pictured in the mail-order catalog—the gizmo I remembered from junior high school shop. The manufacturer says it's "improved." I'm usually skeptical of "improvements" (translation: cut manufacturing costs and, most of the time, quality), but this time I was pleasantly surprised. The American-made Dowl-it is a durable tool of nicely machined steel and extruded aluminum. The hardened-steel drill guide has five holes (¼-in. to ½-in.), with sizes clearly stamped into the metal. There are no loose parts to lose and no extra clamps required. A large T-handled center screw clamps the extrusions around boards up to 2 7/16 in. thick, and centers the drill guide automatically and accurately. You can drill holes off-center by putting a spacer on one side of the wood.

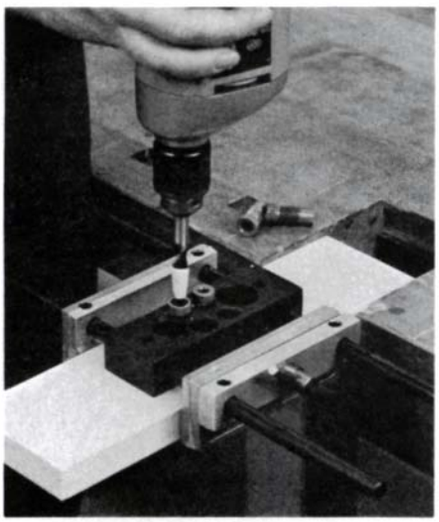
To use the #1000, you first mark the board where you want dowels, then line up the jig's index marks with your pencil lines. You have to read these marks through a slot, which is difficult with overhead light, but this was the only design flaw I found.

Of the nine jigs tested, the Dowl-it #1000 was the handiest and most accurate for edge- or end-doweling, and it's the only one that can be conveniently used on round or odd-shaped stock.

I didn't test the Dowl-it #2000, which is basically the same as the #1000 except for six screw-in bushings that allow you to drill two identical holes parallel to each other, without moving the jig. It's easy enough to do this by moving the #1000, and besides, who needs those loose bushings?

	Sugg price	Dowel sizes
Dowl-it #4000	$72.95	¼, 5/16, ⅜, ½, ⅝, ¾, 1





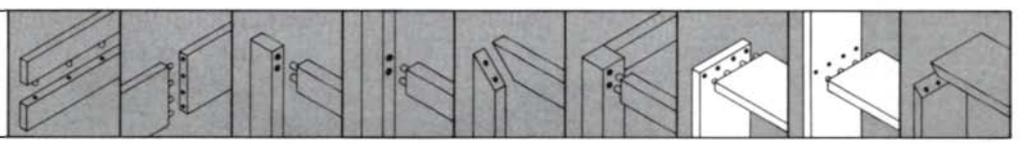
Dowl-it #4000—Weighing just under 4 lb., this behemoth was, at $72.95, the most expensive jig tested. Like the #1000, its quality is high. Two clamping heads and a steel drilling guide slide on two rods. A T-handled screw then tightens the heads. There are seven drill sizes (¼-in. to 1-in.), the three smallest in the form of pairs of threaded bushings that enable you to drill two identical holes without moving the jig. The four larger drill sizes are permanent holes.

Unless you improvise with spacer blocks, the #4000 will drill holes only in the face of a board, or in the edge or end of boards thicker than 1½ in. It can drill anywhere on the face of a board as wide as 12 in., and wider if you add longer rods. It was the only jig tested that could accommodate ¾-in. and 1-in. dia. drills.

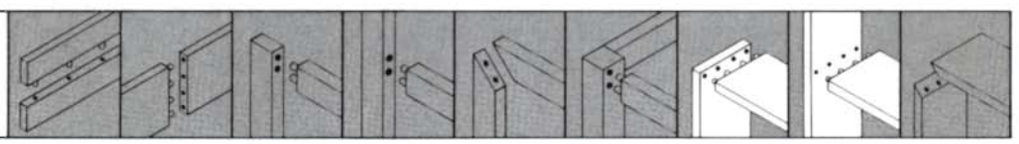
Alignment marks incised on the jig are easy to read on wide stock, but on narrow stock, parts get in the way. No instructions came with my jig, and it doesn't center automatically, but the thing I like least about this one is that you need an Allen wrench (not supplied) to make all the adjustments. Knurled screws, which could be finger-turned, would be a great improvement.

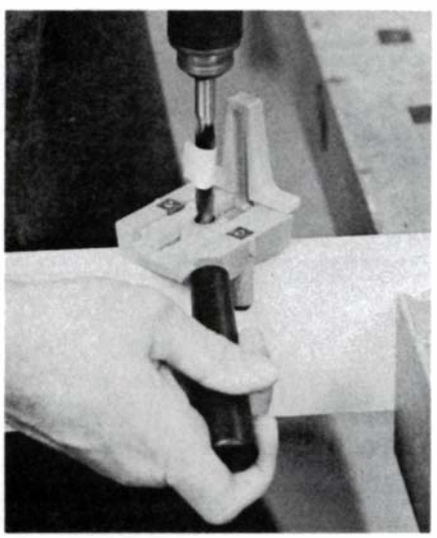
This jig is hard to beat for drilling holes on the face of a board or a beam, but for most cabinet-scale work, it's just too massive. If you work with large, thick stock, this may be the jig for you.

	Sugg. price	Dowel sizes
Disston Dowel Magic	$11.40 (¼-in.)	¼, 5/16, ⅜



	Sugg. price	Dowel sizes
Wolfcraft Dowel-Master	$19.95	¼, 5/16, ⅜





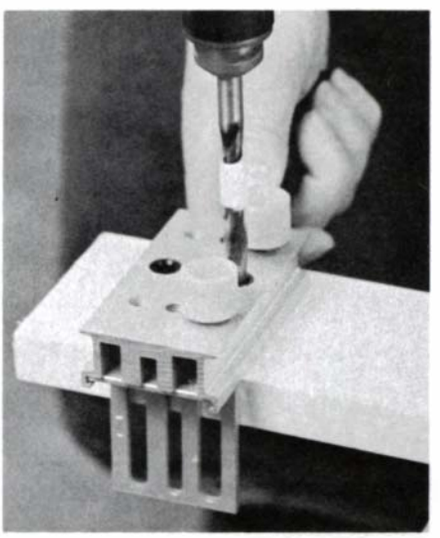
Disston Dowel Magic—This plastic contraption, imported from West Germany, drills only one size hole. You must buy a separate jig to change dowel sizes. At $11.40 for the ¼-in. model, it was the least expensive jig tested. The same jig is sold under the Coastal label.

Two plastic posts protrude from the square face of the jig, flanking a steel drill-guide bushing. A pair of machine screws with nuts clamp a sliding plastic fence to the base.

The Dowel Magic makes only 90° edge-to-face corner or "T" joints, a job it does quickly and well. It can handle stock of unlimited width, up to 1¼ in. thick. You place the jig posts astride the board's edge, which automatically centers the hole, and drill. The indexing marks don't work for edge-drilling, so you have to eyeball the location, which I found fairly easy to do. Then you slide the jig along the edge to drill more holes. Next you put dowels in the holes and clamp the mating board flat on top of the first. When you invert the jig, its slotted fence fits over those dowels to locate the holes on the face of the second board.

I tried both the ¼-in. Disston and the ⅜-in. Coastal. Base sections that were solid plastic on the Coastal were ribbed or hollow on the Disston, but this was the only difference I found, and it didn't seem to affect performance.

I wasn't thrilled about the plastic construction, but it keeps the cost down, and I don't think metal would work any better. The drill was a sloppy fit in the guide bushing. The square nuts that held the fence fell off and got lost.

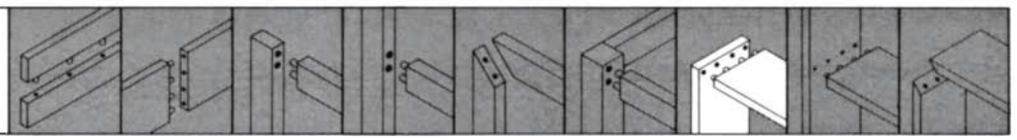


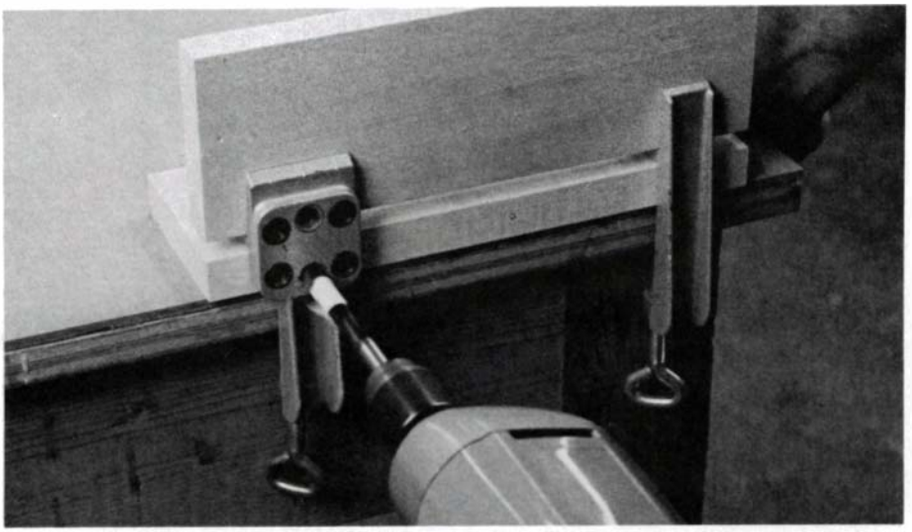
Wolfcraft Dowel-Master—Similar to the Dowel Magic in design and operation, this German-made jig is very well built. Unlike the Dowel Magic, one size jig can drill all three hole sizes (¼-in., 5/16-in. and ⅜-in.). It's also more durable—aluminum extrusions, with steel drill guides. It uses dowels in the edge of one board to locate holes in the face of the second board, and it's limited to corner joints or "T" joints.

My only complaint: When I flipped the jig to drill the second board, I had to reset the depth gauge on my drill. Other than that, the jig performed well and was convenient to use.

(continued on next page)

	Sugg. price	Dowel sizes
Disston Doweling Jig Clamps	$27.30	¼, 5/16, ⅜





Disston Doweling Jig Clamps—This German-made, die-cast aluminum jig consists of two clamps: one with steel drill guides (¼-in., 5/16-in. and ⅜-in.), and one without. The clamps are used to hold one board flat on the benchtop and the other board on edge at 90°. This jig can make only a 90° corner joint, in stock up to 15/16 in. thick.

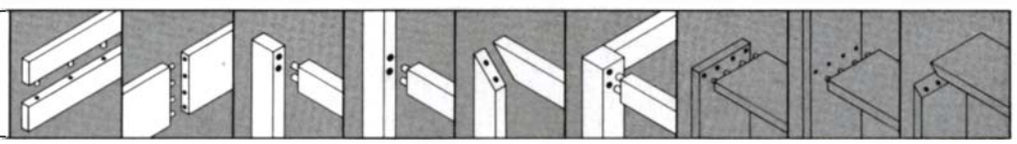
To use the jig, you set up the boards with one clamp at each end, drill a hole in each board, loosen the clamp with the drill guides, move it, retighten it and drill two more holes, and repeat for each pair of holes. When you get to the board's other end, you have to switch the clamps to drill the last set of holes.

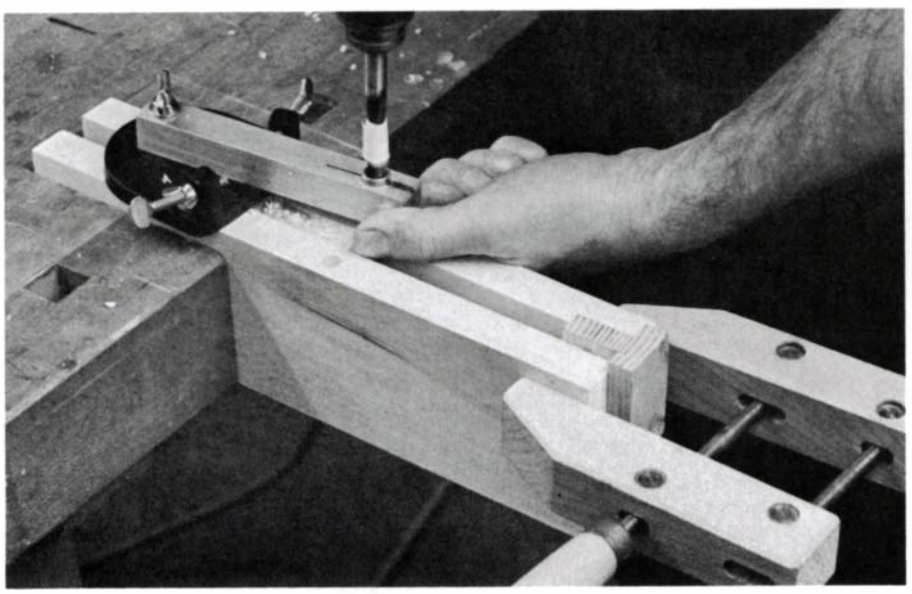
I liked not having to set up extra clamps, but the jig clamps' 2¾-in. throat capacity couldn't grab my 4-in. thick benchtop. It was easy to line up the jig's indexing marks with my pencil lines on the face and edge of the boards, so I got the holes exactly where I wanted. The clamps held the boards firmly for drilling, but the drill was sloppy in the guide bushing. I also found it tedious to unclamp, move and reclamp.

When I drilled the ¼-in. holes, I discovered that they were way off-center: ⅛ in. from one edge and ½ in. from the other edge of my ⅞-in. thick board. There is no way to remedy this. The 5/16-in. and ⅜-in. holes were slightly better—3/16 in. from one edge. This doesn't affect the alignment, but the dowels are too close to the outside corner.

Disston's jig (also sold under the Coastal brand for $19.95) comes in a box marked "best," while their Dowel Magic is marked "better," but I found the latter more useful and a better buy. Although the Doweling Jig Clamps made a joint with good alignment, they were inconvenient to use and will probably end up gathering dust in my shop.

	Sugg. price	Dowel sizes
HIT Products Precision Doweling Jig	$25.95	3/16, ¼, 5/16, ⅜

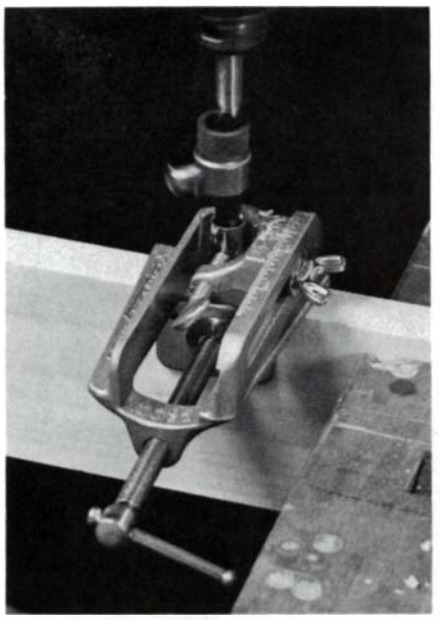




HIT Products Precision Doweling Jig—This aluminum and steel jig is radically different from any other jig on the market. The two boards to be doweled are clamped edge-up, one on each side of the ½-in. thick aluminum vane on the bottom of the jig. An aluminum arm, which holds a steel drill-guide bushing (3/16-in., ¼-in., 5/16-in. and ⅜-in. bushings are supplied), swings from side to side over the edges. You adjust a bolt on each side of the jig to stop the arm where you want the hole. Once the arm is set, you lock it with a wing nut, drill one hole, loosen the wing nut, swing the arm over the other board, and repeat the procedure. All the holes are the same distance from the edge of the board, though not necessarily on-center. The jig reaches to the center of a 1½-in. thick board; thicker stock can be doweled, but with holes off-center.

It took a long time to set up this jig, and using it wasn't easy. I needed a vise, a clamp, a wooden "T" spacer block (supplied with the jig), a 7/16-in. wrench to change bushings, scrap pieces, and four hands—the "T" block kept falling out whenever I tried to clamp the two boards in the vise. I finally got all my holes drilled, but despite careful rechecking, the alignment was off by 1/16 in. I blame the wing nut, which is supposed to lock the arm tight. It doesn't, so the arm wobbles around when you're drilling. I was intrigued by this jig's design, and impressed by the quality of construction, but in use it was a big disappointment.

	Sugg. price	Dowel sizes
Stanley No. 59	$44.45	3/16, 1/4, 5/16, 3/8, 7/16, 1/2
General No. 840	$24.95	3/16, 1/4, 5/16, 3/8, 7/16, 1/2

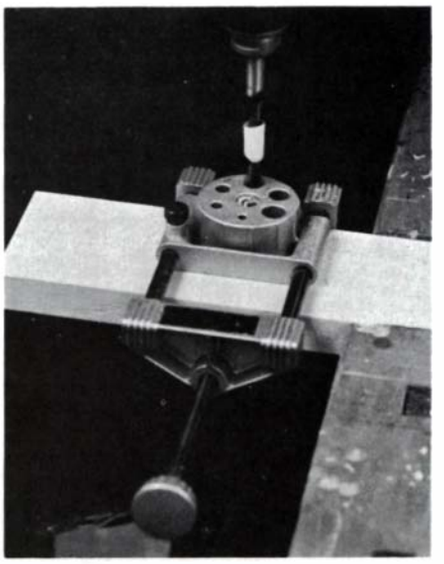


Stanley No. 59—This well-made, die-cast metal jig has a built-in screw that clamps on stock up to 2⅞ in., and a sliding guide-bushing holder that can be set anywhere on the board. The jig comes with six loose guide bushings (3/16-in. to ½-in.), which fit one at a time in the holder, and a useless, one-size-fits-all depth gauge (my favorite depth gauge is a piece of tape wrapped around the drill bit). This jig doesn't center automatically. To center a hole, you line up a mark for your bushing size on the graduated scale (which is accurate), then lock it with a thumbscrew.

The American-made No. 59 was easy to set up and performed well—one of the better ones. I liked it best for drilling a series of holes for a mortise. But the loose bushings and lack of a self-centering feature dampened my enthusiasm.

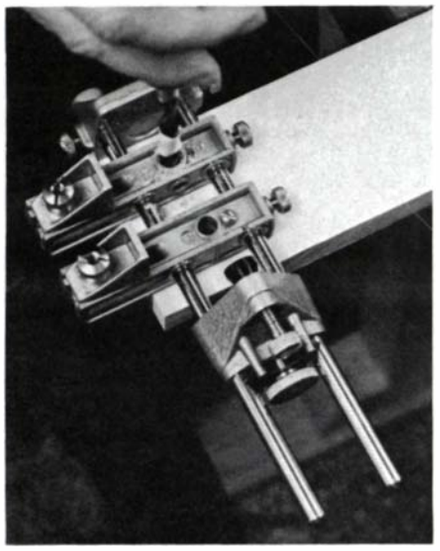
General No. 840—Also sold by Sears under the Craftsman brand ($21.49), this die-cast aluminum jig seems to be an attempt to improve upon the Stanley No. 59. It has a revolving turret with six drill-guide holes (3/16-in. to ½-in.), instead of Stanley's loose bushings. The turret clicks in place to index the desired hole. Like the Stanley, this jig fastens on the edge or end of a board with an integral clamp. The carriage slides on two steel rods to locate holes on- or off-center. You can drill the edge, end or face of stock up to 4⅜ in. thick.

The General is not self-centering. A measurement scale on one of the steel rods lets you locate the center of the hole once you've measured the board thickness. The scale is accurate, and I had no trouble using it.



This jig was easy to work with. No extra clamps are needed to set up, and there are no loose drill guides to lose. It's well made, but the turret has about 1/32 in. of play. Surprisingly, this didn't seem to cause any major alignment problems. The depth gauge that comes with the jig is worthless—it's clumsy and it doesn't fit small drills properly.

	Sugg. price	Dowel sizes
Record No. 148	$59.90	1/4, 5/16, 3/8, 8mm, 10mm



Record No. 148—This British-made jig is a complicated-looking device: Two 6-in. polished steel rods hold a stationary reference head at one end and a sliding head at the other. Between the heads, two drill-guide bushing carriers slide back and forth. You clamp a board between the heads and move the carriers to locate the holes. Five bushing sizes are supplied: ¼-in., 5/16-in. (6mm), ⅜-in., 8mm and 10mm. The basic jig will dowel boards up to 6⅜ in. wide, but optional rods are available, in two lengths, that will extend the capacity to 12¼ in. and 18¼ in., respectively.

There are lots of adjustments, but knurled screws, some of which are slotted, so you can tighten them with your fingers or with a coin or a screwdriver, make it easy. Except for the steel rods and screws, the jig is made of painted, die-cast metal.

The illustrated manual has good, clear instructions, in four languages. I had no trouble using the jig, but I found set-up to be time-consuming, and there were loose bushings—my only complaints.

Equipped with the 18-in. rods, the Record is the most versatile of the jigs tested, but it can't handle round stock. It performed well, though it could stand some improvement. The play in the bushing-carrier assemblies, for example, could be eliminated if these were machined instead of cast and painted.

Some of the other jigs are faster and easier to use, but if you want one that does it all, this is the one to buy. □

Boston Bombé Chest

Bulging drawer fronts are all shaped at once

by Lance Patterson

More than 50 pieces of American bombé furniture made in the last half of the 18th century still exist. Surprisingly, all were built in or around Boston. The kettle-shaped bombé form (the term is derived from the French word for *bulge*) is characterized by the swelling of the lower half of the carcase ends and front, with the swell returning to a normal-size base. This shape is, I think, directly related to English pieces such as the Apthorp chest-on-chest, which was imported to Boston before 1758 and is now at that city's Museum of Fine Arts. Bombé was popular in England for only 10 to 12 years, but remained the vogue in Boston for nearly 60 years.

In America, the carcase ends were always shaped from thick, solid planks of mahogany. In Europe, the ballooning case ends were most often coopered—3-in. to 4-in. pieces of wood were sawn to shape, glued up, contoured and then veneered. Instead of veneering, the Americans worked with solid wood. I think the magnificent grain patterns of this shaped mahogany are a major attribute of Boston furniture. The bombé form, I believe, also shows the enthusiasm that 18th-century cabinetmakers must have felt when wide, clear mahogany first became available to them.

There was also an evolution in the treatment of the case's inside surfaces and, consequently, in the shape of the drawers. On the earlier pieces, the case ends are not hollowed out and the drawer sides are vertical. Some transition pieces have lipped drawer fronts, the lip following the curve of the case. The fully evolved form has hollowed-out ends and drawers with sides shaped to follow the ends. Some of the later pieces have serpentine drawer fronts.

I will describe how I built a small bombé chest with four shaped drawers, ball-and-claw feet and a serpentine front. I didn't take step-by-step photos while building, so I'll have to

Patterson's bombé chest, based on an 18th-century design, has four dovetailed drawers and ball-and-claw feet. Side view, right, shows shape of serpentine front.

Photos this page: Lance Patterson

Fig. 1: Patterson's plans for a Boston bombé chest

BILL OF MATERIALS

Description	Rough Dimensions Amt.	T	W	L	Finished Dimensions Amt.	T	W	L
Case								
Top	1	1	20¼	39½	1	⅞	19¾	38½
Bottom	7	1¾	3	36¾	1	1½	19¼	35¾
Ends	2	12/4	20½	25	2	⅞	20	24½
Rail I	1	1	4	38	1	13/16	3½	34
Rail II	1	1	4	38	1	13/16	3½	35
Rail III	1	1	4	38	1	13/16	3½	38
Drawer runners I	2	4/4	2	15⅜	2	13/16	1¾	14⅞
Drawer runners II	2	4/4	2	16	2	13/16	1¾	15½
Drawer runners III	2	4/4	2	17½	2	13/16	1¾	17
Runner supports	2	4/4	3½	19½	2	¾	3	19
Feet with one ear	2	12/4	8	16	4	2⅞	7	7½
Ears	1	12/4	4	14	4	2⅞	3⅞	2½
Backboards	3	⅝	6¾	38	3	⅜	6¼	37½
Back cleat strips	4	⅝	2	38	4	⅜	1½	37½
Drawer I								
Front	1	12/4	4¼	38	1	⅞	3⅞	32¼
Sides	2	⅝	4¼	17	2	½	3⅞	16¼
Back	1	⅝	4	33	1	½	3⅜	32¼
Bottom	1	⅝	16½	32	1	⅜	16⅛	31⅝
Drawer II								
Front	1	12/4	6	38	1	⅞	5¾	33⅜
Sides	2	⅝	5¾	17	2	½	5⅜	16⅞
Back	1	⅝	5	34	1	½	4¾	33⅜
Bottom	1	⅝	17¼	34	1	⅜	16¾	33
Drawer III								
Front	1	12/4	7	38	1	1	6½	36⅜
Sides	2	4/4	6½	19	2	⅝	6⅛	18⅜
Back	1	⅝	5½	37	1	½	5⅛	36⅜
Bottom	1	⅝	18¾	37	1	⅜	18¼	36
Drawer IV								
Front	1	12/4	8	38	1	1⅜	7¾	36⅜
Sides	2	5/4	7½	19	2	1	7	18⅜
Back	1	⅝	6	37	1	½	5⅝	36⅜
Bottom	1	⅝	16½	32	1	⅜	16⅛	31½

All measurements include length of tenons and dovetails.

Plan view section B

Plan view section A

C/L

Sweep of rail I

Sweep of rail III

Sweep of rail II

Outline for template in Fig. 3C

Detail A: Rail and drawer runner

Notch

Drawer stop

Drawer runner

Drawer-runner support

Slot for screw

End

Stub tenon

Rail

Flat field aligns with case end.

Cock beading

Stepped dovetail

Drawer side

Rail I

Rail II

Rail III

Cock beading

Drawer-runner support

Leave wood here until after glue-up.

Ear

Front elevation

Housed tapered dovetail

Drawer I

Drawer II

Ripping angle for drawer front

Screw slot

Tail C/L is parallel to long edge of board to minimize short-grain.

Drawer III

Ripping angle for drawer front

Drawer-blank outline

Drawer stop

Drawer IV

Ripping angle for drawer front

Mortise and tenon

End elevation

0 1 2 3 4 5 6

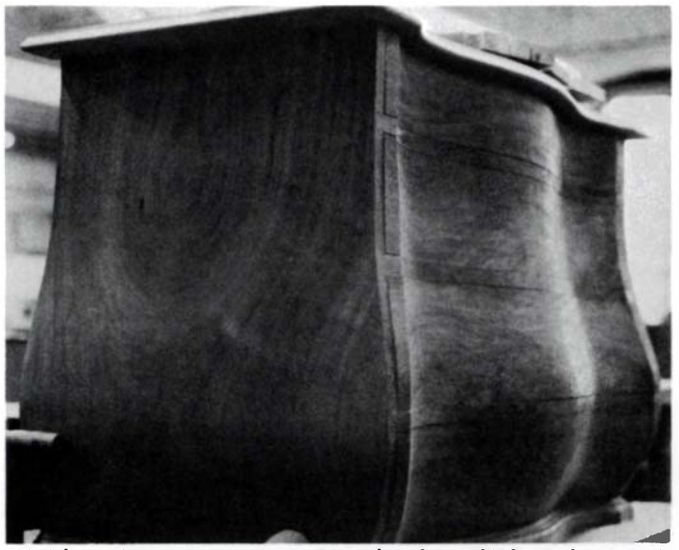
Scale in inches

Grain direction

C/L

Plan is based on four existing 18th-century bombé chests. Three of the originals are at the Museum of Fine Arts in Boston, the Rhode Island School of Design and the museum at Winterthur, and one was privately acquired through Israel Sack & Sons.

Don Burkey



Vivid grain patterns are exposed when thick mahogany is shaped. Making the board's bark side convex yields a hyperbolic figure, as in the author's chest, above; cutting into the other side produces elliptical patterns, shown in the photo on p. 56.

illustrate some operations with photos of Jerry de Rham building his bombé desk at Boston's North Bennet Street School, where I teach. His version is of the basic bombé form: the front is not serpentine, but bulges to match the ends.

It's unclear how early cabinetmakers made the shaped drawers, but it probably was done by trial and error, then angle blocks and patterns were made for future reference. There are graphic methods for figuring the angles, and mathematical methods are quick and accurate, too, as explained in the box on p. 57. The same techniques can be applied when designing anything with canted sides and ends, such as a cradle, dough box, or splayed-joint stool or table.

The first step in any project of this scope is to make full-size orthographic drawings, primarily to facilitate making patterns for shaped parts. This also helps you work out joinery dimensions, and preview the actual size and look of the piece. In developing drawings, I like to gather information from all the sources I can find. I know of four original chests similar to mine—one was privately acquired through Israel Sack & Sons, and the others are at the Museum of Fine Arts in Boston, the Rhode Island School of Design, and Winterthur. Measured drawings of the chest at RISD can be found in *Masterpieces of Furniture* by V.C. Salmonsky (Dover Publications). After building the chest, I revised my drawing by adding ½ in. to the bottom drawer height. Because this drawer recedes from the common viewing angles, it appears narrower than it is. Usually I follow the rule of thumb that drawer height plus rail height should equal the height of the next lower drawer.

The wood for my chest was a 12/4 plank of South American mahogany, 12 ft. by 22 in., and a 4/4 mahogany board, 40 in. by 21 in., with secondary parts of poplar. For effective use of grain, the symmetry of the ends and the continuity of the front are the most important considerations. I laid out the ends book-fashion, with the bulge toward the wider annual-ring pattern (figure 2). Either face of the plank can be used as the outside; both elliptical and hyperbolic annual-ring patterns are beautiful. I chose the bark side of the plank, producing a hyperbolic pattern at the bulge, as shown in the photo at left. De Rham's desk shows the characteristic elliptical pattern of the heart face, best seen in the photo on p. 56.

To avoid conflict between the long grain and the cross grain around the case, and to eliminate applied moldings, I departed from traditional construction. I used a thick mahogany bottom with the base molding cut into it. Thus the end base molding is end grain, but so is the molding on the top's end, and there's a lot of end grain in the serpentine front molding as well. I especially like end-grain molding.

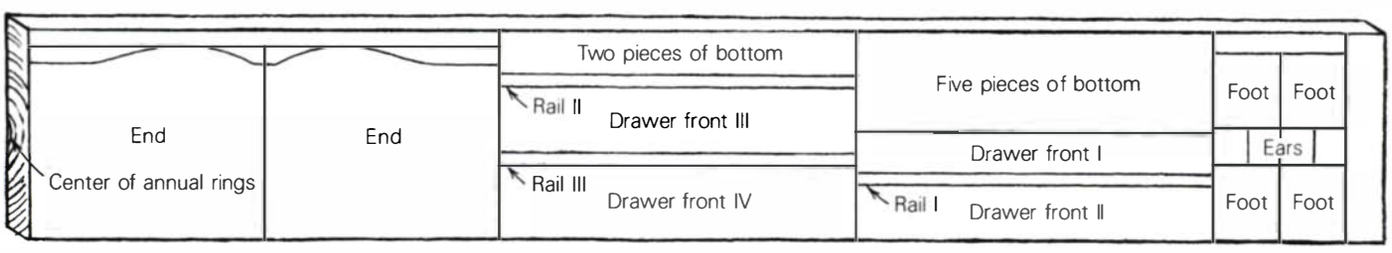
To shape the chest, first rough-saw all the parts according to the rough stock list on p. 53. Note that the final dimensions differ considerably in many cases, but the parts should be cut oversize to ensure that they can be shaped with the setups shown in figure 3. Next, rip the front pieces for the three lower drawers at the angles shown on the side-elevation drawing in figure 1 so that they can be canted to provide the necessary thickness for the serpentine shape. Mark out the rails from the centerline and bandsaw them to shape.

I shaped the front as a unit, the method I recommend for any serpentine or oxbow casework. Mount the drawer fronts and rails on the benchtop jig shown in figure 3A, made with two 2-in. wide supports cut to match the rail and drawer-front profile. I tack-glued the parts to each other at the ends and added two bar clamps for support during shaping.

Using the full-size patterns, trace profile shapes on all four edges of the assembly. These lines, with the bandsawn rails, are your guides for the compound curves. With a large, shallow gouge, I first roughed out the concave areas and then the flat fields at the ends. Now spokeshave to the profile lines, using a square from the end surface to check the front. I used a bandsawn three-dimensional pattern, shown in figure 3C, to draw the line of the corner in to where the flat fields meet the serpentine shape. The rest of the front was shaped from this line. I did most of the gouge work across the grain, following up with spokeshaves, cutting from high to low in various directions. I sawed an inch off the handle of my No. 151 round-bottom spokeshave to reach all the concavities.

The front should be symmetrical and free of lumps,

Fig. 2: Plank-cutting diagram

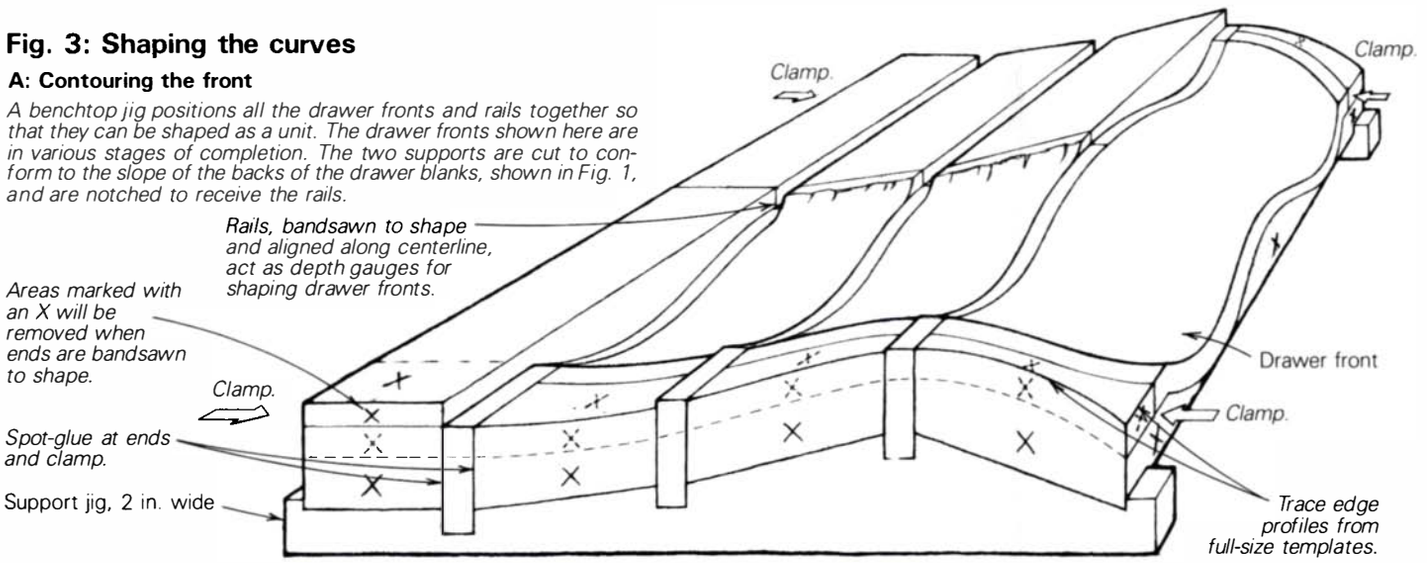


Most of the major parts were cut from a 12/4 South American mahogany plank, 12 ft. by 22 in. The case ends were laid out book-fashion with the bulge toward the wider annual ring pattern.

Fig. 3: Shaping the curves

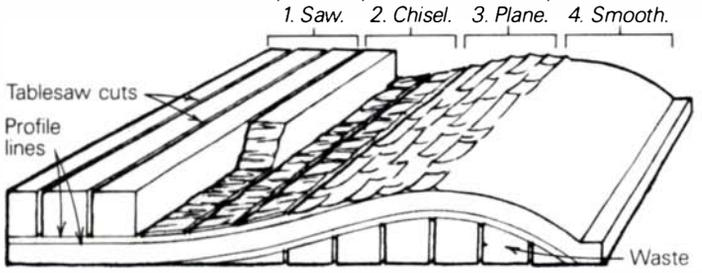
A: Contouring the front

A benchtop jig positions all the drawer fronts and rails together so that they can be shaped as a unit. The drawer fronts shown here are in various stages of completion. The two supports are cut to conform to the slope of the backs of the drawer blanks, shown in Fig. 1, and are notched to receive the rails.



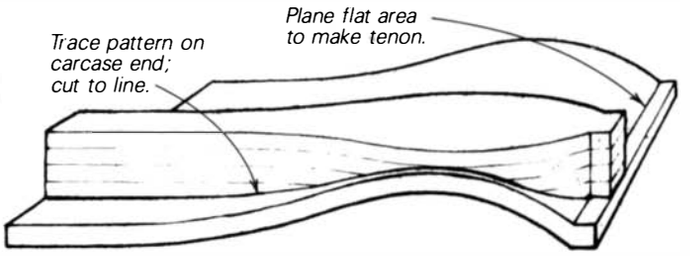
B: Shaping the ends

Carcase ends are rough-shaped by making tablesaw cuts every 2 in. about ¼ in. short of the profile lines traced on the edges. These parallel sawcuts allow the waste to be removed quickly with a wide chisel. The contours are smoothed with planes, spokeshave and scraper.



C: Matching the curves

Three-dimensional pattern, bandsawn to match chest outline in Fig. 1, allows you to draw a fairly accurate pencil line over the contoured surface to define the corner where the case ends meet the front.



smoothly curved in all directions. The final scraping and adjusting of the field lines can't be done until the case and drawers have been assembled, yet before the cock beading is carved. The gouge work goes quickly and is fun. It's important to stay relaxed, and I try to keep a rhythm to my mallet blows. Hollow the backs of the drawer fronts individually, but leave enough flat area at both ends to pass each piece over the tablesaw, to mark out the dovetails, and to check for any movement after shaping. If there is any winding or other movement, first plane it out of the back of the drawer front, thus making a reference surface for correcting edges and ends.

Now put the front assembly aside, and turn to the case ends. Cut them to their finished width of 20 in., but leave the length and thickness rough. With the flat patterns, trace the shape of the long-grain edges. Rough out the contours by making tablesaw cuts about every 2 in., as in figure 3B. I stopped the cuts about ¼ in. away from the profile line to allow for the inevitable movement: the top of my ends cupped outward, though I suspect that the bulge prevented significant cupping at the bottom. The sawcuts allow the bulk of the waste to be chiseled away quickly, after which it's best to let the wood settle for a couple of days. Then plane the inside areas near the top and bottom edges flat and parallel, and retrace the pattern. Now scrub-plane across the grain down to the line, and finish up with smooth plane and spokeshaves. Place the three-dimensional pattern over the contour and trace the profile of the long edges. Bandsaw the ends to shape, and true up the top and bottom edges.

To join the case, first attach the ends to the top with housed tapered dovetails. When fitting the joint, I tapered the square side of the half-dovetail with my shoulder plane because I don't have a dovetail plane that will taper the angled side, as is usually done. Otherwise I used traditional methods of sawing, wasting with a chisel, and cleaning up with a router plane. When drawn home, these joints establish the width of the case, and thus locate the mortises in the base.

I made the case bottom from seven pieces, 36¾ in. by 3 in. by 1¾ in., ripped from waste sections of the plank. The thickness lets you shape the base itself, rather than having to use applied moldings. The moldings on the top and base are cut on a spindle shaper, as are the rabbets in the ends. I grind my own cutters. Nine tenons join each end to the base, allowing a lot of grain to run through to the molded edge. There is a short-grain problem inside the case ends between the tenons, so leave extra wood here until after glue-up to prevent a crumbled edge.

Rails on 18th-century Boston cases are typically 4 in. to 6 in. wide, with secondary wood often joined to the primary wood. I think that 3½ in. to 4 in. is wide enough to keep the rails straight. Assemble the case dry, position the rails (aligning the center marks), and cut them to length. Slide the rails in on the stub tenons, scribe the stepped dovetails and cut the mortises for the runners in the rails (figure 1, detail A). The case is ready to be glued up. To avoid friction between parallel edges, the dovetails joining the top and ends must be slid in individually before the rails and base are added.

Glue blocks or screws usually support the runners in bombé cases. To provide support while allowing movement, I used a vertical strip of poplar, notched to support each runner, at the back of the chest. Stub tenons hook these two vertical supports to the base, and screws through slots hold them at the top. The runners are screwed to the case ends

Drawing this page: Lee Hov

through slots at the back. De Rham used oak supports and fastened them both top and bottom with screws, as shown in the photo at right. I didn't glue the runner tenons in until later, after some finish had been applied to the inside of the case.

Notched vertical members support drawer runners at back.

Bevel dovetails are needed for the lower three drawers, since both their sides and fronts are angled. As discussed in the box on the facing page, cut the drawer parts to length at the proper end and bevel angles, and then before shaping the drawer sides, cut the dovetails. Next, to fit each drawer front into the case, position it over its opening and scribe the curve of the case ends onto the dovetail pins from inside the case. Trim the pins to the scribe line to get the drawer front started in the opening and to check the fit. Then trim the rest of the drawer front to the pins. The grooves for the drawer bottoms are cut on the shaper wherever possible; the rest is done by hand. Assemble the drawers and plane the drawer sides down to the curve of the drawer-front ends. The drawer bottoms are solid wood, with the grain running from side to side and three sides beveled from underneath to fit the grooves.

With the case on its back, block up the drawers flush with the rails. I established the line of the corner between the flat fields and the serpentine shape by running a compass along the curve of the ends. Scrape the entire front to smooth all the contours, taking care to leave the flat fields at a uniform width that is crisp and clean. Then, after removing the drawers, use a scratch stock to make most of the cock beading on the rails and the case ends. The scratch stock will have to be adjusted for the middle rail, because of the angle of its face. The beading at the corners is carved.

The back of the chest is made of wide and narrow horizontal boards with overlapping rabbets. The narrow boards are screwed into the rabbets at the case ends, but the wide boards are free-floating and can move.

Jerry de Rham, a student at North Bennet Street School, scrapes his desk front smooth. Note the alternate traditional design—the front is not serpentine, but matches the curve of the sides.

The grain runs vertically in the feet and their ears. I bandsawed each foot with one ear as part of it and the other ear applied. This uses a little more wood, but it eliminates half the glue joints, and the grain match, of course, is perfect. The feet are stub-tenoned to the base, and I put a screw through a sloppy hole in each ear into the base. The feet are carved as large as possible in the 12/4 pieces. (For an article on how to carve ball-and-claw feet, see *FWW* #10, pp. 58-59.) The side toes are angled slightly forward, but the tips of the claw extend to the diagonals of the square blank. I also keep the knuckles of the rear, side and front toes different distances from the floor, to avoid a box-like appearance. The bones of each toe get progressively longer as you go back from the nail, and the number of knuckles is anatomically correct. The ball itself and the claws are smooth, but I left tool marks on the rest of the foot up to the ankle. The case is designed so that the line formed where the flat field ends and the serpentine shape begins runs across the base molding and around the transition as a miter corner, and ends at the point representing the fetlock. I think knee carving suits this design if the mahogany is highly figured. But if the wood is straight-grained, as mine was, then a less fancy style is better.

Bombé chests deserve the best traditionally made hardware: I spent more money for the hardware than for the lumber. My thin cast brasses with separate posts are from Ball and Ball, 436 W. Lincoln Highway, Exton, Pa. 19341. I shaped a pine block to help bend the plates. To seat the posts properly, I drilled post holes perpendicular to the tangent of the curve, then I adjusted the bails to fit the posts. I used #0 by ¼-in. round-head brass screws to attach the keyhole escutcheons, so they are easily removable. All the locks needed 1⅛ in. to the selvage. I used a slant-top desk lock on the lowest drawer and made strike plates for all the locks.

To finish the chest, I gave it one very thin wash coat of orange shellac, to set up the grain for its final sanding, then used boiled linseed oil. If applied in very thin, hand-rubbed coats, linseed displays the grain with depth, clarity and warmth. I don't thin oil greatly with turpentine (never more than 1 part turpentine to 20 parts oil), nor do I apply soaking coats. I don't think these methods significantly increase penetration, and I suspect that not all of the oil oxidizes, so you risk bleed-out problems. I do add a little Japan drier. I store my oil in a colored glass bottle placed in direct sunlight—I think this helps polymerization and drying. It is most important to apply the oil in the thinnest layers possible and to give it adequate time to oxidize between coats. Each coat should be rubbed hard to build up enough heat to force the oil into the pores and to level the surface. Carvings and moldings should be brushed vigorously to remove excess oil. Instead of waxing, I prefer to build up the oil slowly to a high gloss.

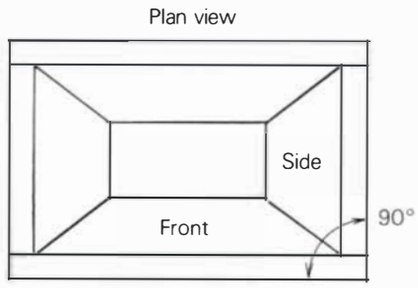
Like most 18th-century furniture, each Boston bombé piece is a complete design in itself, independent of its environment. It has character and warmth which are a joy to live with. Its shape continually invites you to run your hand over its curves, or even to tickle its carved feet. □

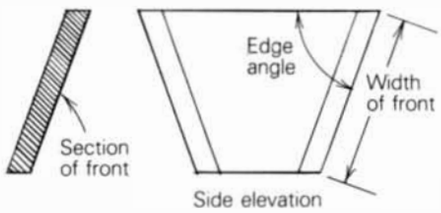
Lance Patterson is a cabinetmaker and shop instructor at the North Bennet Street School in Boston, Mass.

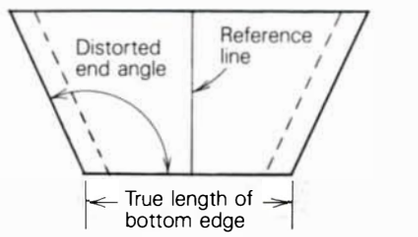
Photos this page: Brad Mayo

How to make slope-sided boxes

Plans for slope-sided boxes, such as the drawers in the bombé chest on p. 52, aren't in the perspective we're used to. In a front-elevation drawing, the front measures less than its true height because it is tilted out of the plane of the drawing. Here is a method for reading tilted plans, laying the pieces out, and setting the tablesaw to cut the elusive angles involved. In this particular hopper, the front and the back could be cut with the same saw settings, but for clarity, let's consider just the front.

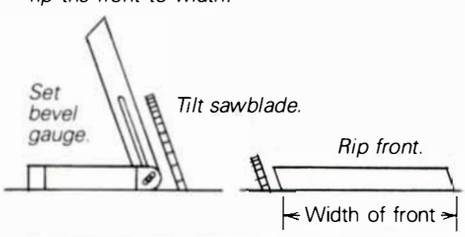




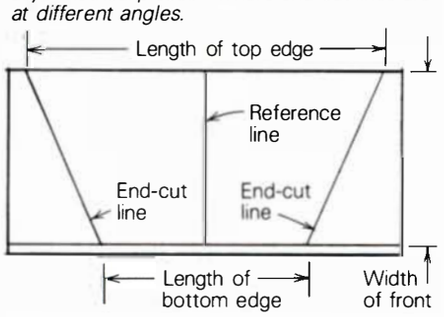


With no math at all

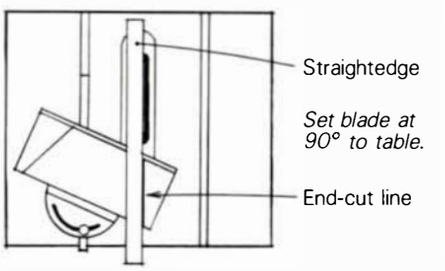
1. *The side elevation, above, shows the true cross section of the board that will be the front of the hopper. Use a bevel gauge to transfer the edge angle to the tablesaw, then rip the front to width.*



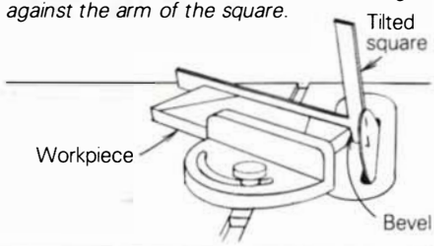
2. *The end angle shown in the front elevation is distorted, but the drawing does show the true length of the top and bottom edges. Measuring out from a perpendicular reference line, transfer the edge lengths to the workpiece. Then connect the edges to draw the true end-cut lines. This method also works for asymmetrical pieces—where end-cut lines are at different angles.*



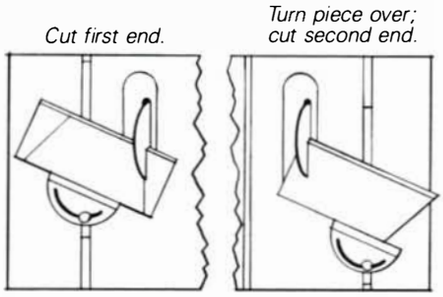
3. *With a straightedge, set the miter gauge so the end-cut line is parallel to the blade.*



4. *As shown in the plan view, above, the cut has to be at 90° to the beveled edge of the workpiece, not at 90° to the face. To determine this tilt angle, place a carpenters' square flat against the beveled edge of the workpiece and crank the blade over until it lies tight against the arm of the square.*



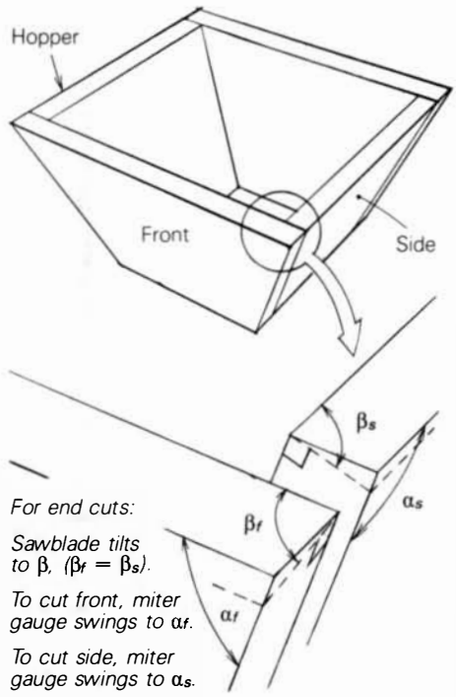
5. *Lower the blade to a safe height and cut to the line. If the piece is symmetrical, you can switch the miter gauge to the other side of the blade, turn the work over, and saw the other end. If asymmetrical, repeat steps 3 and 4. Repeat all five steps for the other sides.*



The problem of the hopper joint is traditionally solved by projection and measurement on full-size drawings. Lance Patterson derived the mathematics at right from the graphical method, then picture-framer Jim Cummins devised the no-math method shown above. For a photocopy of Patterson's mathematical proof, send a self-addressed stamped envelope to Hopper, c/o *Fine Woodworking*, Box 355, Newtown, Conn. 06470.

The ends of hopper pieces are cut at compound angles by tilting the sawblade and setting the miter gauge. You can use trigonometry to calculate the tangents of the angles, then from the tangents set a bevel gauge with which to set the saw, as follows.

Here's the math

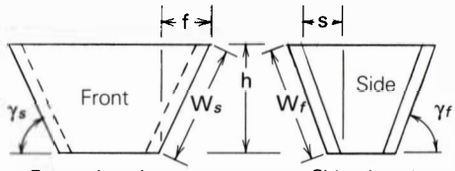


For end cuts:

Sawblade tilts to β, ($\beta_f = \beta_s$).

To cut front, miter gauge swings to α_f.

To cut side, miter gauge swings to α_s.



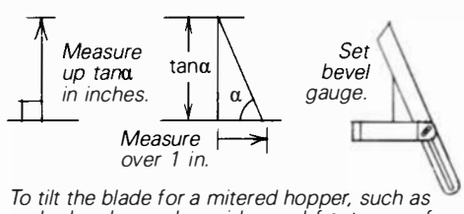
On full-size elevation drawings, measure to 1/32 in. or better:

h = hopper height
f = front 'overhang'
s = side 'overhang'
W_f = width of front face
W_s = width of side face

Now calculate γ_s, *the edge angle of the side:* $\tan\gamma_s = h \div f$. *Calculate* γ_f, *the edge angle of the front:* $\tan\gamma_f = h \div s$.

Then $\tan\alpha_f = W_f \div f$ *and* $\tan\alpha_s = W_s \div s$.
And $\tan\beta = \tan\gamma_f \div \cos\alpha_f$, *or* $\tan\gamma_s \div \cos\alpha_s$.
Or $\tan\beta = h\sqrt{f^2 + W_f^2} \div (f \cdot s)$

Having figured the tangents, you can look up the actual angles in trigonometric tables, punch them on a scientific calculator (arctan or tan-1), or directly set your bevel gauge as below:



To tilt the blade for a mitered hopper, such as a shadow box, when sides and fronts are of equal thickness: $\beta_m = (180° - \beta) \div 2$.

A Patternmaker's Carving Tips

And a portable carving kit for whittling wherever you are

by Wallace C. Auger

The author enjoys carving miniature decoys, but doesn't like to be tied to his bench, so he devised a carving kit that fits in a belt pouch. In the process, he discovered that small tools don't need bulky handles. The template shown was cut from a soft-drink can.

When I was an apprentice patternmaker thirty years ago, the old guys in the shop weren't eager to share what they knew. If an old-timer thought you were watching, he'd turn a little, so that his shoulder blocked the view, or he'd switch to some other work until you went away. So mostly I learned from workers my own age, but I picked up a lot just from the way the older guys moved their elbows. I'd catch a glimpse of what they were doing and try it myself. It didn't take long to learn that the main trick was to choose the right tool and cut in the right direction.

Any carving has problem areas, places where the wood won't cut cleanly in the direction you're working. Experience and practice will show you ways around the problems, but without a teacher, experience can take a long time. A miniature duck decoy is as good a practice field as any. You'll find the same problems there as in larger carvings or in more purposeful things such as cabinet and drawer handles. Whatever you want to make, here are some general carving hints that will smooth your path.

Few tools are needed to start. Because I like to get outdoors, I assembled a small kit that lets me carve miniature decoys anywhere (photo, above). I could probably get by with the knife alone, but the other tools make some jobs easier, as you will see.

First of all, you can't carve something until you know what it looks like, and general knowledge isn't enough. Anybody would recognize a pine cone, for instance, but how many of us have ever really looked at one? Is it egg-shaped or conical? How does each scale taper into the main form? Do the scales run straight up and down, or do they spiral? You won't know unless you look. A carver must anticipate these questions—and a lot more—before starting to cut.

Ducks are symmetrical, which makes it fairly easy to make templates. For a miniature, carved from a single block, you need only a side-profile template (figure 2). But the outline will only start you off; you will have to thoroughly understand the three-dimensional shape you're aiming for. I'll give you tips about duck anatomy as we go along. For any other carving project, the same kind of knowledge and understanding is necessary—there is nothing more frustrating than to carve a block of wood to the point where it *almost* looks right, and not know where to go from there.

In any carving, get close to the final shape in the easiest way—use a saw. For a miniature decoy, I cut the blank profile with a jigsaw. For a larger blank, I bandsaw, cutting not only the side view but the top as well. On a larger bird, quarter-size and up, the head is usually carved separately, then glued on. This saves wood, and also allows you to bandsaw both profiles of the head, as is done with the body. Making the head separately allows you to shift the head template on the carving block so that the long grain of the wood goes in the same direction as the bill. If you tried to cut the whole bird from one block, and wanted a lifelike pose with the bill pointing slightly down, chances are you'd end up with short grain in the bill, which would be liable to break. For the same reason—grain direction—wings and wing tips that stand away from the bird are carved separately, even on miniatures.

Pick a wood that works well. Jelutong is my favorite, but

basswood or any other soft, even-textured wood works well, too. White pine is good for larger birds, but it's a little too weak for miniatures. Some people use sugar pine for full-scale decoys, but I avoid it for miniatures because its large sap pockets can bleed through the final finish, even after you think you have sealed them.

Let's say you have your block sawn out. The first problem is how to hold it while you work. On a little carving, one hand is enough to power the tool, but your other hand will tire quickly if you try to grip the bare blank. On a larger carving, you'll want both hands free to manipulate your tools, so attach a handle to the blank. For miniatures, just screw the blank onto a wood screw epoxied into the end of a dowel. For larger carvings, you can hold the handle in a vise, or you could make the bench I use, shown on p. 60. It securely holds a blank at virtually any position.

The prime tool in my kit is a patternmakers' knife I made from a file many years ago. Actually, these days I prefer a laminated-blade Swedish carving knife, such as those sold by places like Woodcraft. Wille Sundqvist carved spoons with one of these knives in *FWW* #38, pp. 84-88, and demonstrated a lot of carvers' grips and knife strokes.

A laminated blade sharpens faster than a solid-steel blade. Don't just unwrap the knife and start carving, however. It comes from the factory as a general-purpose knife, and it should be modified for the job at hand, as shown in figure 1. First, grind away most of the blade. It is false economy to have more steel in the blade than you need—the point will be too far from your hand to control. Then taper the blade so that it ends in a point, and sharpen as in the drawing, with a crowned bevel.

Many people will tell you that this is wrong, that the bevel has to be flat. Well, it depends on the job you want to do. A flat bevel will give a knife good control for long, straight cuts. But woodcarvers make a lot of scoop cuts as well as straight cuts and cuts across the grain. The most difficult cut is a tight scoop. A straight bevel tends to dig in and scrape at the bottom of a scoop (a hollow grind is even worse), but a crowned bevel helps guide and support the cutting edge. Think of a knife blade as if it were a bandsaw blade. If you try to make a tight curve with a wide blade, the blade binds. When a knife blade binds, its leverage splits off a chunk of your carving. So the tighter the curve, the narrower the blade should be. But, just as for a bandsaw, the narrower the blade, the harder it is to keep a constant curve. That's why a patternmakers' knife is shaped the way it is. It promotes a slicing cut, and, in addition, somewhere along the length of the blade there's the right width and the right crown for the scoop cut you want to make.

Begin to rough out a miniature decoy blank with the knife by cutting away the waste at both sides of the head to center the neck on the body. First, slice a line along the shoulder, aiming at the base of the neck, a little more than $\frac{1}{16}$ in. deep. This is a stop cut, and it has to be as deep as or deeper than the shaving you plan to take from the side of the neck, because its purpose is to prevent the second cut from splitting ahead of the blade through the block. Be sure to slice when you use a knife, especially when making the stop cut. If you wedge the blade through instead of slicing, you won't have any control—chances are you'll cut the head right off, and maybe your finger, too. Make a series of stop cuts, taking shavings off the sides of the head to meet them, until the head and neck are squared off to the right width.

Fig. 1: Shaping the blade

Grind away surplus metal to make the knife blade easier to control. The rounded bevel makes tight scoop cuts without digging in.

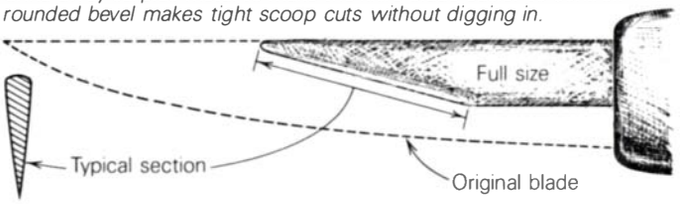
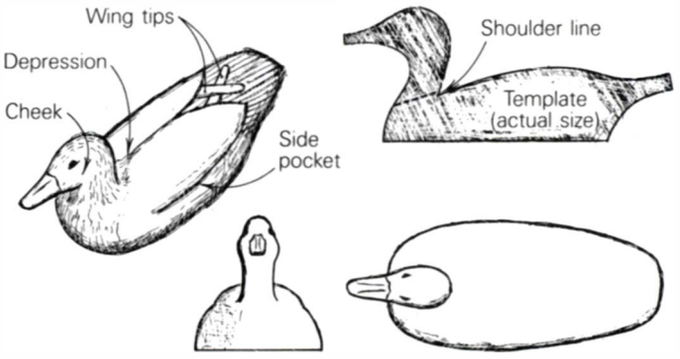


Fig. 2: A miniature mallard, one-twelfth scale



Templates and sizes vary slightly according to species.

When slicing a stop cut, begin at the tip of the blade and end with the thicker part. You have more control with the thicker part of the blade because it's closer to your hand, and its shape will also help prevent the blade from going too deep. To control a cut, you must steadily decrease pressure during the slice. This lets you ease the cut to a halt. If you are right-handed, use your left thumb to help power the cut. Stop cuts, in general, are necessary anytime you don't want a cut to go too far. In scoop cuts, as you cut down from each side to the center, every cut can be thought of as a stop cut—each one prevents the wood from splitting out ahead of the blade on the next cut. When slicing a scoop cut, however, slice from the thicker part of the blade toward the tip. It takes less force to move the thinner part of the blade around the curve, and you'll be better able to maintain control as you ease through.

Next, round the body. On larger carvings, I'd recommend a wide, shallow gouge for this job, but the knife works fine on miniatures. When roughing out, you can take wood away quickly. Work from the high point on the body toward the ends—it's best not to cut uphill into the wood grain; cut down from each side. Use lighter cuts as you get closer to the line of dimension.

When making cuts, you'll find it best to work both hands together. By rocking your hands—something like a scissors action—you will maintain control throughout the cut, instead of having the blade run away from you. You will take a lot of wood off at the front and rear of the body, but aim for a wide curve, like a raindrop, that blends into the curve of the breast below the neck. When cutting from the center of the body back toward the tail, I'd recommend that a beginner make a template of the side of the bird. The template should fit the curve when the bird is finished. It also will show you where you must remove a lot of wood, and it will save you from "finishing" a bird before it has the right overall shape. For instance, don't waste time making a smooth curve along the corners of the block until you have roughed out the top-view profile. When roughing out, you don't have to be too

fussy—there's still plenty of wood if you make a mistake.

Perhaps the best carving tip I can give you is to pay attention to every cut. This is second nature to me after so many years of carving, but beginners often let their attention wander, and lose the chance to learn how the wood, the tool and the hands work together. If the wood tends to split or tear, you should figure out how to deal with the problem while you still have enough wood left to experiment. With the knife, simply changing the slicing angle can make a big difference. Change cutting actions and directions until you find what works. Remember which cut worked best for each trouble spot—it will also work well as a finishing cut. Slice rather than wedge whenever possible, regardless of what tool you are using. With the wide, shallow gouge I mentioned earlier, for instance, I make my share of straight-ahead cuts, but I use it more like a knife wherever I can, holding it slightly askew and slicing with it. Even when making a straight-ahead, cross-grain cut, you can get a gouge to slice if you rotate it a little as you go.

Keep the edges of your tools sharp, of course. When I'm carving larger work in my shop, the minute I feel an edge beginning to drag through the wood, I touch it up on a buffing wheel charged with gray compound. The setup doesn't have to be elaborate—I chuck a 3-in. dia. felt wheel in my drill press, right next to my bench. When I take my kit outdoors, with such small pieces of soft wood, I don't bother to bring sharpening gear along. The edges last long enough.

Ducks fold their wings beneath the feathers along the sides of their bodies. The wing fits into an area called a side pocket, and it pushes the side feathers out, away from the body. I use a V-parting tool to define the top of the side pocket. I could outline the side pocket with the knife, but the parting tool does the job in one stroke, whereas the knife would take two. The parting tool is easier and safer for the job, and its shape helps ensure that both grooves are the same size. Because the V-parting tool has such a small job, I removed its handle. The modified tool worked so well that I removed the handles on my gouge and straight chisel, too, grinding away any sharp edges on their tangs. The V-parting tool and the gouge originally came from a small Marples tool set, but I made the chisel from an old file.

The gouge also has a limited job: it hollows out the areas beneath the tail and the depression on the back behind the neck. The straight chisel makes the low spot between the wings and the tail, outlining the wing tips at the same time: I first make a stop cut by pressing the edge straight down into the wood for the required depth, then I use the same tool to clear the waste—something like chip-carving.

You should be able to detail most of the top of the bill with the point of the knife. For the tight curves around the neck, I use a round file. On the head, a couple of strokes with the round file make the groove above the duck's cheeks. I use a half-round to smooth broader curves, such as around the bill and along the sides of the head. To smooth the sides of the head above the cheek line, lay the edge of the half-round file on the cheek line, then gradually slide the file away from it during the stroke. If you try to file parallel to the line, the file may too easily wander, cutting into and lowering the cheek. When rounding the cheek below the line, begin at the line and roll the file away from it during the stroke.

A duck has a slight depression on its back, which channels water from the high point of the body forward, so that it can roll off at both sides of the neck. This is one of the small things most people don't notice, but if you omit it, the carving will look chunky and lifeless. Make the channel with the gouge and smooth it with the half-round file, being careful not to make the base of the neck too narrow—the neck should be about as wide there as it is just below the head, with the thinnest part about halfway up. This is the time to lower the surface of the wing tips slightly, so they look as if they are emerging from the feathers that cover them.

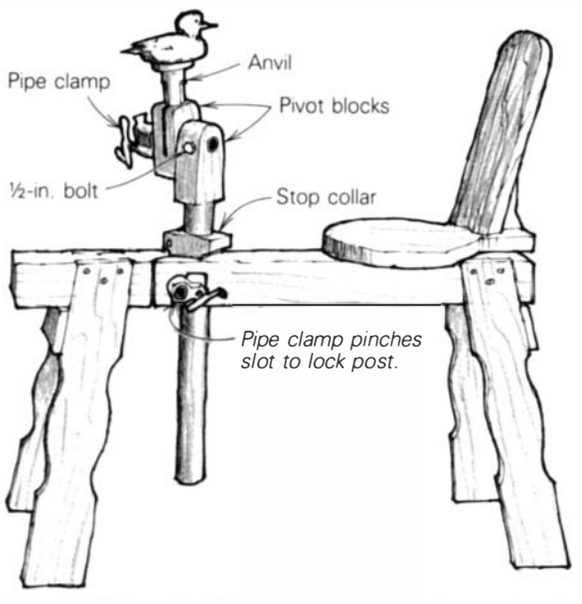
After sanding a little, you're ready for detailing. For this part of the job, it's best to have the carving on a handle, but the handle can be smaller than the one used for carving. I burn-in feather texture with a fine-point woodburner controlled by a rheostat, adjusting the heat according to how fast I want to work. I recommend sealing any wood before painting it. Shellac or lacquer works well. After sealing, I paint the bird with artists' acrylic colors.

A nicely painted miniature decoy sells for about $20. They are 1/12-scale, an inch to the foot, the same scale as most miniature furniture, so they fit right into a scale-cabinetmaker's room displays. I've sold my share, but now I carve mostly for myself. I don't like to think of my carving as a business, because that would take a lot of the fun out of it. I'd like to make a set of all the American waterfowl, more than fifty species if you count the geese and swans, and I find that one of the nicest parts of decoy carving is researching the birds. I've learned much from bird books and magazines, but they often disagree, particularly about colors of bills and iridescent feathers. So once in a while I go to the park or to the zoo and look at the real thing. I'm retired now—I can go look at ducks whenever I want. □

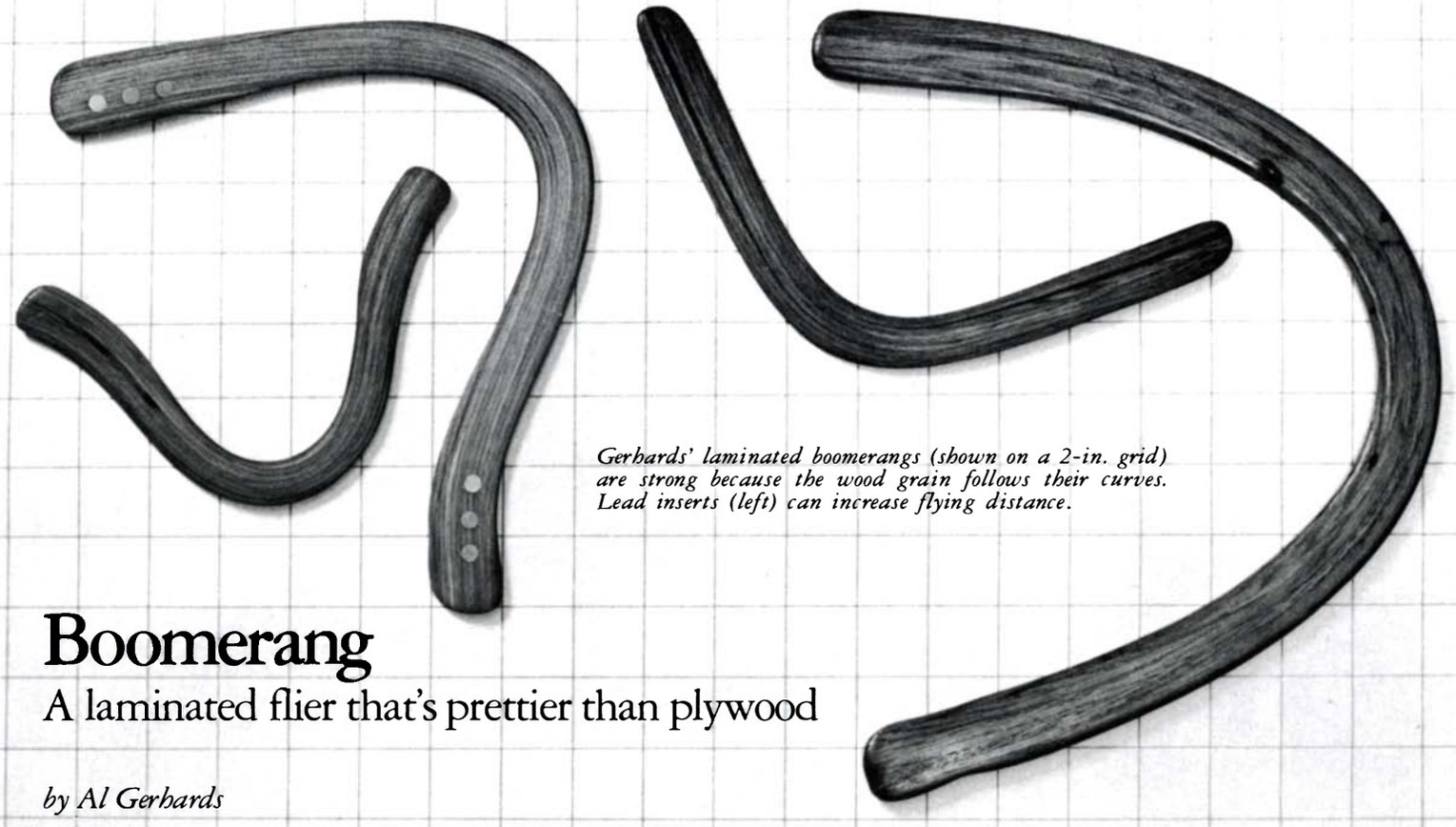
Wallace Auger makes miniature furniture, sells plans for decoys and furniture, and carves in Fairfield, Conn. Duck carvers will enjoy the book reviewed on p. 22 of this issue.

Bench for larger carvings

The carving blank is screwed to a round anvil that fits into pivot blocks. The round post swivels, too, allowing the work to be turned and locked in any position. —*W.C.A.*



Drawing: Jim Richey



Gerhards' laminated boomerangs (shown on a 2-in. grid) are strong because the wood grain follows their curves. Lead inserts (left) can increase flying distance.

Boomerang

A laminated flier that's prettier than plywood

by Al Gerhards

A boomerang is an exercise in free-form woodworking. No straight lines, no corners to fit, no accurate measurements—just flowing lines and curves. Boomerangs can be made in many different shapes and sizes, besides the traditional shape. They're quick to make, fun to throw, and you can pack one along when you travel. To use it, all you need is a field and a little breeze.

The easiest way to make a boomerang is to cut the shape from 5-ply, ¼-in. birch plywood, then rasp and sand the edges to an airfoil section. I prefer to make a laminated boomerang by gluing up strips of wood on a form to build up not the thickness but the width. You can use any type of hardwood that will bend—so far, I've tried ash, hickory, oak, elm and locust. Where I live, these woods are inexpensive and available from local sawmills.

Since I make my boomerangs in batches, I start with a straight-grained, knot-free board, about 28 in. long, 2½ in. thick and 5 in. or more in width. I can get five of them from a board this size. Allow about ½ in. thickness for each boomerang. If you want to make two, you can start with a board 1 in. thick and 5 in. wide.

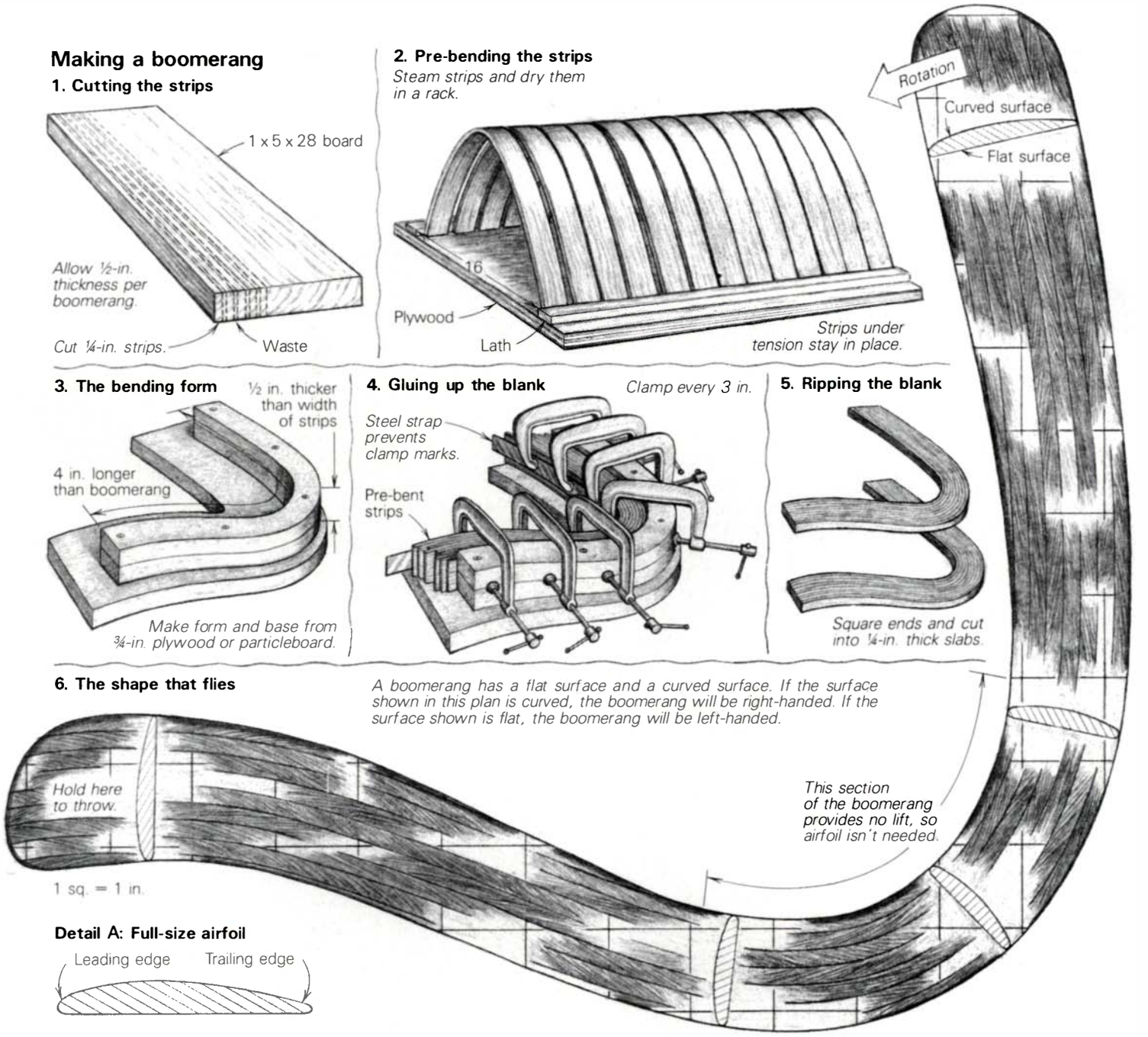
On the tablesaw, rip strips about 3/16 in. to ¼ in. thick from the edge of the board (see drawing, next page). Eight to ten strips, laminated together, should give you a thickness of 1¾ in. to 2 in. It's a good idea to cut a few extra strips, in case you break some while bending.

My boomerangs have sharp bends—less than 90°—so I steam and pre-bend my strips before gluing and clamping them on a form. If your boomerang doesn't have such a sharp bend, you can omit the steaming step. Place the strips in a preheated steam box for about 30 minutes (*FWW* #40, p. 102). When the strips are pliable, bend them freehand into a "U" shape and immobilize the ends to keep the strips from straightening out again as they dry. On my wall, I nailed lath strips about 16 in. apart, and when I compress the bent "U" and place the ends between two laths, the bent strip springs back a few inches and wedges in place. You could nail laths on a piece of plywood instead of on a wall. Whatever you do, let the strips dry for about a week.

To laminate the boomerang, you'll need to make a form by gluing and nailing together pieces of plywood or particleboard. You want a block about ½ in. thicker than the width of your strips, and about 4 in. longer than the length of the boomerang you want to make. The outside curve of the boomerang takes its shape from the concave surface of the form. Trace the outer edge of your boomerang pattern onto the plywood block, leaving about 2 in. of block at either end. Cut out the curve with a bandsaw or a bowsaw. Then glue and nail another piece of plywood to the form to make a base. Now you are ready to glue the strips together, but first coat the form with wax so that the glue won't stick to it.

You can get decorative effects by gluing up the strips in different ways. You can reassemble them in the order they were cut from the board, to match the original grain. For a different effect, you can alternate light and dark woods, or cut two long, thin wedges from wood of a contrasting color and slip them between the strips.

Coat both sides of the strips with epoxy (not quick-set epoxy) and allow the glue to cure for about an hour before assembling. This allows the glue to penetrate the pores of the wood and helps prevent a starved joint. I use T-88 epoxy (available from Chem Tech, 4669 Lander Rd., Chagrin Falls, Ohio 44022), but some other brands may set faster, so this technique may not work with all glues. The epoxy should still be tacky when the strips are assembled. Lay the glued-up strips in the form. To even the pressure from the clamps and to prevent them from marring the wood, I use a thin, flexible, steel strap about 2 in. wide and long enough to follow the curve. On a concave form, however, this isn't essential. Place the steel band (if you're using one) against the last



strip. With a large C-clamp or bar clamp, start pulling in the midsection, snug it up and clamp each side at 3 in. intervals. Allow the epoxy to cure for a day at room temperature.

When the epoxy has cured, remove the laminated block from the form, and square up the sides where the edges of the strips may have slipped out of alignment. You now have a thick block shaped like a boomerang, from which you'll cut individual blanks. I cut mine on the tablesaw, but you can probably do this more safely and waste less wood with a wide resaw blade on the bandsaw. To increase the height of the tablesaw fence, I attach a piece of plywood wide enough to support the blank while ripping. Saw the blanks about ¼ in. thick. The blanks are now ready for shaping and sanding.

Here's how to determine which side gets rounded to form the airfoil. With your throwing hand, hold the boomerang upright by its arm, with the edge of its "elbow" toward your nose. Go through an overhand throwing motion. The side facing your ear is the top surface, which gets curved. The side away from you remains flat. As the boomerang leaves your hand, it spins, and the two edges that cut the wind as it spins are the edges you want to round. The rounded edge tapers to a thin trailing edge like the cross section of an airplane wing.

When shaping and sanding, I use a boomerang-shaped ¾-in. plywood backup to minimize flexing. Clamp the boomerang blank and the backup in a vise. Using a rasp, shape the top side of the blank into an airfoil shape. After you've roughed out the boomerang, finish it with sandpaper. I use an inflatable-bag drum sander for final contouring.

Every shape and size flies differently, so after flight-testing, you may need to tune your boomerang by slightly changing the shape of the airfoil. To make the boomerang travel farther before it returns, I sometimes epoxy ½-in. dia. lead inserts in holes near the ends of the arms. After the glue sets, I file the lead flush with the wood.

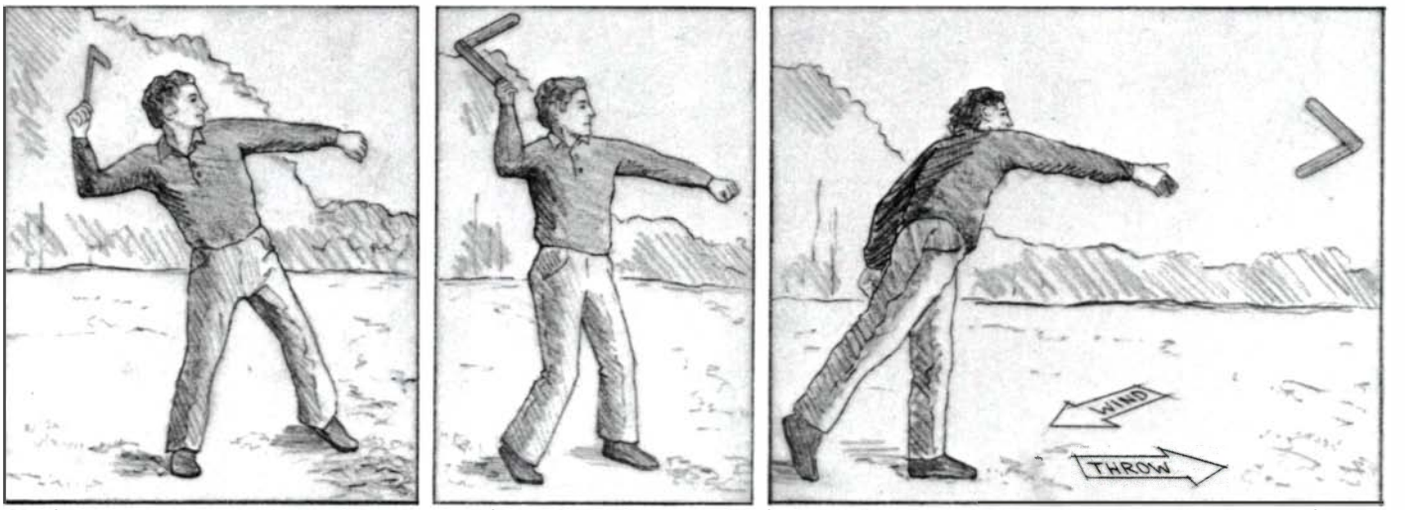
I finish my boomerangs with tung oil or boiled linseed oil, to bring out the wood's natural beauty. A boomerang gets a lot of hard use, and an oil finish is easy to repair. □

Al Gerhards is a dental technician in Downington, Pa. He's been making boomerangs for almost 25 years.

Drawing: Lee Hov

Throwing the boomerang

by John Huening



Hold the boomerang so it's nearly vertical and launch with an overhand throw. Snap your wrist on release to give it a good spin.

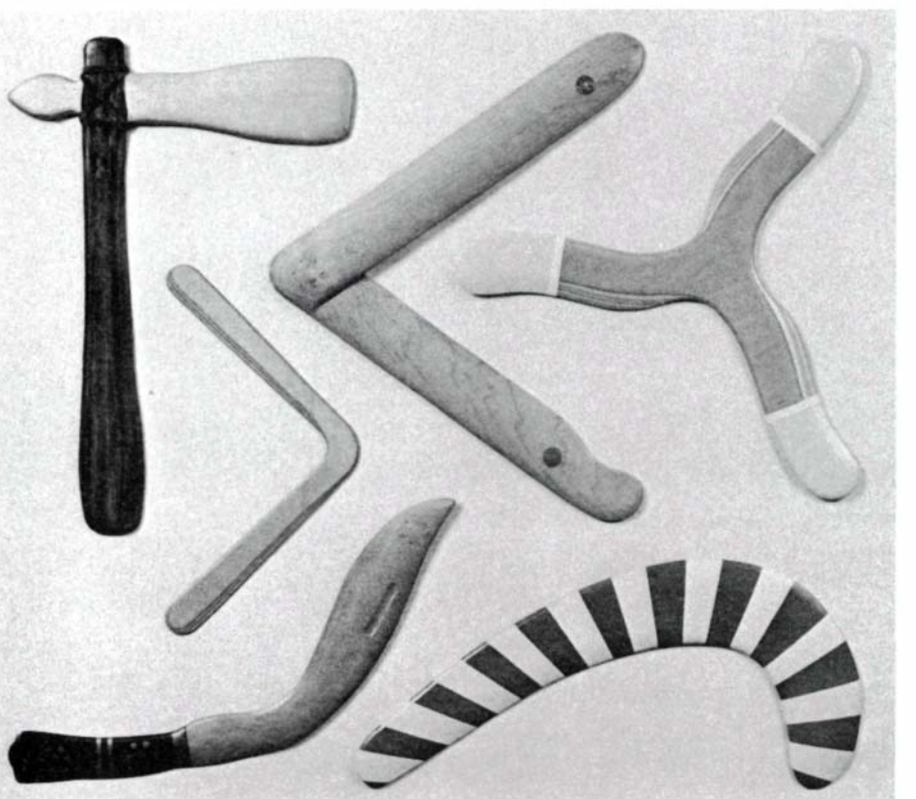
Rusty Harding took me to a field and considered the air and sky. "A boomerang is a gyroscope without a fixed point of gyration. It describes a circle, or whatever its flight path, depending on the design, velocity, spin, wind direction and thermal air currents."

Harding makes boomerangs for a living. Working in his backyard in Lebanon, Tenn., he produces fanciful, unorthodox shapes—a far cry from the familiar shallow "V" shape developed by the Australian aborigines.

There are right- and left-handed boomerangs, the difference being the location of the rounded edges and the direction the boomerang is thrown into the wind. A right-hander returns in a counterclockwise circle, while a left-hander circles clockwise. Hold the boomerang in your throwing hand, with the flat side against your palm, and imagine it spinning out of your hand, away from you. The rounded edge, like the front edge of an airplane wing, should be the edge that hits the wind first. If it's not, you've got a boomerang designed for the other hand.

"I usually pick up pieces of grass and drop them to see which direction the wind is blowing," Harding told me. "Throw about forty-five degrees into the wind. Stand so that the wind hits your left cheek." Since he's left-handed, Harding let the wind hit his right cheek.

"Spin is important," he continued, "so hold the boomerang as close as you can to the end of its arm. The boomerang should be nearly vertical when launched. Now, pick a target forty to fifty yards away, aim, and throw overhand, snapping your wrist to give the boomerang a good spin."

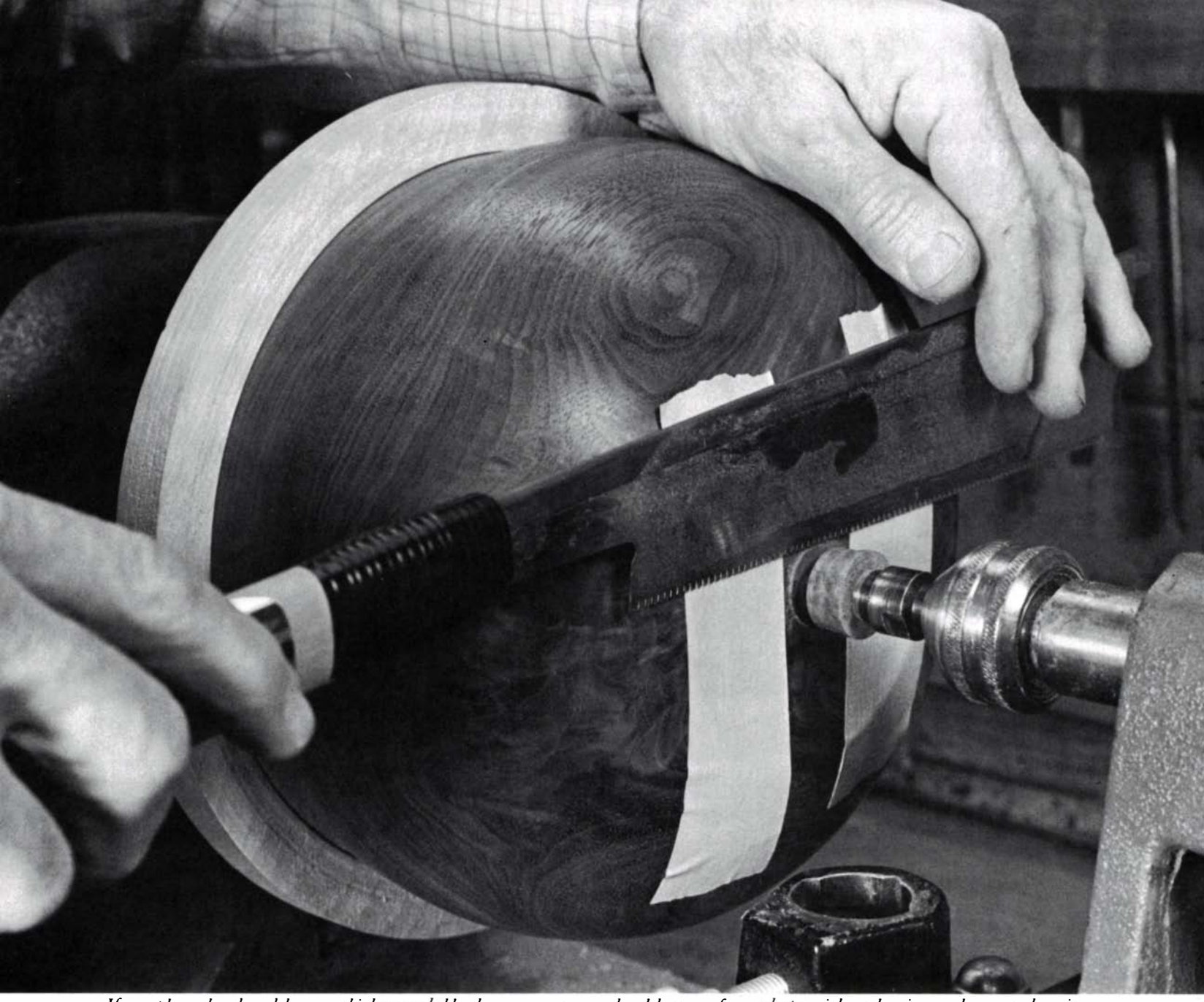


Harding makes his fanciful, unorthodox boomerangs from either hardwood or plywood.

That first throw was nearly miraculous—the boomerang actually returned and I almost caught it. There was a whirring sound as it cut the air. "Consistency is important," Harding said. "Until you can throw the same way each time, you won't know what you're doing wrong. If the boomerang lands consistently to your left, turn more away from the wind. If it lands to your right, turn more into the wind. Do the opposite if you're left-handed. If it lands consistently in front of you, throw a little higher or a little harder. If it lands in back of you, throw a little lower."

Boomerangs were originally used as weapons, and they do have the potential to be dangerous. When throwing one, you should allow between 50 and 75 yards of open space in all directions. □

John Huening is a pipe-organ builder and writer in Seffner, Fla.



If you plan ahead and have a thick enough blank, you can turn a bowl bottom of any shape without leaving a clue as to how it was attached to the lathe. The photo above shows the secret: grip the bowl via a small wooden plug, which you saw off after shaping.

The Bottom Line for Turned Bowls

Versatile chucking plug permits a variety of designs

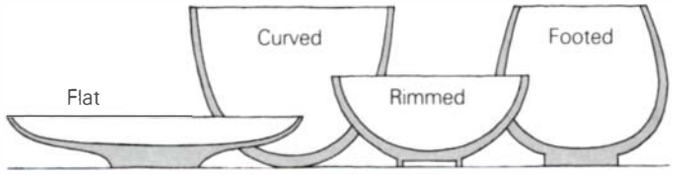
by Wendell Smith

A woodturner can often improve a bowl just by realizing that its bottom is as important to its design as its rim or its overall shape. You may neglect the bottom, but if you submit a piece to a juried exhibition, you can be sure the judges won't. The best bowls don't reveal how they were attached to the lathe. But chucking procedures can interfere with good bowl design. The trick is to make the design you want, while leaving no trace of the method.

The simplest method of chucking is to screw the bowl bottom to a faceplate, but then the finished bottom must be at least as thick as the length of the screws penetrating into the wood. Unless you want a thick bottom and plugged screw holes, a more refined method is needed.

Other chucking methods can impose restrictions. Turning a recess into the bowl bottom for an expanding-collet chuck requires that you design a bowl with a rimmed bottom. If you turn a male plug on the bottom to fit some type of ring chuck, you'll have a footed bowl. On the other hand, facing off the bottom so that it is flat and can be attached to a scrap block with double-sided tape or with glue and paper does

lead to a flat bottom.

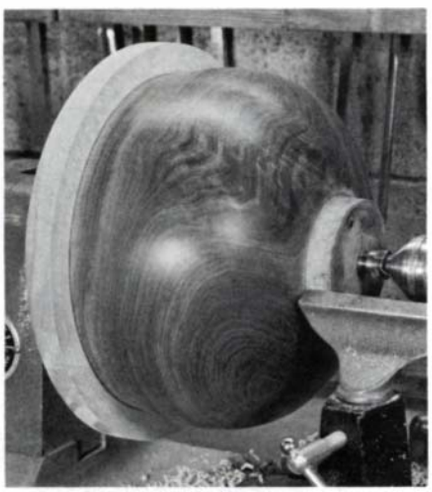


For green wood, I use a simple on-the-lathe method that lets me prepare and finish bottoms of any thickness, and have them flat or smoothly curved (with a slight flat spot to stand on), rimmed or footed, while maintaining complete freedom of design. This technique requires starting with wood thick enough to turn a ½-in. by 3-in. plug on the bowl bottom, using the plug to hold the wood on the lathe, and then removing the plug to finish up.

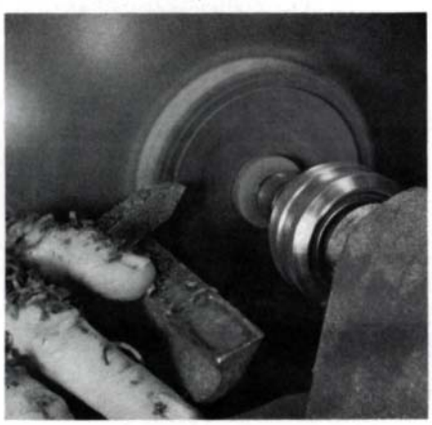
The plug is helpful when turning green bowls because the blank is solidly attached to a faceplate. You cannot use the glue-and-paper method because the glue will not stick to the wet wood. Balance is important with green stock because of its weight, and with the subsequently dried bowls because of their eccentricity.

For chucking dry wood, which is often not thick enough to allow for a chucking plug, I usually use glue and paper to fix the blank to a scrap block that is screwed to the faceplate. This requires a clean-up procedure based on a simple off-the-lathe hand-scraping method (bottom right photo, p. 66).

The photographs illustrate my finishing method for removing the chucking plug from the base of an otherwise finished bowl about 5 in. high and 10 in. in diameter. This bowl was rough-turned green by first screwing a 3-in. faceplate to what would become the open (top) side of the blank, using ¾-in. #12 flat-head wood screws. With the faceplate mounted on the lathe, the bottom can be faced off with a deep-fluted gouge. Then, with the tool rest slightly below the center of the blank, use a parting tool to make a ½-in. deep shearing cut about 1½ in. from the blank's center. It is important to hold the parting-tool handle low when doing this, so the tool cuts, not scrapes. If your design calls for a footed bowl, cut deeper to leave a longer plug. With a gouge, shape the outside of the bowl to a rough form from the rim to the parting-tool groove. After the outside has been roughed out, remove the faceplate from the top of the blank and screw it to the plug. Although the bowl blank may not be perfectly recentered, it's unnecessary to true up the outside until the wood has dried. The inside of the bowl is turned using conventional methods. The photo sequence shows how to remove the plug, picking up after the bowl has been dried, re-turned and sanded.

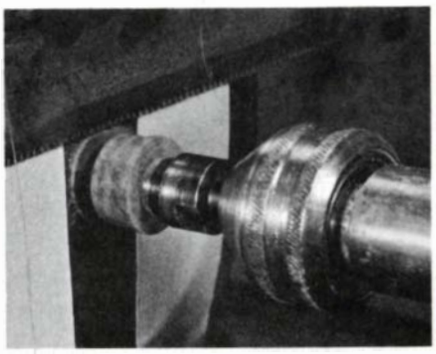


1. The tailstock ring center holds the bowl, finish-sanded except for the chucking plug on its base, against a pressure plate made from a 1-in. by 13-in. hardwood disc. A groove in the plate holds the bowl's rim in place. Make a new groove for each size bowl, using a parting tool to size the groove until the rim of the bowl bears on either its inside edge or its outside edge. Now push the bowl onto the plate and bring the tailstock in. Before locking the tailstock, however, crank the ram far enough out to leave room for a small tool rest. At this point, any type of foot can be turned on the bowl. Here I chose a smooth, footless finish.



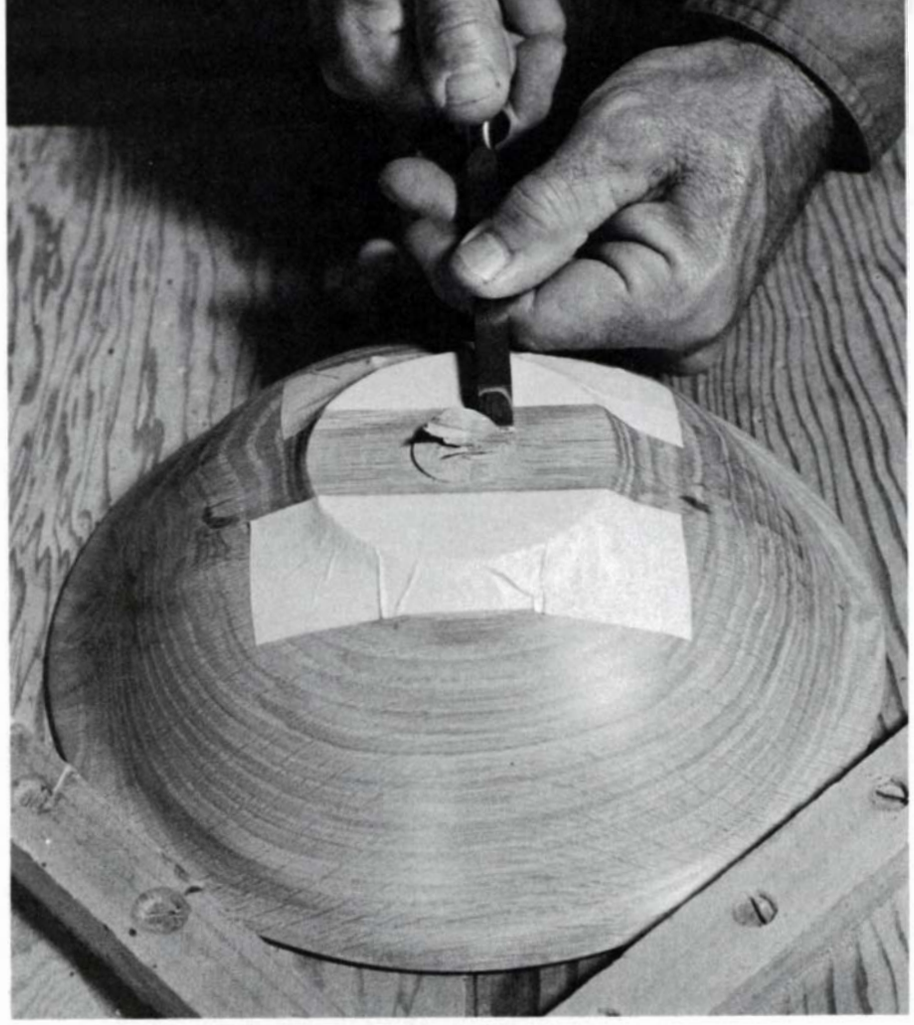
2. With a parting tool or a beading tool, make 1/16-in. to ⅛-in. shearing cuts until the 3-in. plug is reduced to ¾ in. in diameter. Don't use too much force on the tool, or the bowl will slip. If the wood has a fancy figure, put the tool rest perpendicular to the lathe axis, then scrape away the plug with a small round-nose tool. A deep gouge could be used if the tool rest were lowered.

3. After reducing the plug to a ¾-in. diameter, smooth and flatten the bowl bottom using a straight-across or right-skew scraper, followed by sanding. Then, with the tool rest parallel to the lathe axis, use a thin parting tool to make a shearing cut about 1/16 in. from the bowl's base. Before cutting deeply, widen the cut slightly on the right. Keep the cut wider than the tool as you cut into the plug, to reduce resistance to cutting and to keep from breaking the bridge. I find it best to rotate the parting tool slightly clockwise and counterclockwise while cutting, as though cutting a small bead. The small 1/16-in. platform of waste wood left between the base of the bowl and the bridge prevents the parting tool from tearing wood fibers on the bowl bottom.



4. With the lathe off, I use a Japanese *dozuki* saw to cut the small bridge between the bowl and the plug. Before sawing, pull the tailstock ram back slightly to take pressure off the bridge. The masking tape protects the bowl bottom from the saw. For a full view of the work at this stage, see p. 64.

5. Place the bowl rim-down in a right-angle stop-block jig as shown at right and remove whatever waste remains by slicing cross-grain with a bench chisel, held bevel-up. The tape prevents the chisel from damaging the finished base. Finally, scrape the center of the base with the grain, then hand-sand.



Glue-and-paper chucks—To remove a glue-and-paper chucking block, place the completed bowl face-down on a towel and tap in an old plane blade, bevel-up. Insert the blade between the two bottom plies of the plywood, rather than between the block and the bowl, to prevent damage. Lift the blade end to lever off most of the block. The remaining waste can be pared off with a bench chisel, used bevel-up.

Remove the final traces of the glue-and-paper joint with a 1½-in. paint scraper, then follow up with sandpaper. The secret to using these scrapers is to leave a burr on the cutting edge when sharpening it on a grinder. □

Wendell Smith, who lives in Fairport, N.Y., is a chemist in the Kodak Research Labs. Photos by the author.

James Belmonte's grand prize winner, with a picture size of only 1½ x 1½, is shown here one and a half times its actual size.

An Eye on Marquetry, Here and Abroad

You can begin with an easy kit, but the sky's the limit

by Jim Cummins

Marquetry is a field that encompasses, comfortably, an incredible range of tastes, styles and purposes. In our culture, we can trace marquetry back directly to the time when sawing thin veneers became practical, during the Renaissance in Italy. These early marquetarians were among the first to discover the rules of perspective, and frequently outdid painters in achieving realistic three-dimensional scenes. From Italy, marquetry spread north and west, becoming an important decorative element in veneered furniture during several furniture periods. All the while, burgeoning world trade in exotic timbers added fresh colors to the palette.

Today marquetry is beginning what looks like a worldwide revival, with marquetarians in Europe having a slight head start over those in the United States. For the first time, though, marquetry is possible as a hobby rather than as an all-consuming profession. Veneers are cheap and plentiful, and the tools of the trade can be as simple as an X-acto knife or a hand-held fretsaw. Marquetry kits—a paper pattern (something like a paint-by-number design), a selection of veneers, some glue—are available by mail-order. Some kits are even pre-cut and go together as easily as a jigsaw puzzle.

Although a few European marquetarians are professionals, Americans tend to take up marquetry upon retirement, or as a convalescent pastime. Most of the dozen people who founded the Marquetry Society of America in 1972 were self-taught, and they organized not only to display their work, but also to exchange techniques and ideas. For help, they approached Constantine's, the veneer supplier who'd sold many of them their first marquetry kit. Owner Gertrude Constantine, whose late husband had invented the pre-sawn kit a few years before, agreed to provide free space for meetings and classes in a basement workshop, and eventually, last September, celebrated the addition of a second story by hosting a marquetry exhibition and competition that drew about 100 pieces. The Society has 1200 members and has been steadily growing at the rate of about 200 per year. Past president Gene Weinberger estimates that there may be 5,000 more active marquetarians around.

There are several ways to get started in marquetry, whether you want to join the MSA or not. Pete Rose, an authority today, began by picking up a kit about 15 years ago when he accompanied his woodworking brother-in-law to Constantine's showroom. Rose says that instructions in those days were frustrating, calling for each piece of veneer to be sandwiched between two ⅛-in. thick scraps, tacked down, and sawn with a fretsaw. Rose broke a lot of blades in the beginning, but was hooked, and he soon found refinements in tools and techniques that made marquetry a lot easier. Today he writes a monthly beginners' column for the Society's newsletter.

Allan Fitchett took another route. He learned at the age of eight from an old German cabinetmaker who taught him how to inlay designs into furniture with nothing more than a

Photos, pp. 67-69: Doug Long

Clockwise from top left: Veneers for Meta Ketelsen's 4 x 6 parquetry box were cut on a 4-in. tablesaw. Bill Profet's 'At rest until tomorrow,' 12 x 15, won a merit award. Bill Rondholz's 'Bachelor's Plight,' 12 x 15, is adapted from a Norman Rockwell painting.

knife and chisel. Today Fitchett, a retired printer, works part-time for Constantine's as the chief of their marquetry department, which accounts for about 15% of their total sales. He gives demonstrations, lends advice, and develops new patterns for kits, such as the bluejay shown on the facing page.

Most marquetarians seem to have begun with kits, graduating later to working with patterns—the MSA newsletter always has a few—that outline the pieces but allow a free choice of the veneer. Veneer selection distinguishes the masterpieces from the also-rans. Water, sky and skin tones are particularly demanding—purists eschew dyes and stains—and marquetarians often vary a pattern to make the best use of a particularly fine piece of wood. Some marquetarians work to original patterns, but the European-professional tradition is that marquetarians work in pairs: one to do the art, the other to cut and paste. Most MSA members follow the example, with one notable exception, Silas Kopf, whose work is shown on the facing page and who wrote in *FWW* #38. They may adapt designs from photographs or magazine illustrations, but "I'm no artist" is almost a rallying cry. This is but a minor drawback in marquetry competitions: the Society once drew up a checklist for jurying shows, and originality counted for only 10%.

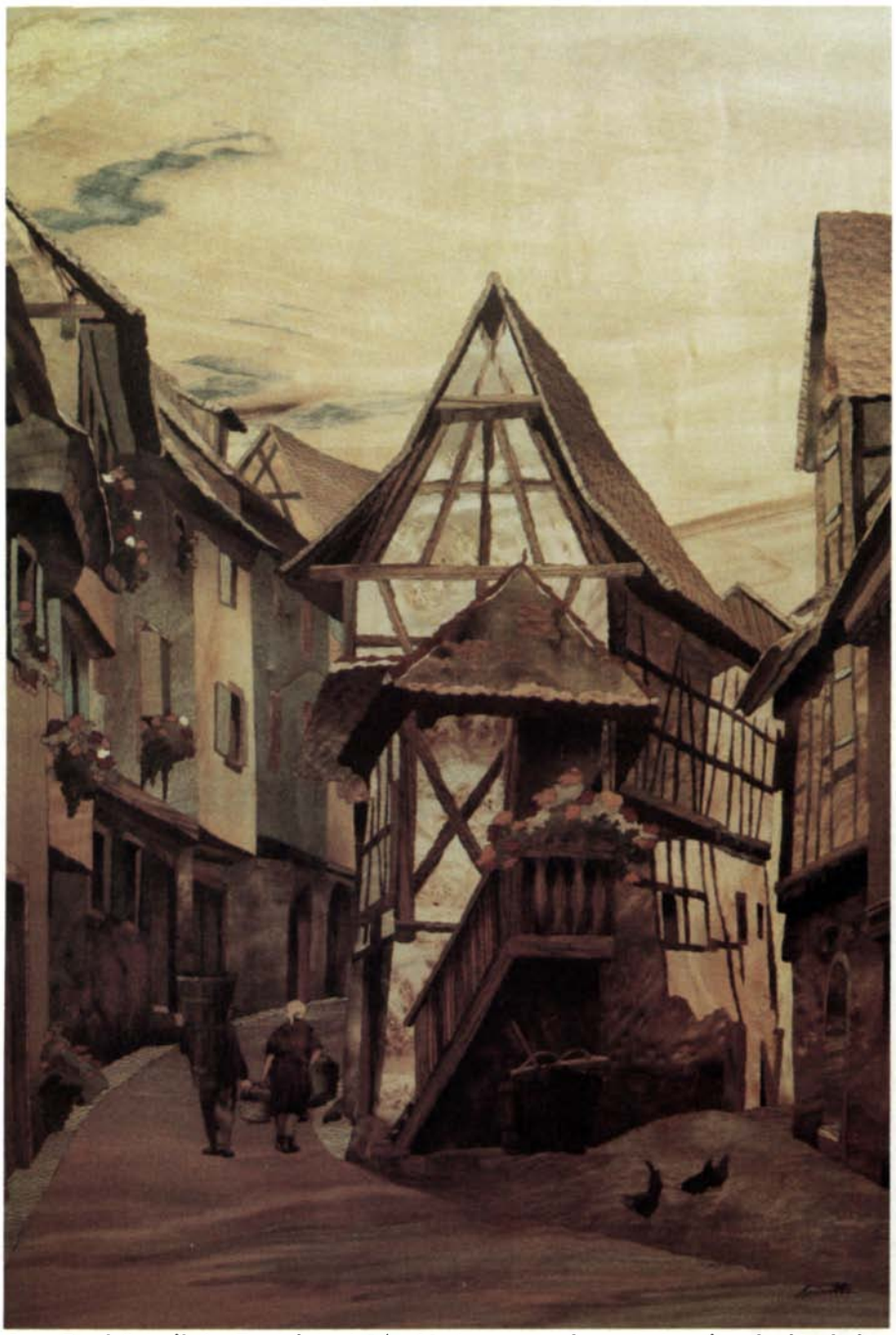
The grand prize winner in the September competition, current MSA president James Belmonte, got his waterwheel idea from a magazine ad for a woodburning kit, and spent about 45 hours cutting and finishing the minuscule picture (p. 67). He took up the hobby 11 years ago while recuperating from heart surgery. No longer a hunter, one day he wondered why he shouldn't veneer his old gunstock (facing page). Bill Profet's sled (above), which won an award of merit, was adapted from *Yankee* magazine. Profet has an electric jigsaw, but he prefers cutting by hand, with jewelers' blades in a handsaw. So does Bill Rondholz, who adds that you can use a handsaw at the kitchen table instead of having to go to the basement. Rondholz's "Bachelor's Plight" (bottom left above), adapted from a Norman Rockwell *Saturday Evening Post* cover, hasn't a line out of place. He sent it off to a prestigious British Marquetry Society competition a few years ago, where it won awards despite an Old World tendency to classify American marquetarians as impatient upstarts. Rondholz says that it was nice to "set them back on their ears a bit." His coup was repeated at 1983's British show, where Gary Wright garnered an artistic merit award (see box, p. 71).

Nevertheless, Europeans still reign supreme. "Equisheim" (p. 70), by Jean-Paul Spindler, was patterned after one of his father's on-the-spot oil paintings. With a family history in marquetry, with six employees, with a "no admittance" back room guarding his trade secrets—and up to a three-year waiting list for any of his standard patterns—Spindler ranks with one or two others at the top of his profession. His work sells for up to $4,000, and he's not likely to be seriously challenged by anyone working at a kitchen table. Indeed, most of the leaders of the MSA seem to feel that such a challenge would be misdirected, that the future of marquetry lies in an

Allan Fitchett's bluejay, 6 x 8½, which he designed for a marquetry kit, requires skillful scorching of the veneer edges to produce its uncanny liveliness.

Above and at right: Silas Kopf's untitled portrait, 24 x 40. Realistic flesh tones are among the most difficult of a marquetarian's challenges.

Below: James Belmonte's gunstock, veneered with hunting scenes he adapted from sporting magazines.



Jean-Paul Spindler's 'Equisheim,' 24 x 30, is a copy of a painting done by his father.

entirely different direction, in what they call applied marquetry—inlaying elaborate designs and scenes into furniture. The practice is rare today, but it has flowered again and again throughout Europe—the Spindler family has been collecting such furniture for five generations.

"You make framed pictures for a few years and your walls will start to fall down," says Fitchett. He claims that the American character is basically impatient and productive. In contrast to European amateurs, who may take two years on a picture, most Americans aim to cut out a pattern in a dozen hours or less. Many marquetarians give most of their work away just to make room, and might welcome a collaborative effort with a period furnituremaker. The two could reproduce something more exotic than high-style Philadelphia, more exciting than just another framed design.

Parquetry, a related field, is an inlaid geometric design, exemplified by Meta Ketelsen's little box (p. 68). Ketelsen began her hobby with a kit from Constantine's: "I didn't know what I was in for—I picked the hardest one!" But she has gone on to a rare distinction. Her original design for a windburnt sailor, "Old Salty," came out so well that Constantine's turned it into a kit and has featured it in their catalog ever since. The sailor in the kit wears a dyed-veneer sweater, but Ketelsen herself is committed to natural wood colors, and shakes her head at her single lapse, a touch of dyed blue: "I just couldn't believe in a Scandinavian sailor with brown eyes." □

Jim Cummins is an associate editor of Fine Woodworking. *You can reach the Marquetry Society of America at Box 224, Lindenhurst, N.Y. 11757. The British Marquetry Society's secretary is Mrs. Pat Aldridge, 2A, The Ridgeway, St. Albans, Herts, England AL4 9AU. Constantine's is at 2050 Eastchester Rd., Bronx, N.Y. 10461.*

Winners from the 1983 British Marquetry Show

by Ernie Ives

Last year's best-in-show winner, Richard Shellard (*FWW* #36, p. 12), improved his record by taking first *and* second places in Class 5, the premier class, this year. British marquetarians begin in Class 1, and after four pictures move to Class 2, where they remain until they win an award, which advances them. Tony Reindorp's prize in Class 3 last year moved him up a grade for this year's show—where he came in second against the stiffer competition—but he nevertheless recaptured the Walter Dolley Award for best picture by a non-group-member. Gary Wright's plain, bold style took the Artistic Merit Award in Class 2, the first time in a number of years that an American has won a major award in the "National." □

Ernie Ives edits the BMS's quarterly journal. Photos by the author.

Clockwise from above: Richard Shellard's 'Fruits of Nature,' 1st in Class 5; Tony Reindorp's 'Waiting for the Wind,' 18 x 20; Gary Wright's 'February Morn,' 8 x 12; Shellard's 'Threshing by Steam,' 18 x 24, 2nd in Class 5.

Laying Plastic Laminates

Understanding the basics of this ubiquitous "veneer"

by Jack Gavin

Let me say, before any purists dash off angry letters to the editor, that I don't consider plastic laminates to be fine woodwork. As a custom cabinetmaker, however, I've laid miles of the stuff, and for every solid cherry secretary or walnut armoire I do, I am offered ten Formica kitchens. So knowledge of the skills has become an economic necessity. Also, a lot of furnituremakers are discovering that new laminate products and techniques add a colorful dimension to their work.

Plastic laminates had their beginning at the turn of the century when Dr. Leo Bakeland, a Belgian scientist, invented Bakelite, the first plastic. Bakeland offered his invention to the Westinghouse Company as an electrical insulator, but Westinghouse wasn't interested. A young Westinghouse chemist named Dan O'Connor, however, impregnated paper and cloth with Bakeland's resin and formed his own company in Cincinnati, Ohio. He called the new product and the company Formica: "for mica," since mica was the premium insulator of the day.

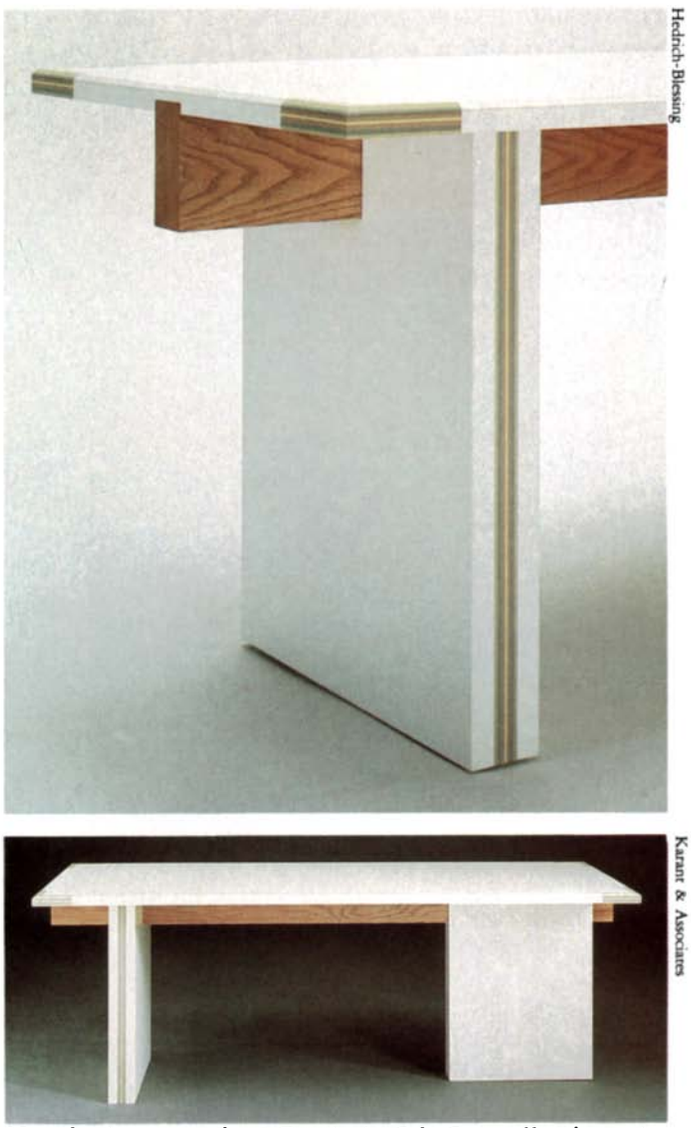
Formica was originally used for such diverse products as radio vacuum-tube bases and gears for the Model-T Ford. In the late 1930s, the idea of laminating a thin surface of this abrasion-resistant plastic to counters and tabletops was tried. After World War II, the idea caught on and grew into a multi-million dollar industry.

Plastic laminates are made of six or less layers of kraft paper (depending on the thickness) that are impregnated with phenolic resin (Bakelite), and then covered with a sheet of colored or patterned paper and sealed with a layer of melamine plastic. Although "Formica" has become the generic name for decorative plastic laminates, there are a number of other laminate manufacturers besides the Formica Corp. Nevamar, Wilsonart, Lamin-Art, and Melamite are some of the many different brands, each a quality product. I've seen 30-year-old countertops that were beginning to wear through, showing a brown tone from the kraft paper beneath, but you can expect an even longer life than that from the modern surfaces, provided that they are well cemented to the proper core material (see box, p. 74).

Laminates come imprinted with simulated wood grain, simulated stone, stripes, grids, raised designs and a seemingly infinite variety of colors. Prices range from 60¢ per sq. ft. to about $3.50 per sq. ft., depending on brand and design. Each company has color charts and makes boxes of samples of their different varieties, and a supplier will be happy to give you one of these for the brand he carries. Plastic laminates are usually stocked in widths up to 5 ft. and in lengths up to 12 ft. Instead of asking your supplier what he's got, tell him what size you need and he'll probably have something close to it, or he can order it for you. You also have a choice of two thicknesses, 1/16-in. and 1/32-in., called horizontal and vertical grade, respectively. Use horizontal grade whenever possible—particularly on surfaces subject to abrasion. Vertical grade is cheaper, and is good for curved surfaces, but it will show core irregularities on flat surfaces. Some laminates come with a plastic film over the surface. Leave it on until the job is done—it's there to protect the surface from your tools.

Visually check each sheet for damage. Unlike wood, scratched plastic laminate cannot be fixed. The sheets can be transported flat in a truck, or rolled and tied. If you roll a sheet, make sure you tape the inside edge to prevent the laminate from scratching itself as it is unrolled.

Seams where edges join can be filled with a product called Seamfil, available from laminate suppliers. It's a lacquer-



Hedrich-Blessing

Karant & Associates

New laminates, such as Formica's ColorCore, offer decoration beyond the usual wood-surface treatments. This table, designed by Milton Glaser, is detailed with ColorCore epoxied into a multicolored sandwich and then sliced into thin ribbons.

based compound that dries very quickly. It comes with color charts that tell how to mix an exact match to whatever color plastic laminate you buy. A filled seam never looks as good as a single piece, however, and Seamfil won't fix scratches.

Cement—The standard glue for plastic laminates is contact cement, and several types are sold by stores that sell laminates. Contact cements have a bad reputation for gluing wood to wood, but when one of the materials is stable and nonporous, as plastic laminate is, contact cement forms a permanent bond. These cements are neoprene rubber dissolved in various solvents. Spread on both surfaces and allowed to dry, the rubber coatings stick to each other when the sheets are pressed together. For all-around use, I recommend the regular industrial grade.

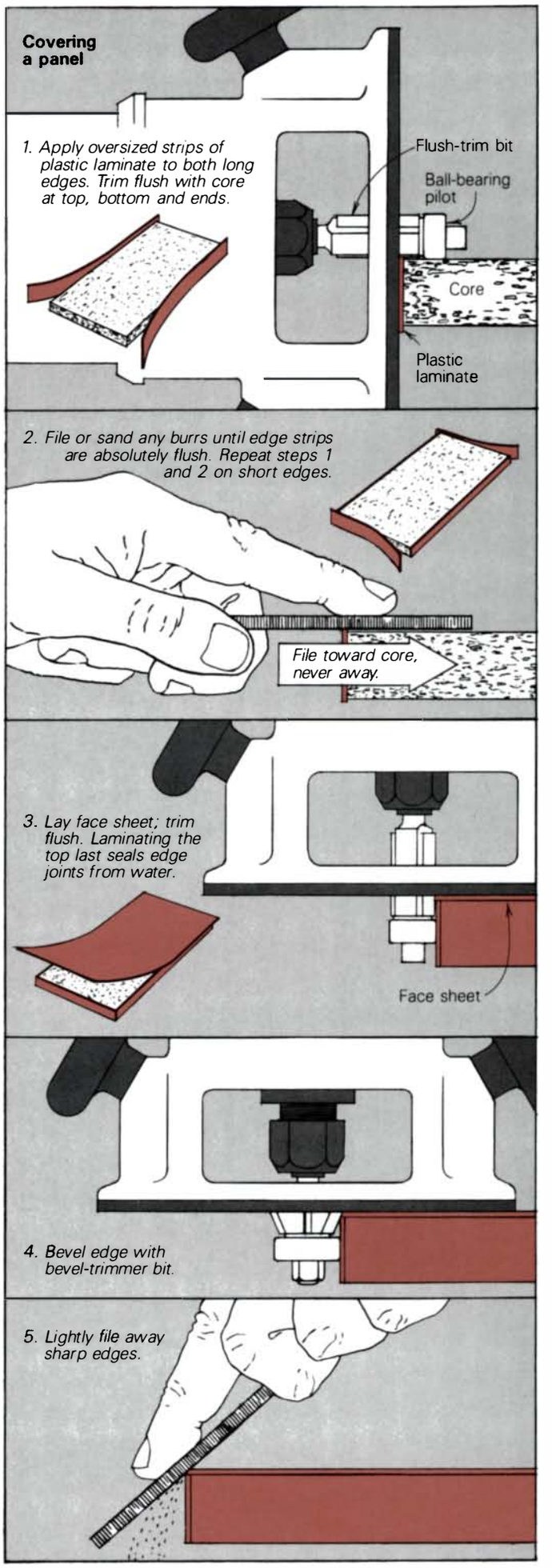
A word of warning here. Industrial contact cement is *extremely* flammable, so much so that if the vapors are allowed to collect in a small room, something as insignificant as a cigarette or a pilot light can ignite them explosively. Work in a well-ventilated area, and even so, *always* wear an organic-vapor mask. The solvents in industrial contact cement are the same as in airplane glue, and we all know the effects of sniffing that. Some suppliers may refuse to sell industrial cements to amateurs, or may carry them only in commercial-size 5-gal. pails. If that's the case (it may even be the law in your area), then use whatever cement you can get. In any event, heed the label, both for safety warnings and for application instructions. Hardware-store cement is less explosive than industrial cement, and there's a nonflammable latex-based contact cement, too, but it takes significantly longer to dry. Otherwise, all types are worked the same way.

One type of cement is specially formulated for use in spray guns, but spraying isn't practical except for large production shops—you can spend up to $3,000 just for the gear.

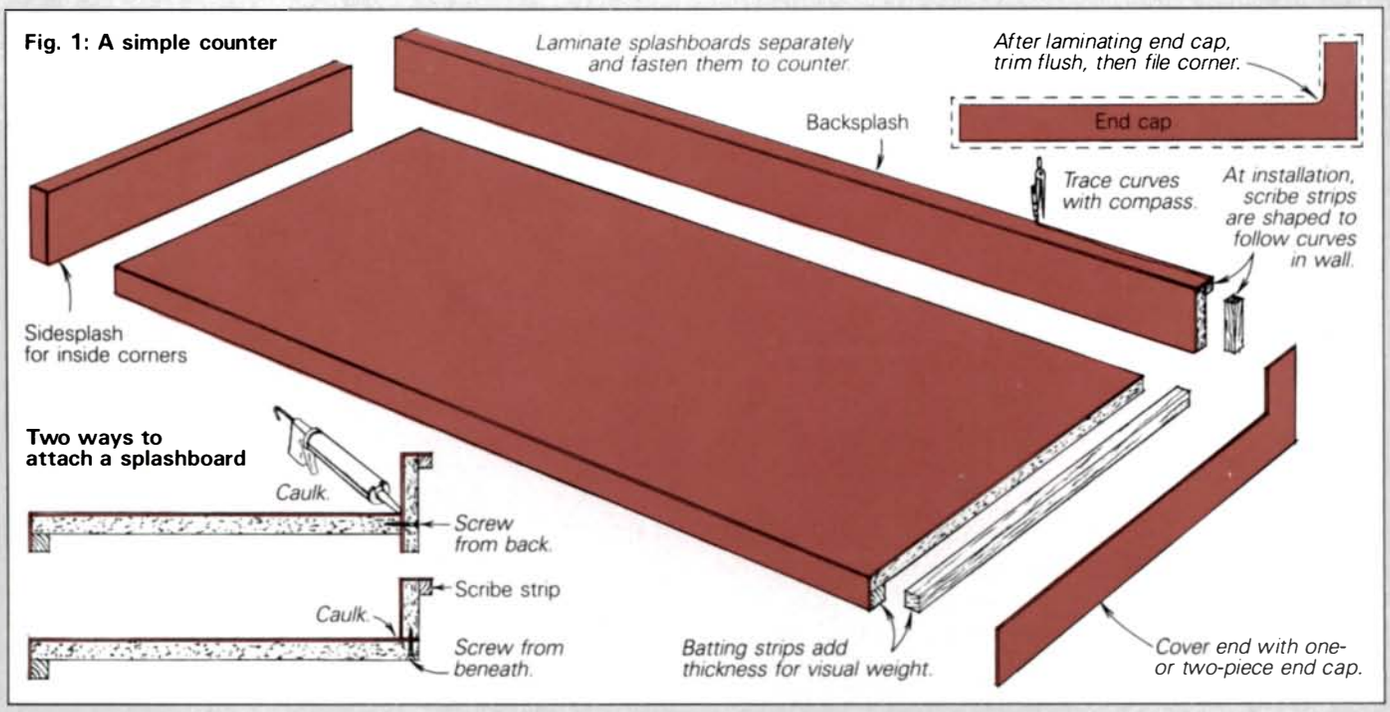
Cutting laminates—I cut most of my plastic laminate on a tablesaw, using a triple-chip blade. So the material won't slip under the fence, I tape a strip of ¼-in. plywood or hardboard to the table next to the fence and run the laminate over it. The laminate sheets must be cut slightly larger than the piece they'll be laid upon, say, ⅛ in. oversize all around. They'll be trimmed flush after application.

The tablesaw gives the quickest and most precise cut, but a plastic scribe or tinsnips work, too. To cut with a scribe, mark the face side and score repeatedly, then crack with the scoreline over a table edge. The break will run diagonally through the thickness of the sheet, so leave the sheet about ⅜ in. to ½ in. oversize in all directions. Tinsnips leave small cracks perpendicular to the cut, requiring a ½-in. allowance.

Order of events—We'll go into detail as things come up, but here's the general plan for, say, a countertop. First, trim the core to its final size. Then cut a big piece of plastic laminate for the top surface and narrow strips for all the core edges you plan to laminate. Remember to cut the laminate slightly oversize. Next, apply cement to both of the core's long edges and to the laminate strips that will cover them, taking care to keep cement off adjacent surfaces and edges. Laminate the long edges and trim the surplus flush. Follow the same procedure for the short edges. Finally, cement the top piece and trim it flush. If the job calls for a splashboard, laminate it as a separate piece and attach it later. For structural pieces such as



Tricks, tips, cores and new products

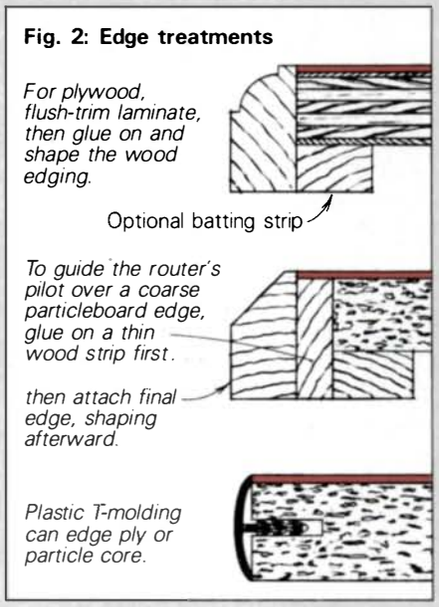


You can lay plastic laminate on almost any stable core. Solid wood, of course, moves too much, so you'll want man-made materials. For cabinet doors and drawer faces, I prefer medium-density fiberboard because it doesn't warp. Thickness can be either $\frac{5}{8}$ in. or $\frac{3}{4}$ in. A $\frac{3}{4}$-in. door with $\frac{1}{16}$-in. laminate on both sides turns out $\frac{7}{8}$ in. thick, which may look a little clunky. For the cabinets themselves, I often use hardwood plywood, because it holds hinge screws better, but I wouldn't use it for any unsupported surfaces.

Countertops can be either $\frac{3}{4}$-in. plywood or fiberboard. There's a tradeoff—fiberboard is my first choice, because it's suitably "dead" (you don't want a counter to be resonant or springy), but it's heavy. If I'm going to have to carry a 12-ft. countertop up three flights of stairs, you can bet it'll be plywood instead. Whichever material you use, screw or glue a batting strip to the edge of your counter so that the finished edge will be 1 in. to $1\frac{1}{2}$ in. thick (figure 1).

Edges can be covered with laminate or decorated with wood trim milled to any shape that suits your fancy, as in figure 2. Plastic or rubber T-molding, slipped into a kerf cut in the panel's edge, is also a good edge treatment. One source of T-molding is Outwater Plastics, 99 President St., Passaic, N.J. 07055.

I've never had any luck trying to lay new laminate over old. On one job a while ago, we tried to cover a curved surface with laminate, then cover that with another sheet of laminate that was itself covered with rift-maple veneer. *Everything* delaminated. We did the whole job over, using epoxy.



Laminates make fine wall coverings, too—have you ever taken a good look at the inside of an elevator? You can bond sheets directly to sheetrock, but I generally cover both sides of $\frac{1}{2}$-in. particleboard and hang these panels on Z-clips (special hardware that allows the panels to be lifted off the walls when necessary).

ColorCore is a new (albeit expensive) Formica Corp. product that's the same color all the way through. Hence there's no dark line at the joints, and a careful workman can make an apparently seamless job. But ColorCore is less forgiving of joint irregularities, and may show contact-cement lines, too. White glue is the recommended adhesive, because it dries clear, but you have to clamp down the laminate until the glue cures. With a sharp bit, you can rout shallow decorative patterns into the surface, and, by laying different colors atop each other, bevel panel edges into multicolored stripe designs. Laminate suppliers also have a variety of other new "designer" products. At the rate things are developing, your shop could end up first-on-the-block without half trying.

Many types of plastic laminates can be heated and cemented around narrow curves, forming a permanent bend upon cooling. Such "postformed" work has been around a long time. Everybody has seen single-sheet countertops that begin with a rolled front edge which sweeps across the counter and up the splashboard. Most postforming is done in factories, but the technique is feasible for a small shop and limited production, too. The Formica Corp. will send a detailed bulletin on the process if you ask—the low-end investment in equipment is less than $400.

The Formica Corp.'s Information Center (114 Mayfield Ave., Edison, N.J. 08837) distributes numerous other technical bulletins, including a how-to guide. If you outline your project to them in a letter, they'll send relevant bulletins and color charts. Formica's technical specialist, Walter T. Davis, will give advice about tricky jobs over the phone at (513) 786-3048. —*J.G.*

countertops, you don't have to laminate both sides, but other parts, such as doors, require it or they will warp.

Spreading cement—Apply contact cement with a brush, a roller or a glue-spreader, spreading it as thinly as possible. Globs dry slowly and will cause a bump when the laminate is laid down. Take care to keep the area clean, because sawdust or chips that get caught in the glue will ruin the bond and are maddening to remove. The surface of the cement should dry evenly glossy. Edges of plywood, particleboard or fiberboard should have at least three coats, each applied after the previous coat has dried. Even on faces, it's a good idea to put a second coat in a 2-in. band around the perimeter.

For applying cement to narrow or tight areas, use a small brush with natural bristles (nylon will dissolve). It costs less to throw cheap brushes away than to buy enough solvent to clean decent ones. If you are edging a few similarly sized pieces, you can stack them and apply glue to the whole stack at once, which helps keep the faces free of cement. I've used a natural-bristle scrub brush for large areas such as countertops, but they are more easily done with a roller. Regular paint rollers will dissolve, but "high-solvent" roller sleeves, designed for spreading epoxy resins, work well. These are available wherever plastic laminates are sold. I prefer a roller with a short nap, rather than a knobby one. If you want a small roller for edges and tight spots, you can bandsaw the regular length into smaller pieces.

The cement should dry in 15 to 30 minutes, and remain ready-to-stick for a couple of hours. Don't wait too long, though, because the cement gradually loses its adhesiveness. The spread cement is ready when it is dry to the touch and has returned to room temperature. If the surface feels cool, it is still losing solvents and should be allowed to dry further.

Applying the laminate—Once the contact-cemented surfaces touch each other, they will stick, so you must be very careful to align the pieces before contact. This is relatively easy with edges and small pieces, but with larger panels it is best to lay out thin sticks—venetian-blind slats, dowels or something similar—about 12 in. apart on top of the panel, and then lay the laminate on top of them. Make sure these sticks are clean and splinter-free, because anything that gets caught underneath the laminate will cause a bump in the surface. Once the laminate has been centered over the panel, remove the sticks one at a time, consecutively, and press the laminate down. Work from one end, so as not to trap air bubbles, and progress down the length of the counter. When all the sticks are out (be sure to get them all), press the laminate down with a rubber mallet, a padded block and a hammer, or a hard roller called a J-roller—suppliers sell them.

Personally, I don't use sticks anymore. With the help of an assistant, I align one long edge and let the panel drop, an action similar to closing a book. It's a neat trick, but it requires some skill, so I wouldn't suggest it for beginners.

When making a lot of interior partitions, or a set of colored drawer bottoms, you can save a lot of trimming time by laminating an entire sheet of plastic laminate to the core material first, then tablesawing the pieces to size. To eliminate chipping while cutting, laminate only one side and run the panel through the tablesaw face-up. Then cover the other side of each piece and trim as usual. If you want to put laminate on the inside of a cabinet, be sure to do it before you assemble the cabinet. This will save you many, many hours of grief.

Moisture may cause delamination. Plan edges and joints so that water will run off, rather than into the seam. When installing a sink, most good workmen take pains to seal the core by applying a strip of laminate around the edges of the hole, in addition to caulking the rim of the sink.

Once applied, laminates can be removed, though the procedure is messy and time-consuming. Lift an edge slightly with a chisel and apply solvent. You can gradually remove the laminate without breaking it. Methyl ethyl ketone (known as MEK and sold in paint stores) will dissolve flammable cements, but it is flammable itself and it won't soften nonflammable cements; 1-1-1 trichloroethane works on both kinds of cement, and won't burn. But wear your vapor mask and gloves in any case, as both solvents are nasty. When dry, the laminate and panel can be reglued and reattached.

Trimming—Once the laminate has adhered, it must be trimmed flush with the core. The best tool is a router with a flush-trim bit, that is, a ½-in. straight carbide bit with a ball-bearing pilot on the end. This allows you to use the core itself as a guide. Don't try a bit with a steel pilot—it's guaranteed to burn the plastic surface. If you plan a lot of laminating, it's worth having a small, one-handed router called a laminate trimmer. The ease of use it affords is well worth its $100 price tag. When using a router, wear goggles or a face shield to protect your eyes from laminate chips.

To trim an edge, hold the router horizontal and guide the pilot bearing along the face of the core, keeping the router's base square against the edge. The objective is to cut the edge strip exactly even with the face, so the face sheet will overlap it without gaps. Chances are, you'll need to do some filing, because flush-trim bits often cut slightly oversize, especially if they've been sharpened more than once. File toward the core to prevent chipping. I use a smooth file for narrow edges and, when I have the room, a belt sander. You can do the entire trimming job with these tools if you don't have a router.

When routing, it's important to keep the bearing free of plastic chips and cement. WD-40 will help dissolve any glue that binds in the bearing, and a few drops of light oil will keep it rolling. If a bearing clogs tight, try soaking it in solvent to restore it. A clogged bearing will burn a ¼-in. wide swath across whatever surface it is riding on, so a little preventive maintenance is a good idea. For extra insurance on really glossy surfaces, you can run a line of masking tape for the bearing to ride on. In a pinch, you can try to clean up a burned surface with 400-grit wet-or-dry sandpaper, but it will never look the same as before, even if you lacquer it to restore the shine. It's best to replace the piece.

When all the laminating is done, clean off excess glue with MEK or lacquer thinner. The edges should be square and sharp. To give the edges a finished look, use a bevel trimmer, which is similar to a flush-trim bit, but cuts a chamfer instead of a square edge. Bevel trimmers come in various angles: 15° and 22° are standard, and even 45° can be used. The greater the angle, the more the inner layer of the laminate will show on the top surface, sometimes desirable for contrast or to make the plastic laminate look thicker. In any case, a smooth file relieves sharp edges left by the router. □

Jack Gavin is a cabinetmaker and furnituremaker in New York City.

The Woodworker's Tools

Function is but one reason for making

by Paul Bertorelli

Coachmakers' plow plane by Robert Baker.

Baker's chariot plane (at left) and miter plane.

Baker's gleaming brass plow plane mimics an 18th-century design.

As manmade objects go, modern hand-woodworking tools usually live squarely in the middle of function's realm. The jointer plane's sole, for example, is no longer than it need be to true a board; the curvy handle of rosewood is not for pretty but to both fit the user's hand and survive a crash around the mean insides of a toolbox. If some of us also find our tools pleasing to look at, we've hit upon a happy coincidence. But suppose the reverse were true? What if hand tools existed only to delight the eye and touch, and whether or how well they worked wood was of less concern?

Indeed, for tool collectors this is just the case. They own tools for love of polished brass or for the satisfying way that precision-machined parts fit together, and, of course, because there's money to be made collecting. The tools shown on these three pages, however, come from a different ken. Displayed last fall in a show entitled "Tools of the Woodworker" at the Brookfield (Conn.) Craft Center, all—save one—were made by devoted woodworkers and tool users who, for various reasons, wandered off the usual path, pursuing a definition of tool that only incidentally embraces function. In all, more than 30 tools by 15 makers were on display, from chisels and planes to clamps and saws. Here's a sampling.

• • •

Shortly before the turn of this century, the Scottish firm of Spiers had elevated the bench-made metal plane to near its zenith, producing 14 models in 65 sizes. Guided by an old Spiers catalog, Robert Baker of Mattawan, Mich., crafted the chariot plane and the miter plane shown here. Both have dovetailed brass bodies which are in turn fastened to their stainless steel soles via dovetails—all the joints painstakingly cut and filed by hand, much as you'd do in wood. The inspiration for the coachmakers' plow plane (shown in two views above)—a tool once used to cut the grooves for panels in the curved rails and stiles of fancy carriages—was an 18th-century French design. The plow is made of brass and steel, and has an applewood handle.

"I couldn't afford the tools I wanted, so I started building my own," says Baker, explaining why five years ago he turned from woodworking to full-time toolmaking. "As I got into it, I became more intrigued with building than using." Though his tools are likely as good as any ever made, most wind up unused in collectors' cabinets, a market Baker cultivates. "I understand the appeal, and it doesn't bother me that my stuff never gets used. . . people like to feed their eyes."

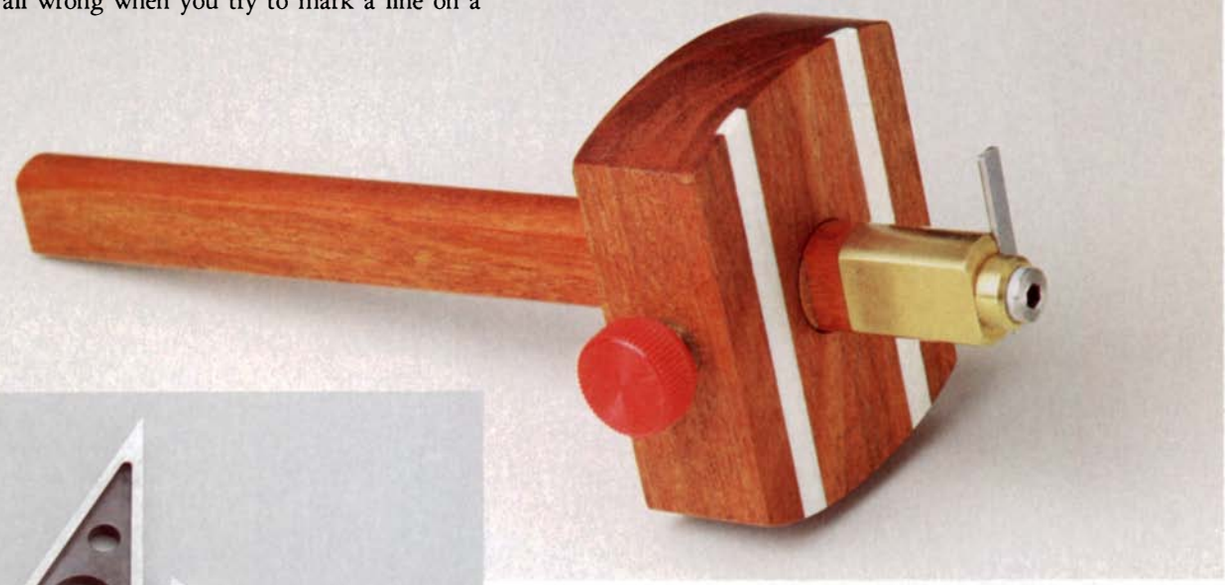
Photos: White Light

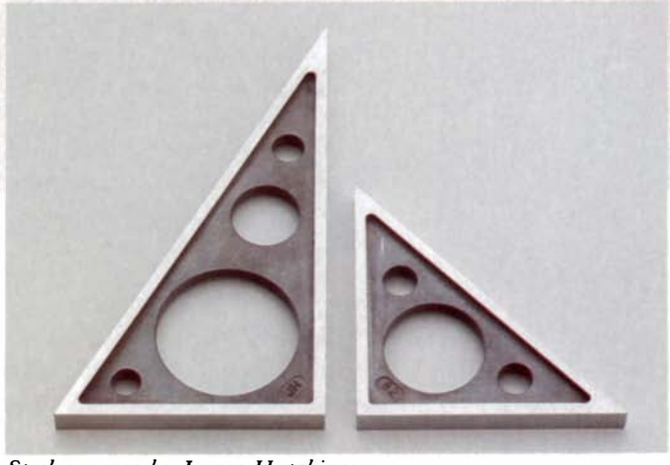
A hundred years ago, a cabinetmaker might have had an entire toolbox devoted only to hollows and rounds—wooden planes whose sole function was to work decorative coves and beads into boards. Today a router can do the same job in a fraction of the time, yet Curtis Erpelding of Seattle, Wash., finds the old tools useful still. He builds his hollows and rounds to match the radii of his router bits. The power tool chews away most of the wood, then a quick pass or two with the wooden plane whisks off the router's burns and burrs, leaving behind a glassy smooth finish that needs no sanding. The fir planes shown at right have soles of harder-wearing teak.

"Toolmaking is kind of my hobby," says Erpelding, "but I use these planes. They're representative of how I feel about myself. . . I like the idea of a hand tool made with and used with a machine technique. I'd prefer to use hand tools all the time, but I'm trying to make a living at woodworking."

Hollow and round planes by Curtis Erpelding.

Allan Boardman's 5-in. long pernambuco marking gauge (with ivory wear strips dovetailed into the fence) was conceived as and is an everyday tool, albeit a fancy one. Boardman, an amateur woodworker in Woodland Hills, Calif., spends his bench time crafting small, precious boxes and tiny puzzles held together by delicate joinery. "The scale of a commercial gauge is all wrong when you try to mark a line on a piece of wood the size of a playing card," says Boardman. He had the gauge's design in mind for five years, but admits to getting carried away when he finally built it. "I could have made it simpler. It didn't have to have all this pernambuco and brass and ivory junk on it. . . but I figured that if I was making it, I might as well make it nice."





Steel squares by James Hutchinson.

Like many contemporary woodworkers, James Hutchinson likes to play with metalworking tools, specifically, the Bridgeport miller. Wanting something useful and beautiful from his experimentation, he fabricated these steel set-up squares (6 in. and 4 in.), which are handier than a store-bought T-bevel for setting a tablesaw's arbor angle. Milled from ⅜-in. bar stock, the squares darkened attractively after Hutchinson hardened the steel to preserve their precise edges.

The sinuous striations in these paring chisels ensue from the Damascus steel from which they were forged by Richard Sexstone of Putney, Vt. Damascus steel was the ancient swordmaker's solution to brittle steel, which would otherwise snap when drawn out to the thin section of a cutting edge. It's made by forging and reforging a sandwich of hard tool steel and soft mild steel into hundreds of thin layers, resulting in a tougher, more elastic blade. But modern hand-forged tool steels are far superior, so Sexstone used Damascus just for looks. In fact, a Damascus edge serrates when used, making it ideal for a flesh-cutting sword but useless for woodworking, a problem Sexstone solved by welding a tool-steel layer to the chisel's back. The shanks and ferrules look turned, but are actually forged to near final shape, then hand-filed.

Bowsaw by Alphonse Mattia.

This bowsaw, one of a pair built by Alphonse Mattia in 1973, sprung more from a desire to probe aesthetic and technical possibilities than from a need for a cutting tool. Inspired by artful tools he had seen in European museums, Mattia wanted to play around with the conventional notion of a bowsaw. "The tools I saw in museums were all functional, but many of them were clearly about form," says Mattia.

He laminated the saw's uprights out of teak, and rather than settling for the usual loose mortise-and-tenon for the crosspiece, he devised more smoothly functioning cylindrical joints that allow the uprights to pivot under tension instead of binding. Though functional, the saw rarely cuts wood. "When I need a bowsaw," says Mattia, who teaches woodworking at Boston University, "I just use my Sandvik." □

Some tools shown here were displayed in Cutting Edge tool stores in Los Angeles, San Diego and Berkeley, Calif. Paul Bertorelli is managing editor at Fine Woodworking.

Portfolio: Garry Knox Bennett

Oakland innovator takes on the trestle table

by John Kelsey

Color photos: ©1982 Nikolay Zurek

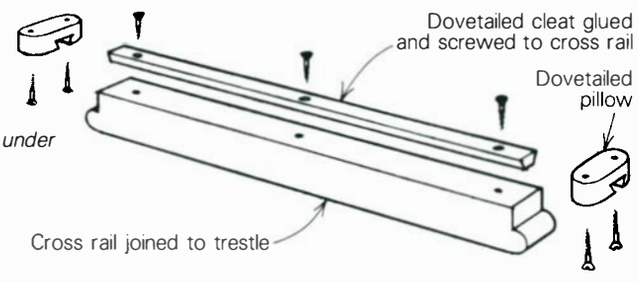
Some people make furniture that's really art, so they sell a few pieces of it in galleries at astronomical prices. Others produce cheaper, simpler objects in profitable quantities. Believing the art route too precious but production work too hard, Garry Knox Bennett of Oakland, Calif., has found his own way of getting by, a way he can have the elements he likes from both of those other worlds.

What Bennett does is produce related objects in series. He takes a well-known furniture form such as the dining table, and a standard structure such as the trestle. Then, at the rate of one per week, he joins up a series of 12 trestle tables. They're not like any tables you've seen before, no two of them are alike and each of them can stand alone, yet the series reveals an evolutionary wholeness.

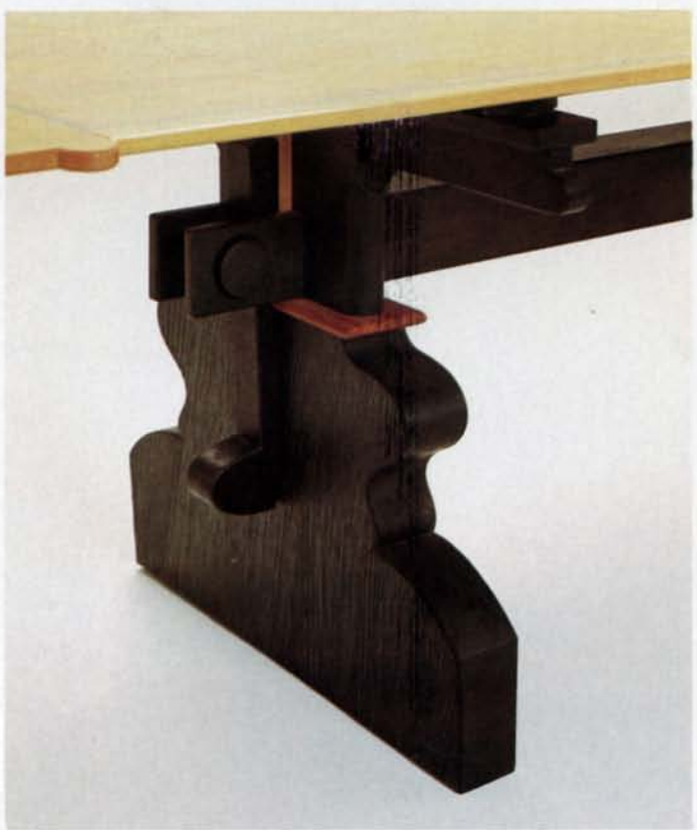
"I have an isometric mind," Bennett explains, "so I don't do any drawing except right on the wood, at the bandsaw. I figure out the next table while I'm making the current one. In my mind, each one fades into the next."

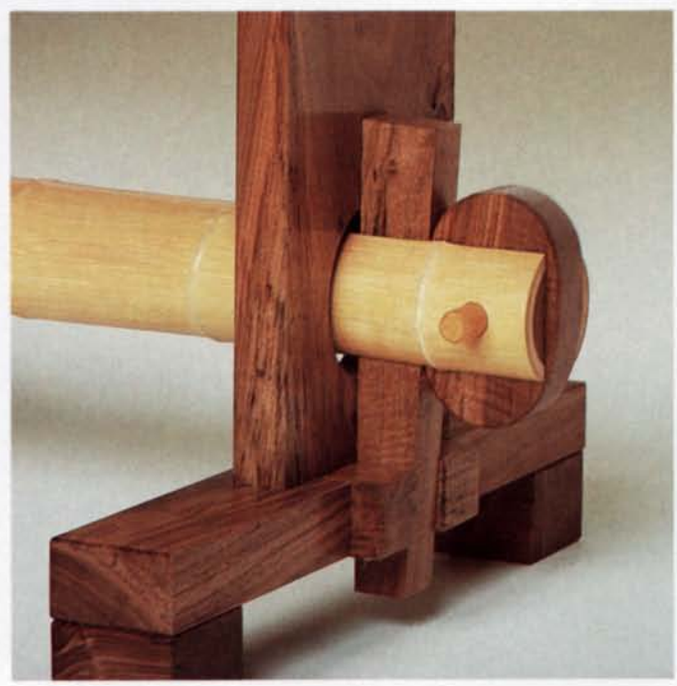
Bennett got started on dining tables when, he says, "I found out that a trestle table about seven feet long and thirty to thirty-six inches wide can seat any-

Instead of being mortised, the walnut stretcher is slotted as if to form a bridle joint. The wedge then bears against a large, horizontal pin. The thin tabletop is fastened to the cross rails with dovetailed cleats that slide in little dovetailed slotted pillows, as shown at right.

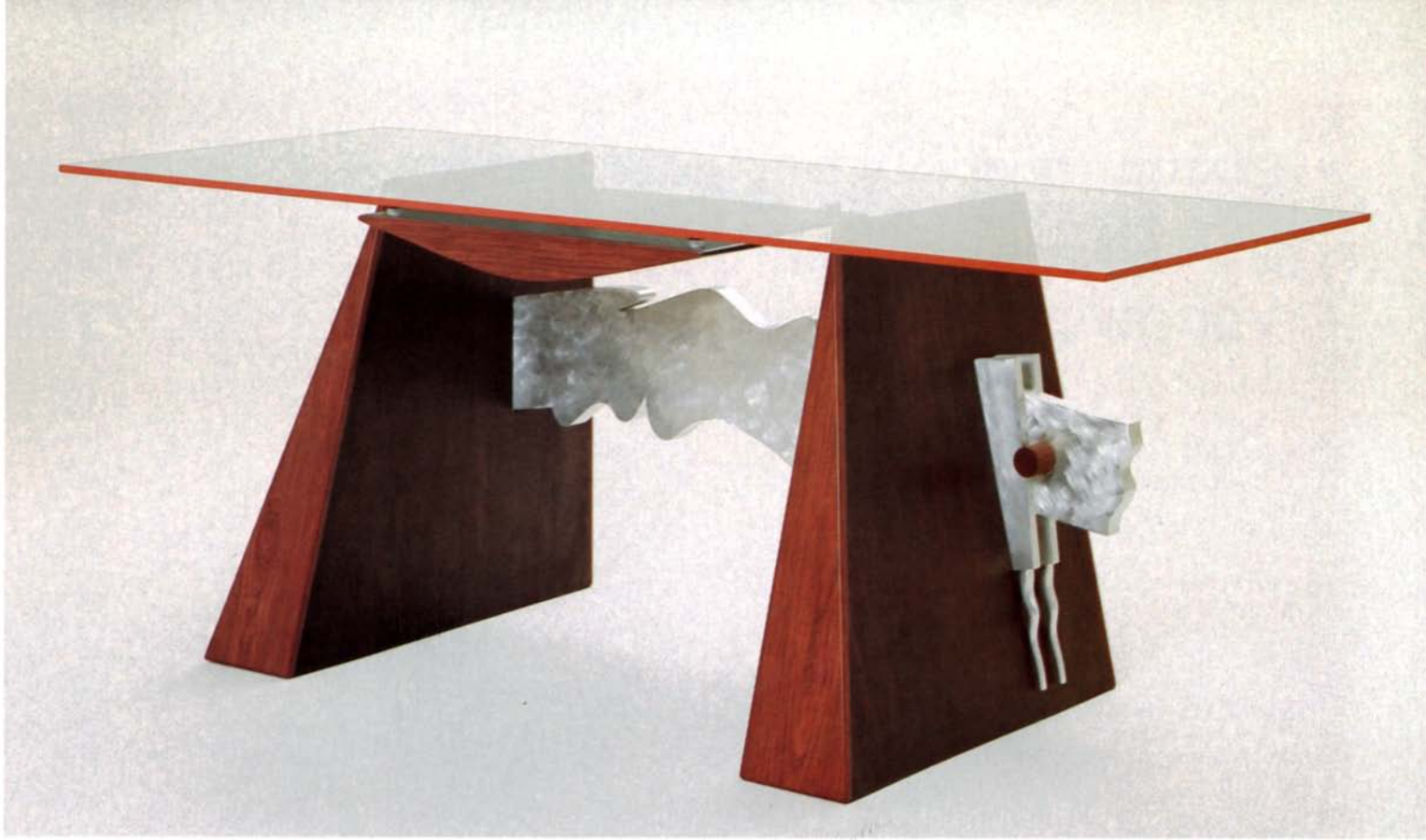


Acacia trestle assemblies, painted white, support a knotty acacia top. The long, wedged stretcher is shouldered top and bottom for a snug fit between the parallel crosspieces, whose slotted ends receive glued-in blocks that lock the trestles together.





A brisk scrub with coarse steel wool cleans up the chainsawn surfaces of this walnut pedestal, above. Then Bennett dyes the wood black, applies paste wax, and burnishes with a hardwood stick. Right: Wedge bears against cam that's pinned into bamboo stretcher.



A glass top with pencil drawer makes a trestle table into a desk. The prism-shaped pedestals are walnut, stained black, with cocobolo end caps. The stretcher is bandsawn from an aluminum bar; its twin wedges bear against a big cocobolo pin. Bennett also built the reverse idea: a glass top on aluminum prisms, connected by a curvy beam of yellow satinwood. Below, Bennett at work.

Alan Wilson

where from two to ten people, though ten is pushing it. Trestles look great out at the end of the table, but then nobody can sit there. I put them on four-foot centers, which allows enough room to sit outboard without knee-banging. And if you hang a little drawer in between the trestles, the thing becomes a desk."

Now 50 years old, Bennett is a shaggy log of a man, about as tall and wide as one of his tabletops. His background includes a fine arts degree and a number of years of working as a sculptor, with many more years of owning and operating a metal-plating and jewelry-manufacturing business. He's learned how to work materials besides wood, and with wood he frequently combines (or contrasts) aluminum, brass, paint and glass—especially glass.

"I love a glass tabletop," Bennett says. "It's thin and it lets you see what's underneath, where all that good woodworking got done. But you can't eat on glass. It's smeary and cold, and the wine glasses break when they tip over. Glass tabletops are a cheap and easy solution to a hard furniture problem, which my tables try to solve with thin plates of wood. The tops are a half-inch or five-eighths of an inch thick, light like glass. Underneath they have two lengthwise supports as well as several cross rails, all held by little sliding dovetail mechanisms that allow the wood to move, yet hold it flat and make it stay put.

"What I like best about a trestle table is, you put that sucker together and whack that wedge, and it really firms up. This series is as close as I've come to loving the process of woodworking, the grunt work."

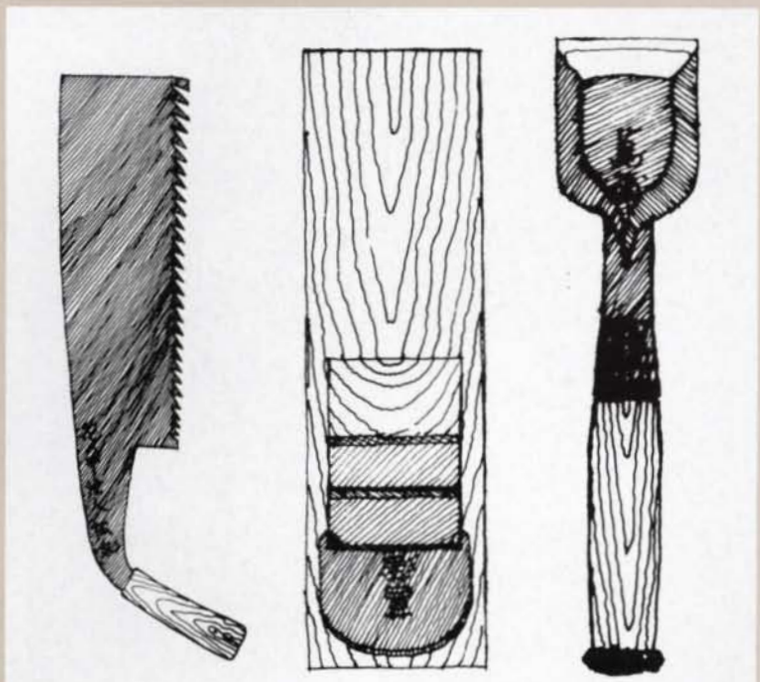
Though he may complain about shop work, Bennett has accumulated a remarkable collection of heavy-duty machinery and he has become an adept craftsman: he imagines what he wants and directly makes it, without fuss or fooling around. His series of things customarily move through his shop to storage in the loft upstairs, until he can arrange places to show and sell, and while he goes on to the next theme. Before tables he elaborated clocks, cabinets and benches. Since tables have come lamps and (at this writing) chairs.

The way in which Garry Bennett works couldn't suit everyone. Bennett-the-craftsman produces a run of useful furniture, in the process discovering and refining his shop techniques. Bennett-the-artist plays with texture, line, color and form while exploring a furniture archetype. Bennett-the-businessman gets a dozen reasonably priced tables to market. And the whole Bennett? He gets to go down to the shop every day, fool around with good tools and materials, make some stuff, try the next idea, see how it comes out. □

John Kelsey is editor of FWW.

Books for woodworkers

From the publisher of *Fine Woodworking* and *Fine Homebuilding* magazines



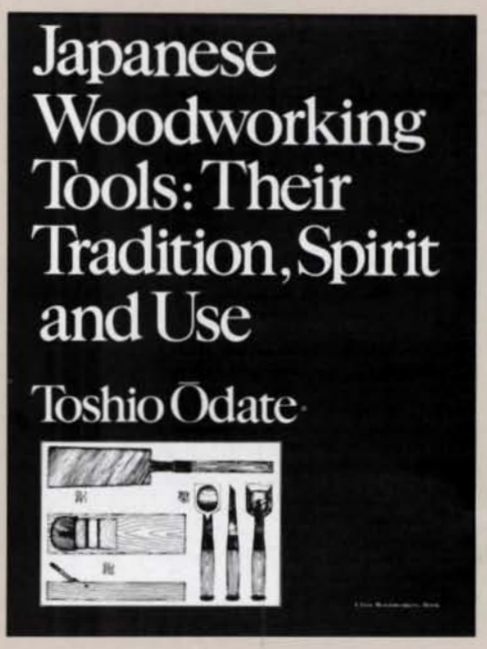
Introducing a tradition

The best way to describe Toshio Ōdate's new book (*Japanese Woodworking Tools: Their Tradition, Spirit and Use*, $23) is to say it's a lot like his workshops.

During a workshop, Ōdate will often talk about his own rigorous apprenticeship in Japan and describe many of the traditions of Japanese woodworking. Then, working with a master's speed and skill, he'll show his audience some of what he's been talking about—how to set up a traditional Japanese workshop, for instance, and how to use a variety of tools. Almost always, he will recall stories and reminiscences that help his audience understand the spirit as well as the techniques of Japanese woodworking.

Needless to say, people who attend these workshops come away deeply impressed and hungry for more. For them, and for anyone who wants to understand Japanese woodworking tools, Ōdate's new book is a marvelous resource.

The book is a kind of extended workshop, with individual chapters on saws, planes, marking tools, chisels, hammers, sharpening stones and more. Like the workshops, the book blends clear, detailed instruction



with memories and digressions that help illuminate each tool's rich heritage.

The chapter on saws, for example, begins with Ōdate's own theory about why Japanese saws are made to cut on the pull stroke, and how this simple fact helps account for their unique qualities. Ōdate also explains how he came to own two antique ripping saws, and in so doing reveals something about the tools' traditions and his own deep interest in preserving those traditions.

With this as background, Ōdate turns to the saws themselves and Japanese sawing techniques. He shows you the different ways a Japanese craftsman stands (or sits) when sawing, depending on whether he's cross-cutting, ripping or sawing tenon shoulders. And he describes the eleven different kinds of saws used to perform these and other operations, explaining what work each saw does best and showing you the most effective way to use it. The chapter concludes with sections on Japanese sawteeth, the files and techniques you need to sharpen the saws and the procedures for making your own saw handles.

This kind of thoroughness is characteristic of the whole book. Every chapter is equally clear, detailed and complete, and illustrated both with photos and with distinctive line drawings by Ōdate himself.

Whether you're looking for information about an individual tool or just looking to expand your own woodworking horizons, you can't do better than this very personal, very complete volume.

鉋

About the Author

As a young boy, Toshio Ōdate was apprenticed to a *shokunin,* or master craftsman. Under his master's stern guidance, Ōdate learned the ancient craft of making *shōji* (sliding screens). Later, he came to the U.S. to teach Japanese woodworking techniques to Westerners and stayed on to become a sculptor. Today, he teaches sculpture at the Pratt Institute in Brooklyn, N.Y. His work has been exhibited at numerous galleries and museums, including the Whitney and the Guggenheim museums in New York.

Find the information you want in

Fine Woodworking Back Issues

Issue #1, Winter 1975
Banjomaker. Making hand planes. The Renwick Multiples (exhibition). Checkered bowls. Tramp chip carvers. Carving design decisions. Woodworking thoughts. Library ladders. Marquetry cutting. Which three (machines)? Serving tray (project). Stamp box (project). All in one (project). French polish finish. Birch plywood. Bench stones.

Issue #2, Spring 1976
Shop becomes school. Marquetry today. Split turnings. Eagle carvings. Hand dovetails. Mechanical desks. Antique tools. Oil-varnish finish. Wood moves. Spiral steps (project). Gustav Stickley. Shaker lap desk (project). Chair woods. Back to school. Micro bevels (sharpening).

Issue #3, Summer 1976
Craftsman's gallery. Wood. Plane speaking. Mortise and tenon. The Christian Tradition (exhibition). Hand shaping. Boston exhibition. Desert cabinetry. Hidden drawers. Green bowls. Queen Anne design. Gate-Leg table. Turning conference. Furniture plans, a listing. Stroke sander.

Issue #4, Fall 1976
A. W. Marlow. Thoughts on woodworking. Water and wood. Hidden beds. Shaped tambours. Exotic woods. Veneer. Tackling carving. Market talk. Abstract sculptures. Workbench. Ornamental turning. Heat treating tools. Guitar rosettes. Buckeye carving exhibition.

Issue #5, Winter 1976
Stacking. Design considerations. Keystone Carvers exhibit. Carcase construction. Plywood. Patch-pad marquetry cutting. Drying wood. Gothic tracery (carving). Measured drawings. Peters Valley exhibition. Guitar joinery. The bowl gouge. English treen. Making shaper knives.

Issue #6, Spring 1977
The wood butcher. Wood threads. Bent laminations. The scraper. California woodworking exhibition. Dry kiln. Expanding tables. Two sticks layout method. Stacked plywood. Two tools to make. Pricing work. Craft exhibitions. Colonial costs. Serving cart design.

Issue #7, Summer 1977
Cooperative shop. Glues. Baltimore exhibit. Design around the construction. Lute roses. Bowl turning. Carving fans. Wharton Esherick. Doweling. Spalted wood. Antiqued pine Furniture. Solar dry-kiln. Bending a tray. Index.

Issue #8, Fall 1977
Medieval woodworking. Out West, diverse businesses. Steam bending. Triangle layout system. Painted furniture exhibition. Sawing by hand. Chain-saw lumbering. Getting lumber. Gaming tables. Two contemporary tables. Wooden clamps. Dowel maker. Elegant fakes. Aztec drum project. Gout stool project. Two tools to make. Young Americans exhibition. Measuring wood moisture. The flageolet project.

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Repair and restoration. Routed edge joint. Designing dining tables. Tall chests, the art of proportioning. Entry doors. Hanging a door. Drawer bottoms. School shop. Health hazards. Blacksmithing. Carving exhibition. Carving exercises. Shaker round stand (project). Mounting marquetry. Small turned boxes.

Issue #10, Spring 1978
Two schools. Wooden clockworks. Hammer veneering. Claw and ball feet. Ball and claw feet. Block-front design transformed. Hot-pipe bending. Several exhibitions. A two-way hinge. Laminated Turnings. Circular saws. Chain-saw carving. Staved cones, the mathematics. Louvered doors. Small workbench.

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Harpsichords. Tool cabinets. Spinning wheels. American woodcarvers exhibition. Drawer assembly. Turning spalted wood. Scratch Beader. Leather inlay. Finishing, avoid the rush. Building green. Parsons tables. Hanging a door. Pencil gauges. Dulcimer peg box.

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Community workshop. Greene and Greene. Shaving horse workbench. Scandinavian exhibit. Tambours. Stains, dyes and pigments (finishing). Spindle turning gouges. Cleaving wood. Whetstones. Sharpening. Cockleshell carving. Sanding. Dust-collection system. Used machinery. Knife checks in veneer.

Issue #13, November 1978
Business practices. Scientific instruments. Making a microscope (project). Harmonious exhibition. Laminated bowls. Preparation of Stock. Tung oil finish. Relief carving. Roll-top desks. Shaped tambours. Of the cylinder desk. Basic machine maintenance. Portfolio: A. W. Marlow. End-boring jig. Scale models. Purpose of making (design). Lumber grading.

Issue #14, January 1979
Ammonia finishing. Guitarmaking school. George Nakashima. Lester Margon's drawings. Tapered lamination (bending). Improving planes. Restoring Bailey planes. Box-joint jig. Five chairs critique. World globe project. Koa table. Incised lettering (carving). Bolection turning. Air-powered tools. Polyhedral puzzles. Design sources. Wood has to breathe.

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Making a big clock. The shape of a violin. Stalking mesquite. Mortise and tenon. Portfolio: W. A. Keyser. Router tables. Treadle lathe. Freewheel lathe drive. Milk paint finish. Flying woodwork. Carved shells. Routed signs. Coopering. Restoration. Gilding.

Issue #16, May 1979
Miraculous staircase. Handicap. Edward Barnsley. Locking the joint. Harvesting green wood. Vacuum press. Five more chairs critique. Hollow turnings. History of marquetry. Before the finish. Workbench. Circular stairway. Three stairways. Spiral staircase. Woods glow.

Issue #17, July 1979
Frederick Brunner, woodcarver. Bending compound curves. Sawmilling. Heavy Timber joinery. Woodworking women. Furniture from photographs. Make a shaper. Routing for inlays. Precision. Finishing materials. Ontario exhibition. Solid wood doors. Library steps (project).

Issue #18, September 1979
Charred finish. Tool auction. Mortising table legs. Showcase cabinets. Tapered sliding dovetail jig. Haunched mortise and tenon. Old World cabinetmaker. Production problem. Drop-leaf and gate-leg tables. Making the rule joint. Turning chisels. High school woodwork. Finishing the finish. Cabriole legs. Contour tracer. Cabriole tem-

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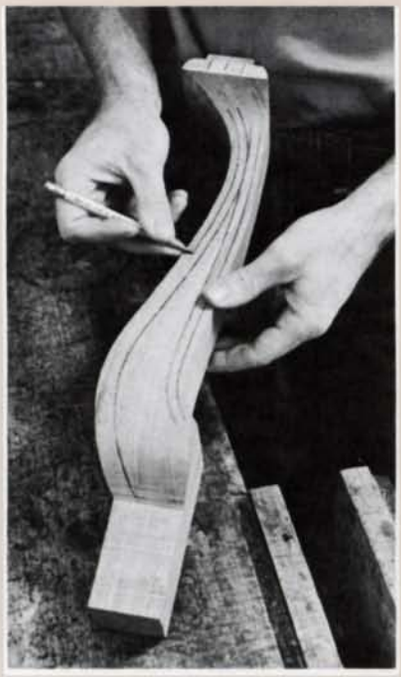


plates. Paneled doors and walls. New Handmade Furniture exhibition. Elephant desk.

Issue #19, November 1979
Grandpa. Wharton Esherick. Two rattles (project). Dragonfly (project). Two toy trucks (project). Oyster-shell veneering. Polyethylene glycol-1000. Turning conference. Turner's gauges. Oil-varnish finishes. Portfolio: Charles Rombold. Chip carving. Copenhagan exhibition. Mortise and tenon by machine. Japanese joinery. The jointer. Mortising. Survey of bandsaws.

Issue #20, January 1980
Expensive tools. Michael Thonet. One-piece chair. Glue press. Woven cane. Ash splint basket. Laminated fishing net. Knockdown tabletops. Orientable. Japanese planes. Wooden plane. French polish finish. Seedlac varnish. Shaper cutters and fences. Pigeonhole desk. Repairing chairs. Safety. Arnold Mikelson.

Issue #21, March 1980
Cherry log. Hans Wegner. Dovetailing carcases. Making machines. Sanding-disc jointer. Inflatable drum sander. Low-tech thickness sander. Abrasive facts. Micrographs of worked wood. Turner's art in Ethiopia. Turning full circle. Sketchbook as design tool. Ogee bracket feet. Hewing. Dowel joint. Japanese saws. Two schools in England. Brandon Chambers, pipe carver. Appalachian crafts exhibition. Index.

Issue #22, May 1980
Steeling away. Kerf-bent boxes. Balinese carving. Alpine furniture designs. Easy chair and sofa. Cowhide for chairs. Alternative wood-drying technologies. Barn for air-drying lumber. Sharpening saws. Furniture conservation. Shop math. Oblique miters. Boring angled holes. Drawing the ellipse. Exhibition of clocks. Marquetry with flexible veneers. Woodworkers and copyright law. Dan Dustin, spoonmaker.

Issue #23, July 1980
Period furniture makers. Plans for Newport and Boston blockfronts. Building blockfronts. Variations in 18th-century casework. Post-and-panel chests. Frame and panel possibilities. Bowls of Harry Nohr. Turning thin bowls. Turning tactics. Carousel horse. Abrasive planer. Disc sander. Turning thin spindles. Carbide circular saws. Hardwood plywood. French fitting. London exhibition. Northwest exhibition.

Issue #24, September 1980
Setting up shop. Mobile home shop. Three phase power. Build a walking-beam saw. Treadle bandsaw. Rhinebeck exhibition. Softwood workbench. Shoulder vise. Combination machines. Wooden vise. Lumber rack. Double-top workbench. Tool rack. Joiner's tool case. Make carving gouges. Sawhorses. Quality in production runs. Dial indicator. Sawdust sculptor. Decoration vs. Desecration.

Issue #25, November 1980
Sam Maloof. Router rail surfacer. Return-air dust collection. Projects, candelabra, wagon toy, triangular table, flip-top box. Bandsaw boxes. Precision in joinery. Butterfly joint. Lion's paw pedestal table. Tambour kitchen cabinets. Tuning up your lathe. Turnings without screw holes. Improved turning chuck. Two neglected woods, elm, chestnut. Finishing marquetry. Drawknife. Woodcarvers exhibition. John Freimuth, stairbuilder.

Issue #26, January 1981
Business costs. Gimson and the Barnsleys. Arts and Crafts Movement. Mosaic door. Curved dovetails. Curved slot mortise and tenon. Clear finishes. Tall-case clock. Abnormal wood. Large sculptures. Mitering on table saw. Aluminum miter jig. Patternmaker's trade. Woodworking schools. Charles Riordan's period furniture.

Issue #27, March 1981
Buying hardwood. Egg and I. Sue and Mare. How inlay is made. Inlaying mother-of-pearl. Treadle jigsaw. Sculptor Armand LaMontagne. Shaker blanket chest (project). Spline-mitered joinery. Coloring with penetrating oils (finishing). Template dovetails. Chisels, and how to pare. Basics of the bandsaw. Alan Peters. Where wood comes from. Santa Fe exhibition.

Issue #28, May 1981
Olivewood recorder. Wooden jointer. Jointer safety. Guitar rosette. Guitar binding and purfling. Woodworking lasers. Scale cabinetmaking. Roll-top desk plans. North Bennet Street Industrial School. Single bed (project). Fumed oak finish. Decorative joinery. Box joint jig. Turning coopered columns. Hand-carved turnings. New Showpieces (exhibition).

In Progress:
Make a Windsor Chair with Michael Dunbar

Michael Dunbar saw his first Windsor chair at a porch sale in 1970. He's been making Windsors ever since. He's also been teaching workshops on Windsor chairmaking, and for the past year, writing a book on the subject.

Make a Windsor Chair with Michael Dunbar is now on its way to the printer. It includes complete plan drawings for two traditional versions of the Windsor—the sack back and the continuous arm—and scaled patterns for every chair part. Using step-by-step photos and instructions, Dunbar shows you how to make both chairs, including how to cut and shape the pine seat, turn the birch or maple legs and stretchers, shave and whittle the red oak spindles and bend the oak bows—all pretty much as the work was done in the 18th century.

While you're waiting for Dunbar's book to come out, you may want to look at another book about chairmaking we publish: John Alexander's *Make a Chair from a Tree: An Introduction to Working Green Wood.*

To order: Use the insert or write The Taunton Press, 52 Church Hill Road, Box 355, Newtown, CT 06470.

Issue #29, July 1981
Reproducing old finishes. Woodworking in Mendocino. Two-board chairs. Stroke sander. Glued-up turnings. Geometric turnings. Inlaid turnings. Finishing on the lathe. Variations on the frame and panel. Pin router setups. Homemade pin routers. Grinding. How to sharpen. Japanese sharpening. Pole-and-wire joinery. Particleboard. Boatbuilding Apprenticeshop. Pipe Organ.

Issue #30, September 1981
Index. Tool auction. Old tools. Building stairs. Tool cabinet. Panel-raising planes. Planemaker's float. Carved signs. Carver's tricks. Mechanical advantage. Sharpening equipment. Slow-speed sharpening. Fixtures for steam bending. Bending with ammonia. Round-top table. Routing mortises. Furniture exhibition. Logging with a horse.


photo: Leroy Radanovich

Issue #31, November 1981
Canoeists meet. Preying tree. McKinley wrestles demons of industrial design. On designing chairs. Projects: end-grain lamp, living-room table, music stand, cross-country skis, American harp, spindle cradle. Mechanism for cribs. Turning for figure. Bowl lathe. Pillar-and-claw table. Gluing up. Lacquer finishing. Long Island exhibition. Portfolio: Michele Zaccheo.

Issue #32, January 1982
Dashboards d'elegance. Turned bowls. Timber. Wooden bar clamps. On making chairs comfortable. Slip joints on radial-arm saw. Grainger McKoy's carved birds. Burning-in bird feathers. Cutting gauge. Business of woodworking. Printer's saw rebuilt. Oval boxes. Shaker carrier (project). Torsion box. California exhibitions.

Issue #33, March 1982
Cratewood to cradle. Split and shaved chair. Tool lovers get together. Tool auction. Designing for machine craft. Backgammon board (project). Appalachian dulcimer. Golden Age finishes. Scribed joints. Trussed log bridge. Woodlot management. Air-drying lumber. Shop-built panel saw. Twist turning. Vietnamese planes. Iowa exhibition. Miter box.

Issue #34, May 1982
Beginner's lament. Cabinet in the sky. Japanese sliding doors (shoji). Plans for Ellis desk. Powderpost beetles. Using the tablesaw. Craftsman style. Bamboo fly rods. Howard Raybould, ornamental carver. Stereo equipment cabinets. Chair design. Blockfront treasure. Routing wide moldings. Period furniture hardware. Repairing finishes. Plate joiners. Woodturning on metal lathe. Horgos' Gambit.

Issue #35, July 1982
Commission show. First rosewood. Joinery on curved lines. Routed drawer pull, mortising jig and wooden hinge. 18th-century finishes. Harpers Ferry conservation shop. Framing pictures. Decorative joints. Bermudan dovetailing. Stripper canoes. Furniture business. Dough bowls. Bench planes. Alabama exhibition. Furniture business.

Issue #36, September 1982
Marquetry exhibition. Hot tub escape. So noma exhibition. Lapstrake boatbuilding. Chainsaw lumbermaking. New lumbermaking machines. Three-legged stools. Knockdown stool. Taming the (turning) skew. Wood identification. Gilding. Curved moldings on radial-arm saw. Island workbench. Set-up table (workbench). Portable carving workbench. Woodworking injuries. Photographing woodworking. Linenfold carving. Rocky Mountain exhibition. Concord exhibition. Armin Erb of the Alps.

Issue #37, November 1982
Shims and patches. Packing out perfume. Arthur Espenet Carpenter. Dovetail jigs. Make a molding plane. Chest of bags. Musical chest. Luthiers convention. Lapstrake boatbuilding. Turning tips. Lathe duplicator. Lathe speeds. Chinese woodworker. Horizontal boring machine. Color finishes. Woodworking with kids. Exhibitions in Mendocino, West Virginia, San Diego. Woodcarving exhibition.

Issue #38, January 1983
Hand injuries. Going for broke (business). Secretaire-bookcase. Marquetry on furniture. Portfolio: Walker Weed. Matched bowls. Walnut-oil finish. Turning goblets. Babbitt bearings. Trade in exotic woods. Storing scraps. Knife work. Stanley #55 plane. Fixed-knife planers. Smoke finishing. Artiture. Branching into chairs.

Issue #39, March 1983
Cancer risk. Commercial woodworking (business). Green scheme. Letting the wood bend. Bending fixtures. Souping up block planes. Sharpening. Wallace Nutting. Southern huntboard. Designer's intent, Six Northwest woodworkers. Unturned bowls. Bandsawn baskets. Making beehives. Humidity and wood. Radial-arm raised panels. Decorative frame joint. Backsaw. Router threadboxes. Two schools, Krenov and Castle. Survey of Woodworking Schools. Once a Tree exhibition.

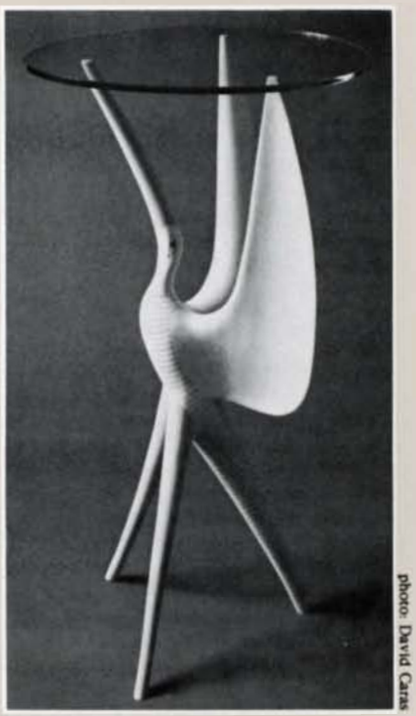
Issue #40, May 1983
Index to issues 31 through 39. Miniatures by machine. The Louisville slugger. Straightening up an old secretary. A spider-leg carriage table. Making wooden buckets. Taos furniture. Repairing bandsaw blades. Bandsaw blade sharpening jig. Japanese resaws. Scroll sawing. Knoll makes a wooden chair. Turning tools that cut. Bent bowl gouges. Woodshop computers. Radial saw meets computer. An adaptable instrument form. Chicago Furniture (exhibition). John Winkler's Sierra boxes.

Issue #41, July 1983
A wooden tablesaw. The laminated wood ribbon. Respiratory hazards. Making ax handles. Kitchen on a stick. The legendary Norris plane. Turning giant bowls. Making a pencil-post bed. Moldings. Layout tips from the boatyard. San Francisco in miniature. Keeping the "poplars" straight. Making your own hardware. A catch, three hinges and a lock. Wooden eyeglass frames. Color and wood. Small New England clocks.

Issue #42, September 1983
A small highboy (project). Cabriole legs. Patternmaker carves wildlife. Designing trestle tables. Tricky trestles. Carving running patterns. Making a router table. How Sam Maloof makes a rocker. A child's rocker. Tools are where you find them. Working locks made of wood. Outdoor wood finishes. Wendell Castle tries elegance. Tips on veneering. Keeping ten fingers. Ripping, grooving and molding safely. The miniature shipwright.

Issue #43, November 1983
Quick and tricky little boxes. Splitting out a firewood tote. Plans for a Swiss shaving horse. Shop-testing five jointer-planers. Learning how to read the grain. Bandsawn dovetails. Cutting dovetails with the tablesaw. Carving satyrs. European-style cabinets. Improving the fretsaw. Which glue do you use? Disc sander sculpts turnings. Spoon bits. New gallery imports current work. A tea table: Applying classical proportions. A Hepplewhite breakfront.

Issue #44, January 1984
Making 50 tables. How to market? Movement and support at the lathe. Versatile plant table. Black walnut woes. Machining backwards. Glues for woodworking. A blacksmith's bleak view of modern tools. Blanket chests and record cabinets. That piano finish. Auger bits. How to make a wooden flute. Modular chairs around a standard seat. Leather seats for wooden chairs. Inventing the coffee table. Rethinking the Federal style. Judy Kensley McKie.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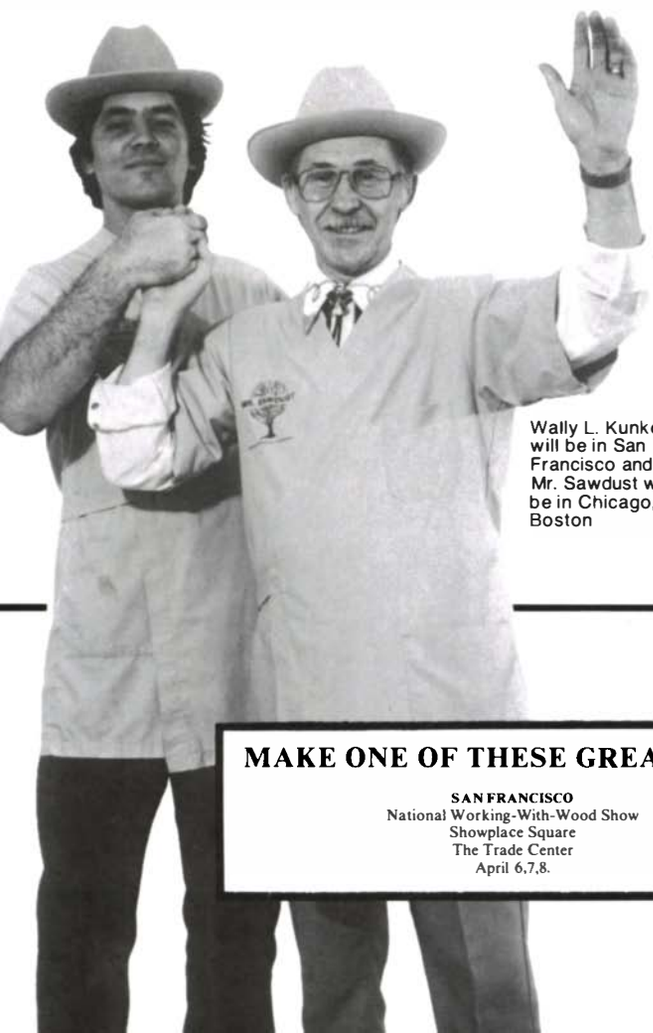

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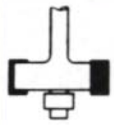	3/8" RABBETING	Deep 3/8"	1¼"	1/2"	14.00
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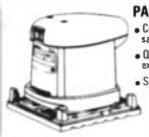

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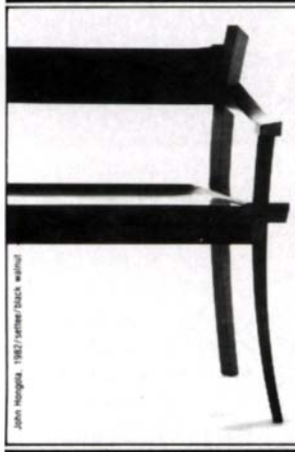

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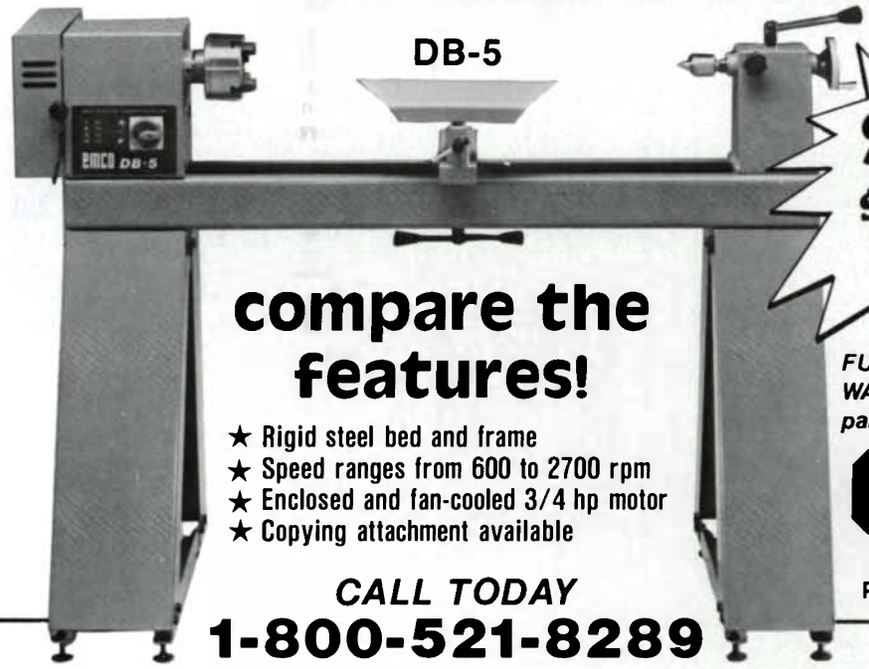

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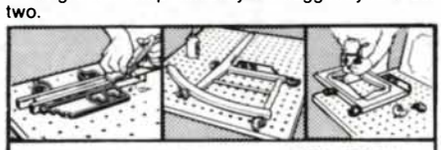

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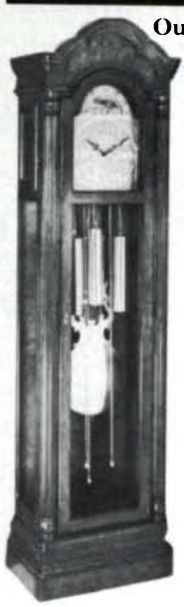

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Hitachi Planer-Jointer F1000A $1465.00

Ryobi 10" Miter Saw TS25IU $189.95

Black & Decker ⅜" VSR Holgun Drill 1172-10
List $100.00
Our Price $69.95
Mfg. Rebate $10.00
Your Cost $59.95

Black & Decker Two Speed Cut-Saw Kit 3103-09
List $145.00
Our Price 99.95
Mfg. Rebate 20.00
Your Cost $79.95

Black & Decker 4½" Angle Grinder 4247
List $90.00
Our Price 69.95
Mfg. Rebate 10.00
Your Cost 59.95

RAKUTA Blade Sharpener (Made in Japan) **$119.95**
Blade Holder **$39.95**

Black & Decker Palm Sander w/dust bag 4010
List $73.00
Our Price 47.95
Mfg. Rebate 10.00
Your Cost 37.95

Makita Cordless Drill Kit w/light 6010DL $99.50

Ryobi ½" 3 H.P. Plunge Router R-500 $165.00

Makita Palm Sander B04510 $46.95

Ryobi Drywall Screwdriver E3700A $77.95

Black & Decker 7¼" Circular Saw Variable Speed Reversible **3027-09 $67.50**

MAKITA TOOLS

1100	3¾" Planer Kit	$168.75
1805B	6-1/8" Planer Kit	278.75
1900BW	3¼" Planer w/cs	88.65
2030	12" Planer/Jointer	1399.00
2040	15-5/8" Planer	1295.00
2400BW	10" Mitre Saw w/blade	254.75
2401BW	10" Mitre Saw w/blade. w/electric brake	184.20
3600B	Plunge Router	188.95
3600BR	Plunge Router	183.70
3601B	Router	129.95
3608BK	Router w/case	81.50
3700B	Laminate Trimmer	83.50
4200N	4-3/8" Circular Saw	91.95
4300BV	Jig Saw Var. Sp.	119.95
5007NB	7¼" Circular Saw	93.95
5012B	12" Chain Saw	119.95
5081DW	3-3/8" Cord. Saw	110.40
5201NA	10¼" Circular Saw	219.55
6000R	Uni-Drill	106.00
6010D	3/8" Cordless Drill	77.75
6010DL	Cordless Drill w/charger light & case	99.50
6010DW	3/8" Cordless Drill w/Charger	84.95
6010DWK	Cordless Drill w/Charger & case	83.95
6012HDW	Cord. Drill Kit 2-Sp. w/leather holster	106.95
6013BR	½" Reversible Drill	119.00
6300LR	½" Angle Drill	149.30
6510LVR	3/8" Dril-Rev.	67.95
6710DW	Cord. Screwdriver	107.10
6800DBV	Drywall Screwdriver	97.50
9030	1-1/8"x21" Belt	120.50
9035	Finishing Sander	49.95
9045B	Finishing Sander	105.50
9045N	Dustless Sander-	109.00
9207SPB	7" Sander Polisher	136.95
9401	4"x24" Belt Sander	169.95
9501BKIT	4" Sander-Grinder Kit	76.55
9900B	3"x21" Belt Sander	126.50
9924DB	3"x24"Belt Sander	135.95
B04510	Finishing Sander	46.95
OA3000	3/8" Angle Drill	116.50
OP3720	3/8" Reversible Drill	48.95
DP4700	Drill Reversible	94.80
GV5000	Disc Sander	49.95
HP1030	Hammer Drill	105.00
JG1600	Jig Saw Single Sp.	91.10
JR3000V	Recipro. Saw	134.75
JR3000W	2 Sp. Reciprosaw Kit	124.75

PONY CLAMP FIXTURES

	Each	Pkg. 6
No. 50 ¾" Pipe Clamp	7.85	7.10 ea
No. 52 ½" Pipe Clamp	6.40	5.80 ea
No. 1215 Band Clamp (WEB) 15'	6.40	5.80 ea
No. 7456 Clamp Pads	2.50	2.25 ea

JORGENSEN BAR CLAMPS (Heavy Duty)

	Each	Pkg. 6
No. 7224 24"	16.50	14.95 ea
No. 7230 30"	17.25	15.65 ea
No. 7236 36"	17.85	16.15 ea
No. 7248 48"	19.75	17.90 ea
No. 7260 60"	21.55	19.55 ea
No. 7272 72"	23.40	21.20 ea
No. 7284 84"*	25.30	22.95 ea

*(No. 7284-3 per pack)

JORGENSEN CLAMPS (Med. Duty)

	Each	Pkg. 6
No. 3712 12"	$5.85	$5.30 ea
No. 3724 24"	7.20	6.50 ea
No. 3736 36"	8.80	7.95 ea

JORGENSEN HAND SCREWS

	Each	Pkg. 6
No. 3/0 3"	$8.85	$8.00 ea
No. 0 4½"	10.40	9.40 ea
No. 1 6"	11.80	10.65 ea
No. 2 8½"	14.10	12.70 ea

JORGENSEN BAR CLAMPS (5" reach)

	Each	Pkg. 6
No. 4512 12" Open.	16.25	14.65 ea
No. 4524 24" Open.	18.15	16.35 ea
No. 4536 36" Open.	20.20	18.25 ea

JORGENSEN CLAMPS

No. 3325	3 Way Edging	$5.15 $4.65 ea
No. 1623	3" Hold Down	6.85 6.17 ea
No. 3202HT	2" Spring	2.15 1.95 ea

RYOBI TOOLS

B7075	3x21 Belt Sander	$118.95
B7100	3x24 Belt Sander	148.50
B7200A	4x24 Belt Sander	167.90
D1010	3/8" Var. Sp. Drill	89.50
D1015A	3/8" Screwdriver/ Drill	111.95
D1310	½" Drill	89.95
D132DR	2 Sp. ½" Rev. Drill	99.95
E3700A	Drywall Screwdriver	77.95
JS-60	Jig Saw	99.95
JSE-60	Electronic Jigsaw	125.90
L-120U	3-5/8" Planer	81.25
L-1323 ALS	3¼" Planer	129.95
LS-35	Finishing Sander	46.95
L-580	6-1/8" Planer	189.00
R-150	1 H.P. Plunge Router	88.00
R-330	2 H.P. Router	139.70
R-500	3 H.P. Plunge Router	165.00
RA-2500	10" Radial Saw	449.95
S500A	3x5½ Finishing Sander	43.95
SU-6200	Finishing Sander ½ Sheet	86.50
TR-30	Laminate Trimmer	74.90
TS-251U	10" Miter Saw	189.95
TS-251U	w/accessories	199.95
W630	7¼" circular Saw	99.50
W730	8¼" Circular Saw	109.75

SQUARE RECESS WOOD SCREWS

Size	100 per pk.	1000 per pk
8x1	$2.25	$13.90
8x1¼	2.50	16.70
8x1½	2.70	18.15
8x2	2.95	23.40
8x2½	3.15	26.15
8x3	3.35	30.25

Sq Recess Screwdrivers $3.65

Square Recess Drill Bits 75¢ ea

Phillips Drill Bits .65 ea

WOOD SCREWS - Flathead Phillips **NEW** Hardened Furniture Screws

Size	100 per pack	1000 per pk
6x1¼	$1.75	$10.95
8x1	2.05	12.70
8x1¼	2.30	15.40
8x1½	2.50	16.95
8x2	2.75	23.40
8x2½	2.95	25.10
8x3	3.15	29.25

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Natural, Medium, Dark, Black or Colors
$5.75 Qt. $17.65 Gal

TITE BOND WOOD GLUE
$5.75 Qt. $12.95 Gal

PRICES SLASHED!
FREUD WHISPER SAW BLADES

Model	Use	Teeth	List	Sale
WS73M10	Fine Cut	60	103.50	59.95
WS81M10	General	40	90.20	49.95
WS82M10	General	60	112.31	59.95

FREUD SAW BLADES 12" - 1" Bore Carbide Tipped 5/8" Bore

No.	Size	Teeth	Use	Price
LU72M10	10"	40	General	$41.50
LU73M10	10"	60	Cut-Off	45.50
LU73M12	12"	72	Cut-Off	67.00
LU78M10	10"	80	Plastic	79.95
LU82M10	10"	60	Cut-Off	50.00
LU82M12	12"	72	Cut-Off	81.50
LU84M10	10"	40	Comb.	42.50
LU84M11	10"	50	Comb.	45.50
LU85M10	10"	80	Cut-Off	73.95
LM72M10	10"	24	Ripping	45.00
TR100	3 blades & Dado set			264.95
OS306	6" Dado			98.95
DS308	8" Dado			119.50

SUN GOLD SANDING SHEETS
9x11 Aluminum Oxide C Weight

Grit	Pk. of 100
150, 120, 100	$21.95
80	23.70
60	28.90
50	32.05
40	38.30

9x11 Non-Loading Silicon Carbide

Grit	A Weight	Pack of 100
400,360,320,280,240		
220,180,150,120		$19.60

Catalog $1.00 — Free with any order.

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1165	3/8" Angle Drill	$113.90
1169-10	3/8" Var. Sp. Drill	49.95
1172-10	3/8" VS Drill	79.95
1310-10	1/2" VSR Drill	94.50
1311-09	1/2" VSR Drill	115.75
1940	3/8" Cordless Drill w/charger	114.75
1975	3/8" Cordless Scrudrill No Charger	99.50
2034-10	Drywall Screwdriver	83.70
2054-09	VSR Screwdriver	147.75
2931	Cordless Screwdriver No Charger	128.95
3027-09	7¼" Circular Saw	67.50
3037-09	7¼" Circ. Saw	99.50
3038-09	8¼" Circular Saw	110.95
3051	7¼" Wormdrive Saw	144.50
3091	10" Miter Saw	189.95
3103-09	2 sp. Cut Saw Kit	79.95
3105-09	Var. Sp. Reciprocating Saw Kit w/case	109.50
3141	Cordless Jig Saw No Charger	114.95
3157-10	Var. Sp. Jig Saw	114.25
3265	Laminate Trimmer	145.65
3310	1½ H.P. Router	139.50
3330	1 H.P. Router	99.95
3370-10	3¼" Planer	119.95
4010	Palm Sander	47.95
4018	½ Sheet Sander	87.95
4247	4½" Disc Sander/ Grinder	69.50
98060	115 V Charger	39.50
98065	12 V Charger	47.95

BLACK & DECKER HOMEOWNER TOOLS

7390	1¾ H.P. 7¼" Circ. Saw	49.95
7404	⅓ Sheet Fin. Sander	29.75
7451	3"x24" Sanderw/bag	99.50
7580	⅓ H.P. Jig Saw	34.75
7605	¾ H.P. Router Kit	59.95
7696	3¼" Planer	49.95

HITACHI TOOLS

B-600A	14½" Band Saw	$1675.00
CJ65VA	Electronic Jigsaw	132.75
CR10V	Reciprocating Saw	124.75
C10FA	10" Miter Saw	289.00
ORC-10	Cordless Screwdriver	94.75
DR-10	3/8" Drill/Screwdriver	108.00
D6V	¼" Var. Speed Rev. Drill	71.00
D10V	3/8" V Sp R Drill	79.95
D13V	½" Var. Sp. Rev. Drill	99.75
F-20A	3¼" Planer	99.75
F1000A	Planer/Jointer	1465.00
JH-60A	Jig Saw	99.75
P50	6-5/8" Planer	295.00
P100F	12" Planer	1250.00
PSM-7	7¼" Circular Saw	114.95
PSM-8	8" Circular Saw	141.90
SB-110	4x24 Belt Sander 2-Speed w/dust bag	185.95
SO-110A	½ Sheet Sander w/dust bag	119.95
SB-75	3x21 Belt Sander-2 Speed w/Dust Bag	135.75
SB8T	3x24 Belt Sander-2 Speed w/Dust Bag	149.95
TR-6	Laminate Trimmer	83.50
TR-8	1 H.P. Plunge Router	127.50
TR-12	3 H.P. Plunge Router	194.75
W6V	Screwdriver	94.50

SUNGOLD X-WEIGHT SANDING BELTS Sold in packs of 10 only

Size	Grit	10	50
3"x21"	120,100	$.98 ea	$.84 ea
	80	1.00 ea	.86 ea
	60	1.05 ea	.92 ea
	50	1.07 ea	.94 ea
	40	1.10 ea	.97 ea
3"x24"	120,100	1.20 ea	.93 ea
	80	1.22 ea	.97 ea
	60	1.26 ea	1.12 ea
	50	1.31 ea	1.15 ea
	40	1.34 ea	1.18 ea
4"x24"	120,100	1.68 ea	1.46 ea
	80	1.73 ea	1.51 ea
	60	1.78 ea	1.64 ea
	50	1.85 ea	1.70 ea
	40	1.89 ea	1.76 ea

Outlasts regular belts 2 to 1

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Busn. Opportunities

WOODWORKING SHOP, furniture repair, refinishing and custom work. Est. 13 yrs. $53,000 gross, 3 mo. backlog. Growing area of central Florida. Expandable. Sell or rent property with business. Box 1452, Melbourne, FL 32901.

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MAINE, former woodworking shop, living quarters above, lumber shed, 27 acres, gardens, $50,000. Owner. (401) 789-0433.

Professional SHOP, FARM, HOME in Tennessee. Ideal situation. $95,000. Fine machinery, lumber available. Sharp, Rt. 1, Woodbury, TN 37190. (615) 563-2831.

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N.Y.S. co-ed resident camp seeking creative woodshop instructor. Family accommodations available. Write Box 296, Woodbury, NY 11797.

APPRENTICE VIOLIN MAKERS and restorers: Positions available with finest rare violin shop in the country. Good salary and benefits, excellent training program. Professional woodworking experience required. Must be willing and able to learn. Bein & Fushi Inc., 410 S. Michigan Ave., Chicago, IL 60605.

COUNSELORS—MAINE: First-quality residential co-ed camp. Counselors with knowledge of woodworking needed. Write R.W. Scott, 34 Sea Lane, Hilton Head Island, SC 29928.

One-man shop seeks HELPER/APPRENTICE. Emphasis on hand tools. Write Box 324, Monterey, MA 01245.

Situations Wanted

Cabinetmaker with 10 yrs. experience desires established business to work for, invest in or buy. Willing to relocate. Refs. 3482 Hwy. 34, Waldport, OR 97394. (503) 563-4817.

Los Angeles. Responsible woodworkers wanted to share well-equipped shop on westside. $125/month. John Houck, (213) 553-3939 days or (213) 472-7009 eves.

Cabinetmaking apprenticeship wanted beginning summer '84. Some related experience. Determined. Rich Green, 2702 NE 9th Ave. #A, Wilton Manors, FL 33334.

Instruction

WOODTURNING with Rude Osolnik, "Design and Technique". March 10 and 11. N.C. State University Craft Center, PO Box 7305, Raleigh, NC 27695. (919) 737-2457.

CANADIAN SCHOOL OF WOODTURNING (family woodturners since 1830). Basic training or full journeyman course. Bert Thompson, 1069 Southdown Rd., Mississauga, Ont. L5J 2Y7.

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SWEDISH WOOD DYES. Bright colors. Easy and inexpensive. Nontoxic. Send $3 for sample and brochures. Henningson & Assoc., PO Box 6004, Rockford, IL 61125.

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SO. CALIF. CRAFTSMEN & HOBBYISTS—If you are a professional or aspiring fine woodworker, plan to attend *The Woodworking Show* at the Pasadena Convention Center April 13-14-15, 1984. See the latest techniques, tools and machines. 1516 So. Pontius Ave., Los Angeles, CA 90025, (213) 477-8521 for information and discount admission.

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Hardwoods of Englewood. Southwest Florida's largest hardwoods dealer. 33% discount to architects, contractors and cabinetmakers. 1687 Manasota Key Rd. East, Englewood, FL 33533. (813) 475-2675.

Georgia

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Illinois

The Hardwood Connection, 420 Oak St., DeKalb, IL 60115. (815) 758-6009. A complete woodworking store staffed by woodworkers serving northern Illinois. Native and imported hardwoods. Millwork, plywood, veneer.

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Massachusetts

Hardwood, softwood, plywood, complete millwork, glued panels, wholesale, retail. Large inventory. Amherst Woodworking, Northampton. (413) 584-3003.

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The source for the elusive hardwoods. Curly maple, padauk, bubinga, walnut, cocobolo, ebony and more. Joshua's Trees, 113 N. 7th St., Brooklyn, NY. (212) 387-9016.

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San Antonio and South Texas' hardwood store. Austin Hardwoods, San Antonio, 2446 Brockton, San Antonio 78217. (512) 822-8833; 822-8323.

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BANJO-MANDOLIN-guitar plans, kits and parts. Free catalog. Stewart-MacDonald, 21 N. Shafer, Box 900F, Athens, OH 45701. (800) 848-2273.

GUITAR, BANJO, violin, mandolin-making materials, accessories, books. Piano-tuning kits. Catalog, $1. International Luthiers Supply, Box 15444, Tulsa, OK 74158.

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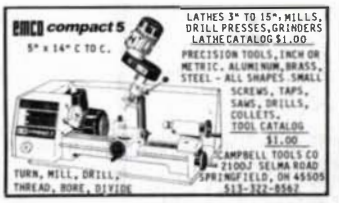

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Events

Listings are free, but restricted to happenings of direct interest to woodworkers. Our May/June issue will list events between Apr. 15 and July 15; deadline Mar. 15. Our July/Aug. issue will list events between June 15 and Sept. 15; deadline May 15.

ALABAMA: **Show**—Panoply of the Arts, May 10–13. Big Spring Park, Huntsville. Contact Jean Porter, Arts Council, Von Braun Civic Ctr., 700 Monroe St., Huntsville, 35801. (205) 533-6565.

ARIZONA: **Fair**—Mar. 30–Apr. 1. Arts Center, 7383 Scottsdale Mall, 85251. (602) 994-2301.

CALIFORNIA: **Show**—Tools and supplies exhibits, seminar speakers, Apr. 13–15. Pasadena Convention Center, 1516 S. Pontius Ave., Los Angeles, 90025. Contact Ellen Sandler, (213) 477-8521.
Workshops/seminars/lectures/exhibits—Berkeley: Chairmaking, Grew-Sheridan, Feb. 18–19; Shaker boxes, John Kassay, Mondays, Feb. 27–Mar. 12; duck decoys, Chester Wilcox, Mar. 3, 10; making carving tools, Bruce Britton, Mar. 10; basic tools, Simon Watts, Mar. 24. Los Angeles: Lapstrake sailboat, Simon Watts, Feb. 20–24, Feb. 27–Mar. 2; turning, Jerry Glaser, Mar. 12–26; marquetry, Mar. 17–31. San Diego: Traditional tools, Feb. 21; bent lamination, Martha Rising, Feb. 25; veneering, Pat Edwards, Wednesdays, Feb. 22–Mar. 21; cabinetmaking, Chuck Davis, Feb. 25–Mar. 31. The Cutting Edge, Los Angeles: (213) 390-9723; San Diego: (619) 695-3990; Berkeley: (415) 548-6011; Phoenix: (602) 997-8665.
Juried fair—Furniture, toys. Sept., San Francisco. Deadline Mar. 10. American Craft Enterprises, Box 10, New Paltz, N.Y. 12561. (914) 255-0039.
Workshops—Fresno: Turning, Bill Livingston, Feb. 25. Strathmore: Handsaw sharpening, drawermaking and joinery, Carl Westburg, Mar. 24–25. Contact Mark Webster, Box 789, Porterville, 93258. (209) 781-4074. Oakhurst: Wood inlay, Chris Cantwell, Feb. 25, 26, Mar. 3. Contact Allen Wenglin, 41368 Hwy. 41, Oakhurst, 93644. (209) 683-8990.
Show—National Working With Wood, display and sale, Apr. 6–8. Trade Show Center, San Francisco.
Festival—Bird carving competition and exhibit, Feb. 18–19. Holiday Inn, Embarcadero, 1355 North Harbor Drive, San Diego, 92101.
Exhibit—Furniture as sculpture, Erik Gronborg, through Feb. 26, MiraCosta College Gallery, 1 Barnard Dr., Oceanside, 92054. (714) 757-2121.
Show—Woodline/East Bay Woodcrafters, Mar. 3–4. 1731 Clement Ave., Alameda. Contact Dick Compton, 4351 Whittle Ave., Oakland. (415) 531-6455.
Juried show—3rd Annual, June 14–July 1. Deadline Apr. 27. Design in Wood Show, Southern California Exposition, 92014. (619) 297-0338.

CONNECTICUT: **Exhibit**—American chairs and tables, Feb. 1–Mar. 7. Elements Gallery, 14 Liberty Way, Greenwich, 06830. (203) 661-0014.
Seminar—Marketing, Mar. 3. Hamden Library. Contact Anita Malone, Coop. Ext. Serv., 670 Wintergreen Ave., Hamden, 06514. (203) 789-7865.
Workshops—Toshio Odate, Apr. 14–15; Tage Frid, Apr. 28–29; Allan Stirt, May 5–6. Brookfield Craft Ctr., Box 122, Brookfield, 06804. (203) 775-4526.
Show—Apr. 14–16, Hartford Civic Center.
Conference—Crafts, Mar. 23–24. Conn. Guild of Craftsmen with Greater Hartford Community College, 61 Woodland St., Hartford, 06105. Call Frank Chiaramonte, (203) 549-4200, ext. 284.

WASHINGTON, D.C.: **Craft show**—Apr. 27–29. Departmental Auditorium, 1301 Constitution Ave.

GEORGIA: **Workshops**—Ian Kirby, Apr. 30–June 17. Deadline Mar. 30. Kirby Studios, 811 Atlanta Rd., Cumming, 30130. (404) 889-9823.
Exhibit—19th-century furniture, through June 10. Atlanta Historical Society, (404) 261-1837.
Seminar—Skills and techniques, Tage Frid, Feb. 24–26. Highland Hardware, 1034 N. Highland Ave., Atlanta, 30306. (404) 872-4466.
Craft fair—Mar. 17–20. Atlanta Merchandise Mart, 240 Peachtree St. N.W. (404) 658-5616.

IDAHO: **Exhibit**—Big Sky Biennial, Mar. 2–30. Idaho State University, Pocatello. (208) 236-2361.

ILLINOIS: **Show**—Chicago Contemporary Furniture, Mar. 30–May 6. Evanston Art Center, 2603 Sheridan Rd., Evanston, 60201. (312) 475-0079.
Juried show—Arts/crafts, June 30–July 1. Deadline Apr. 13. Contact Ira Golan, Chamber of Commerce, 807 Davis St., Evanston, 60201. (312) 328-1500.

IOWA: **Exhibition/lecture**—Small furnishings, Mar. 19–30; Wendell Castle lecture, Mar. 25. Gallery 181, Iowa State Univ., Ames, 50011.

KANSAS: **Crafts competition**—Apr. 1–30. Deadline Mar. 11. Gallery of Fine Arts, Topeka Library, 1515 W. 10th, Topeka, 66604. (913) 233-2040.
Seminar—Stretching Your Shop Dollar, Mar. 22–23. Contact L. Duane Griffiths, Pittsburg State Univ., Pittsburg, 66762. (316) 231-7000.

LOUISIANA: **Festival**—"Mardi Gras" craft exhibit and sale, Mar. 8–11. Hyatt Regency, New Orleans.
Juried shows—Crafts, Apr. 14–15, Riverside Centroplex, Baton Rouge. Deadline for Aug. show, Apr. 30. Craftworks, Rt. 4, Box 688, Gonzales, 70737.

MAINE: **Workshops**—High school, summer. New England Craft Program. J. Sinauer, 374 Old Montague Rd., Amherst, Mass. 01002. (413) 549-4841.

MARYLAND: **Show**—Knockdown furniture, Mar. 23–May 6. Appalachiana, Georgetown Square Mall, Bethesda. (301) 530-6770.
Craft fairs—Sugarloaf Mountain Works, Inc., Ijamsville, 21754. (301) 831-9191.

MASSACHUSETTS: **Workshop**—Country cabinetmaking, Feb. 25. Old Sturbridge Village, Sturbridge, 01566. (617) 347-3362.
Lecture—Toshio Odate, Mar. 14. Contact Program in Artisanry, Boston University, 620 Commonwealth Ave., Boston, 02215. (617) 353-2022.
Shows—"Do Touch," sculpture, through Mar. 20. Juried furniture shows: Interiors I, II, III, Feb.–June, slides by Mar. 31. Society of Arts & Crafts, 175 Newbury St., Boston, 02116. (617) 266-1810.
Show—Woodworking World, New England, Apr. 13–15 at Sheraton Inn, Boxborough. Contact Convention Designs, Box 485, Plymouth, N.H. 03264. (603) 536-3768.
Workshops—Marquetry, Silas Kopf & Gary Wright, Mar. 3–4; dovetails, David Morreale, Mar. 31; Toshio Odate, Apr. 27–28. Worcester Craft Ctr., 25 Sagamore Rd., Worcester, 01605. (617) 753-8183.

MISSOURI: **Classes**—Refinishing and conservation, Mar.; veneer repair, Apr. SASE to The Finishing School, 1607 N. 2nd St., St. Charles, 63301.

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Show—Wood, through Feb. 29. Private Stock Gallery, 1612 Westport Rd., Kansas City, 64111.

NEW HAMPSHIRE: **Exhibit**—Furniture and accessories, Feb.–Mar. Woodworkers Gallery, Rt. 101A, 161 Nashua St., Milford. (603) 673-7977.
Juried show—Crafts, Mar. 17–Apr. 26. Manchester Institute of Arts and Sciences, 148 Consora St., Manchester, 03104. (603) 623-0313.

NEW JERSEY: **Lecture**—Running a gallery, Richard Kagan, Mar. 23. Kean College, Union. Contact Michael Mack, (201) 974-1723.
Workshop—Tage Frid, May 5. Brookdale College, Lincroft. Gabe Longo, (201) 842-1900, ext. 586.
Juried show—Westfield, Oct. Deadline Apr. 27. Craft Market America, Box 30, Sugarloaf, N.Y. 10981. (914) 469-2249.
Show—N.J. woodworkers, Mar. 11–Apr. 1. Bloomfield Cultural Center. (201) 599-0177, 262-2766.

NEW MEXICO: **Exhibit**—New Mexico furniture, 1600-1900, through mid Apr. New Mexico Museum of International Folk Art, Sante Fe.

NEW YORK: **Exhibition**—19th-century patent models, through Apr. 1. Cooper-Hewitt Museum, Fifth Ave. and 91st St., N.Y.C. (212) 860-6868.
Workshop—Sharpening, Apr. 7, 14. YWCA, 610 Lex. Ave., 53rd St., N.Y. (212) 755-4500, ext. 60.
Show—National Working With Wood, May 11–13. New York Penta Hotel, 7th Ave., 33rd St., N.Y.C.
Exhibits—Furniture from *Design Book 3,* Feb. 23–Apr. 1; Colorcore, Apr. 12–May 27; work from RISD, June 7–July 7. Gallery at Workbench, 470 Park Avenue S. at 32nd St., N.Y.C., 10016.
Festival—Crafts, June 30–July 1, 7–8. Lincoln Center. Deadline Mar. 16. Brenda Brigham, ACAC, Box 3221, Hoboken, N.J. 07030. (201) 798-0220.
Juried crafts—Croton-on-Hudson, June 16–17. Deadline Mar. 10. Great Hudson River Revival, RD 1, Box 175, Putnam Valley, 10579.
Exhibit—7th annual carving, May 5–6. Grange Hall Bldg., Erie County Fairgrounds, Hamburg. Contact Richard Reimers, 67 Lyndale Ct., W. Seneca, 14224.
Workshop—Japanese tools, Robert Meadow, Mar. 10–11, Apr. 7–8, May 5–6. The Luthierie, 2449 W. Saugerties Rd., Saugerties, 12477. (914) 246-5207.
Juried fair—Crafts, May 25–28. Deadline Mar. 15. Scott Rubinstein, Box 825, Woodstock, 12498.
Juried festival—Arts and crafts, July 6–8, Aug. 10–12. Slides by May 1. SASE to Chautauqua Crafts Festivals, RD 2, Portage Hill Rd., Westfield, 14787.
Exhibit—Old tools and things, through July 1. SASE for catalog, DeWitt Historical Society, 116 N. Cayuga St., Ithaca, 14850. (607) 273-8284.

OHIO: **Seminar**—Dovetails, Mark Duginske, June 23–24. University of Akron. (216) 375-7826.

OKLAHOMA: **Seminars**—Ian Kirby, Mar. 9–11; Inca tool demonstration, Apr. 12–14. Fine Tool & Wood Store, 7923 N. May Ave., Oklahoma City, 73120. (405) 842-6828, (800) 255-9800.
Show—Carving, June 9–10, Midwest City. Contact Jim Crist, 2000 N. Purdue, Oklahoma City, 73127.

PENNSYLVANIA: **Juried show**—Crafts, July. Museum of Art, Pennsylvania State Univ., University Park. Deadline Apr. 1. SASE to Joyce Hagen, 230 E. Burnside St., Bellefonte, 16823. (814) 355-4013.

Juried exhibit—The Woodworker, Philadelphia, Sept. Deadline Apr. 27. Craft Market America, Box 30, Sugarloaf, N.Y. 10981. (914) 469-2249.
Show—Carving, Apr. 7–8. Penn State Gym, Abington. Contact Howard Clarke, 1306 Friendship St., Philadelp' , 19111. (215) 745-7938.
Worksho -Hardwood grading, Feb. 27–Mar. 2. Penn. State Univ., Univ. Park. (814) 865-9547.
Show—Pennsylvania crafts, Mar. 3–25. Market House Craft Center, Queen & Vine Sts., Lancaster.
Festival—Crafts, May 12–13. Mercer Museum, Pine St., Doylestown. Contact Jane Acton, Bucks Cty. Hist. Soc., Pine St., Doylestown, 18901. (215) 348-8083.

RHODE ISLAND: **Shows**—Bent wood and lamination, until Apr. 29; furniture, Mar. 16–June 27. RISD Museum, 224 Benefit St., Providence. For hours, call (401) 331-3511, ext. 131.

TENNESSEE: **Fair**—West Town Mall, Knoxville, Apr. 13–15. (615) 637-4561.
Workshops/exhibit—Carving, Robert Lockhart, Mar. 12–16; turning, Stephen Hogbin, Mar. 26–30; exhibit: surface enrichment, Mar. 2–Apr. 2. Arrowmont School of Arts and Crafts, Box 567, Gatlinburg, 37738. (615) 436-5860.

TEXAS: **Juried fair**—13th Annual Houston Festival, Sam Houston Park, Mar. 24–Apr. 1.
Fair—ACC Craft Fair, Market Hall, Dallas Market Center. Trade: Apr. 4–5; public: Apr. 6–8.
Show—Contemporary and traditional furniture, May 17–30. Dougherty Cultural Center, Austin. Contact Woodworkers Guild, 225 Congress Ave., Suite 156, Austin, 78701. (512) 282-0493.

UTAH: **Symposium**—5th Annual Turning, Apr. 26–28. Brigham Young Univ. Contact Dale Nish, 230 Snell Bldg., B.Y.U., Provo, 84602. (801) 378-6491.

VERMONT: **Exhibits/workshops**—Vermont State Craft Center at Frog Hollow, Middlebury, 05753.
Workshop—Wood and canvas canoe building, May 12–20. Sterling College, Craftsbury Common, 05827. (802) 586-2561.

WASHINGTON: **Seminar**—Lofting, Simon Watts, Mar. 2. Center for Wooden Boats, 1010 Valley St., Seattle, 98109. (206) 382-BOAT.
Exhibit—Woodworkers, Feb. 27–Mar. 16. Viking Gallery Union, Western Wash. Univ., Bellingham, 98225. Contact William Wasson, (206) 676-3263.

WISCONSIN: **Workshops**—Kiln-drying, Eugene Wengert, Paul Bois, Apr. 4–5, Greenville; Apr. 25–26, Madison. National Wood Drying Assoc., 27 Mondale Ct., Madison, 53705. (608) 238-7097.
Festival—12th Annual Arts Festival, Mar. 25. Contact Festival of Arts, Box 872, Stevens Point, 54481.
Show—Contemporary, through Feb. 26. West Bend Gallery, West Bend, 53095. (414) 334-9638.

BRITISH COLUMBIA: **Exhibition**—British Columbia woodworkers, May 14–June 24. Langley Museum, Mavis and King Sts., Fort Langley. Contact Shirley Sutherland, (604) 888-3922.

MANITOBA: **Crafts show**—Winnipeg Gallery, Mar. 4–Apr. 15. Manitoba Crafts Council, 202-89 Princess St., Winnipeg, R3B 2X5.

ONTARIO: **Competition**—Handcrafted furniture, sculpture, instruments, $1500 prizes, Aug. 10–12. Deadline June 1. Contact Durham Art Gallery, Box 1021, Durham, N0G 1R0. (519) 369-3692.

Connections

In Connections we'll publish membership calls for guilds, queries from authors, and appeals from readers who want to share special interests.

Inland Empire Woodworkers Guild: James Freeman, Box 7413, Spokane, Wash. 99207-0413.

Woodworkers' association, United States and Canada. Woodworking Assoc. of North America, 35 Main St., Plymouth, N.H. 03264. (603) 536-3876.

St. Louis club: Bruce Denslow, Wood & Shop, 5605 N. Lindbergh, St. Louis, 63042. (314) 731-2761.

Vancouver Area Woodcraft Guild: Ted Ingham, 12 E. 17th Ave., Vancouver, B.C. V5V 1A2.

Summer tour of India: Brochure from Michael Scott, 3632 Ashworth N., Seattle, Wash. 98103.

$750 scholarships for New York State students. Apply by Mar. 15. Crafts Management, NCCC, 20 Winona Ave., Saranac Lake, N.Y. 12983.

Craftspeople: Summer rentals. Write Woodstock Guild, 34 Tinker St., Woodstock, N.Y. 12498.

'Neat Pieces, the plain-style furniture of 19th-century Georgia,' runs through June 10 at The Atlanta Historical Society, 3101 Andrews Dr. N.W., Atlanta, Ga. 30305. The piece shown above is a yellow-pine pie safe with tin panels. Over a five-year period, curators examined more than 2,000 pieces before selecting 126 for the show. There's a 216-page photographic catalog for $18, postpaid.

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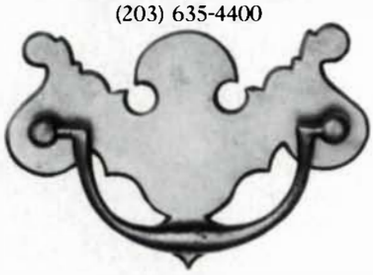

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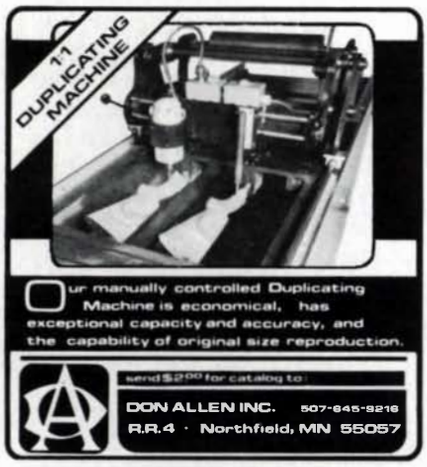

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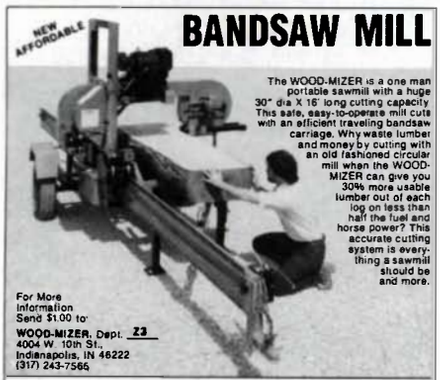

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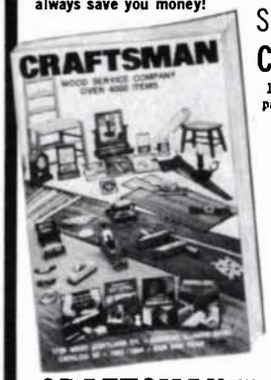

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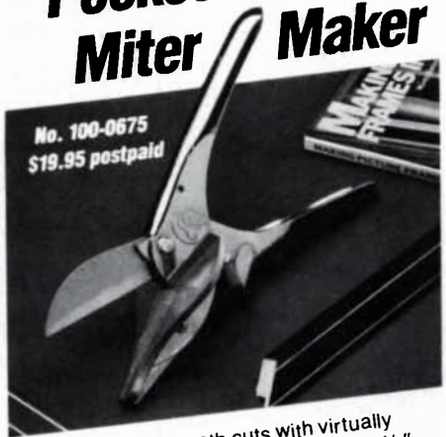

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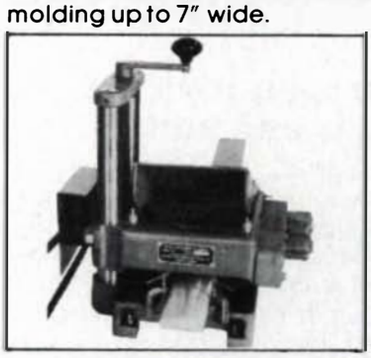

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NOTES AND COMMENT

Clamping in the Arctic

Letters from afar

It was late fall in Ottawa, a time when night falls dark and cold behind gray snow clouds, when I was reminded once again of the most important thing I'd ever learned in cabinetmaking.

I was attending a seminar on making *shoji* screens, given by Toshio Odate. Sixteen of us were squirming in desperate silence on cheap, worn-out chairs. The silence was hard, but Odate insisted on preserving it. We were learning by the ancient method of observation and private thought, a method old before Socrates first allowed questions into the classroom.

There he was, this intense master of the delicate with the avant-garde artist's mind, surrounded by the best European workbenches, British wood vises, and clamps so ingenious they could have tied down the devil's soul. And what was Odate using? A 4x4 beam for a bench, a nail for a vise, and a 5-ft. length of yellow plastic rope as a clamp.

In two days he turned out an attractive screen that for the rest of us would have required the full resources of our benches, tablesaws, thickness planers, clamps, sandpaper and I don't know how much time just dreaming up jigs.

"It's the attitude you bring to your work," Odate said. "If you don't have a tool or space or knowledge, there's no point in thinking about it, because when you dwell on what you don't have, the work suffers from the lack of attention." In other words, "do with what you have." That's a lesson I had learned before.

I used to live in a place where cabinetmaking is as alien as the art of firewalking is to us—the village of Frobisher Bay on Baffin Island. This land is a rock sea of rolling hills and shallow lakes that are free of ice perhaps only two weeks of the year, where there hasn't been a tree growing for 540 million years. Only the Inuit (Eskimos) have tamed it—they've learned and applied what Odate was trying to teach us in that seminar.

The village and its 2300 people sit in a region of the Eastern Arctic that even the polar bear shun. The only reason the place exists is because it's where one of the main DEW (Distant Early Warning) Line stations of the Cold War was built. The radar base now is an ice-cloaked ruin, made obsolete by spy satellites and over-the-horizon radars.

But it lives on throughout the community in the form of bookshelves, Inuit sleds, and storage boxes for gasoline cans. The old station is about the only source of milled wood north of Montreal. Virtually every gas box outside each home was once part of the defense against missiles coming over the Pole. And those boxes are important—the snowmobile is the main mode of travel here, so you have to be able to get at your gasoline.

This was the project, a gas box, which I turned to one February morning. I had a borrowed circular saw, a hammer so soft that the nails embedded themselves in its face, two sheets of poplar plywood ripped from the DEW Line

Oregon toys delight kids and adults

The children's toy market puts it on the line for woodworkers: make durable, engaging products, but keep the prices down. The 39 woodworkers who exhibited at the Annual Wooden Toy Show at the Western Forestry Center in Portland, Ore., last Thanksgiving weekend offered several solutions to the challenge.

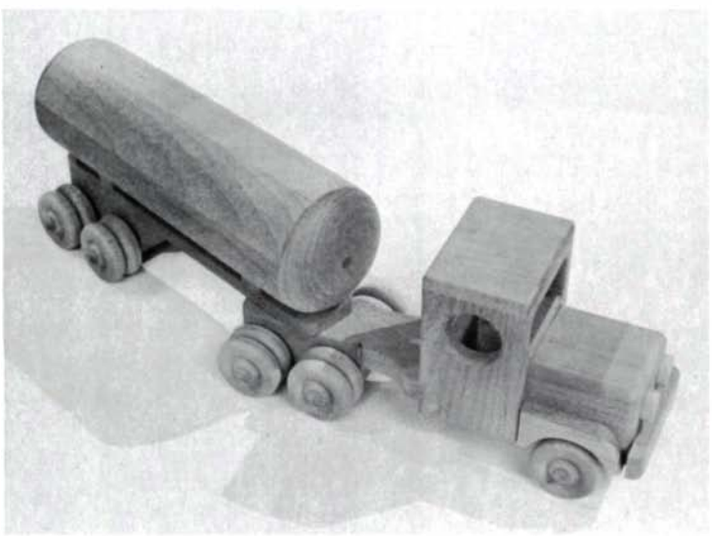
Most exhibitors had abandoned complex joinery techniques, relying instead on glue and nails for construction. Some of the toys were crudely shaped, but they worked well. Few workers used a finish on their toys, leaving them to be weathered naturally by a child's hand.

Some toymakers concentrated on fine-tuning production techniques to produce as many toys as possible. John Shefler, an industrial arts teacher, has standardized his designs and developed many jigs to produce trucks like the oil tank truck shown at left below. He can produce 50 trucks in 10 hours, spread over a three-day period.

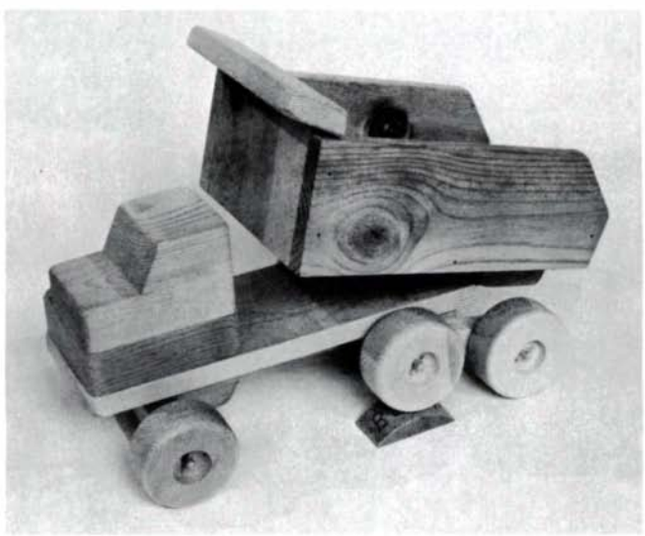
Dennis King, an electronics engineer, used knee-action suspension on the doweled wheels of his dump truck (below right). He doweled the tandem wheels to a support, then doweled the support to the chassis. The dump truck, which sold for $24, took bumps easily, even when a child was riding on top of it.

The children were delighted. Even those who were too young to read the "Try Me" and "Touch Me" signs started playing with everything that was for sale. But a few crafstmen opted to make toys for adults rather than children. Robert Cottrell, a retired lithographer, meticulously reproduces classic cars in an assortment of exotic and domestic woods. His display included a 1929 Mercedes Gazelle, a 1914 Stutz Bear Cat and a 1909 Buick limousine. He chose yew for the seats because, when oiled, it looks like leather. His miniatures ranged in price from $45 to $60 each.

—Ellen Francis, Eugene, Ore.



Oil tanker by John Shefler.



Dump truck by Dennis King.

Photos: David Stein

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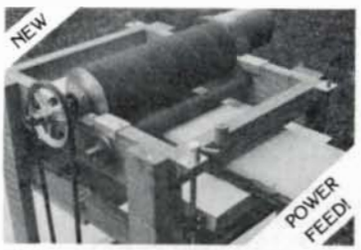

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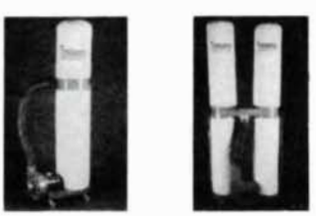

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station, and a bag of scrounged nails.

It was about 30°F below zero, with a 20-knot wind. At that temperature the skin doesn't so much freeze as burn. Every breath is a carefully filtered effort through the nose, to keep the air from searing on the way down. It's the kind of cold that makes thought difficult. To mark a line under such conditions is agony. A ½-in. error in a 2-ft. by 3-ft. panel is easy at 30 below.

The wind caused me all sorts of trouble. It kept lifting the plywood and sending it off down the hillside. For a while the desperate chases after a piece and then the trudge back up the slope kept me warm, but it was tiring. Then I put the climate to use. I dragged out a 10-gal. bucket full of hot water, and froze the panels to the hard-packed snow. Then the circular saw could easily rip through the wood, ice and snow, more or less along the wavy line I had marked on the plywood.

Still the job took much longer than I had expected. I had to wait 15 minutes every time I clamped (froze) another panel in place. Wandering sled dogs needed careful shooing away. Then there were trips inside to warm up and to refill the bucket with hot water. If you ever try this clamping system, wear steel-tipped boots. I didn't, and the constant kicking to unclamp the panels from the ice became painful.

The real trouble began when I started to nail up the box. First of all, I was trying to end-nail plywood, because there wasn't any wood around for battens. Second, the nails I had laboriously pulled from the DEW Line station were ¼ in. too short. I was stuck with six pieces of roughly cut plywood.

By now the sun was long gone. But then I remembered the Inuit. The first white men to reach the Eastern Arctic were amazed by what the Inuit had done without steel: bone for knife edges, driftwood for their sleds, and ice to protect their sled runners from the hard-packed snow. A coating of ice is cheap, easily made, and effective. I had been using ice all day. It's funny how easily the answer came to me, and how appropriate the solution in a land where you can't survive with a rigid mind.

In just a few minutes I had poured buckets of water over the joints. By turning the box (which was already getting rigid) on its side and tilting it, I was able to build up thick gussets of ice. Then I cemented the whole thing down beside my snowmobile and banked water-soaked snow around it.

When my tour of duty ended that July, the box was still there, still rigid with ice, and looking strong enough to brave the six-week summer. The new tenant had only to throw a few buckets of water over it sometime late in August and it would be fine until next year.

I regretted pulling those nails out of the DEW Line base. The few in the box seemed almost to rob it of the elegance of being the only box in North America joined together by ice.

—Rick Grant, Ottawa, Ont.

Notes and Comment

So there's a terrific exhibition of woodworking going on in your town? Just finishing some unusual project? Got a theory you'd like to try on the woodworking world, a beef you want to air, some news to share? Send text and photographs (preferably with negatives) to Notes and Comment, Fine Woodworking, *Box 355, Newtown, CT 06470.*

East African Carving

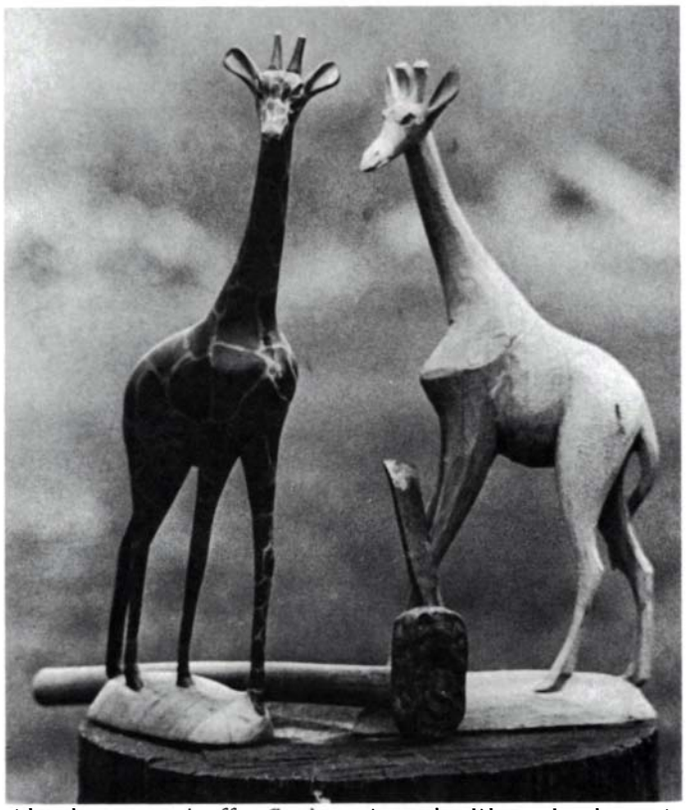
Letter from afar

When I visited Eastern Africa in 1970, I was impressed with the wood sculptures of the Makonde tribe—sculptures created by drug-inspired carvers!

A friend told me that the tribe in Tanzania used to give hallucinogenic drugs to budding young carvers when they were apprenticed. While in the drug-induced trance, the carver was urged to "see" the spirits in his work—relatives, ancestors, village spirits and animals, all entwined with each other. Each carving was a unique glimpse through the mind's eye of the artist. As the carver matured, his dependence on the drug diminished until he could induce a trance by his own will. But he carved only while in a trance, for his conscious mind could never conjure up the weird and wild figures that we see in Makonde carvings. Outsiders tried to copy the Makonde carvings, but their pieces never held the same mystical spirit of the originals.

When I visited neighboring Kenya in 1980, I saw great numbers of "New" Makonde carvings being sold, but it was obvious that these were spiritless reproductions or attempts at re-creating a fading tribal art. The old way of carving is not done anymore by the Makonde, so the original drug-inspired pieces are now collectors' items, expensive and hard to find. The original carvings, such as the one shown at right below, came from deep within the spirit of the carver, while the copies are just an attempt at spontaneity.

This change in the nature of East African carvings is no surprise. Kenya has undergone changes in the past decade. Nairobi, the capital city, which was frontier-like when I first visited, has be-



Photos: Don Smith

Akamba co-op giraffes flank native adze-like tool, above. At right, drug-inspired Makonde carving.

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come a fast-paced, modern city with too much traffic and too much noise. Increased tourism has brought out a flood of native carvers and craft vendors wherever tourists congregate: border gates, petrol stops and even public toilets. As is the custom in many countries, the African vendor takes delight in haggling over the price, quickly losing respect for the person who accepts the first offer.

The predominant carving group in Kenya is the Akamba tribe. Animals are their favorite subjects, but their human figures can also be interesting. Some of the carvers have emerged as gallery-quality sculptors and are building reputations for themselves in art circles.

Akamba carvers don't use models. They work directly from their mental images and don't even make sketches. The tribe has little knowledge of modern carving tools. Their tools are hand-forged common steel and are usually sharpened on any smooth, flat stone. The primary tool is adze-like, a crudely forged chisel about ½ in. thick embedded into a piece of raw rhinocerous hide. A hole is drilled or cut into the hide at a right angle to the blade, a wooden handle is inserted, and then the whole thing is placed in the sun until it has dried rock-hard. There is no way you can remove the wood or steel from that hide!

This tool is used to rough out carvings from a small log which the seated carver holds with his feet. A handmade steel knife is used to whittle out ears, nostrils, tails and other details. In spite of rough-sanding, the pieces are amazingly smooth. I saw a 12-in. giraffe carved and ready for stain in just a few hours.

Even though carvers are paid by the piece, they exhibit a timeless patience with each figure. I particularly noticed this at their co-op in Nairobi. Here the carvers work on the ground along both sides of a long center aisle. Sitting elbow-to-elbow, they sometimes break into a chant which sets the cadence of their work. No two pieces are exactly alike, since each carver seems to put himself into the work.

Joseph K. Mbwika, manager of the co-op, told me that the co-op helps and protects craftsmen. When a carver completes a piece, the manager takes it to the warehouse and credits the man for a set amount of money. The carver can depend on a standard price and doesn't have to take his chances haggling over prices. The warehouse is regularly tapped by local merchants, as well as by overseas buyers. New York area firms are diligent importers.

—Michael DeNike, Wayne, N.J.

Power tools in Tokyo

Letter from afar

I was born in 1924, and in my youth I employed solely the Japanese traditional handsaw, plane and chisel for woodworking. So far as I know, the power tools were used exclusively in lumber factories and by professional furnituremakers. During my stay in the States (1957-60), I had to make some furniture, so I bought a circular saw, electric drill, router and portable jigsaw. I left the furniture behind but brought my power tools home, and since then I have constructed a tilting-arbor bench saw, shaper, belt sander, bandsaw and lathe, using Gilliom's kits of parts.

During the 1960s, portable power tools began to be manufactured in Japan, but they were used mainly by professional carpenters, especially by the younger, unskilled workers. Then economic growth and inflation greatly increased labor wages, giving rise to the do-it-yourself idea for house repair as well as for home furnituremaking. A variety of sizes of planed wood have become purchasable at many shops, and most hobbyist woodworkers now work in a hybrid fashion, using at least a portable power saw and electric drill.

Power-tool manufacturers do not yet make stationary machines of intermediate capacity and quality at appropriate prices for the average hobbyist. I prefer the U.S.-made machines for hobbyists to the Japanese ones because of their appropriate weight, accuracy, stability, capacity and reliability. The tools of Black & Decker, Skil, Bosch and Emco, sold through their agents in Japan, are equipped with special motors for our 100-volt, 50-cycle current. I must buy sawblades and sanding belts by mail order from Sears' catalog, though their tools are not modified with 100-volt motors. The agent of Rockwell disappeared last year, and the dealer of Skil recently stopped supplying imported tools.

Average Japanese houses, especially in towns and cities, are not big enough for the heavier machines. Our style of house construction avoids basements, so we don't have basement workshops. A large proportion of people in Tokyo now live in apartments and worry about making noise as much as having to suffer noise from neighbors. I am fortunate to live in a big yard where I have myself built a separate workshop building, although I shall have to make a shielding for noise in the near future. . .

—Dr. F.K. Anan

Starting in Germany

Letter from afar

Germany produces some of the highest-quality production furniture in the world today. The sound, honest workmanship stems from the three-year apprenticeship program all woodworkers—roof framers to furnituremakers—must go through. Most woodworkers remain in the production field after their apprenticeships, but some, like Verena Wriedt (photo, right), yearn for more independence. The rigorous training, she says, "tends to sap your creativity."

Wriedt believes that people don't have to buy things from a production line: "My goal is to create a fusion of traditional craftsmanship with new design, resulting in a quality piece with lasting value. Hopefully, people who see or buy my pieces can feel the affinity I have for the material and the work I'm doing."

I met Wriedt last summer when I wandered into the *Haus der Kunsthandwerker* (House for Artistic Handwork) in Hamburg, a three-story factory that has been converted into workshops and gallery for several resident artisans. Wriedt, 29, has been in business for a year and a half. After completing her apprenticeship in Munich in 1976, she

Verena Wriedt and her yew mirror.

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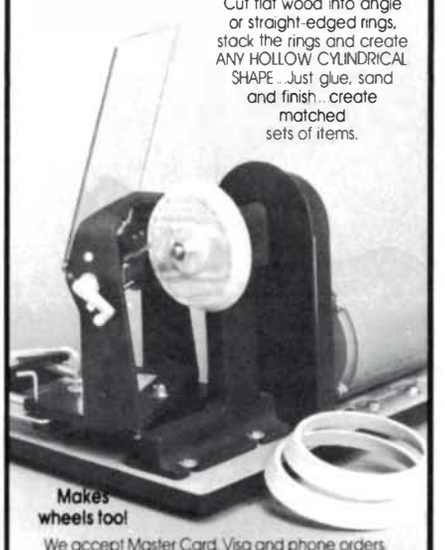

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had studied art history at universities in Munich and Berlin, then went to London to study "fine and decorative arts" for a year at Christie's Auction House. In 1979 she got into John Makepeace's School for Craftsmen in Wood, which she says pushed her to achieve and come up with imaginative designs.

Wriedt's designs are what I call modern: the lines, whether curved or straight, favor crisp corners. She pays meticulous attention to wood selection, joints and details. Precise dovetails highlight and blend into her work, as do hidden hinges and latches. And there are pleasant surprises: drawers that traditionally would be pulled open often pivot on hidden hinges; a basic cube that serves as a small coffee table opens out to become a larger coffee table. Allowing customers to play with a number of the pieces on display acquaints people with the ingenuity of her work.

Wriedt has run into several problems in trying to establish her shop. One is lack of competition. There really aren't any other shops in Hamburg where she can go to shoot the breeze and to see what other woodworkers are doing. German law and the high quality of production work are responsible for this lack of competition. You have to be a master cabinetmaker to open a shop, and that means completing the basic apprentice program, then five years of practical work experience and two to three years of advanced training—about the same length of time it takes to become a surgeon. Wriedt is not such a "master," so she had to go into business as an artist, rather than as a woodworker.

While the master system may stifle some workers, it helps consumers: the customer generally expects and gets solidly made furniture at a good price. I didn't find that production or mass-produced furniture has the same stigma here as it does in woodworking circles in America. That's also a problem for craftsmen. Most people here don't think you can do any better than production furniture.

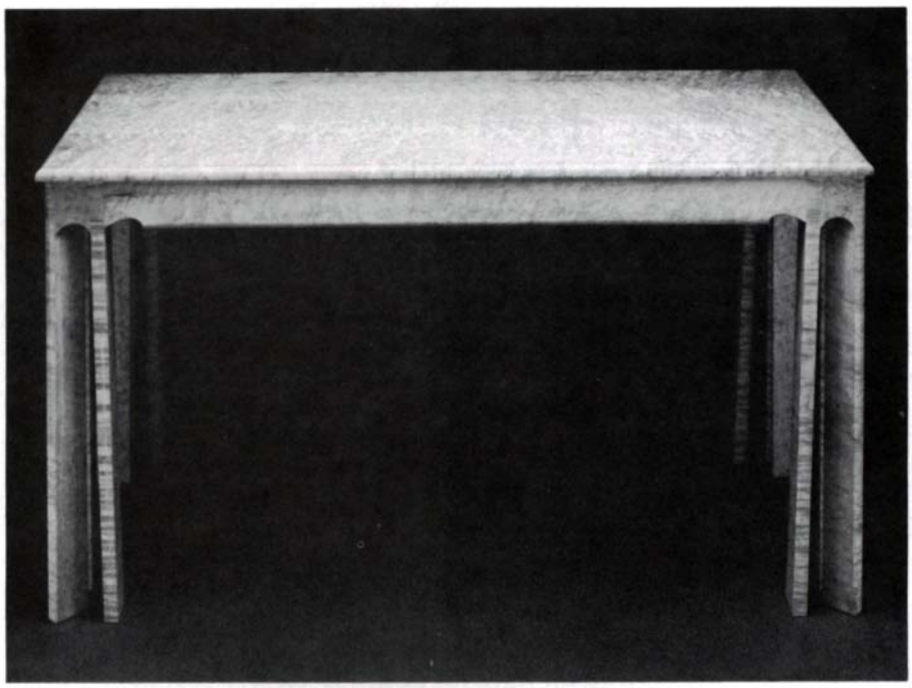
Despite the obstacles, I had the impression that Wriedt's business is doing fairly well—that means she's eating and paying her bills. Orders are coming in, and word of mouth continues to be her best advertising as she tries to develop markets for handcrafted furniture. One plus seems to be that she is a woman in what is, in Germany, a traditionally male occupation. For most potential customers, it is a source of amazement and joy to see her doing this work.

—Richard J. Amand, Hamburg, Germany

Twelve-legged table

This bird's-eye maple library table by Kurt Holsapple of Germantown, N.Y., was one of the pieces featured when the Snyderman Gallery, 317 South St., Philadelphia, Pa. 19147, opened last October with an exhibit entitled "Artists and Designers in Wood." The show included work by 16 woodworkers from around the country. "Boston Connections," an exhibit of works by faculty, students and alumni of the Department of Wood of Boston University's Program in Artisanry, will run through April.

Gallery owners Ruth and Rick Snyderman plan to devote the ground floor of the two-story space to regular exhibits of work in wood, making it the only gallery in the Philadelphia area where you can always find wood on display. The gallery takes pieces on consignment. For more information contact Bruce Pollock, gallery manager.



Twelve-legged library table by Kurt Holsapple.

School in Switzerland

Letter from afar

The little town of Brienz, Switzerland, is famous for its woodcarving and its magnificent alpine scenery. While vacationing near the famous Eiger, Jungfrau and Moench peaks, I visited the Swiss Woodcarving School there.

The state-run school has 24 students, both men and women, from all over the country. Generally 15 to 30 years old, they serve a four-year apprenticeship at the school, hoping to become skilled enough to make a living as wood sculptors. The school distinguishes between woodcarvers and wood sculptors: the woodcarver copies models, usually a series of little statues or ornaments; the wood sculptor makes his own designs.

The school does not guarantee placement in a career in wood sculpture, but graduates have been hired by firms producing religious statues, furniture ornaments and family crests. Some alumni have done restoration work on antique carvings, church ornaments and statues; others have opened their own studios.

A crest-in-progress at the Swiss school.

The training program is divided into four parts: carving fundamentals, ornamental carving, the human figure and animal carving. School days are nearly

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nine hours long, and include both lecture and hands-on practice. Besides carving, students also study mathematics, business, graphics and anatomy.

Beginning classes stress carving a fixed set of "school figures." I saw several cases where the "master figure" was at the bench for close study, right next to the student's own emerging copy. This lets the student see for himself how grain, angles of cut and other problems were handled in the original, and how the finished surface should look. First-year students copy about twenty such figures before moving on to develop their own designs.

Most of the carvings, especially those by beginning students, are done in linden wood, but walnut, cherry and pear are also used. The quality of work is generally outstanding, even among beginners. No doubt I unknowingly saw the students' work elsewhere in Switzerland—the school keeps what the students make and sells the pieces through various shops. It's not such a bad deal for the students either—they don't pay any tuition for their education.

—William Page, Arlington, Va.

North American woodworkers group

A trade-show promoter has formed what he calls the first large-scale international association of woodworkers. Promoter Peter Engel says that the purpose of the Woodworking Association of North America is to bring together woodworkers, and to promote woodworking as a hobby, an industry and an art.

Engel and his wife, Ellen, who operate Convention Designs Inc. (35 Main St., Plymouth, N.H. 03264), say that the new association will sponsor the series of "Woodworking World" shows they began last fall in Boxborough, near Boston. Shows are now scheduled for Apr. 13-15 at the Sheraton Inn in Boxborough; Oct. 12-14 at O'Hare Expo Center, Chicago; Nov. 9-11 at the George Washington Motor Lodge, King of Prussia, Pa.; Feb. 1985 in Toronto; and Apr. 12-14, 1985, at the Springfield (Mass.) Civic Center.

Meanwhile, the promoters of the "Working With Wood" trade show have moved their Apr. 6-8 event to the Trade Show Center, 7th and Brannan Sts., in San Francisco. They plan a second show May 11-13 at the Penta Hotel, Seventh Ave. and 33rd St., in New York City. Each show will feature 200 exhibitors, including manufacturers and individual craftsmen, plus free seminars by Sam Maloof, James Krenov, Ian Kirby, Michael Dunbar and Roy Underhill. The promoters can be reached at Box 2518, Redwood City, Calif. 94064.

The Bowlturner

by Nan Fry

Sawdust sparks
arc from the chisel.
Swiveling, you release the light
sap leaves on the rim,
trim down to the darker
heart
You search for
feathers and burls
swirls tightly clustered
under the bark
the pressure of the weather
the path of the worm
stain of the fungus
wondrous rot

Chairs from old Taos

An exhibit at the New Mexico Museum of International Folk Art uses furniture to show how the skills and traditions of Spanish artisans, Pueblo Indian carvers and Anglo-American cabinetmakers merged to produce a unique regional style of furniture. Typical of the style are these four chairs apparently made in Taos in the early 1900s. "Carpenteros and Carpenters: New Mexico furniture 1600-1900" includes 80 pieces of furniture and will be at the museum in Santa Fe through mid-April. □

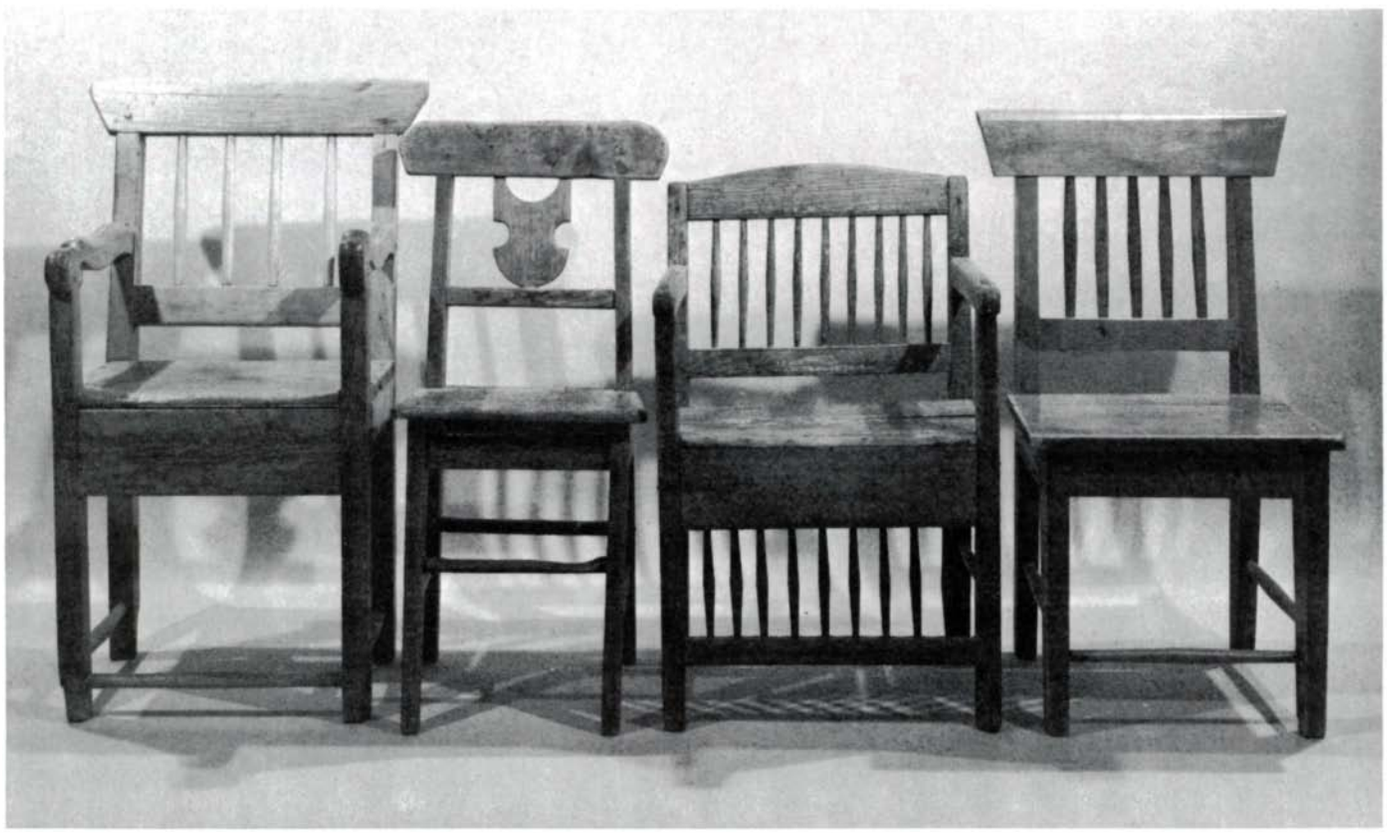

Photo courtesy Museum of New Mexico

Taos chairs from the early 1900s show subtle evidence of Pueblo, Spanish and Anglo-American traditions.

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SUPERIOR EX MACHINA

Roy Superior delights in fantasy machines: three-dimensional critiques of the world that twist and turn and stick their tongues out at you, making you smile and think. All his machines work, use traditional joinery—mortise-and-tenon, wedges and pegs—and could be made full-size, but Superior says that the small scale lets viewers join in the fantasy with more imagination. "Leonardo da Vinci's Studio" features a flapping flying machine, a rotating spiral staircase, and a copy of the Mona Lisa revealing Leonardo's struggle to get the smile right. The studio, which was displayed last December at the Heller Gallery in New York City, is 36 in. high and 30 in. square. Superior, 49, is a full-time wood sculptor in Williamsburg, Mass.