March/April 1987, No. 63, $3.75

Fine WoodWorking

Spindle Turning Basics

Shop-Built Disc Sander

Music Stand Plans

Bandsawn Boxes

Designing a Chair

Selecting a Bandsaw

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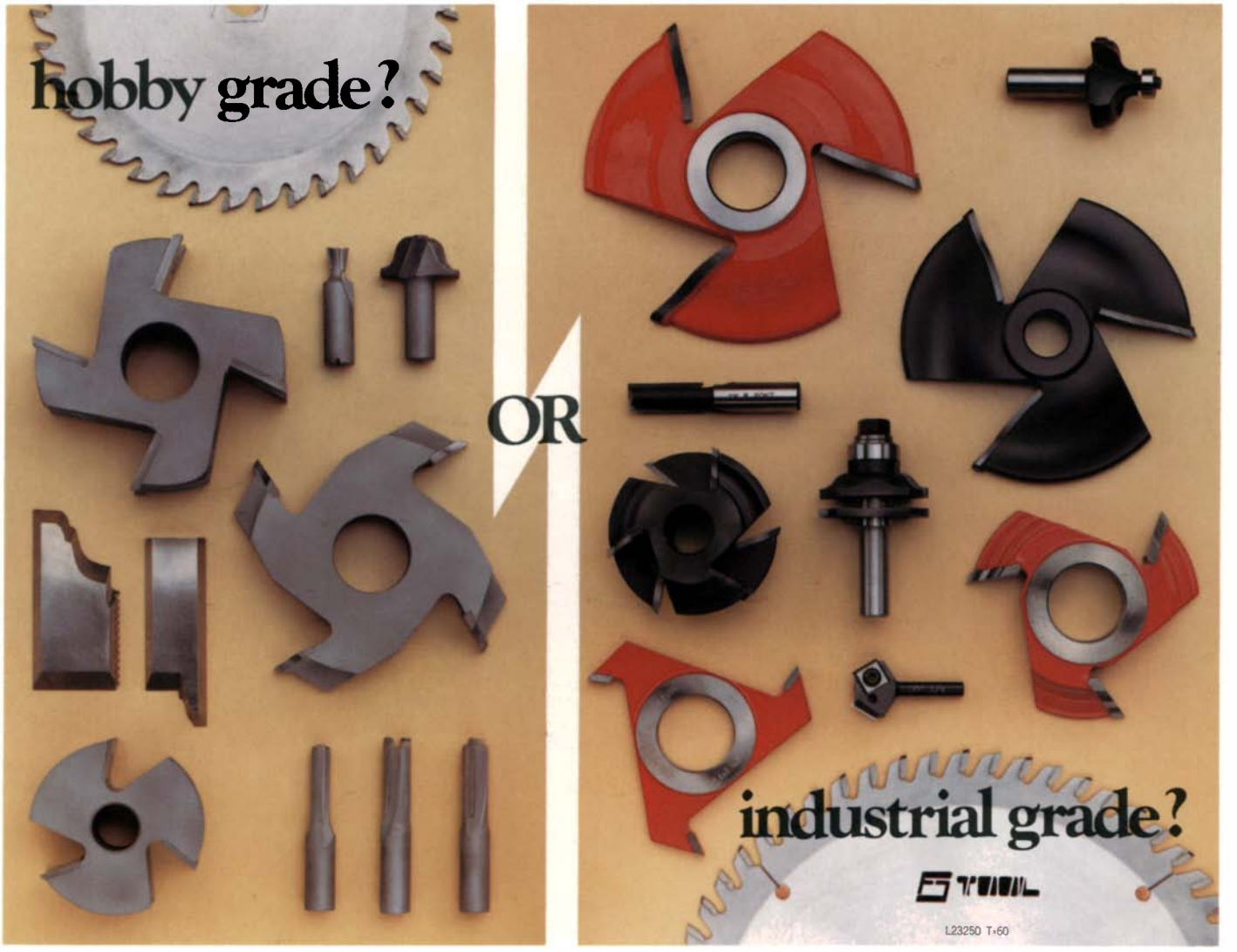
HOW WOULD YOU RATE YOUR CUTTING TOOLS?



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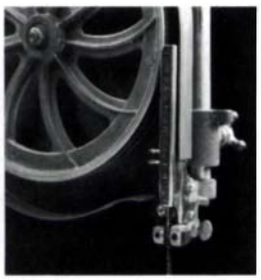
Fine WoodWorking March/April 1987



A bandsaw can be the most versatile tool in the shop. But, even the best machines need to be tuned up and properly adjusted. For some useful tips, turn to p. 67.

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DEPARTMENTS

ARTICLES

Postmaster: Send address changes to The Taunton Press, Inc., PO Box 355, Newtown, CT 06470.

I read, with much interest, the article on spraying with lacquer in *FWW* #62. I find lacquers very satisfying to use. I switched from polyurethane to lacquer a couple of years ago. What used to take several days to do with polyurethane can be done with lacquer in a matter of an hour or two.

Once applied, polyurethane must sit in a dust-free environment for six or eight hours, or dust will cling to it like steel to a magnet. Lacquer, on the other hand, can be handled and moved in a matter of minutes. By the time I clean my spray gun, I can move the piece and make room for something else. I let the finish sit for a day or two before putting it to use.

One thing I disagree with is spraying inside pigeonholes with the back enclosed. It's much easier to leave the back off and spray inside the holes. The overspray goes right out the back, instead of in your face. Spray the back while it is off and after both pieces are dry, fasten the back to the piece.

There is another advantage to using lacquer over polyurethane. On dark wood there's not much difference. However, on light-colored wood, such as maple, oak and pine, using polyurethane tends to slightly yellow the true color of the wood. When I switched to lacquer, there was a noticeably nicer color to the finished piece.

—David Miller, Annville, Penn.

As a life-long hardwood lumberman, a National Hardwood Lumber Association member and *Fine Woodworking* reader, I always get a chuckle from letters like Brad Newcomer's (*FWW* #61), telling how the NHLA (and by extension, its members) had to back down in the face of the U.S. government's dislike for billing for kiln shrinkage. Let me assure you that lumbermen, like any other businessmen, must receive a certain return on their investment. The inability to bill for shrinkage will simply result in an increase in price in the long run. The NHLA management was not attempting to put something over on the public; they were simply defending what had come to be normal business practice in the wholesale lumber trade. It makes no difference whatsoever to the lumberman as to the basis of measurement of the lumber they sell. If you really want to get upset, think for a moment about the shellacking the buyer takes when he buys a 2x4. Actually, the same theory applies. If the manufacturer of 2x4s had to sell them as 1½x3½, he would certainly require a bit more money, say on the order of 50%. In view of the miniscule net profit the hardwood industry "enjoys," loss of the 7% shrinkage would put most of them in the red, so don't be surprised if prices increase as a result of the law.

—Donald Bradley, Plainfield, N.H.

Either my glasses need changing, my brain is in neutral or I detect two glitches in Richard Blizzard's toy truck drawings in *FWW* #61.

First, I find no specs for the front axle cross bar in the schematic on pp. 74-75. Second, on p. 74, if the main chassis cross members are made as indicated, it appears to me that the tops of these two parts would be flush. However, the schematic and the pictures seem to indicate that the cross members are recessed below the top of the main member.

—C.A. Brown, Waterville, Vt.

EDITOR'S NOTE: There's nothing wrong with your glasses. According to Blizzard, the cross members should be flush with the main chassis member. The drawing on p. 75 is incorrect. Unfortunately, the photo didn't reproduce well enough to show the joint clearly. Because the truck is so complex, we condensed the material quite a bit to fit the space available and, as a result, left some details to the discretion of the builder. The front axle cross bar is nominally 7¾ in., but must be shaped and profiled to fit the front axle unit.

"Drywall screws: Who needs pilot holes?" (*FWW* #60) reminds me of the "Hi-Lo" wood screws I have been using for several years. They're similar to drywall screws, having a straight shank, double thread and gimlet point. One thread has a high (deep) profile, the other has a low profile. They have a standard Phillips flat head, and are packaged by Elco Industries Inc., 1103 Samuelson Rd., Box 7009, Rockford, Ill. 61125.

—Harold E. Smith, Dahinda, Ill.

I read the article "Grinding Wheel Primer" (*FWW* #61), by Jerry Glaser, with great interest. The properly maintained bench grinder has always been *the tool* for shaping a cutting edge.

As a wood turner, a grinding wheel coarse enough to remove metal quickly and coolly, and still leave the tool smooth enough to hone easily would not be of use to me. Once a lathe tool is initially ground, it will not require frequent reshaping. Instead of frequently grinding the edge, may I suggest only polishing the edge.

The bond type "R" that Glaser told us to "forget" is perfect for this edge work. This rubber-bonded abrasive wheel gives a quick mirror-like finish on any cutting edge. This polished cutting edge allows the bevel to polish the turning workpiece.

The only significant disadvantage I have found with rubber-bonded abrasive wheels is that the wheel must turn away from the cutting edge. If you sharpen with the wheel turning in the standard direction, you will slice the wheel as a lathe tool slices rotating spindle work. These wheels are readily available from Cratex Manufacturing Co., Inc., 518 Stone Rd., Benicia, Calif. 94510, (707) 746-1700.

—Thad B. Welch, Marina, Calif.

By accident, I once broke an old Buck Bros. chisel, and I called the factory to moan about my bad luck. The superintendent wrote me a secret: On old Buck chisels, especially the big ones, the limit of temper was marked with a miniature buck's head, about the size of the white part of a match head. He said if I could see that deer head, no retempering was needed, just resharpen as necessary. Not all have it, but most of the old and big ones do. Nice to know.

—Ford Green, San Antonio, Tex.

As a retired research chemist, I would like to correct a statement made by Ric Carpenter in his article on wooden combs (*FWW* #62). He states that "wood, on the other hand, is organic and similar to hair in its molecular structure." This is not only erroneous, but technically misleading. Wood is cellulose, which is composed of glucose united to form long-chain molecules, while hair is a protein consisting of amino acid units in long chains. They are both organic compounds, but radically different in molecular structure.

On the other hand, the plastic materials used in making combs are also long-chain organic molecules such as nylon, polystyrene, polypropylene or cellular acetone. The only true statement that can be made differentiating plastic and wood

is that wood is a natural organic molecule, while the plastic materials are synthetic organic polymers.

—*Max Kline, Saluda, N.C.*

I walk through the woods with a folding pulp saw and maybe a shovel with an eye on attacking the first woody life-form that deviates from sameness. Be it a stump for a table, a burl for a bowl or a stick for a cane, in an attempt to create, as a hobbyist, something beautiful. And, don't forget all of those clear board feet that I'm counting as I walk. Then I find it, that perfect (or imperfect) piece. I cut it and carry it home on my shoulder and store it to cure.

A few months pass and I bring it into my shop to begin gnawing at it with any piece of steel that seems suitable. With lots of luck and some skill, beauty is born. It's finished, my masterpiece, so I lie back on the sofa staring at my finished project with all sorts of pride. Then, drifting back to my childhood, I remember sitting on the sidewalk with a magnifying glass frying ants. I just killed a tree.

—*Gary Cernak, Easthampton, Mass.*

Referring to your article "Marquetry Mystery" by Kit Williams in your November/December 1984 issue: Do you know the name of Williams' untitled book about bees? I was one of the people who entered his contest, which closed in May of 1985. Since that date I have heard nothing as to the winner or the title of the book. My entry was done in marquetry. I have already written Williams in England (his post office box was closed) and I wrote the publisher here in the United States. I've thus far received no response.

—*Annabelle Apodaca, Downey, Calif.*

EDITOR'S NOTE: We called Williams' American distributor, Alfred Knopf, and learned that the winning name was "The Bee on the Comb." The winner was announced May 28, 1985, and was submitted by Steven Pierce of Leicester, England, an amusement park designer. He made a mechanical clocklike device about the same size as the book.

The articles in the Nov./Dec. issue on pin routers (*FWW* #61) encouraged me to investigate the field. If others have a drill press and a ¼-in. end mill, they can have a pin router in 30 minutes.

First, I turned the drill-press table to the side to a spot where there were no ribs under the chuck. Then, I spotted a hole with a starting drill and completed the hole with a 9/64-in. drill. I exchanged the drill for a 10-32 tap and turned the chuck by hand to tap the hole. I took a 10-32 screw and cut the head down to 0.280 in. to give a cut a bit smaller than my template. While I cut the head on a lathe, a non-purist can put the screw in the drill-press chuck and turn it down with a file.

Put the screw in the tapped hole, the ¼-in. mill in the chuck, and you're ready to go. I was making plate covers for outlet boxes, so I screwed the cover template to the bottom of the ¾-in.-thick workpiece. The workpiece can be routed by using the screw in the drill-press table as the guide pin.

—*Roger Easton, Canaan, N.H.*

I was interested in the letter from John Gallis in the Nov./Dec. issue (*FWW* #61). He described his difficulty in finding a 4-in. PVC angle for his dust-collection system that didn't have the restriction of the standard 90° elbow.

Gallis (and your other readers) may be interested to try this trick that I learned from plumbers installing a swimming pool. To get the PVC to conform to the irregular shape of the pool wall, they bend the pipe by first allowing the exhaust gas from their truck to pass through the pipe for two or three minutes. They had made a coupler for the truck's tailpipe so that the PVC pipe would fit inside the coupler. With the engine at idle, the exhaust gas made the pipe soft enough to bend to any shape. As soon as the PVC cooled, it retained its new shape.

Incidentally, the pick-up truck was out in the open and the heated PVC pipe was handled with insulated gloves.

—*Anthony H. Bathurst, Tucson, Ariz.*

I feel compelled to write in defense of the good name of "ironwood," or as identified by Jon Arno in the Jan./Feb. issue of your fine magazine, hop hornbeam *(Ostraya virginiana)*. Arno says that "this creamy-yellow wood is rather bland."

I have been collecting hop hornbeam logs here in New Hampshire for several years, sawing them into flitches and drying them. I have found the wood to be superior to most native species in a number of respects. The wood is far from bland, as a matter of fact the color and figure is extraordinary. The deep-brown heartwood seasons as does cherry, becoming almost purplish as it ages. Bland? I think not!

Arno correctly states that the wood's greatest claim to fame is for "rugged purposes." I believe that to be due to its rarely reaching more than 22 in. in diameter, breast height. It is a slow growing tree, and its reputation for strength has probably doomed it to uses less noble than cabinetry. I, for one, intend to rectify this inequity. —*Chip Sieglinger, Canaan, N.H.*

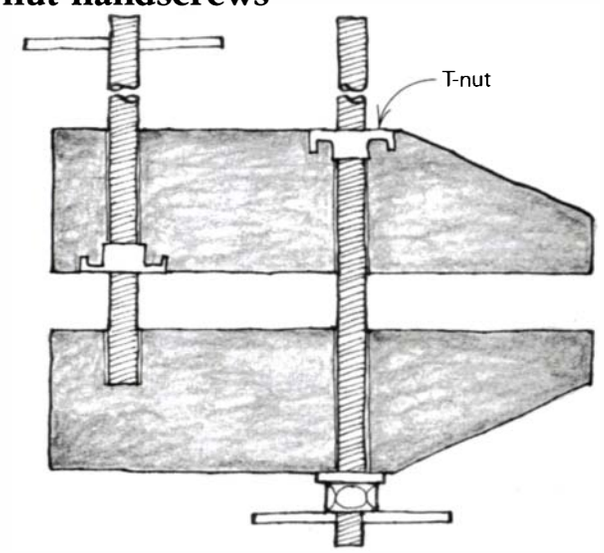
I was very much interested in the article "Chucks for Woodworking," by David Sloan, in *FWW* #62. My shop is in my basement and most of the items I make are small, such as buckles, pendants, bracelets, napkin rings, bolos, earrings, clocks, etc., and either the parts or the entire item winds up on the lathe. I must admit, as Sloan has, I didn't feel that I could spend a large sum of money on a good chuck. And then I saw the Grizzly 3- and 4-jaw chuck advertised at a very, very reasonable price, around $40. I felt that the 4-jaw would serve my purpose better than the 3-jaw for square blocks or irregular pieces. Furthermore, you can shift a piece in the 4-jaw and you can't in the 3-jaw. How true it is that these chucks will not hold your wood if you gouge a little too deeply, even with the 4-jaw. Another thing that Sloan was correct about was how those darn jaws can be knuckle busters. I've even painted the jaws, but when running at a good speed, they are just a blur and although I haven't had a serious accident yet, I've certainly been clipped too many times.

You pay a cheap price and you get a cheap piece of merchandise. The main part of the Grizzly chuck is made of cast iron, while the jaws and threaded adjusting bolts are made of a hardened steel. If the chuck is used for expansion, the pressure of the hard steel bolt against the cast iron is near the center, where there is ample cast iron material to withstand the wear. But, when the chuck is used for compression, the pressure and wear is on the outside where the cast iron material is quite thin. This thin material soon wears through after a number of tightenings. When this happens, the chuck becomes useless. The first time this happened, I took it to a friend of mine who is a retired machinist and has a little machine shop at his home. He had to mill out a slot to place a steel piece in the place where the cast iron had worn. He only charged me $10 and I am sure that it took him two or three hours. It worked fine, but in a short time another adjusting bolt broke through and so I had my friend replace the remaining three pieces which cost me $40 in all, about the price of the chuck. If I had to take this work to a regular machine shop, the work would have amounted to well over $100. I now have a better Grizzly chuck than when it was new, but I still have to be careful about gouging the wood, or it will fly out, and the chuck cost me $80 instead of $40.

—*Myer S. Freshman, Parsons, Kans.*

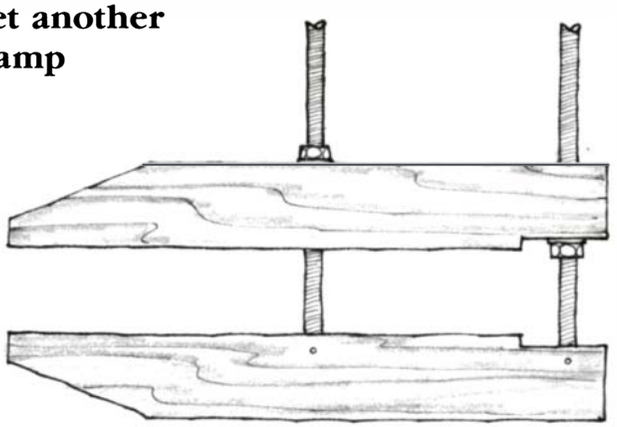
edited and drawn by Jim Richey

T-nut handscrews



For a few cents worth of hardware you can transform a couple of pieces of scrap into durable small handscrews. The sketch shows the general construction idea. Handles could be turned from wood, but I just use T-bar handles made from 1½-in.-long pieces of brazing rod that press-fit into 3/32-in. holes in the threaded rod. Note the nut and washer on the front screw (to leave space between the handle and the clamp) and the flat bottom on the back hole (to prevent the threaded rod from splitting the clamp). I like to counterbore the T-nuts for a neater appearance and put a dab of epoxy under them to make sure they stay in place. —*Chuck Anderson, Porterville, Calif.*

Yet another clamp

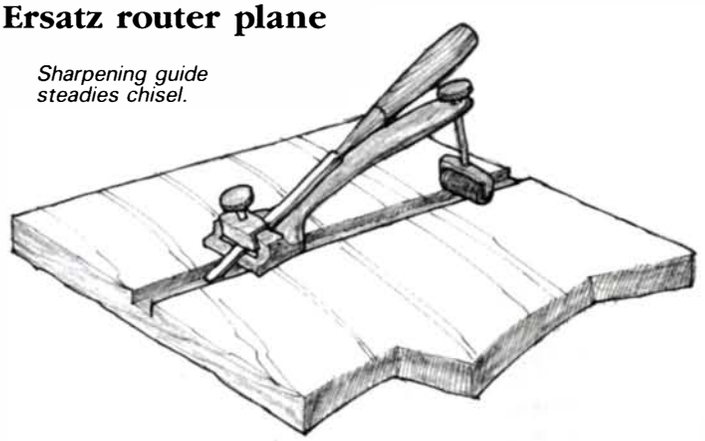


These clamps, which are patterned after a set of steel ones made years ago by the grandfather of a fellow worker, are inexpensive, easy to build and suit my small work better than purchased models. Over the years I have made several sets in a variety of sizes.

Construction is straightforward. Select a strong, hardwood such as oak or maple and cut two identical jaws. Clamp the two jaws together and drill the two threaded rod pilot holes. The holes should run through the top jaw and about an inch deep into the bottom. Enlarge the through holes in the top jaw to slip over the threaded rod. Although it is not necessary, you may wish to cut steps at the backs of the jaws, as shown, so that the jaws can be tightened down to zero. Tap the holes in the bottom jaw and screw in the lengths of standard threaded rod. Next drill a 1/16-in. pin hole through the cheeks of the jaw and through the threaded rod. Pin the threaded rod in place with a finish nail. Ordinary washers and nuts installed as shown in the sketch finish the clamps. For large clamps you can buy "Quick Acting Hand Knobs" from Reid Tool Supply Co., 2265 Black Creek Road, Muskegon, Mich. 49444 (part No. QK1, $3.26 each). When these knobs are tilted, they slide freely along ¼-20 threaded rod, allowing quick adjustment.

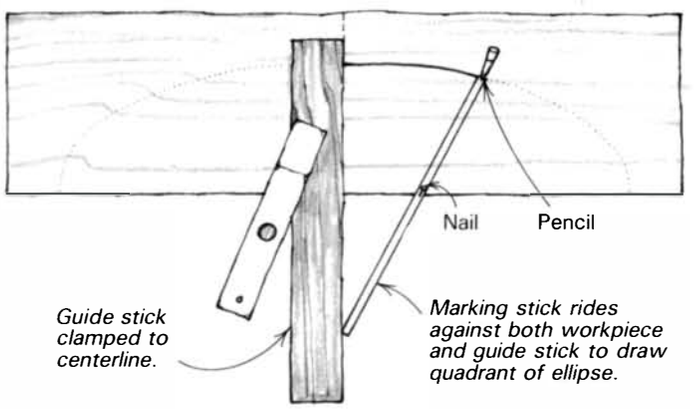
To use the clamps, first adjust them to the work, keeping the jaws nearly parallel. Tighten the outside nut gently and use the inside nut to apply pressure. Use a light touch. These clamps can develop awesome force with just a few turns of the screws. —*Raymond Levy, Soquel, Calif.*

Ersatz router plane



If you don't own a router plane but need to clean out a few dadoes fresh from the tablesaw, try mounting a ¼-in. mortising chisel in a sharpening guide. Adjust the chisel for the desired depth of cut and proceed. Go gently. If you push the tool too hard or too fast the chisel may chatter out of adjustment or make an unwanted submarine dive into the dado. —*Richard Melloh, Plainfield, N.H.*

Drawing a half-ellipse



We use this method to lay out seat backs in our shop. First mark the rise and run of the half-ellipse on the stock and clamp a 1x2 guide stick on the centerline, as shown in the sketch. Now cut a 1x1 marking stick half as long as the ellipse and notch one end to hold a pencil point. Drive a nail through the stick at a distance from the notched end equal to the rise of the ellipse. To draw the ellipse, hold a pencil in the notch and move the head of the stick from left to right while riding the nail against the stock and the tail of the stick against the guide stick. Reclamp the guide stick to the other side of the centerline to complete the curve. —*Doug Hansen, Letcher, S. Dak.*

Sharpening center punches

Here's how to put a perfect cone-shaped point on the end of a punch. You'll need a grinder fitted with a 6-in. coarse wheel, a small electric drill and a small piece of heavy cardboard. Wet the cardboard thoroughly, wrap it around the barrel of the punch and let it dry overnight in place. The next morning

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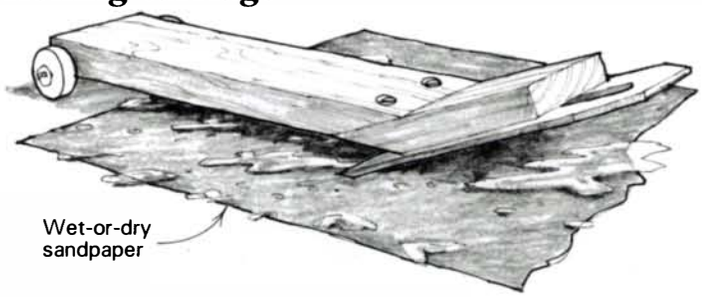
spring open the cardboard and grease the inside lightly. This cardboard tube is your guide bearing and friction insulation. Now chuck the punch in the drill and, holding the spinning punch with the greased cardboard tube, bring the punch to the rotating grinding wheel. Grind the point to shape on the edge of the wheel but finish on the side.

—Ford Green, San Antonio, Tex.

Honing carriage



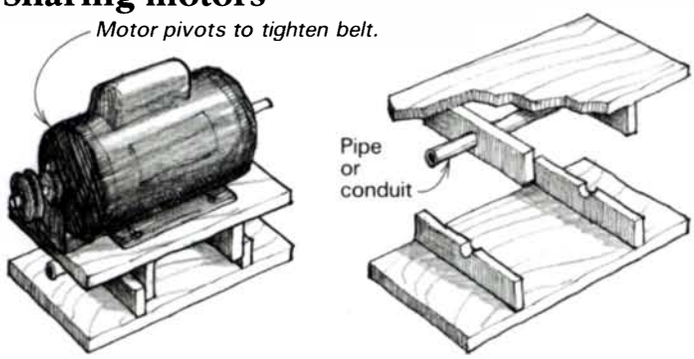
This simple honing carriage will enable you to hone your plane iron or chisels on a sheet of commonly available wet-or-dry abrasive paper. Select a 2-in. wide, ½-in. thick piece of hardwood about 9 in. long. Using a bevel angle of 20°, cut the board in two about 3 in. from one end. Rejoin the pieces with glue and two wood screws into a dogleg, as shown, and attach wheels—mine are nylon pulleys from an old drapery rod.

To use the carriage, screw the plane iron to the dogleg through the slot in the plane iron. The angle of honing can be adjusted from 20° to 30° by raising or lowering the plane iron. Make sure the blade is square to the working surface so that the entire bevel is honed evenly. Place a sheet of waterproof 240-grit silicon-carbide abrasive paper on a hard flat surface such as a sheet of glass or a piece of Formica. Keep the sandpaper flushed with water while you move the honing guide forward and back with the tool's bevel resting on the wet abrasive paper. Soon the sharpening action will produce a wire edge. Remove the blade from the carriage and strop by hand.

—Tom Frohlich, North Miami Beach, Fla.

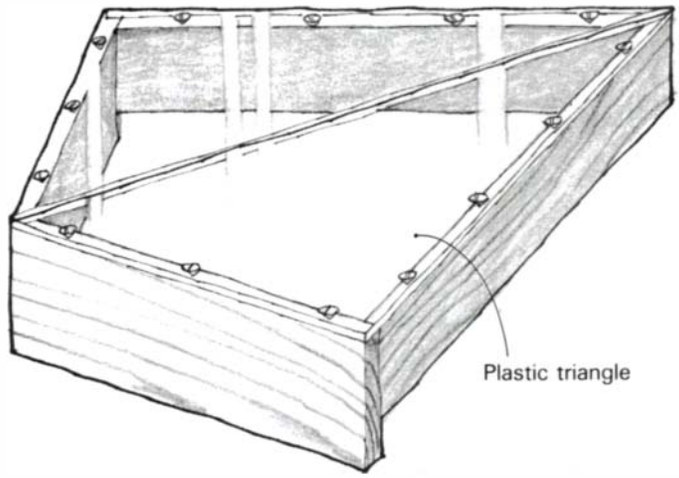
Quick tip: I roll large plans and charts backwards—with the good side out—then protect the roll with a scrap sheet. When unrolled for use, the plans stay flat without having to weight the four corners. *—Roger S. Apted, Milton, Wisc.*

Sharing motors



When I recently purchased some used equipment from the widow of a life-long woodworker, I found it unusual that several of his machines were missing a motor. But, when the motor almost fell off a machine I was carrying, I realized what the woodworker had done. On several of his little-used machines he had installed the same shop-made motor mount shown in the sketch, and consequently he could move a single motor from one tool to the next as needed. The mount is designed so that the motor pivots in the saddle and tensions the belt with its weight. *—Dan Miller, Elgin, Ill.*

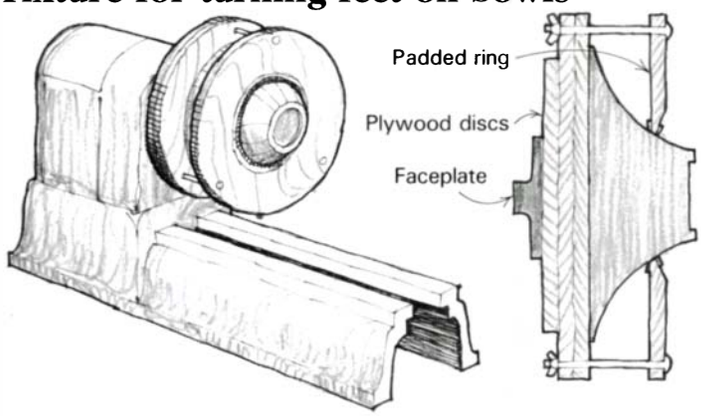
Homemade center finder



To make this inexpensive but accurate center finder, purchase two identical 30-60-90° triangles at an art or drafting supply store. The triangles are available in a variety of sizes. Attach the two triangles to a wooden frame using small brass screws. Leave a 1/16-in. space between the two triangles to provide a marking slot. On my center finder I made the frame deeper on the 60° end, as shown in the sketch, so I could use the center finder for marking objects too large to fit within the frame.

—Dave Sander, Port Orchard, Wash.

Fixture for turning feet on bowls



This fixture is for those woodturners who appreciate a neatly turned foot on the bottom of a bowl or plate. Unlike other fixtures I've seen, it won't bust your knuckles, lose the workpiece at the critical time or require much fussing to center the work. The easy-to-build fixture is made from one 9-in. disc, two 12-in. discs and one 12-in. ring—all cut from good quality plywood. Glue up the three discs into a solid base and mount them to a faceplate as shown in the sketch.

Now install three smooth-headed carriage bolts through the plywood ring into the base so that the work can be sandwiched between the ring and the base and tightened in place with wingnuts. It's a good idea to round and pad the inside of the ring so it won't mar the work. You may need several different rings, each with a different-size opening to handle various sizes of bowls and plates. To center work in the fixture, turn the work by hand as you tighten the wingnuts, adjusting the position as necessary—you can rest a pointed skew across the tool rest to use as a reference point.

—Doug Napier, Mansfield, Ohio

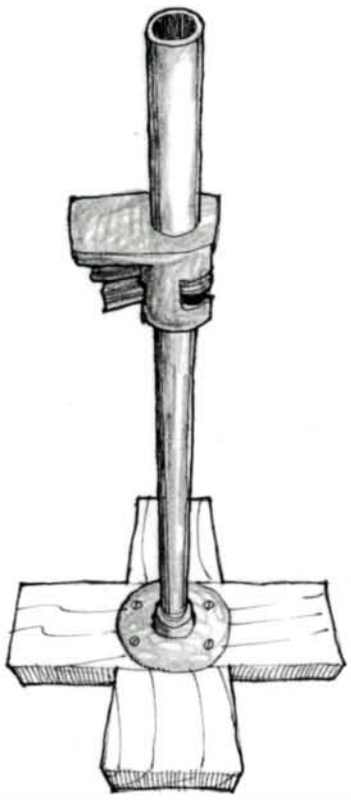
Milk-jug chisel protectors

A good, fast way to make chisel and knife-edge protectors is with plastic one-gallon milk jugs. Because these jugs are made of a thermoplastic, they can be easily shaped with heat and

pressure. I use a propane torch to heat the plastic until it turns clear. Then I press the tool edge straight into the plastic and hold it for a few seconds until the plastic cools. To finish I remove the tool and cut the plastic to the length required. This technique is also good for taking impressions of almost any small object to make plaster casts.

—Robert Kelton, Saranac Lake, N.Y.

Pipe-clamp bench slave

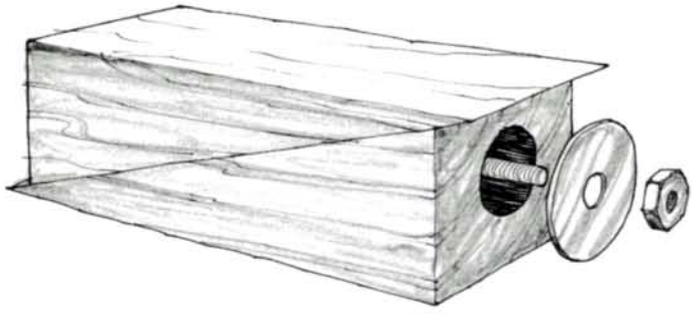


I made this bench slave from a pipe clamp, a pipe flange and a wooden base. It is especially useful in holding up the other end of a long board when hand planing in your bench vise. I have seen many wooden versions before, some with notches at various heights, others with lines of pegs and holes to allow a number of height adjustments. Undoubtedly, most of these have been more graceful and handsome than mine, especially when they have been well finished. The prime advantage of my stand is that unlike its wooden cousins, it is infinitely adjustable.

—Louis Sass, Eola, Ill.

Quick tip: Plant-tie tape, available at garden supply stores, makes a good gluing clamp for small-to-medium jobs and irregular work. The tape is made of elastic plastic and comes in ½-in. and 1-in. wide rolls. The more you wrap, the tighter it clamps the work. *—Robert Boardman, Nevada City, Calif.*

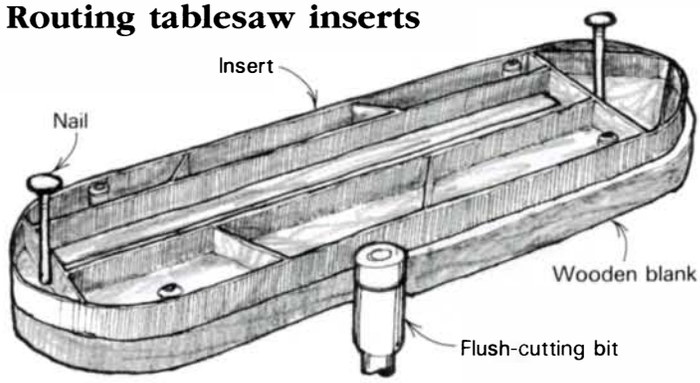
Power wedges for edge-gluing



Small wedge pairs are a good way to clamp thin stock when edge-gluing (see *FWW* #58, p. 45) because the wedges won't exert too much pressure. But recently I needed to clamp a glue joint where the only thing that would fit were wedges, yet I had to apply a lot of clamping pressure to the joint. To solve the problem I came up with the power wedges shown below. These wedge pairs work just like the pairs you tap into place. But since they are tightened with a machine screw, you can apply much more clamping pressure.

Start with a rectangular block about 1 in. by 1 in. by 3 in. Drill an oversize hole lengthwise through the block, cut the block in two on the diagonal, then add a machine screw and washers as shown. *—Richard Farwell, San Luis Obispo, Calif.*

Routing tablesaw inserts



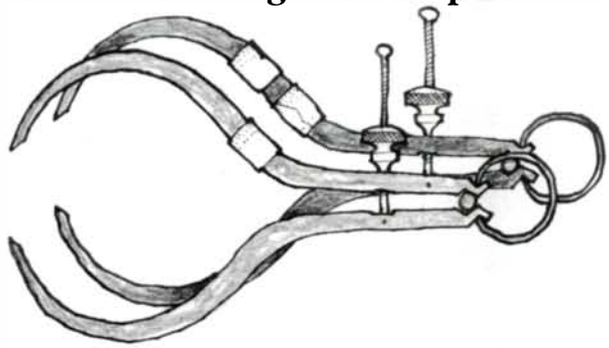
Drilling two nail-sized holes in your tablesaw insert lets you tack the insert to a rough-cut blank and pattern-rout a replacement wooden insert that's exactly the size of the original. A flush-trim bit with a ball-bearing pilot works best for the routing. Before you start, thickness-plane the stock for the blanks to the exact depth of your insert hole. I make the inserts up by the dozen and put in a new one at each blade change.

—Jeffrey P. Gyving, Point Arena, Calif.

Kitchen baster handy in shop

Transferring lacquer from a gallon can to your sprayer cup needn't be messy and awkward. Use a common kitchen baster like a jumbo eyedropper to transfer the finish. To maintain domestic tranquility, don't steal the baster from your kitchen. Rather, go buy your own, making sure the body is nylon so that it is impervious to lacquer and lacquer thinner. The baster is useful in cleanup also. Use it to squirt solvent through gun orifices. *—Chuck Anderson, Porterville, Calif.*

Production turning with calipers



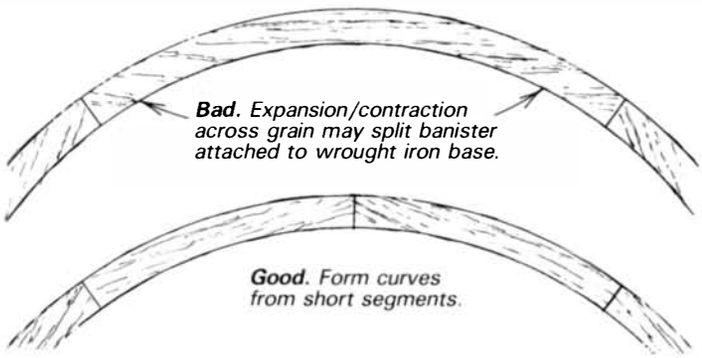
If you do much production-run spindle turning you have probably already discovered that it's much more efficient to use several calipers preset to various key diameters rather than to reset one caliper several times. But if you happen to pick up the wrong caliper at the wrong time it's easy to ruin the work. To reduce the chance of this error, I mark each caliper with bands of tape and set the calipers in the sequence used. The caliper for the first cut will have one band of tape, the second caliper two bands, and so on. This simple procedure has virtually eliminated mistakes. *—Alan Dorr, Chico, Calif.*

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. We'll return only those contributions that include an SASE.*

Curved oak banisters for iron staircase

The answer on laminating curved steps in* FWW *#60 prompted me to consider using an oak banister to cover a wrought-iron spiral staircase. One of the suggested methods for the stairs involved joining angled segments with splines, then hand sawing the curve after the glue cured. Would this technique work for my banister?

—Walter W. Crites, Tulsa, Okla.



Seth Stem replies: Mitered splines would be fine for the staircase banister you describe. Since the handrail will be supported from underneath by the wrought-iron structure, the splines will provide enough strength for the joints. Be careful, though, to limit the amount of the curve that's formed by any one piece of stock. It would be better to use several short segments, as shown, rather than one long segment. You don't want an excessive amount of cross-grain in the curve. If the wrought-iron work is screwed to the wood banister, the expansion/contraction factor of the cross-grain could cause the banister to fracture.

[Seth Stem teaches furniture design at the Rhode Island School of Design in Providence.]

Rain blackens unfinished furniture

I was given a piece of furniture that had been stripped of finish. The piece was left outside for me to pick up, but it rained before I got there. The piece wasn't structurally damaged, but the oak turned black in places. Sanding away the stains would remove too much of the carving detail. Is there some other way to prepare the wood so a clear finish could be applied?

—Harry W. Welliver, Wapwallopen, Penn.

George Frank replies: Oxalic acid should work. Fill a small jar half-full with oxalic acid crystals (available at some local paint supply stores and by mail from Garrett Wade, 161 Ave. of the Americas, New York, N.Y. 10013), then add denatured alcohol until the jar is ¾ full. Let the mixture set a day or two. Shake frequently and let the alcohol dissolve as many of the acid crystals as it can. Then apply the concentrated solution to the wood and let it set for 10 to 20 minutes. Avoid contact with metal. You may have to repeat the process to lighten the wood as much as you want. Before applying any finish, you should neutralize the acid with a solution of ordinary Clorox laundry bleach cut in half with water. This operation will smell terrible—better work outside.

[George Frank, of South Venice, Fla., is a retired master woodfinisher and author of *Adventures in Wood Finishing* (1981, Taunton Press)]

Turpentine versus mineral spirits

Is turpentine safer for a worker's health than mineral spirits?

—Gregg Aanes, Bellingham, Wash.

Beau Belajonas replies: You should be careful with any solvent, no matter how safe you think it is. Provide adequate ventilation, avoid excessive skin contact and wear whatever respirator might be recommended by the manufacturer. Turpentine is the distilled resinous sap found in pine trees in the southeastern United States. Pure gum spirits of turpentine, the only grade you should use for paint or varnish, has an agreeable odor, its vapor is relatively non-irritating and it's one of the safest solvents in terms of fire risks. Mineral spirits are distilled from petroleum oils, and as a thinner has properties similar to turpentine. It also has several advantages over turpentine. It leaves no sticky, gummy residue, it does not deteriorate with age, its cost is a small fraction of the price of gum turpentine and it's less likely to affect people with allergic reactions. In indoor work, where solvent fumes and odors are rather concentrated, mineral spirits are universally preferred.

[Beau Belajonas is a professional wood finisher in Camden, Me.]

Kevlar for strip canoes

I'm building a conventional wood-strip canoe on which the glued-up strips of wood are sandwiched between layers of fiberglass cloth. Since some canoes are made entirely of Kevlar cloth, which is stronger than fiberglass, would it be a good idea to substitute Kevlar for the fiberglass or to use some composite of fiberglass and Kevlar?

—Andre Boening, Gaithersburg, Md.

James R. Watson replies: The type of Kevlar Aramid fiber used in canoes, kayaks and other boats is called Kevlar 49. This Du Pont product has an exceptionally high strength-to-weight ratio when bonded with a high-performance resin. This means that Kevlar can have the same tensile strength as fiberglass with only a fraction of the weight. But Kevlar has low compression strength, being elastic under low stress and almost perfectly plastic under higher stress. For best results, you have to design your project so that the Kevlar is exposed to tension rather than compression.

In the type of wood-composite boat you describe, where softwood strips comprise the core and a reinforcing fabric is bonded to the inside and outside of the strips, fiberglass is typically the material of choice. The elastic and strength characteristics of fiberglass and wood match nicely, both in terms of compression and tension. Taken to the point of failure, they both would go about the same time, which means they both contribute to structural stiffness when stressed under normal operational loads.

If you build with Kevlar, you can't maintain the natural wood look that strip builders prize. Kevlar does not become transparent when fully wetted with resin as fiberglass does. It's yellow when dry and becomes a golden color when thorougly wetted with resin. Kevlar is extremely tough to cut with scissors, and when cured, it is most difficult, if not impossible, to shape or sand. It fuzzes when filed, sawn or sanded, which makes finishing difficult. The solution is to bond a thin layer of fiberglass over the Kevlar, then use a conventional fiberglass finish. The last feature to consider is cost, which is 10 to 20 times that of standard E-type canoe-grade fiberglass. All in all, I think fiberglass fabric and epoxy resin are still the best choice for a wood-strip canoe.

[James R. Watson is a technical assistant with Gougeon Brothers Inc. in Bay City, Mich.]

Instant repairs

A local priest asked me to repair a wooden chalice with a fine crack in the cup section. I'm reluctant to try to widen the crack enough to insert glue and risk splitting the rather fragile turning. Any suggestions?

—Douglas Hammer, Solon Springs, Wisc.

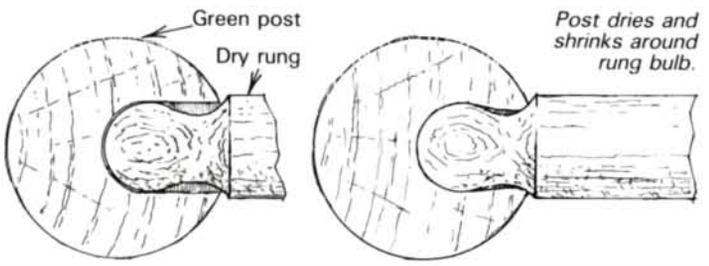
Jim Cummins replies: I would use cyanoacrylate glue to fix the crack. The Hot Stuff brand (available from Woodcraft Supply and other mail-order houses) is good. Buy both the thin

and the thick types, and a squirt can of accelerator. First apply the thin, which will penetrate the crack. Wait about 10 seconds or so. Then apply the thick, which will fill any gaps. If you have to, sand the surface a little to color the glueline with dust. If you don't have to sand, give the chalice a squirt of accelerator and the glue will set almost instantly. Turners also use the glue to repair cracks and to keep the bark on natural-edge bowls. Store the glue and accelerator in the freezer between jobs and it will last for a couple of years.
[Jim Cummins is an associate editor of *Fine Woodworking*.]

Bulbous ends for chair rungs

I am in the process of repairing an old chair. The rungs are somewhat unusual with round ends. What was this joint called? Any idea how old the chair is?

—Irving Peters, Ulster, Penn.



Norm Vandal replies: The rungs on your chair are made of ash, and were probably split out and shaped with a drawknife and spokeshave. If you look carefully at the rungs, you'll see their ends aren't really round. It's more of a bulb shape. This shape cut on the end of the rung was a technological innovation aimed at allowing the green post to shrink around the dry rung, as shown, and hold it fast. Sometimes the compression from the shrinking post was strong enough to crush the bulb. This, plus the constant strain on the joint as the chair was used over the years, contributed to the failure you are now repairing. This type of joint was common on both ladder-back and Windsor chairs from the early 18th century till the mid or late 19th century. It's difficult to pin it down any further without fully examining the chair.
[Norm Vandal makes period furniture in Roxbury, Vt.]

Silencing carbide saw blades

Loud carbide-tipped circular sawblades can be very annoying. What causes the noise, and can anything be done to make them quieter? *—Martin F. Mueller, Chicago, Ill.*

David Snook replies: There can be many reasons for noisy blades, and you may have to consult with a professional saw technician to solve your problem. Blades commonly make two types of noise. One is generally referred to as whistling, the other as ringing or screaming.

Whistling can be caused by several things. If several blades whistle on the same machine, the problem could be the guard. Think of the sawblade as a fan, with each tooth acting as a fan blade. If you put a fan that moves air into a housing, you create a siren. Putting a saw blade onto a machine with a guard can create the same effect. In order to change the airflow, either the guard or the blade must be altered. Turning the guard slightly can sometimes be enough to make a difference. Drilling holes in the guard, or shortening or lengthening it can also make a difference, but unless you know quite alot about air flows, you'd be working on a trial-and-error basis and could increase the problem rather than correct it.

If the blade itself is a problem, you'd probably need to have it checked by a professional saw serviceman. The saw gullet depth could be incorrect. The angle of the heel relief behind the carbide tips could be incorrect or at the wrong height in relation to the tip. Radial or tangenial side clearance of the carbide might be the problem. Sometimes you can quiet a blade by filling the expansion slots or holes in the blade with lead solder, copper, brass, resin or silicone plugs. Be careful that the finished plug is flush with or thinner than the saw plate itself.

A screaming blade has a much more shrill and penetrating sound than a whistling blade. If there are tight spots in the steel, places where the molecules are closer together than in other areas in the saw plate, the blade will be out of balance when it spins, and this will cause it to oscillate or vibrate in the same way a ringing bell does. This problem must be corrected by a properly equipped saw service shop with personnel skilled in hammering blades to tension or stress-relieve the metal.
[David Snook operates a saw service shop in Salem, Ore.]

What's German for Juniper?

I'm interested in identifying a wood I know by the German name Wacholder. ***It's a light-colored wood with a rather pungent odor, something like freshly ground pepper. Do you recognize the wood?***

—Dale C. Baker, Pasadena, Calif.

Bruce Hoadley replies: *Wacholder* is German for juniper. This would be consistent with your description of a pungent but pleasant odor, as junipers are quite aromatic. The light color you mention is a little puzzling, though, unless you have all sapwood. The heartwood of juniper is characteristically purple or purplish brown.

The junipers of Europe (*Juniperus communis*, common juniper, and *J. sabina*, sabine juniper) are not usually considered to be commercially important. Among the more notable junipers are *J. procera*, African pencil wood, and *J. virginiana*, eastern red cedar found in the eastern part of North America. In the western United States, *J. occidentalis*, western juniper is well known.
[Bruce Hoadley is professor of wood science at the University of Massachusetts at Amherst.]

Handling foreign current

I will be moving overseas in a few months and will need tools that can operate on 220V, 50-cycle power. I'd like to get the tools in the U.S. before I go because prices are lower here. Would it be cost effective to replace the motors on the power tools I have or should I replace the whole tool? Are American inch-standard accessories compatible with European metric sizes? Can I use my ¼-in. router bits in 6mm European collets or do I need new bits?

—Norman Teman, Portland, Ore.

Edward Cowern replies: Three types of motors are normally used in woodworking applications. The first is a universal motor used in routers, most hand drills, belt sanders and other similar portable equipment. The universal motor has brushes and is designed for a single voltage (in this country 110V), but it can run on either the 50 cycles used in Europe or the 60-cycle current used in the U.S. You can buy a transformer that would convert the 220V, 50-cycle European current to the 110V, 50-cycle current. With this, you should be able to operate your power tools without any problems, except for the inconvenience of needing the transformer.

The second type of motor is a DC motor that is used in many rechargeable power tools, such as the Makita rechargeable drill. In this case it would be desirable to get new charging units that would be set up to accept the 220V, 50-cycle current found in most overseas situations.

The third and most difficult type of motor is an induction motor used on most fixed equipment such as tablesaws, drill

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5371-1	HD mag hammer drill ½"	313	207
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6226	port band saw 2 sp w/case	416	280
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6405	8¼" circ. saw 13 amp	191	127
6460	10¼" 15 amp w/case	380	245
6165	12" Chop saw 15 amp 4200 R.P.M.	311	189
6255	v/sp Jig Saw 3.8 amp	217	140
6245	sgle sp Jig Saw 3.8 amp	191	125
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9035	⅓ sheet finish sander	96	48
9045B	½ sheet finish sander	186	90
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4200N	4⅜ circ saw 75 amp	182	93
5008NB	8¼ circ saw 13 amp	198	105
5201NA	10¼ circ saw 12 amp	438	215
4300BV	v/sp jig saw 35 amp	234	120
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741070-7	1000 (med) Grdg Whl	34	22
741071-5	6000 (fine) Grdg Whl	45	30
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3608BK	¾ hp router w/case	132	85
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3700B	½ hp trimmer 28,000 rpm	162	82
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DP4700	½ v/sp w/rev 48 amp	178	92
HP1030W	⅜ v s r hammer drill w/case	168	98
6300LR	½" angle drill w/rev	288	152
841988-2W	½" s sp hammer drill w/case	268	150
GV5000	Disc Sander	108	53
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1805B	6⅛" planer kit w/case	498	265
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JV2000	var. speed orb. jig saw	198	100
5005BA	5½" circular saw 8 amp with brake	192	98
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630	1 H.P. 6.8 amp	150	100
690	1½ H.P. 8 amp	194	130
691	1½ H.P. D-Hdle 8 amp	218	145
536	1½ H.P. Speedmatic Double Handle	300	190
537	1½ H.P. Speedmatic Double Handle	315	215
520	3 H.P. Production	460	270
518	3 H.P. Micropressor 5-sp	490	345
	TRIMMERS BY PORTER-CABLE		
309	3.8 amp laminate trimmer	130	90
310	3.8 amp laminate trimmer	190	135
312	offset base laminate trim	205	140
319	tilt-base laminate trim	215	150

★ *X-TRA SPECIALS* ★
MAKITA TOOLS

		List	Sale
6010DL	C/less Drill w/flashlight - charger & case	188	90
DP3720	⅜ drill Rev. 0-1800 rpm	99	47
6510LVR	⅜ drill Rev. 0-1500 rpm	144	67
6013BR	½" Drill rev. 6 amp	208	100
5402A	16" Circular Saw - 12 amp	542	315
2414	14" Cut Off Saw - 13 amp	338	169
3612BR	3 HP Plunge Router	338	175
9401	4x24 belt Sander w/bag	288	160

MILWAUKEE HAMMERS AT BLOW OUT PRICES

MODEL	DESCRIPTION	LIST	SALE
5343	1⅛" Rotary Hammer w/case 3150 BPM	550	350
5344	1⅛" Rotary Hammer Kit 3150 BPM	669	419
5347	1⅛" Rotary Hammer w/case 3150 BPM	595	375
5348	1⅛" Rotary Hammer Kit 3150 BPM	711	530
5332	Demolition Hammer w/case 2000 BPM	1150	695

BOSCH TOOLS

		List	Sale
1581VS	Top Handle Jig Saw	225	126
1582VS	Barrel Grip Jig Saw	126	118
1604	1¾ H.P. Router	199	118
1942	Heat Gun 650°-900°	99	85
1272	3x24" Belt Sander	259	159
1272D	3x24" Belt Sander w/bag	274	169
1273	4x24" Belt Sander	274	169
1273D	4x24" Belt Sander w/bag	289	179

		List	Sale
101-084	Shop Helpers	79.50	69.00

★ NEW LOW PRICES ★
PONY CLAMP FIXTURES

Model		List	Sale	Lots of 12
#50	for ¾" Black Pipe	11.23	7.15	79.00
#52	for ½" Black Pipe	9.36	6.10	67.50

JORGENSEN HAND SCREWS

Model	Jaw Length	Open Cap.	List	Sale	Box of 6
#5/0	4"	2"	11.59	7.25	39.15
#4/0	5"	2½"	12.45	8.10	43.75
#3/0	6"	3"	13.36	8.50	45.95
#2/0	7"	3 ⅞"	14.36	8.95	48.35
#0	8"	4 ⅛"	15.97	9.95	53.75
#1	10"	6"	18.25	11.35	61.25
#2	12"	8½"	20.94	13.60	72.95
#3	14"	10"	26.56	16.75	91.35
#4	16"	12"	34.55	23.75	128.25

JORGENSEN BAR CLAMPS
STYLE 37 — 2½" Throat ¼" x ¾"

Model	Jaw Length	List	Sale	Lots of 6
#3706	6"	7.88	5.50	29.70
#3712	12"	8.73	5.95	32.13
#3718	18"	9.64	6.95	37.53
#3724	24"	10.54	7.35	39.69
#3730	30"	11.76	8.25	44.55
#3736	36"	12.85	8.95	48.33

Who Has The Saws That Cut It Across The Board?
BLACK & DECKER of course!!!

Model	WORM DRIVE SAWS	List	Sale
3050	6½" 12 amp - 4600 rpm	247	169
3051	7¼" 13 amp - 4300 rpm	232	149
3052	8¼" 13 amp - 4300 rpm	247	169
	SUPER SAWCATS		
3047-09	7¼" w/brake - 12.5 amp	226	149
3048-09	8¼" w/brake - 13 amp	240	155
	BUILDERS SAW CAT		
3030	7¼" 13 amp - 5800 rpm	155	100
3035	8¼" 13 amp - 5800 rpm	175	125
3034	7¼" 13 amp - 5800 rpm	162	115
3033	6½" 13 amp - 5800 rpm	162	115
	JIG SAWS		
3157-10	var/sp orb action d/hdl	174	115
3153-10	var/speed 4.5A 0-3100	158	105
3159-10	2/sp orb action barrel grip	178	120
	CUT SAW KITS		
3103	2 sp 6 amp-2400 strokes	163	100
3105	v/sp 6 amp-2300 strokes	170	110
3107	v/sp orb 6A 0-2300 strokes	183	119
4300	Drill Bit Sharpener	289	205
1321	½" drill 450 rpm 6 amp	175	115
4010	Palm Sander	80	48
4015	½ Sheet Finish Sander	160	105
	DRYWALL GUNS		
2034	v s r 0-4000 rpm	121	79
2037	v s r 0-4000 rpm	139	89

"Door Openers" from MAKITA

		List	Sale
9501B	4" Grinder Kit	119	55
2708	8¼" Table Saw	348	199
5007NB	7¼" Circ. Saw	158	94

MILWAUKEE BUY OF THE YEAR
Model 6365 — 7¼" Circular Saw
List $169.00 Sale $99.00
Lots of 3 — $289.00

***Brand New* • PORTER CABLE**
Model 7548 Top Hdle Jig Saw
LIST 199 — SALE 129.95
Model 7648 Barrel Jig Saw
LIST 199 — SALE 129.95

PORTER-CABLE

		List	Sale
9548	HD v/s bayonet saw w/case	255	169
9627	2 sp tiger saw kit 8 amp	193	130
9629	V/sp. tiger saw kit 8 amp	204	135
505	H.D. ½ sheet finish/sander	175	100
330	spd bloc sander ¼ sheet sz	87	54
304	Professional 7" disc sander	169	120
305	Professional 7" polisher	169	120
7511	⅜" xtrahvy v/s drill 5.2 amp	164	115
7554	½" xtra hvy drill 8 amp	210	150
9652	Versa-Plane Kit	419	285
9118	Porta Plane Kit	289	190
	DRYWALL SHOOTERS		
7544	5.2 amp — 2500 rpm	158	105
7545	5.2 amp — 0-2500 rpm	158	105

AEG POWER TOOLS

Model		List	Sale
EZ 501	C/less Scrwdvr Brand New	59	35
EZ 502	C/less Scrwdvr-190 rmp	98	52
EZ 505	C/less Drill/Driver	139	79
EZ 506	C/less Electronic Dril/Drvr	159	94
EZ 581	C/less Caulk Gun var/sp	179	106
SCR1E	Drywall Screwgun 0-2000	125	74
SCR11E	Drywall Screwgun 0-4000	125	74
BE8RL	⅜" var/sp drill 3.8 amp rev	86	51
BE10RL	⅜" var/sp drill 5 amp rev	125	74
SBE401RL	⅜" Ham. Drill v/sp h.d.	88	52
SE2E13RL	½" Ham. Drill 2 sp h.d.	169	101
TC25E	Tech Driver v/sp 5 amp	150	89
PC70	7¼" Circular Saw 12 amp	157	93
VS130	Orb Sndr 20,000 OPM ⅓ sh	75	48
VS260	Orb Sndr 25,000 OPM ½ sh	156	88
VSS260	Orb Sndr 25,000 OPM w/bag	189	118
Hbse75S	Belt Sander v/sp 3"x21"	199	118
8SPE60	Jig Saw Orb v/sp 4.6A w/case	214	127
RSK600	Recip Orb Saw 10 amp	229	136

ROTARY HAMMERS

		List	Sale
PHE 16 RL	3.8 amp ⅝" capacity in concrete	269	175
PH 210	5.2 amp ¾" capacity in concrete	398	260
PHE 20	Same as above — except var/sp 0-750	418	270
PHD 26	6.3 amp 1" capacity in concrete	495	320
PH 38	7.5 amp 1⅝" capacity in concrete	549	355

All above complete with cases

SKIL TOOLS

		List	Sale
551	5½" Circ. saw 6.5A	99	73
77	7¼" Worm Saw	240	135
367	6½" Worm Saw	239	135
825	8¼" Worm Saw	270	165
807	7¼" Skilsaw 13A-Super	153	100
808	8¼" Skilsaw 13A-Super	172	110
2016-02	⅜" Cordless Drill complete W/Charger Case & 2 batteries	199	95

presses and jointers. If these tools are designed for 60-cycle service, it is probably not practical to convert them or attempt to run them on 50 cycles. The basic problem is that they contain an internal centrifugally operated switch, which may malfunction on the 50-cycle current, causing the motor to overheat and burn out. If you are buying new tools, make sure that any induction motors on your machines are designed for 50 cycles or for a dual 50/60 cycle. In this way you would have no problems because the capacitor-start induction motors are made in a dual voltage configuration of 110V and 220V. Thus you can run them on either 50 or 60 cycles and on either 110V or 220V.

With the router bits, ¼ in. is very close to 6mm (0.250 in. versus 0.236 in.)—only 14-thousandths of an inch difference, but you should still check with the tool manufacturer to see if this is within acceptable limits. If they can't handle this difference, you might be able to just change the internal collets to make the tool accept the 6mm bit.

[Edward Cowern is an electrical engineer in North Haven, Conn.]

Revitalizing teak counter tops

The kitchen counters in my home are covered with teak flooring and finished with Watco teak oil. The counters have worked well in the past eight years, but the part next to the sink has become gray. Re-oiling doesn't seem to restore the finish fully and the treatments don't last long. Is there a way of revitalizing the wood?

—Donald F. Stanat, Chapel Hill, N.C.

David Shaw replies: One good way to revitalize the finish is to remove all traces of the oil finish that remain on the wood. Use a paste stripper, then rinse the teak with lacquer thinner to remove the stripper residue and sludge. Next, sand the area throughly to get below the discolored areas. Open-coat garnet paper works well for this. I find closed-coat papers clog too quickly. I wouldn't use any paper coarser than 150 grit.

You are now ready to recoat the wood. If you like the look of Watco teak oil, then apply it and let it dry for two days, removing the excess as it bleeds. Once the oil is fully dry and cured, you can coat it with any number of finishes. I have used both plain and catalyzed lacquers as well as polyurethane and varnish. If you don't have spraying equipment, I recommend you use a combination shellac and varnish finish. Lay on a coat or two of shellac (depending on the depth of finish you want), then seal the shellac with varnish. If you like the dullish look you obtained with the oil finish, you can kill the gloss of the shellac with 2/0 steel wool, then seal with one coat of satin varnish. The varnish can also be rubbed out with 2/0 steel wool to reduce the gloss, if you like. Finally a good paste wax will hide the minute scratches left in the finish by the steel wool and enhance the overall protection as well.

[David Shaw is a professional writer and finisher in Kelly Corners, N.Y.]

Special treatment for high-speed steel?

I use high-speed steel turning tools. Do I have to do anything special to care for them? *—Paul Mahany, Bethesda, Md.*

Russ Zimmerman replies: I don't find I have to do anything special to care for my high-speed steel tools. Nevertheless, I did notice that the paperwork accompanying one shipment of gouges from the Henry Taylor Co., in England, recommended high-speed steel should not be cooled in water, if the steel became overheated. Just let the metal air cool. Otherwise, I don't think you have to do anything different than you would for carbon steel tools. The high-speed steel tools just hold their edges better when you are working on abrasive woods or on projects that heat the tool up a lot, as bowls often do. Your actual turning techniques would be no different than those you would use if you were turning with carbon steel tools.

[Russ Zimmerman runs a turning school in Putney, Vt.]

Drill press speeds for wood

I recently acquired a 16-speed drill press, and am now looking for some guidelines on what speeds are best suited for various woods and applications. Are there charts which provide this information?

—Mitch Bergner, St. Louis Park, Minn.

Rich Preiss replies: Speed charts for drilling metals are available in most machinists' handbooks, but I'm not familiar with comparable graphs for wood boring. Speed selection for wood depends on a few basic factors, and there is quite a bit of room for subjective judgments. The first factor to consider is the type of bit you're using. Unlike the almost universal selection of twist drills for boring metals, woodworkers can choose from many configurations, such as brad point, Forstner or multi-spur. I classify these bits, which cut with a chiseling action, as low-speed bits because they are prone to overheating at high speeds. High-speed twist drills are much less delicate and have smaller cutting surfaces.

As with metal boring, a good rule of thumb is that larger diameter bits require lower boring speeds. As the bit size increases, there is a proportional increase in rim speeds, which can overheat the perimeter of the bit, causing it to dull.

The third factor is the hardness of the wood. As the material gets softer, it's possible to increase the speed without overheating the bit. Softer woods can also be bored with twist drills much more successfully than harder, more brittle woods.

I generally follow a simple procedure for setting speeds. After determining the size hole required, I try to select an appropriate bit for the job. I prefer brad point bits for most jobs because they track accurately and cut most cleanly. For large diameters, ¾ in. and larger, I go with multi-spur bits. On the average I start with the drill press at 600 to 1100 RPM, then switch to a higher speed if the wood tears around the rim of the hole or the feed speed is slow. I lower the speed if the bit heats badly or feels unstable. When boring large diameters, it's a good idea to clamp your work firmly to the table and feed the bit in at a conservative rate. Be sure to keep your bits sharp. If you have any doubts about the speed you've selected, try a test hole in scrap before advancing to your good work.

[Rich Preiss is head of the wood program at the University of North Carolina at Charlotte.]

Reader exchange

. . . Supplier of chemicals for natural dyes include City Chemical Co., 132 West 22nd St., New York, N.Y., 10011; Educational Modules, Inc., 1665 Buffalo Road, Rochester, N.Y. 14624; Baker J.T. Chemical Co., Phillipsburg, N.J. 08865; Wood Finishing Enterprises, 2438 N. 48th St., Wauwatosa, Wisc. 53210 and Olde Mill, RD #3, Box 547A, York, Penn. 17402

. . . Spray on suede lining for boxes and other projects is available from DonJer Products Company, 55D Alder St., Dept. W, West Babylon, N.Y. 11704

. . . ⅛-in. half-round dowel rods are available from Northeastern Scale Models Inc., P.O. Box 727, Methuen, Mass. 01844

. . . 14K gold-plated nuts and bolts are available from Reactive Metals Studio, Old Mingus High School, Hwy. 89A, P.O. Box 425, Jerome, Ariz. 86331

. . . Polyurethane based on safflower oil is available from Barrett Varnish Co., 1532 S. 50th Court, Cicero, Ill. 60650.

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

Sources of Supply: Bandsaws

This is a listing of the bandsaw and bandsaw-blade manufacturers and importers we were able to locate doing business in the U.S. or Canada. Each source is keyed to a table of sizes, prices and types. Decide on the type of saw or blade you need, then use the key to locate the company that sells the product. Call or write for current information and local distributors.

MACHINES
A two-wheel
B three-wheel

C special resaw
D professional shop
E small shop

F under $150
G $150 - $450
H $450 - $900
I $900 and up

BLADES
J thin-style
K steel
L bimetal
M carbide

A.J. Tool, Inc.
(A, E, G)
15250 Texaco Ave.
Paramount, CA 90723
(800) 523-2140
(213) 630-2270

American Machine and Tool Co. (A, E, G)
Fourth Ave. and Spring St.
Royersford, PA 19468
(215) 948-0400

Andreou Industries
(A, D/E, G-I)
22-69 23rd St.
Astoria, NY 11105
(718) 278-9528

Black & Decker U.S. Inc.
(A, F, K, L)
10 North Park Dr.
Hunt Valley, MD 21030
(301) 683-7000

Bridgewood: Wilke Machinery Co. (A, C/D/E, G-I)
120 Derry Ct.
York, PA 17402
(717) 846-2800

Davis & Wells: PAL Industries
(A, D, I)
11090 S. Alameda St.
Lynwood, CA 90262
(213) 636-0621

Delta International Machinery
(complete line)
4290 Raines Road
Memphis, TN 38118
(901) 223-7678

DoAll (A/B, D, I)
254 N. Laurel
Des Plaines, IL 60016
(312) 824-1122

Elektra Beckum (A, D/E, I)
P.O. Box 24
Somerdale, NJ 08083
(800) 223-8600

Emco USA (B, E, G)
2080 Fairwood Ave.
Columbus, OH 43107

Foley-Belsaw (A, E, H)
6301 Equitable Rd.
Kansas City, MO 64120
(816) 483-4200

General: J. Philip Humfrey Ltd. (A, D/E, H/I)
3241 Kennedy Rd., Unit 7
Scarborough, Ontario
Canada M1V 2J9
(800) 387-9789

Gilliom Mfg. Inc.
(kits: A, E, F-G)
1700 Scherer Parkway
St. Charles, MO 63303
(314) 724-1812

Grizzly Imports
(A, D/E, G/H)
Box 2069
Bellingham, WA 98227
(206) 647-0801

Hitachi Power Tools USA Ltd.
(A, C, I)
4487-E Park Drive
Norcross, GA 30093
(404) 925-1774

Inca: Garrett Wade Co.
(A/B, D/E, G-I)
161 Avenue of the Americas
New York, NY 10013
(800) 221-2942
(212) 807-1155

Jet Equipment and Tools
(A/B, D/E, G-I)
Box 1477
Tacoma, WA 98401
(206) 572-5000

KITY Precision Tools
(A, D/E, I)
2908 Oak Street
Kansas City, MO 64108
(800) 322-4565

Mafell North America Inc.
(portable saw, I)
Box 363
Lockport, NY 14094
(716) 434-5574

Mini Max (A, D/E, H/I)
5933A Peachtree Industrial Boulevard
Norcross, GA 30092
(800) 447-1351,
(404) 448-1120

Powermatic Corporation
(A, D/E, I)
Morrison Road
McMinnville, TN 37110
(615) 473-5551

Ryobi America Corp.
(A, C, I, K/M)
1158 Tower Lane
Bensenville, IL 60106
(312) 766-1621

Sears Roebuck and Co.
(A/B, C/E, F-H)
Check your phone book for local store listings

SKIL Corporation (B,F)
4801 West Peterson Ave.
Chicago, IL 60646
(312) 286-7330

Startrite Inc. (A, D/E, H/I)
3400 Covington Road
Kalamazoo, MI 49002
(616) 344-3800

Sunhill (A, E, H)
1000 Andover Park E.
Seattle, WA 98188
(206) 575-4131

Tannewitz Inc. (A/B, D/E, I)
0-794 Chicago Dr.
Jenison, MI 49428
(616) 457-5999

Vega Enterprises Inc.
(A, E, I)
Box 193, Rt. 3
Decatur, IL 62526
(217) 963-2232

Wood-Mizer/Dupli-Carver
(B, C/E, H)
8180 W. 10th St.
Indianapolis, IN 46224
(317) 271-1542

INDUSTRIAL SAWS
The following manufacturers and importers deal only with industrial machinery.

Danckaert Woodworking Machine Co.
891 Howell Mill Rd. NW
Atlanta, GA 30318
(404) 873-6477

Holz Machinery Corp.
45 Halladay St.
Jersey City, NJ 07304
(800) 526-3003
(201) 433-3800

MBD Machines Div.
Tyler Machinery
615 S. Detroit St.
Warsaw, IN 46580
(219) 267-3530

Moak Machine and Foundry Co.
2547 Conner St.
P.O. Box 927
Port Huron, MI 48060
(313) 985-7164

Northfield Foundry and Machine Co.
P.O. Drawer 140
320 N. Water St.
Northfield, MN 55057
(507) 645-5641

Oliver Machinery Co.
1025 Clancy Ave. N.E.
Grand Rapids, MI 49503
(616) 451-8333

Parks Woodworking Machine Co.
1501 Knowlton St.
Cincinnati, OH 45223
(513) 681-1931

Precision Concepts
Box 918
Addison, TX 75001
(214) 931-3500

BLADE GUIDES
These companies manufacture add-on ball-bearing guides to fit home-shop handsaws.

Carter Products Co. Inc.
437 Spring St., N.E.
Grand Rapids, MI 49503
(616) 451-2928

Paddock Tool Co. Inc.
1708 Central Ave.
Kansas City, KS 66102
(913) 621-3234

Woodworkers Tool Works
(J, K)
2420 E. Oakton St.
Arlington Heights, IL 60005
(312) 640-6420

BLADES
These companies either sell blades mail-order, or will direct you to a distributor who will.

Rule Industries (K, L, M)
Cape Ann Industrial Park
Gloucester, MA 01930
(617) 281-0440

Diamond Saw Works (J, K, L)
Route 16
Chaffee, NY 14030
(716) 496-7417

DoAll Company (J, K, L, M)
254 N. Laurel Ave.
Des Plaines, IL 60016
(800) 362-5526
(312) 824-1122

L.S. Starrett (J, K, L)
Athol, MA 01331
(617) 249-3551

Lenox: American Saw Mfg. Co. (J, K, L)
301 Chestnut St.
E. Longmeadow, MA 01028
(800) 628-3030
(413) 525-3961

Marvel: Armstrong Blum (K, L)
5800 W. Bloomingdale Ave.
Chicago, IL 60639
(312) 637-4000

Milford Products (J, K, L, M)
P.O. Box 817
Branford, CT 06405
(800) 243-0072
(203) 481-4281

Nicholson: The Cooper Group
(K, L, M)
P.O. Box 728
Apex, NC 27502
(919) 362-7510

Neill Tools (K, L)
33 Business Park Drive
Branford, CT 06405
(203) 481-6442

The Olson Saw Co. (J, K)
Box 262, Route 6
Bethel, CT 06801
(203) 792-8622

Peerless Saw Co. (J, K)
4353 Directors Blvd.
Groveport, OH 43125
(614) 836-5790

Sandvik Saws and Tools Co.
(K, L)
Box 1220
Scranton, PA 18501
(800) 446-7404
(717) 587-5191

Simonds Cutting Tools
(J, K, L, M)
Intervale Road
Fitchburg, MA 01420
(617) 343-3731

Star Victor: Clemson (K, L)
22 Cottage St.
Middletown, NY 10940
(914) 343-4176

York Saw Machine Co (K, L)
P.O. Box 733
York, PA 17403
(800) 233-1969
(717) 767-6402

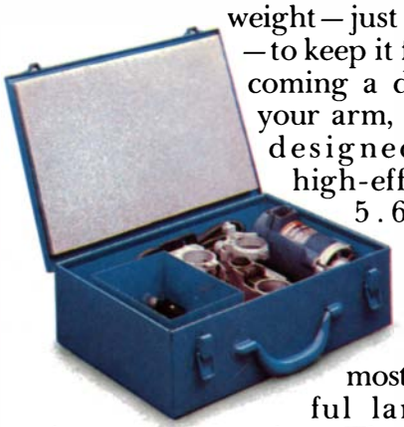
Introducing The Complete System For Making Plastic Laminate Fit And Trim.

When you have a lot of plastic laminate to get in shape, you need a laminate trimming system that lets you go flat out. Without requiring a lot of muscle.

That's the whole idea behind the new Bosch 1608 Laminate Trimming System. We designed it to handle the complete range of real-world conditions you face in trimming laminate. In the cabinet shop. And on-site.

Most Powerful Laminate Trimmer You Can Buy.

While we've made the 1608 lightweight—just 3.5 lbs.—to keep it from becoming a drag on your arm, we also designed in a high-efficiency 5.6 amp motor. That makes it the most powerful laminate trimmer you can buy. That makes it fast, safe and easy to handle, too. The double insulated motor housing fits comfortably in your hand, because unlike other trimmers, there are no knobs, posts, levers or bases to interfere with your grip.



Cover All The Bases.

Because plastic laminates are being applied to all kinds of shapes in all kinds of places, we offer you a complete set of bases that let you maneuver in any trimming situation.

Model 1608 comes with the standard base, including precision height adjustment and the ability to accept templet guides.

Model 1608L has the same base, but adds a two-position, fully-adjustable trimming guide for use with non-piloted bits.

If you need a tilting base for installations, choose Model 1608T. It tilts through a full 75° for trimming odd angles, or an edge up to a vertical surface. So it eliminates excessive filing or the need to score and break laminate.

And our Model 1609 features an offset base—with a belt-driven offset bit—that lets you trim narrow ledges against walls and into corners such as backsplashes. The motor has an *exclusive* tapered tooth drive pulley to make it quick and easy to mount the base.

Buy the motor and interchangeable bases separately, or buy the installers kit with all four. They mount and demount with just the turn of a single screw. Plus, two optional oversized sub-bases can be used whenever extra stability is needed.

Change A Bit Easier.

To make changing bits easier, our unique wrench system frees one hand, so you can keep one hand on the collet wrench and one on the trimmer.

The Bosch 1608 Laminate Trimming System lets you do far more, but it's competively priced with systems that do far less. So it makes plastic laminate fit and trim, while fitting into your budget, too. That's the *complete* system. Get the complete story at your nearest Bosch power tool Distributor. Find him in the Yellow Pages, "Tools—Electric".

BOSCH

"Quality You Can Hold On To."™

Affordable Quality

in Carbide Dado & Saws from freud®

		List	SALE
DS306	6" Dado	$160.12	$119.35
DS308	8" Dado	$196.09	$130.25

Three Important Features in a Carbide Circular Saw Blade

The Tips: These are made of carbide tungsten and are available in different grades and thickness. Small, softer tips are used by many manufacturers of blades. But Freud uses the hardest grade available, induction brazes it to the saw shoulder and then applies a "glass" edge with a 400 grit diamond wheel. The larger, more durable tips, mean more blade sharpenings and greater blade life for you.

The Plate Body: Milled tool steel will be found in the plate body of the premium blades. At Freud, after the tool steel is milled, it is heat treated and surface ground on both sides. It is then hammered to provide the proper tensioning and then hand checked for trueness. This will ensure that the blade will stretch evenly when run at high speeds.

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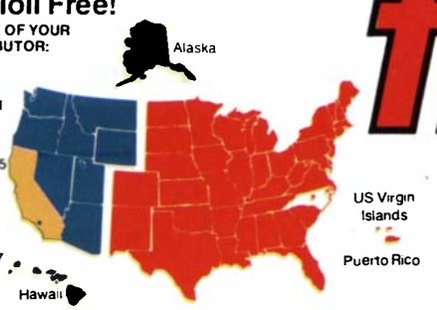

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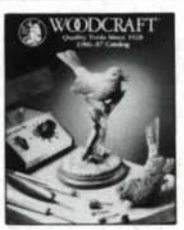

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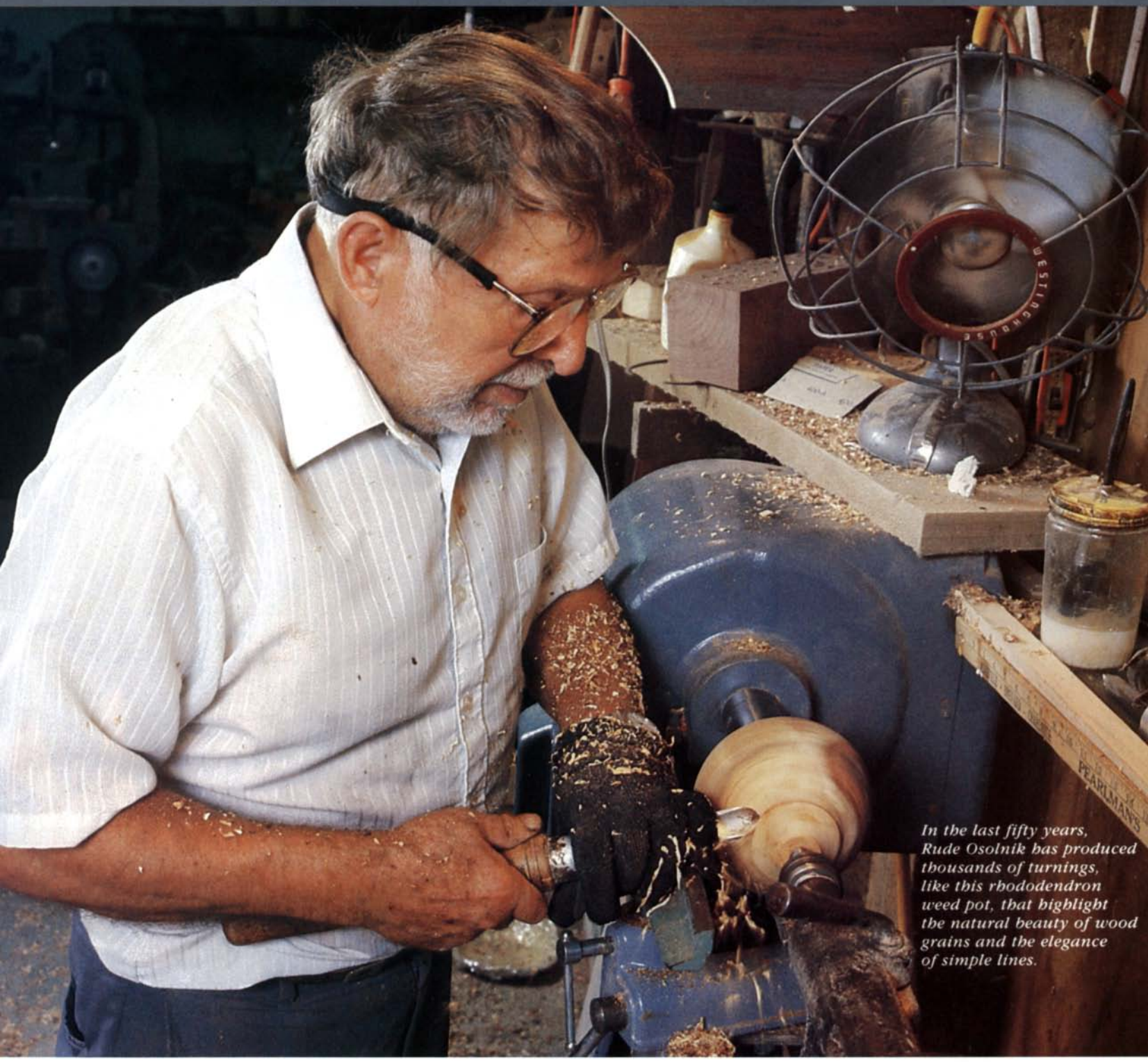


In the last fifty years, Rude Osolnik has produced thousands of turnings, like this rhododendron weed pot, that highlight the natural beauty of wood grains and the elegance of simple lines.

Spindle Turning

Fine points for the beginner

by Rude Osolnik

I always enjoy teaching spindle turning because any well-coordinated person can pick up the rudiments of the craft so quickly. Unlike so many woodworking disciplines, spindle turning doesn't demand a long apprenticeship. Almost from the start, good students begin exploring an endless variety of shapes, wood grains, colors and textures, and injecting their own feelings and personality into their work. This personal involvement is what makes the craft so fascinating for me year after year.

If you want to learn spindle turning, don't even think about duplicating the complex spindles you see in books. That copying has given spindle turning a reputation as a boring, repetitive task. Relax, and concentrate on cutting a nice, free shape. I encourage beginners to start with simple shapes, like the weed pot shown in the picture series, and to work with found wood, which is cheap and often stunning. If you buy expensive wood, you'll be too worried about the money to learn how to handle your tools and master the basic cuts. The secret to spindle turning is locating the highs and lows, which is a matter of measurements, then connecting those points with shoulders (flat areas), coves (hollows) and beads (round or oval swellings). These shapes are cut with a parting tool and a shallow fluted gouge, with the same techniques used to shape the weed pot.

Since so many good turnings are designed to showcase the natural beauty of woods, searching for wood is a good way to start thinking about turning. Good sources for hardwoods include the firewood pile, trees knocked down by storms or old age, and fallen branches. Look for sections with curvy undulations to the bark, or with burls, bubulous growths often having spectacular, distorted grain patterns. Spalting, the dark-line patterns caused by mineral stains and fungus infestation as wood decays, is very pretty. Wood with wormholes, cracks and interesting bark also is good.

Generally, dead limbs are pretty dry, but if the wood feels wet, I stack it out of direct sunlight for a few months to get rid of excess moisture. I might rough-turn a wet piece and put it into a plastic bag for a week before finishing it. I don't use chemicals like polyethelene glycol (PEG) to stabilize wet wood. I tried it once, but the turning never felt dry. One thing that sells turnings is the warmth you feel when you pick up a piece. If a turning feels clammy, it won't sell. That's why wood doesn't sell well on a rainy day when it can absorb environmental moisture.

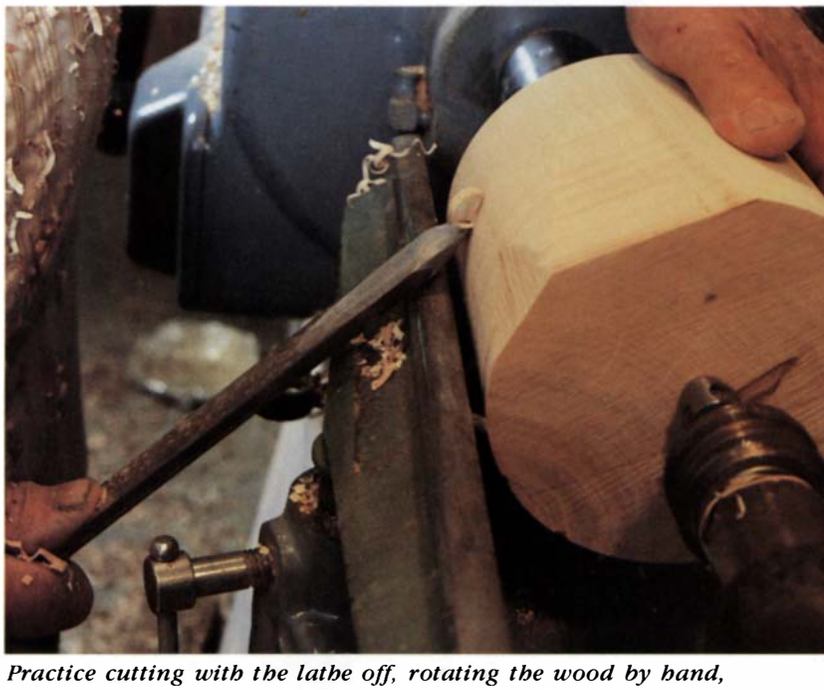
If your found wood doesn't have an exceptional grain or spalted pattern, it's crucial that its turned form be attractive. This means a turning has to be balanced, well-proportioned, and have pleasing lines. That's an intimidating roadblock for many beginners. Get around it by working from nature. Natural objects frequently have an attractive shape—an onion is a good example. Fruit forms are also good. The designing is all done—you just need to extract some of the lines. Also, get into the habit of cutting pieces to different lengths. The size variations will force you to think of different forms, shapes and proportions.

When you see a pleasing shape, scribble that form on a scratch pad and build an inventory of shapes. Look for simple lines that don't detract from the natural flow of the wood grain. Pieces should look as if they're rising out of the surfaces they rest on. Note how slender, delicate sections create a distinctive elegance. I've also found that if a piece looks good, it feels good. If your hands flow smoothly over the piece, it's good.

Another thing that hampers beginners is that they have too many tools. My tool kit is pretty small, only five tools—a square-nose parting tool; three homemade gouge/skew combinations (¾ in., ½ in. and ¼ in.), and a large gouge about 2 in. wide. I always show how I use my tools, but nobody needs tools like mine. All you need are a parting tool and a couple of gouges. The Superflute gouges, available at local outlets and mail-order supply houses, work well for spindle turning. The point is, almost any tool will work well if you learn how to hold it properly.

I don't spend a lot of time preparing turning stock, especially for simple shapes like the weed pots, but it's wise to bandsaw off any lopsided corners and protuberances that will get in the way when you rough-turn the piece. Perfect balance isn't necessary. I usually locate one of the spurs to the side of the heart of a limb section, which throws the piece out of balance anyway. This produces an interesting star effect on the side of the turning. I often try four or five centers on a piece before getting the effect I want. It's a good way to manipulate the emerging grain patterns. Because of the out-of-balance pieces, don't turn at the higher RPMs, especially when roughing out. Ninety percent of my work, anything up to 5 in. to 6 in. in diameter, is done at 1,800 RPM. For pieces more than 6 in. in diameter, I slow down to 600 RPM.

To shape the weed pot shown, I mount a chunk of oak between centers and rotate the spindle by hand a couple of times to seat the centers. Since my centers are small and sharp, they penetrate easily, but you may want to drill a center hole for heavy centers with thick spurs. If a piece is very irregular, I sometimes begin with the heavier centers, then shift to the smaller ones, once the spindle is balanced. Rotating the spindles is also a good way to check if the turning clears the tool rest, which should be about ⅛ in. from the turning. The tool rest should be slightly below the center of the turning, so the cutting edge of your tool will be just above the center, as shown below. Remember, you will be cutting with a small section of the bevel near the point of the tool, or slightly to the right or the left of center, and that part of the chisel should be above center. Concentrate on the relationship between the edge and the work. Take a ¾-in. gouge and try cutting with the lathe off, turning the stock by hand so you can see how the gouge rides on its bevel and can be lowered or rotated to the right or left until the cutting edge contacts the wood and begins to remove stock. Always try to set the bevel first, then bring the cutting edge down, rather



Practice cutting with the lathe off, rotating the wood by hand, until you understand how the tool rides on its bevel as it cuts.

To shape a weed pot, begin with the gouge on its side, left, and reduce the diameter of the vessel's neck. Don't try to cut the shape all at once, but make several passes. Final cuts, center, are very light, aimed at minimizing the amount of sanding needed to polish the surface. On the bottom, work the point of your gouge or parting tool in to form a concave surface, right, which will help ensure that the pot's base will be true enough to sit on a flat surface without rocking.

than jamming in the point of the tool, which could catch.

I rough out pieces with a 2-in. gouge, making a shearing cut down the cylinder, but a ¾-in. gouge will work. This is one of the most difficult parts of turning, because the out-of-balance stock produces quite a bit of vibration and the larger tool will absorb some of this. Because of the great amount of material removed during roughing out, I also wear a glove to prevent chips and bark from cutting my hands. A face shield is advisable.

Once the stock is turned to a fairly true cylinder, try to visualize a shape that best shows off the wood's natural beauty. My general strategy is to shape the base of the turning first, to eliminate excess waste and give myself more room to work, then do the top near the tailstock. Most of my weed pots are cut with a ¾-in. or ½-in. gouge, but I will use a narrower gouge for tight curves. The general rule is to cut in from the greatest diameter to the smallest, as shown. Begin your cuts with the gouge fairly high and the flute of the tool pointing up. Then, as you go to the smaller diameter, bring the cutting edge down and rotate your wrist so it's almost at a right angle to the spinning, above, left. Keep the tool riding on its bevel. Don't rely only on your hands to move the gouge. The smoothest turning motion involves swaying back and forth with your body, rather than a hand movement. Keep your arms close to your body and move your arms and body together. Don't use a white-knuckle grip on the tool. As you get toward the final shape you want, take finer and finer cuts, above, center, to produce the smoothest surface possible.

Bark left on the turning can provide an interesting texture, but if it comes loose, stop the lathe and squirt in Hot Stuff, a syrupy cyanoacrylate glue which dries almost instantly. It's available from Craft Supplies USA, 1644 S. State St., Provo, Utah 84601 (they also sell Osolnik's turning tools and urethane oil), and Conover Woodcraft Specialties, Inc., 18125 Madison Rd., Parkman, Ohio 44080.

Before cutting off or parting the top and bottom, I shape the ends of the turning to facilitate cleanup. On the top, I cut an inverted cone with a stem slightly thinner than the drill bit used to bore out the center of the pot. The drill will neatly pop off the waste as it goes into the main body of the pot. On the bottom, I work the gouge in to create a concave surface, above, right. I cut nearly through, then sever the last bit with the lathe turned off.

I bore the pilot hole in the weed pot with a brad point drill in a Jacobs chuck mounted in the headstock. You can also use a drill press. The best way to finish the hole is to modify regular spade bits, which are available from any hardware store. Grind the center to make a long, slender brad point and taper the main body of the bit to shape the rim of the original hole, as shown. I wrap the center bit with enough tape to make it fit snugly and run true down the drilled hole.

Forming the concave surface on the pot makes it easy to level the bottom, since the center bump left in parting off is recessed so it can't make the pot rock. To sand this surface, I mount a mandrel with a 1-in.-dia. sanding disc in my drill press, far left, and hold the turning under the spinning disc. With a little practice, you'll find you can manipulate the turning to produce a smooth bottom. To prevent the paper from grabbing, I glue a thin piece of foam to the disc, then glue sandpaper to the pad.

After you've made a few weed pots, try a simple stool with turned posts, as shown in figure 3, p. 40. Make the beads, coves and shoulders with the same cutting techniques you used on the weed pot. Chuck a 2-in. turning square between centers and

Sand bottom of the pot by rotating it freehand against a foam-backed sanding disc mounted on a mandrel chucked in a drill press.

Fig. 1: Modified spade bit

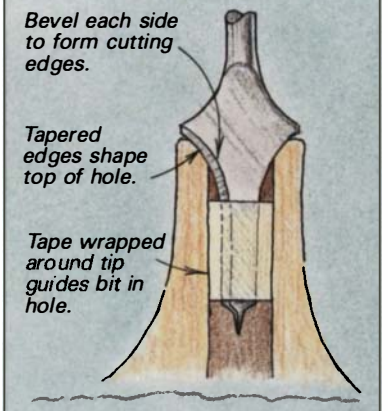
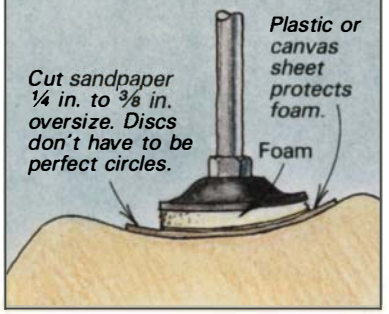


Fig. 2: Sanding mandrel



Working with an old-time turner

by Dick Burrows

Working with Rude Osolnik is a delight—he's the fastest, and probably cleverest turner I've ever seen, a great storyteller and, even after 50 years as a woodworker, just plain excited about wood. When he was showing me how to turn a weed pot, he abruptly shut off the lathe, moved the light up and said, "Isn't that pretty?" It was, but what's more important, he reminded me why I wanted to be a woodworker in the first place.

Wood is everywhere in Rude's world. There are piles of it near the nine lathes in the two shops next to his house. The house itself could be a craft museum. Bowls and pots ready to go to the Benchmark Gallery, which his son runs in Berea; carvings, ceramics and other objects he traded his work for; even a handmade Windsor chair built by his wife, Daphne. During a tour of the neighboring countryside, he showed me another barn full of his wood. Across the road is another complete shop, now unused, where he and his sons used to mass-produce wooden letters, stools and other gift items for companies in New York and other big-city markets. Nearby are more sheds full of wood, some of it dark with dust and age, but Rude identified the rosewood, walnut and rhododendron without hesitation. Each wood cache also prompted a story about bargains, sly trading and people trying to take the country boy to the cleaners.

Rude never wastes a chance for a story or a humorous ruse. Due to a reservation mixup at the car agency, I drove to Berea in a shiny, metallic-blue Toyota MR2, a hot little sports-car that seemed a little out of place in the quiet college town. Rudy just had to borrow it. "There are some old guys I have coffee with every day. I'm going to drive up and tell them it's my car. Shake 'em up a little." They believed him, for a while at least, and marched out to admire the car, talk about cylinders and gears, while commenting about old goats who won't grow up.

Later, Daphne asked how he was going to explain the car's absence when I left. "I'm going to tell them you made me take it back. They'll believe that." Afterward, he admitted he probably gave everything away when he answered a question about the cost of the car with "I'd give my pickup for the car and $200."

I had hoped to meet Rude ever since I began teaching myself turning in North Carolina about 15 years ago. His work was pictured in magazines or shown in the Southern Highlands Guild shops, and I knew he was making a living at it, just as I wanted to do. I copied some of his plywood-lamination bowls and rolling pins, and his distinctive candleholders, but I never got the candlesticks right.

To make a distinctively Osolnik-style candlestick, form two cones, cutting in from each end toward the narrow stem. The top cone is one-third the length of the stock, which should be straight-grained to prevent the stem from breaking.

The difference, Rude told me, is that he shaves the stems thinner than his imitators and cuts a slight curve on the top and bottom cones. He's made at least 150,000 of these candlesticks, which helped pay his children's college tuitions. The design is simple—the top cone is one-third the length of the stock, the bottom two-thirds, but each one is a little different and has a little different shape. Rude consistently turns one every five minutes. He often began turning at 4 AM, four hours before he had to leave to teach his first class, and he knew the time was up when he'd finished 48 candlesticks. (Incidentally, be careful if he says, "we'll get an early start in the morning." He means it.) To save time on spindles like the candlesticks, Rude doesn't even stop the lathe to remove and chuck on new pieces. The secret is in having a delicate touch and using a fine spur center. He made a believer of me, and I'm going to try it again, as soon as my fingers stop stinging.

Little details like the stem of the candlestick—the elegance of a slender form, a subtle curve or line cut to reveal the natural beauty of the wood—abound in Rude's work. His output as a turner over the years is astounding, yet each piece has a certain individuality that comes from Rude's enthusiasm for the wood and his joy in revealing its beauty. He's a craftsman's production turner. Not only is he enthusiastic about the work he produces, he delights in the process and coming up with clever ways to produce. There was no pretentious posturing, no art babble—just two guys who like wood enjoying the work. That's a feeling I often find stifled in a world of art objects and woodworkers who pride themselves on working within tolerences that would challenge a machinist.

Rude has no secrets. He'll show you every technique he knows, if you're interested, all the while stressing there's no one right way to do any turning. Experiment and have fun as you develop your own style and technique. Don't do too much measuring. Use reference points on your tools, such as the distance from the bandsaw table edge to the blade, or the length of your thumb or the width of your hand instead of rulers. If the diameter of your lathe's tailstock is ½ in., use that as a guide for estimating spindle diameters. When making duplicates, use completed objects to guide your eye, rather than taking measurements. Simple, common-sense tricks. Try them and see how relaxing spindle turning becomes, and how much more of you goes into the turning.

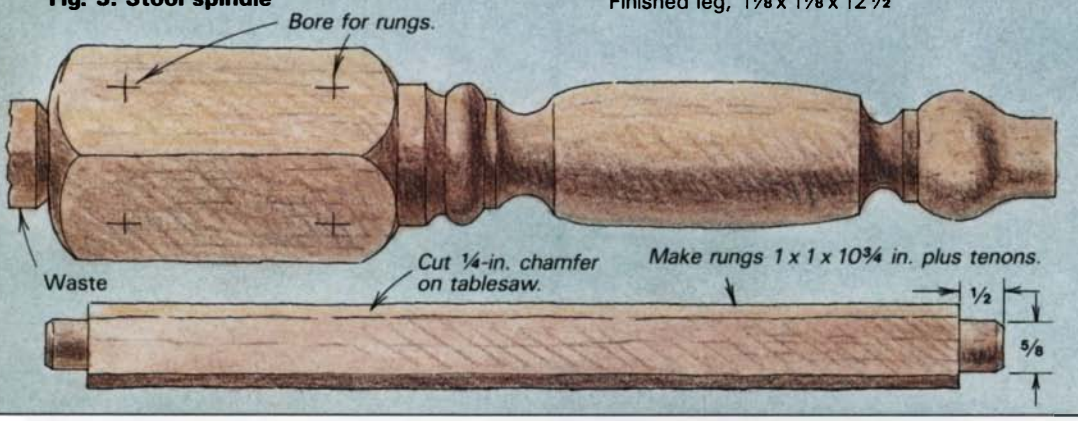
Be warned though. Rude makes everything seem easier than it is. He's been at it a long time. He grinds high-speed steel bars to make his own turning tools, for example. Each tool looks like a roundnose scraper with a 30° bevel on the bottom and a flute cut into the top to help clear shavings. In Rude's hands they cut, not scrape, and they do everything effortlessly. When I tried it, though, I found the long bevel a little awkward and caught the tool a couple of times. I discovered it pulled and tore much the way a badly placed skew did. The tool's so versatile that it's worth a little practice.

One thing I like about Rude's tools is their beefy 1½-in.-dia. handles. Rude explained that a small handle encourages you to clench the tool tightly and this hampers smooth cutting. If you hold the tool as if you were shaking hands with a person, with your thumb on the top of the tool, and relax your grip, you'll do better work with less effort. Little pointers like that kept cropping up all day long. One of his former students, a woodworker in Berea, told me Rude had always been like that. He continually came up with efficient, if somewhat unorthodox, methods to get the job done.

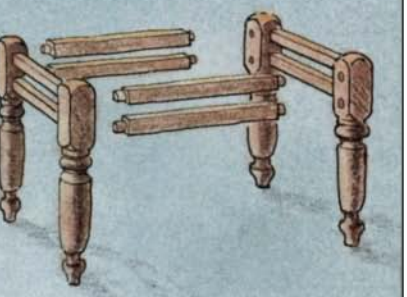
One day a pickup drove up to Rude's shop and a man and his wife got out. Folks downtown had given them directions and said Rude wouldn't mind seeing him. The man had an idea for a new sharpening system. As Rude was talking to the man, his wife softly said "My husband thinks it's an honor to walk on the same concrete as that man." That about sums it up. □

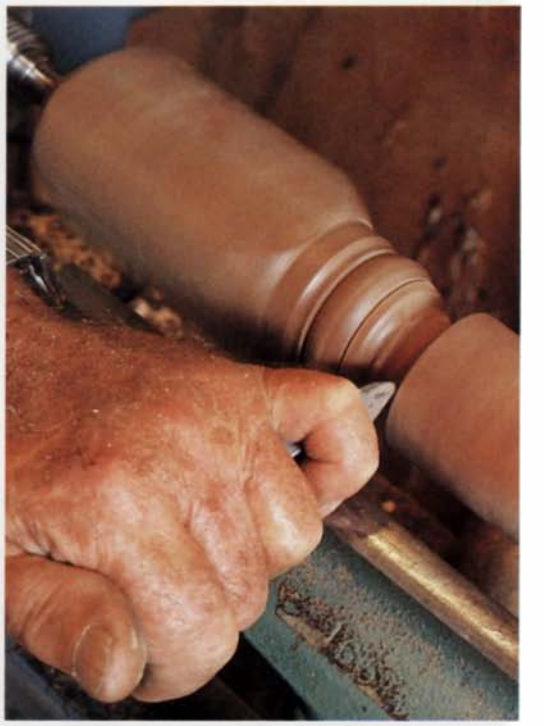
Dick Burrows is an associate editor of Fine Woodworking.

Fig. 3: Stool spindle



To assemble stool, bore one set of holes and glue up two end frames. When dry, bore second set of holes and finish assembly. Weave seat of suitable material.





When shaping a spindle leg for a stool, use a parting tool to set the depths of the coves, left. After setting the depths, roll the gouge down each side of the flat band to create a bead, center. To cut the cove, right, roll the gouge down from each high point to hollow the section between the shoulders. Always cut downhill, toward the middle of the hollow.

For a napkin ring, fit a block on a mandrel, left. Cut beads by rolling a gouge over the shoulders formed with a parting tool, right.

rough-turn a cylinder, as before. Use your parting tool to set the depths, then round the shoulders with a ½-in. gouge. To avoid tearing the corners below the top square, I score the area with the point of my gouge, then cut from right to left and left to right with the gouge to clear out about ½ in. of wood. Then, I lower the depth with a parting tool. In addition to the depth below the top square, you must establish the flat below the narrow top bead and the bottom of the top cove. Again, use the narrow gouge to round over the square shoulders left by the parting tool to form the bead or hollow out the cove. The bottom section is done the same way. Set the flats, then shape between the flats. Use the point of a gouge or a parting tool to crisply cut the small flat areas and cut sharp lines bordering the beads and coves. Size the coves and beads with calipers, if you like. For rungs, I turn ⅝-in. tenons on the stretchers and chamfer the pieces on a tablesaw. (For more on assembling stools and seat weaving, see *FWW* #36, #62).

To expand your technique, experiment with mandrels. Basically, they're plugs that support stock that would be awkward to mount between centers. To make a napkin ring with a 1½-in. hole, for example, turn a 6- to 7-in.-long plug that's 1½ in. in diameter. The plug is just a holding device, so don't worry about producing a perfectly flat surface. Now, drill a 1½-in. hole through a 2-in.-thick block of walnut and friction-fit the block on the plug, as shown at bottom left, facing page. To turn the ring, use a parting tool to lower the center of the ring, then a small gouge to round the end sections.

Another mandrel makes it easy to turn salt and pepper shakers. Since I make a lot of these, I've modified a drill to cut the three-step hole in one pass, figure 4, but you could use three different drills. The larger hole is ¾ in., and is later plugged with a small cork. After I bore out the walnut blank, I turn a three-step plug to fit inside. Then, the blank slides over the mandrel, the tailstock is brought up and the outside of the shaker turned to shape, sanded and finished. Drill the top for salt and pepper holes.

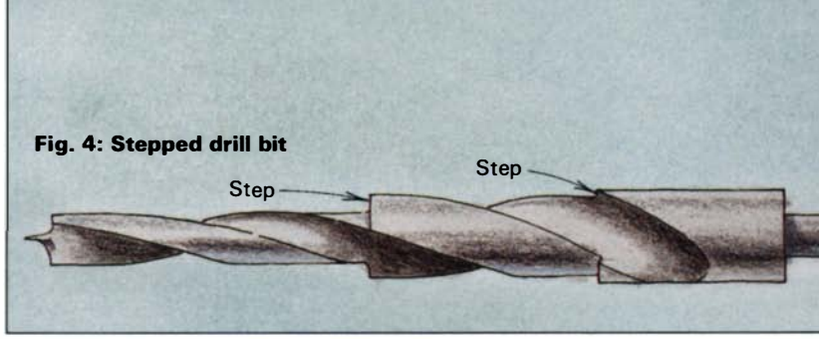
Bracelets are always a nice gift, and an excuse to try pressure turning. Turn the two fixtures shown at bottom right, which resemble two 3-in.-dia. bottles set opening-to-opening. Glue sandpaper to the ends of the fixtures, mount a 5-in.-dia., ½-in.-thick disc between them as shown and turn the bracelet shape. Free it with the tool shown in figure 5. You can re-turn the small disc to make a napkin ring.

It's annoying how many people ruin good turnings by sanding. They forget that clear, sharp lines make the spindle look nice. I cut 100-grit garnet paper into strips about 2½ in. wide, and fold them lengthwise. I wrap the strips around my fingers or use parts of the strip, whatever I have to do to make the paper follow the lines of the piece and not dub off the sharp shoulders. Don't ever flatten out a wide sheet with your hand and sand. That's how beginners sand bowls to create razor-sharp rims. After sanding with 100 grit, I progress to 150, 220, then 320. As you sand, check to get rid of the smear wood, torn chalky-looking fibers. Sand until these fibers have a glazed look.

For a good, quick finish, apply a coat of Deft clear sanding sealer and let stand until tacky. Then saturate a pad of 0000 steel wool with urethane oil, and use the pad to apply the urethane while the turning is spinning slowly on the lathe. Buff the turning on the lathe with a cloth. □

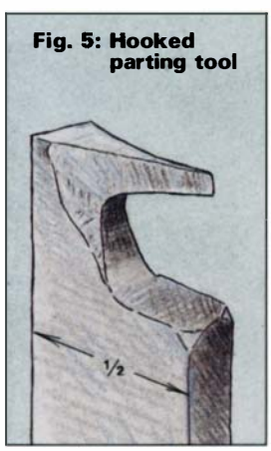
Rude Osolnik has been turning wood for more than 50 years. He retired as head of the woodworking program at Berea College in Kentucky in 1978, but still conducts turning seminars at his home and in workshops across the country.

Fig. 4: Stepped drill bit



Turn plug to match three-stepped hole bored with modified twist drill, top. Hole could also be bored with three separate drills. Then, fit salt shaker blank on plug and mount it on lathe.

Fig. 5: Hooked parting tool



A walnut disc pressure-fit between two bottle-shaped plugs can be shaped to form bracelet. Free bracelet by working in hook-shaped tool, shown above, left, from both sides of disc.

Shop-Built Disc Sander

The disc tilts, not the table

by Dwayne Intveld

Anybody who has worked with a small, stationary disc sander knows how valuable it can be. I used to put a sandpaper-faced plywood disc on my tablesaw to sand curved pieces and take fractions of an inch off stock that was a shade too long. When I traded for a tablesaw with a motor that was too fast (3,400 RPM) to safely run the 10-in. disc, I realized how much I missed the sander and vowed it would be my next power tool purchase.

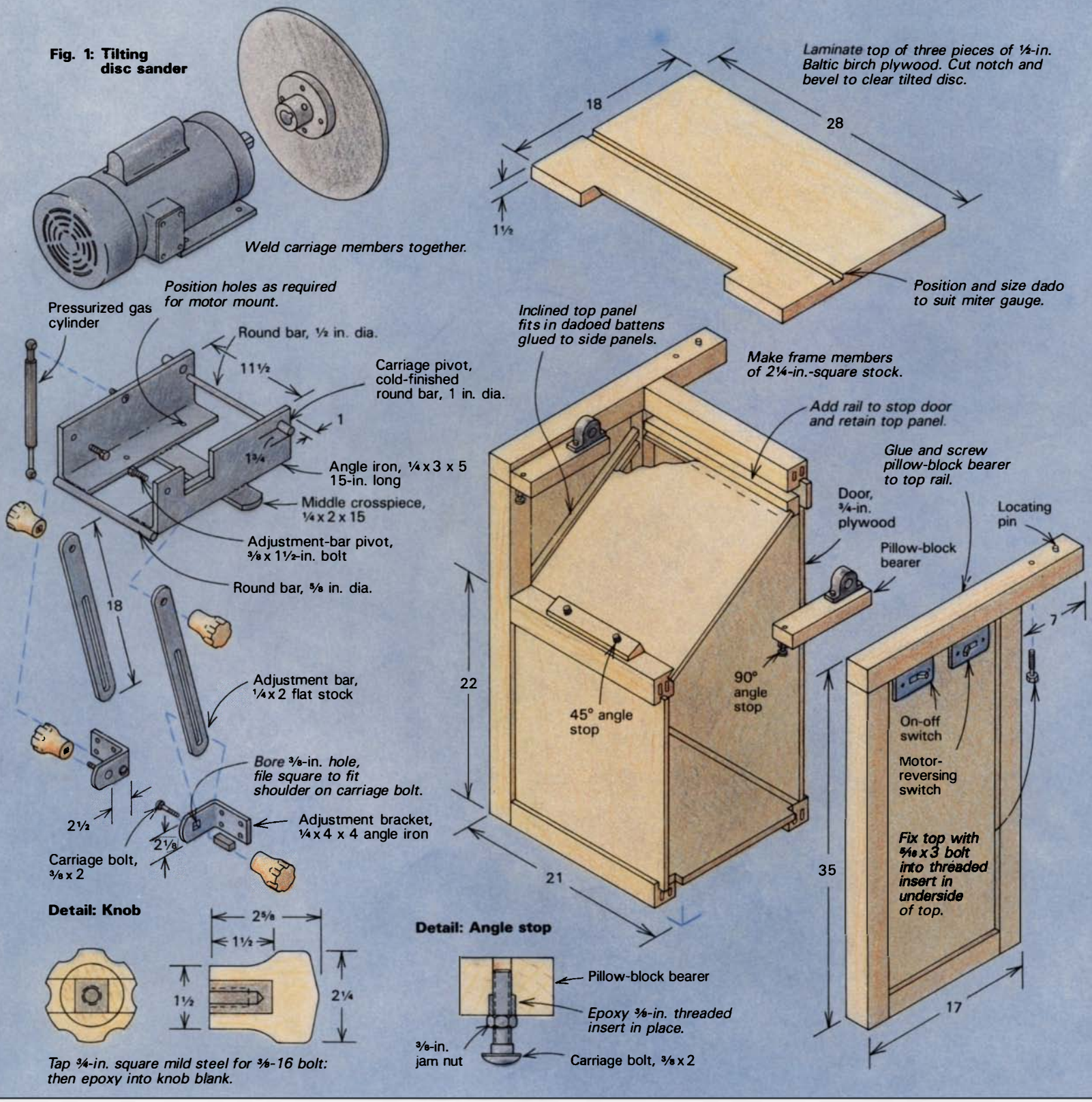
After some shopping around, it occurred to me that the tool's simplicity meant I could build my own sander and include the best features of several different commercial models to create a tool that would be ideal for my purposes. I especially liked the Vega model 148 disc finisher, which has a tilting disc instead of a tilting table. Because the table remains horizontal, it's easy to angle-sand large, cumbersome workpieces. Many larger production sanders also have reversing switches, which increase the sandpaper life and permit sanding on both the left and right sides of the disc, a convenience for certain jobs. I incorporated these features into my design, shown in the drawings and photos.

The machine is straightforward: The 16-in.-dia. disc is mounted directly onto a motor attached to a metal carriage. The carriage pivots on two pillow blocks bolted to a wooden stand, which also carries the thick plywood work table. Angles are set by two slotted metal bars, pinned to the back of the carriage and sliding on metal brackets screwed to the back of the stand. Lockknobs on the metal brackets anchor the slotted bars and hold the assembly at the desired angle. Making the sander requires basic woodworking and welding skills. I can't weld, but a friend could—we made two sets of everything and each got a sander.

Before building anything, get the motor. I found mine at a year-end clearance sale. It's a 2-HP, 1,725-RPM, totally enclosed, fan-cooled capacitor-start motor. One horsepower would be adequate for woodworking operations, but total enclosure is a must for the dusty environment. The capacitor start gets the heavy disc spinning without blowing a fuse. In addition to the motor's on-off switch, I added a second switch, connected to two interchangeable wires inside the motor, to change the direction of rotation. (Most reversible motors come with a small diagram showing how to rewire for reversal.) Though both switches look the same, I placed the reversing switch so that I'd have to think to reach for it.

Next, I determined the hinge pivot point for the motor mount. The ideal pivot point is at the intersection of the disc and the tabletop, as shown in figure 2. Pivoted there, the disc will contact the table throughout the entire adjustment range. But the pillow blocks required to support the heavy motor-carriage assembly would extend into the table and interfere with sanding

Dwayne Intveld's disc sander features a tilting disc, a reversible motor and straightforward construction.



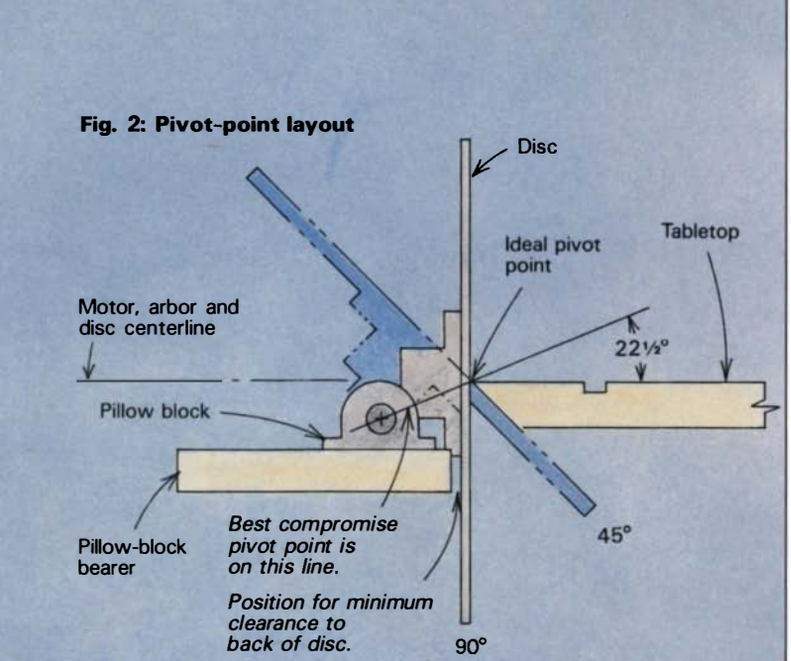
long stock if they were placed at this ideal hinge location.

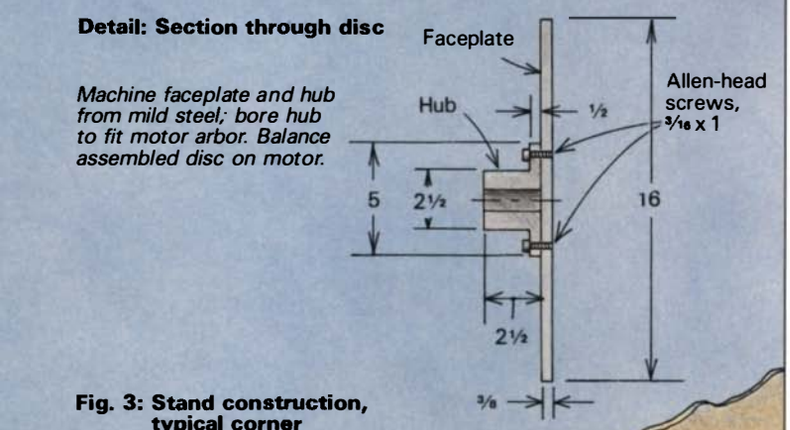
The best compromise is to place the pivot along a line drawn through the point of contact of the disc and tabletop and angled downward 22½° (half of the total 45° adjustment). Place the actual pivot point as close as possible to the ideal point, leaving a minimum clearance between the pillow blocks and the back of the disc when the disc is vertical (90°). This arrangement backs the disc away from the table slightly for any angle between 90° and 45°, but keeps the disc close to the table for supporting small workpieces at those extremes, which are the two settings most often used.

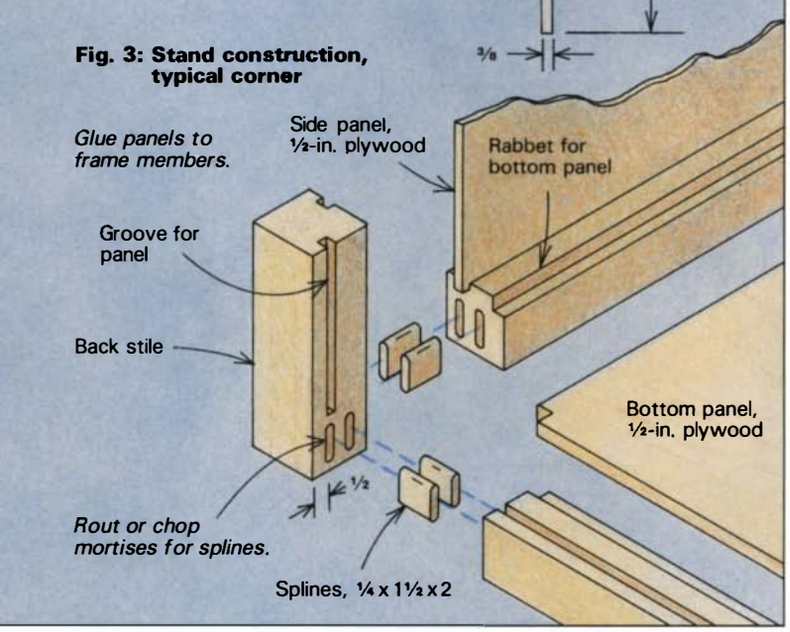
A 16-in. disc offers increased sanding surface over the common 12-in. size—useful for the large objects I wanted to sand—and is about the biggest disc you'd want to spin at 1,725 RPM. Replacement sandpaper discs are available through most patternmakers' supply houses. I had a machinist turn the faceplate and hub, which are two pieces of mild steel joined with Allen-head screws. The hub is keyed to the arbor shaft, with one set-screw bearing on the key, and another bearing on the arbor at 90° to the first screw. The machinist also balanced the disc on the motor for me, boring shallow holes in the back of the faceplate to reduce weight—this is important given the size of the disc. The whole job cost $140.

The carriage is constructed from commonly available angle

Drawing: Caren Mastranardi







iron, round bar, and flat stock. With some patience, these can all be cut by hand with a hacksaw. One flat and two round crosspieces are welded to the two angle-iron members that support the motor. The round bar along the back of the carriage doubles as a handle for adjusting the angle. The carriage pivots are 1-in.-dia. cold-finished round stock, which, unlike hot-finished stock, is dimensionally accurate and will fit snugly in the pillow blocks without turning to size. A wooden fixture positioned the stock accurately for welding. Two ⅜-in. bolts welded to the opposite end of the angle iron provide attachment points for the adjustment bars. (You could bolt the carriage together, but remember that threaded joints can loosen. Wood

Built of commonly available iron stock, the motor carriage tilts to allow sanding at 45° and 90°, and any angle in between.

construction is also possible, but to get the same strength, it might be cumbersome.)

The adjustment bars are flat stock, slotted by the machinist on his end mill. Short lengths of angle iron made good adjustment brackets. The lockknobs are laminated of ¾-in.-thick maple. I epoxied a drilled-and-tapped piece of ¾-in.-square metal bar inside each knob, then turned the knobs on the lathe. I routed the lobes on the knobs using a jig and a straight bit; you could rout them with a core-box bit on the lathe, or cut them freehand with a gouge. I put lockknobs at the top pivot of the adjustment bars to eliminate any movement at those joints. With all four lockknobs secured, all looseness and endplay is removed from the motor-carriage assembly.

The stand is a framework of 2¼-in.-square maple members splined together, with ½-in. Baltic birch plywood stress panels (figure 3). I glued 1-in. by 2-in. maple strips to the side panels, dadoed to hold the inclined top panel. A plywood door opens to a large, dust-free storage area for sanding accessories. The tabletop is three pieces of ½-in. Baltic birch plywood laminated together. Two bolts anchor it to the extended top rails of the stand. The top must be removed to change the sandpaper, so I inserted two brass patternmakers' locating pins in the top and the stand so the miter-gauge slot is always returned true to the disc (round metal bar stock and bushings made from copper tubing would work, too). The top is cut away around the disc and beveled to allow for tilting. To cut the bevel, I positioned the top on the tablesaw and raised the blade into it. A handsaw and chisels finished the job.

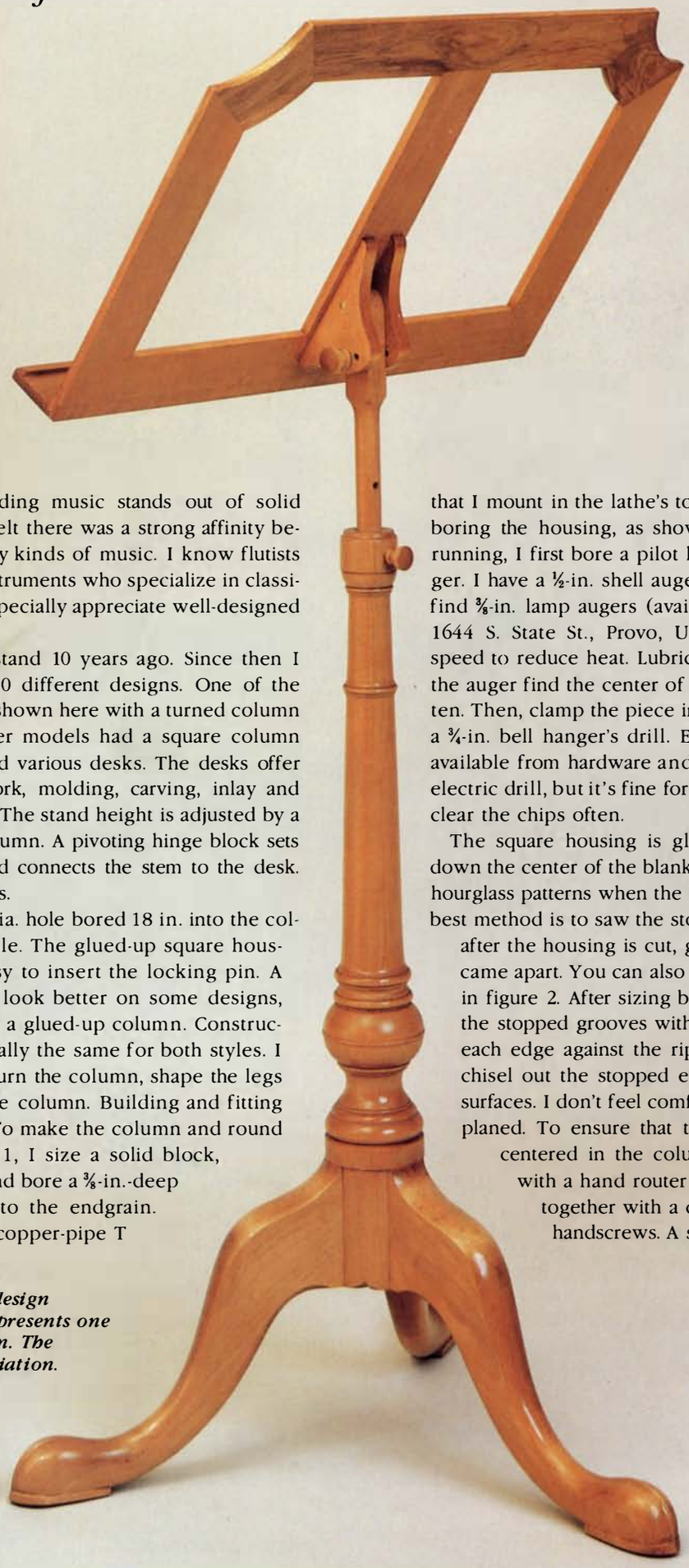
Adjustable stops allow fast, accurate settings to 45° and 90°. Two carriage bolts, with jam nuts in threaded inserts in the stand, contact the motor-carriage assembly to provide the stop. Since the motor and carriage are quite heavy, I added a pressurized-gas cylinder to counterbalance the weight and ease adjustment—it will support the weight while I fine-tune the angle setting. Mine cost $20 new, but you can also get one from a junked late-model hatchback automobile. I prefer solid, heavy machinery and was prepared to add weight to the stand. But, happily, the machine turned out stable and balanced as built. □

Dwayne Intveld is a design engineer for a construction equipment manufacturer and a part-time furnituremaker in Hazel Green, Wisc. Photos by author.

Holding the Notes

Building an adjustable music stand

by Lance Patterson



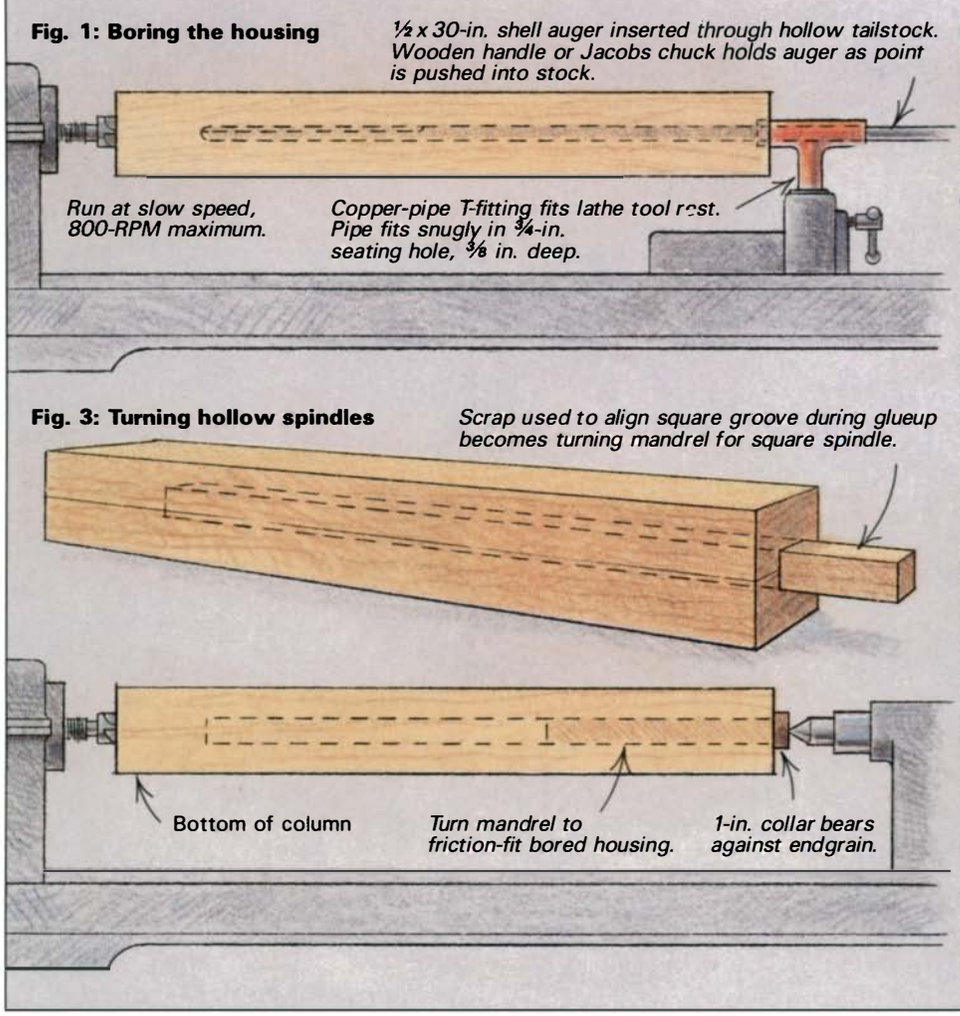
I like the idea of building music stands out of solid wood. I have always felt there was a strong affinity between wood and many kinds of music. I know flutists and players of stringed instruments who specialize in classical and chamber music especially appreciate well-designed solid-wood stands.

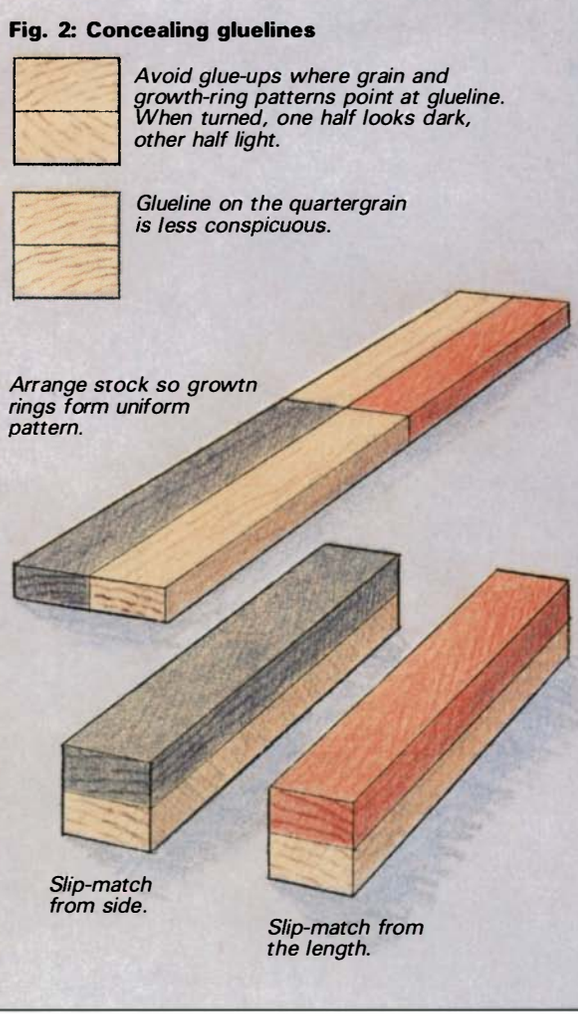
I built my first music stand 10 years ago. Since then I have built 23 stands in 10 different designs. One of the most popular is the stand shown here with a turned column and dovetailed legs. Other models had a square column with cross-lapped legs and various desks. The desks offer many possibilities—fretwork, molding, carving, inlay and the use of figured woods. The stand height is adjusted by a stem that slides in the column. A pivoting hinge block sets the work surface angle and connects the stem to the desk. Pegs lock both adjustments.

The housing is a ¾-in.-dia. hole bored 18 in. into the column, or a ¾-in.-square hole. The glued-up square housing and stem make it easy to insert the locking pin. A round housing and stem look better on some designs, though, and don't require a glued-up column. Construction procedures are basically the same for both styles. I cut or bore the housing, turn the column, shape the legs and dovetail them into the column. Building and fitting the desk is the last step. To make the column and round housing shown in figure 1, I size a solid block, 24½ in. by 3 in. by 3 in., and bore a ⅜-in.-deep ¾-in.-dia. seating hole into the endgrain. The seating hole fits the copper-pipe T that I mount in the lathe's tool rest as a hollow tailstock for boring the housing, as shown in figure 1. With the lathe running, I first bore a pilot hole with a hand-held shell auger. I have a ½-in. shell auger, but you may only be able to find ⅜-in. lamp augers (available from Craft Supplies USA, 1644 S. State St., Provo, Utah 84601). Use a fairly slow speed to reduce heat. Lubricate the wood with paraffin, let the auger find the center of rotation and clear the chips often. Then, clamp the piece in a vise and ream the hole with a ¾-in. bell hanger's drill. Electricians use the 18-in. drill, available from hardware and industrial supply stores, in an electric drill, but it's fine for reaming in a hand brace if you clear the chips often.

The square housing is glued up. The joint should run down the center of the blank to avoid creating elliptical and hourglass patterns when the bulbous shapes are turned. The best method is to saw the stock down the middle and then, after the housing is cut, glue it back together the way it came apart. You can also slip-match the pieces as shown in figure 2. After sizing both halves of the column, I cut the stopped grooves with a dado set and tablesaw. Run each edge against the rip fence to center the cut, then chisel out the stopped ends. Now, plane the glue-joint surfaces. I don't feel comfortable unless the joint is hand-planed. To ensure that the two grooves form a square centered in the column, I true and equalize them with a hand router plane before gluing the halves together with a careful amount of glue and five handscrews. A scrap of square stock fit into the

Music stands offer many design possibilities. This stand represents one design by author Patterson. The plan on p. 52 shows a variation.





The dovetails on the legs are cut entirely by hand. Lay out the shoulders with a marking gauge, then clamp the leg on its side and rough-saw the shoulder, above, staying 1/16 in. from the line. The wood strip clipped to the saw acts as a depth stop. Next, cut the dovetail slope with a sharp chisel running against a 6-1 angled block, center. Chisel away the waste in two or three steps until you can pare right off the block. Finally, shoot the shoulder to the gauge line with a small plane, right.

housing aligns the pieces during glueup. The scrap piece is also good for wiping glue from the housing.

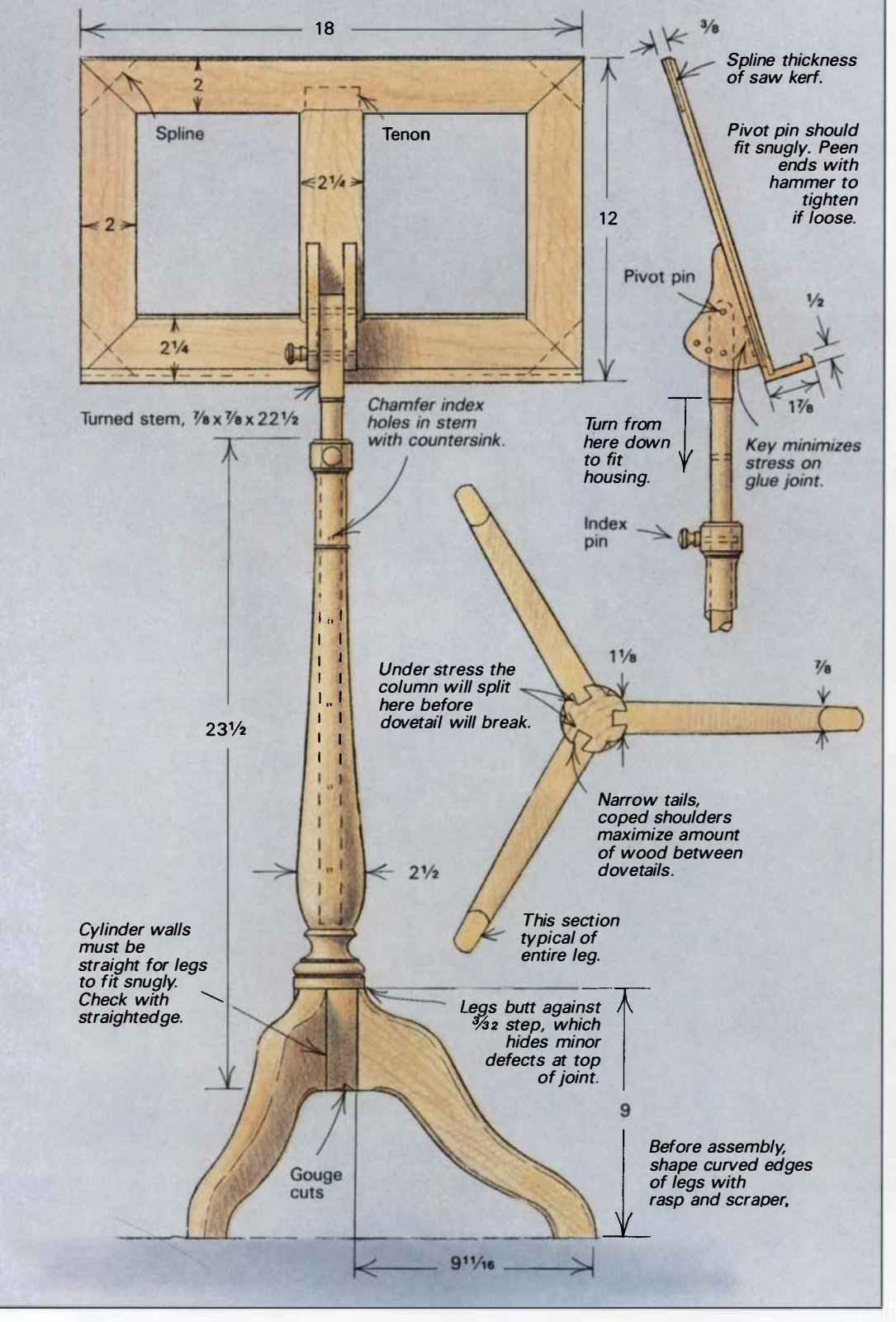
The centered hole means the blanks must be mounted on a mandrel to be turned. For the bored housing, I turn an 8-in. wooden plug to fit the hole as shown. I plug the square housing with the alignment scrap from the glueup, wedging it to eliminate slop. I cut the other end of the blank to length and turn the column. The cylinder where the legs join the column must be perfectly straight. Check it with a straightedge. If the walls are either hollow or bulbous, the shoulders of the leg joints won't fit well. Also, note how the cylinder profile steps out 3/32 in. This step, which is almost always present on traditional work, hides any discrepancies at the top of the leg-to-column joint.

To shape the legs, cut a ⅛-in.-thick plywood pattern of their side profile, including the dovetail. For strength, the grain should run the length of the leg. I fair the legs with a #49 or #50 patternmakers' rasp (available from Jamestown Distributors, 28 Narragansett Ave., P.O. Box 348, Providence, R.I. 02835). If you clamp the legs together with a large C-clamp that can be swung out of the way, you can reach all the edges. The endgrain at the foot and joint are squared with a smooth plane.

The housed dovetail on this stand can easily be cut, as shown in the picture series, with only handtools—dividers, marking gauge, chisels, dovetail saw, carving gouge, a 6-1 chisel block

Photo left: Lance Patterson

Fig. 4: Adjustable music stand



Coping the shoulders requires careful paring. Line up a pattern of the column base with the top and bottom shoulders of the dovetail and trace the curve, top. Carve to the line with a carving gouge.

After sawing and coping the shoulder at the top of the dovetail, hold the leg against the cylinder, align the centerline of the leg with that of the housing and trace the tail. Shaped blocks secure column in vise.

and a shoulder plane. Cut the tails first and trace them to lay out the housings. Saw 1/16-in. on the waste side of the lines, then cut the slope of the tail by paring with a chisel guided by an angled block. Plane to the line and repeat the process on the other side.

For small cylinders, it's always better to cope the legs rather than make flats on the cylinder, since this leaves more wood between the tails and makes for a stronger stand. To cope the shoulder you'll need a file-folder cardboard template that's the same diameter as the base of the column. Make a mark every 120° to indicate leg locations. Line up the cardboard circle with the shoulders at the top and bottom of the leg and trace the curve. Pare to the line with a carving gouge (or an in-cannel firmer gouge). Finally, saw and cope the shoulder at the top of the dovetails. Don't worry if you cut too deeply on the insides of the shoulder since these aren't important glue surfaces and the step will hide them. If you really mess up, set your marking gauge a bit deeper, re-mark the shoulders and try again. I usually plane the straight taper on the legs right after cutting the tail. Use a marking gauge to set the finished thickness of the foot and plane to the lines. To hold the leg, cut a hole the shape of the leg

into ¼-in.- to ½-in.-thick plywood and clamp the sheet to a bench.

Before laying out the dovetail housings, remember that it's important, aesthetically, that the growth-ring patterns of the column be symmetrical to the front legs, and thus centered on the back leg, as shown in the plan. Use your circular pattern to mark out the centers of the housings, and draw straight lines on the endgrain from these marks to the spur center mark. To mark out the dovetails, hold the tail you just cut on the leg against the bottom of the cylinder, align the leg's centerline with the housing centerline and trace the tail with a sharp pencil. Letter each leg and housing, so you can match them up later. To extend these marks, the borders of the housing, down the column to the step, put the piece back on the lathe and set up a post scribe. The scribe rides on the lathe bed, holding a pencil horizontally, so the housing will be parallel to the column's centerline and the legs will fit properly.

When you cut the housing, saw as far as you can, just leaving the layout lines. Chisel out the waste. There's no need for drilling here, since the wood comes out in long pieces and the main glue surfaces are the sides (the depth is less important). To fit the joint, pare to the pencil lines and try the leg. You can see where you need to pare by how the shoulders fit. The leg should go in all the way with just hand pressure.

If the joint is loose at the top, shim the housing with a piece of veneer. A rag stuffed in the housing provides enough pressure to clamp the shim while the glue is drying. The shim gives you a second chance and will not affect the strength of the joint. Use as many clamps as you need to pull the joint tight at glueup. Finally, fair the top of the legs to the column with rasp and cabinet scraper, and cut the decorative chamfers on the bottom of the column by tapping a carving gouge into the end of the column at about 45° to the cylinder sides. Aim toward the center point, or where it would be if extended out from the endgrain.

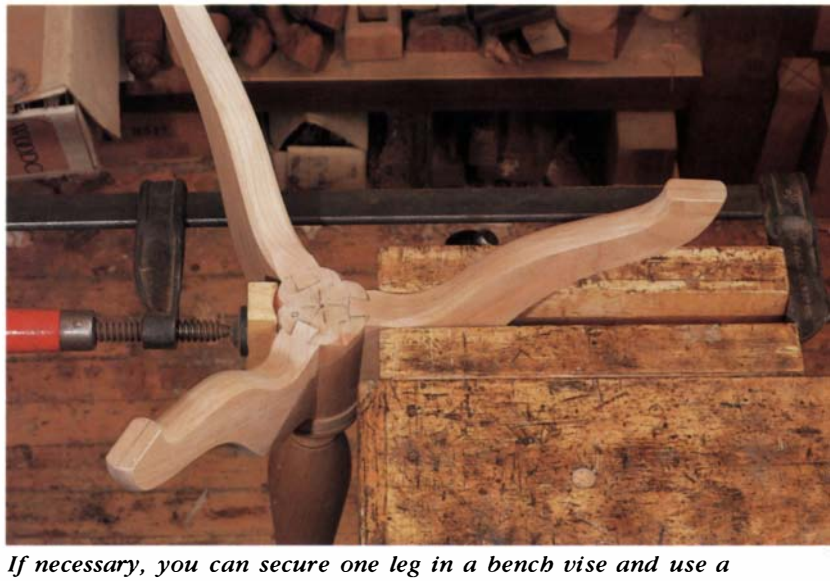
The desk on this music stand is a rectangular frame with one vertical muntin, to which the ledge and hinge-block are joined. On this desk the frame is mitered and splined, and the muntin is mortised and tenoned into it. You could also use a half-lap joint for the muntin and half-lap miter at the corners. Join the muntin to the top and bottom rails first, since the muntin determines the length of the stiles. The shoulders of the joints are cut-in to miter the cove molding that runs around all the front edges. This means you have to cut the molding on the inside edges of the rails and stiles and on the muntin first, in order to determine the size of the miter and depth of the shoulders. I use chisel blocks clamped to the stock to help cut the miters and rail shoulders. I chop the mortises with a proper ⅛-in. mortise chisel. The corner miters are cut next. I use a shooting board, always clamping each piece to the board. I glue the muntin in, then fit the stiles. After the frame is glued up, the splines are added and the cove molded on the outside front edges. The lower back edge of the frame is rabbeted on the tablesaw to form a tongue that will fit in a groove in the desk's ledge as shown.

The hinge block is next. I start with 1¾-in. stock and cut the ¾-in.-wide by 2-in.-deep groove in the middle of the block with a dado head. For safety, I use wood at least 12 in. long, dadoing two blocks at a time. The stock for the stem is thicknessed to fit the dado groove. Then the lower 19 in. of the stem is planed or turned, depending on the housing you're using, to fit into the column. I drill the 3/16-in. pivot-pin hole and the indexing hole in the top end of the stem about 1½ in. apart. These holes will be guides for drilling the hinge block, to ensure that the indexing holes line up.

Draw a line on one face of the hinge-block blank showing the

After remounting the column on the lathe, finish laying out the joint with a post scribe. The scribe slides on the lathe bed and draws housing lines parallel to the centerline of the column.

Use a backsaw to cut just inside the layout lines of the dovetail housing, left, then pare to the lines with a sharp chisel. The waste will come out in long strips. Once the leg goes in an inch or so, use the first part of the joint to guide the chisel to the full length of the housing, right.



If necessary, you can secure one leg in a bench vise and use a clamp as shown to pull the shoulders tight on the tails.

To ensure that the stem and hinge are properly aligned, use the 3/16-in.-dia. hole bored in the stem as a guide for drilling the hinge blank. A screw or pin inserted through the hinge and the stem holds the pieces together while the holes are bored.

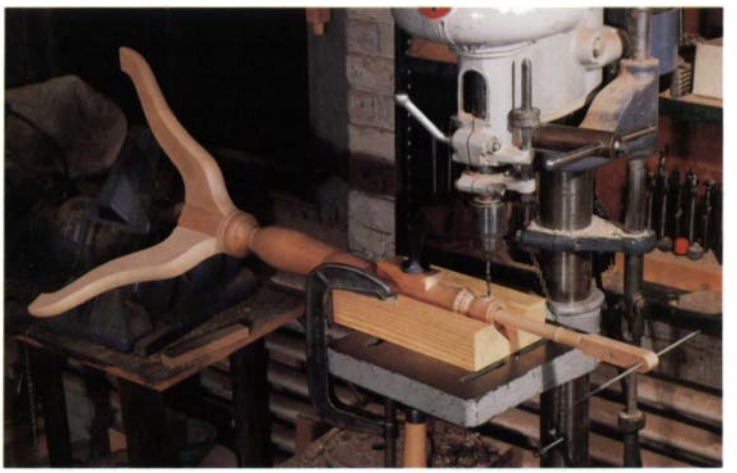
depth of the groove. Trace a side-view pattern on this face, lining up on the groove depth line. Also mark the pivot point, then drill the pivot-pin hole on a drill press. A piece of scrap wood fit tightly in the groove helps prevent splintering as the drill goes through. To drill the indexing holes in the hinge block, the stem is lined up against the outside face of the hinge blank, and the pivot pin or a screw is inserted while the holes are drilled through the stem index hole into the hinge block.

I finish the hinge block by bandsawing the side profile, planing the joint and fairing the bandsaw marks from the curves with a rasp and cabinet scraper. To mechanically protect the joint between the back of the desk and the hinge block, I chisel recesses into both pieces for a small wooden key, 1⅛ in. long by 1 in. wide by ¼ in. high, and glue the block and key to the desk.

The pivot pin is a plain 3/16-in.-dia. brass rod, but I add a wooden knob to the brass for the index pin. I run a ¼-in. by 20 die on the pin for about ½ in. to cut light threads in the metal. Then, with a little epoxy added, I screw the pin into a 3/16-in.-dia. hole in the wood knob blank. I then turn the knob with the pin mounted in a Jacobs chuck on the lathe.

A V-block is needed for drilling the column and stem for the height adjustment. I clamp the V-block to the table with the V centered under the bit. The column should be clamped with the back leg vertical while you're drilling the 3/16-in. hole at the top of the column. The hole doesn't need to go all the way through, but it should go into the other side a little.

To ensure an accurate alignment on the height adjustment, the stem is drilled inside its housing. I put a piece of rod or a 3/16-in. chainsaw file through the pivot-pin hole, to help line up the front of the stem with the front of the pedestal. (The chainsaw file is useful if any holes need to be relieved later for the index pins to slide easily.) I drill the first hole with the stem all the way in. After drilling the first hole, I put a pencil mark on the stem at the point where it leaves the housing. Then I mark every 3 in. down the stem from this mark. I drill another hole every time the alignment marks reach the top of the housing. The orientation should be checked each time by sighting the rod through the pivot-pin hole.



The stem is bored after being inserted into the housing, which is clamped in a V-block on the drill-press table. The chainsaw file in the pivot-pin hole aligns holes with the front of the pedestal.

There is nothing special about the finishing. I often use shellac and/or an oil finish. These music stands are a good meeting place for the creativity of the musician and the cabinetmaker. The artful musician's medium is sound, using instruments to produce sounds that can, as if by magic, attract and move the emotions and spirit of those who hear them. Artful cabinetmakers use wood and tools to build functional forms that attract our eyes and hands, and stir up good and positive feelings about humanity. □

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

Photos this page: Lance Patterson

A mouse, the symbol of Robert Thompson's Craftsmen Ltd., is handcarved on every piece that leaves the shop. This mouse inhabits the firm's showroom.

The Mouseman of Kilburn

Arts and Crafts woodworking in England's north country

by Donald Bird

The enduring legacy of the Arts and Crafts Movement is very much alive and well in Britain. The place to find it is in the heart of James Herriot country, nestled under the escarpment of the Yorkshire moors. Subtle decoration, natural materials, utility and pride in workmanship are all characteristics of the movement championed by William Morris in the late 19th century. The craftsmen and carvers at Robert Thompson's Craftsmen Ltd., in Kilburn, would deny that they are any part of Morris' movement, but they would subscribe wholeheartedly to those precepts. Their skills have been acquired in the traditional way of the craft guilds, and the fact that such a system can still be made to work in this age of "high tech" is a credit to them and the founder of the firm. Last year, during a trip to England, I was pleased to be able to see Thompson's firsthand.

Robert Thompson began his life-time work as a craftsman and carver in the 1890s, at the same time Ernest Gimson and Sidney and Ernest Barnsley, the best known early Arts and Crafts woodworkers, were setting up shop in the remote, tranquil Cotswold Hills. Though it is likely Thompson knew of Morris, Gimson and the Barnsleys, their influence on him is uncertain. Instead, Thompson's biographers credit his inspiration to his frequent visits to Ripon Cathedral and its masterpieces of late-Gothic oak carving, such as William Bromflet's choir stalls, canopied and testered, with 34 misericords and richly worked bench ends. It became Thompson's dream to bring back these old skills, not as ornament but as honest decoration of basic structural members. This he achieved, and his work can be found in over 200 cathedrals and churches in England, including Westminster Abbey, York Minster, and Coventry Cathedral.

Born in 1876, Thompson apprenticed as an engineer, returning to Kilburn at the age of 20 to work with his father, the village joiner, carpenter and wheelwright. He never left again. During the next 20 years he mixed the daily fare of a village carpenter—house building, gate mending, coffin making—with an intense study of the art and techniques of carving in oak, which occasional church commissions gave him the chance to practice. By the early 1920s, church work and regular commissions for a local preparatory school (which continues to employ the firm today) had established the business, and allowed him to employ six men.

The firm's famous mouse trademark, which is carved on every Thompson's piece, appeared almost by accident around 1925. "I was carving a beam on a church roof," Thompson reportedly told his grandsons, "when Charlie Barker, another carver, murmured something about us being as poor as church mice, and on the spur of the moment I carved one. I thought how a mouse manages to scrape and chew away the hardest wood. . ., and it works quietly. I thought that was maybe like this workshop. . . . It is what you might call industry in quiet places, so I put the mouse on all my work."

It wasn't long before the Mouseman of Kilburn was widely known. (One story is told of a letter sent from America to "The Mouseman, England" that duly arrived in Kilburn.) Today the firm has no advertising budget, relying on the mouse and a repu-

Peter Daynes

Thompson's workshops, in England's Yorkshire moors, have turned out straightforward furniture in the Arts and Crafts style for most of this century. Almost all work is done in oak, seen at left air drying on the hills overlooking the workshops and showroom. Tabletops, panels and other surfaces are often finished with an adze (below), which creates a gently undulating surface.

tation for quality to fill the order books—every piece is unconditionally guaranteed. Only a small brass plate beside the door tells that you have arrived at the house of the mouse, Robert Thompson's Craftsmen Ltd.

Going north from York, visitors must drive slowly through Kilburn, because the only street is quite narrow, with a brook close to one side. Watching carefully for children, dogs or ducks, and wondering if the Foresters Arms is open, you might not notice the large undraped window in the end of a two-story cottage, with golden-oak furniture discreetly displayed. However, very few casual visitors pass through Kilburn. Most come with a purpose. They want a piece of Mouseman furniture.

The thriving shop employs 30 craftsmen and carvers, managed by Thompson's grandchildren and a great-grandson, working on domestic furniture and civic and ecclesiastical contracts. (Robert Thompson died in 1955, having continued to work at the bench well into old age.) All Thompson furniture is made of English oak, *Quercus robur*. (Some contemporary commercial commissions have been done in other woods). Close grained and exceptionally hard, it's a carver's wood. Trees are purchased from three or four agents in different parts of England who know what the firm wants. The decision to buy is made after the tree is cut down. The owner runs the risk, but no doubt receives a good price if the tree is right. The logs go to a local mill where they are sawn through-and-through and moved to Kilburn. There, they dot the hillsides around the plant, the planks of each reassembled in the order they were cut and stickered for air drying. (No kiln-dried wood is used.) Each log is dated and moved into the plant only when its drying time is up, after about five years.

Once in the shop, milling is done by the best of European woodworking machinery. When a workman needs three planks for a tabletop, he will probably mill twelve, the balance being placed on a rack where the next workman needing similar stock will discover it. It saves a lot of set-up time to find stock ready to hand; otherwise, each piece of furniture is made start-to-finish by one craftsman. And, on completion, the craftsman goes in the delivery van, making sure that the client is satisfied.

All case goods, dressers and cupboards are frame-and-panel construction. The mortise-and-tenoned joints are draw-bored and pegged, the panels raised, their beveled face placed on the back or toward the inside where it is less likely to be seen. Panels for special projects are made from selected boards of highly figured oak. (Plywood cannot be found on the premises, unless it is used for crating.)

Thompson furniture seems to have been almost entirely handmade in the early days, but bowing to economic necessity, machines were introduced over the years. Today, all the preparation of stock is done by machine, and, in addition to dimensioning, mortises and tenons and dovetails, for example, are machine cut. The furniture, however, retains a handmade look and feel, thanks in large part to the firm's attention to precise fitting of doors and drawers and to surface quality. The carving is still hand done, flat surfaces are finished by hand planing and hand sanding, and many are adzed.

Almost as distinctive as the mouse was Thompson's use of adzed surfaces. Early on, he rediscovered this ancient tool, but rather than squaring timbers with it, as in American Colonial days, he used the adze to give an undulating surface to tabletops, panels, and other structural members, where such a surface suited its use and appearance. Razor sharp, an adze can scoop off shavings as thin as 1/64 in., leaving a surface similar to broadly beaten pewter. The workman stands on the piece, with feet safely out of the way of his swing, cutting diagonally across the grain. Saddled seats for stools and chairs are made in a similar way, except the adze is allowed to cut deep and thereby hollow out the desired form. Sometimes an adzed effect is made on small members with a razor-sharp chisel.

When the craftsman is finally satisfied, the piece goes into the fuming room, a closet large enough to hold a couple of dressers. Here it is left for 24 to 48 hours with an open dish of ammonia beside it. Reacting with the tannins in the oak, the ammonia produces a uniform, almost greenish-gold color. The final step is a coat of beeswax. This is prepared by a local beekeeper who has developed a formula that pleases Thompson's, and is sold in their showroom for continual maintenance.

Each year one or two boys, about age 16, join the firm as apprentices directly out of school. For the first two years they are helpers, assigned perhaps to a particular craftsman, but subject to everyone's needs. They lift and carry, hold down work in the machine room and do rough chisel work, learning care and respect for tools. After two years, they are allowed to do small projects, like stools, on their own. Gradually they are offered more important jobs, but only after five years are they accepted as qualified craftsmen. Since every man must carve a mouse on his work, this is one of the first things an apprentice practices on his own time. In two years, he will do it in two hours. Later, after hundreds of mice, he will give himself twenty minutes.

The most difficult person to discover at Thompson's is a foreman. There may be such a person, recognized by the workmen in the shop, but to the casual visitor he is not obvious. The family members who now manage the business also started as apprentices and Robert Thompson's great-grandson will point with great pride to a picture of the craftsman who served in the shop for fifty years and guided him through his training.

It is obvious that this system leads to the height of craft excellence, but not to any innovation in style, technique, or form. Working under the constant observation of one's equals produces carefully executed furniture, but some craftsmen decide this isn't the way they want to spend a lifetime of work. There are a number of former Thompson's employees scattered around Yorkshire. They purchase a few basic machines, find a suitable shed, barn, or outbuilding and set up shop. All of these craftsmen make the same type of furniture as Thompson's, though some are more flexible, using different woods and varied designs. Knowing the value of the mouse, each has adopted his own symbol—a fox, squirrel, eagle, beaver, lizard, wren, and hedgehog can be found within ten miles of Kilburn. The attitude at Thompson's is "good luck to them." The area is richer because of this spinoff, in the same way as the old guilds benefited by grouping together in an area of a city.

In 1957, the men then belonging to the firm paid their respect to its founder by completely furnishing Saint Thomas' Chapel of the parish church in his memory. The workshop stands hard by the church and the churchyard where Robert Thompson is buried. There is no mouse on his stone. This he passed on as a living symbol to his faithful staff. Besides being found in hundreds of sites in Britain, the mouse has been lovingly transported overseas. Visitors to the United States Naval Academy at Annapolis will see a plaque near the replica of the flag of John Paul Jones and on the frame of the plaque, the famous mouse. □

Donald Bird is a retired civil engineer and town planner living in Truro, Nova Scotia.

Photos, except where noted: Alex Marwood/courtesy Robert Thompson's Craftsmen Ltd.

Making and Using a Northwest Coast Adze

A fast cutter that also finishes

by Gregg Blomberg

Gregg Blomberg's gutter-style adze with yew handle finished with shark oil. Adze is shown ¾ of actual size.

When Captain Cook visited the Northwest Coast of North America in 1778, he was impressed by the woodwork done by the native American craftsmen—carved and painted totem poles showing family crests and mythical creatures, canoes, masks, chests, boxes and other items. The tools used by the Indians were basically the same as those found today: the adze and the crooked knife. The Indians had both D-adzes and elbow adzes, but in this article I'll concentrate on the elbow adze. Today's wood sculptors and carvers, even those who don't carve in the Northwest Coast tradition as I do, have discovered that properly designed adzes are precise tools, capable of repeatedly removing paper-thin chips.

The most crucial element of elbow adze design is what I call Holm's Constant, after Northwest scholar, author and artist Bill Holm, who first noted it: "The edge of a hand adze blade must be at right angles to the first finger," as shown in the drawing on the facing page. If you follow this rule, regardlesss of the angle of the haft or the length of the blade, the edge will crisply enter and exit the wood, turning a chip as it goes. Vary this angle much and the adze digs in or requires an unnatural swing to get the edge to cut.

In practice, Holm's Constant will vary somewhat depending on wrist length, natural stroke and actual blade shape, but by following these instructions you'll be able to make a first-rate tool. The two common types of elbow adzes are the shaping adze, for roughing out and hollowing, and the surfacing or texturing adze, for producing the final, evenly textured surface. The two adzes are similar, except that the haft of the texturing adze is cut away between the head and grip to give the tool extra spring for popping out chips. This springiness also reduces shock to the wrist and elbow. The surfacing adze has an acute profile, and the point on the haft to which the blade relates at 90° shifts upward somewhat, closer to the head, than on a shaping adze.

The first step in making a Northwest-style adze is to find a crook with a suitable elbow shape for the type of adze you want. Almost any hardwood tree will do. I've used yew, maple, apple, plum and alder. The crooks can vary quite a bit and still be functional.

If you choose a crook with an angle that's too acute for a shaping adze, even though you've satisfied Holm's Constant and the tool cuts well, its head will bang into the work if you try to carry the stroke through. This is true to some extent on all Northwest-style adzes and can help stop a dangerous understroke. There is no banging of the adze against the work in normal cutting. The eye and hand automatically coordinate to use the energy for the actual cut, and there is no carry through. Of course, if the crook is quite steep, you can fudge a bit and carve some of the angle out of it. A crook too acute for a shaping adze often makes a perfect finishing adze.

Select a crook that will allow you to lay out the head of the adze parallel with the tree trunk or main branch. The secondary branch will become the handle. Cut the haft blank as shown in the drawing, then make or buy your iron. Most likely, you'll choose either the straight or gutter configuration shown. The gutter blades are better for cross-grain cutting and hollowing; straight blades are used for shaping and texturing.

I usually begin with 1¼-in.-wide 1084 steel, either 3/16 in. or ¼ in. thick, about 6 in. long. I prefer plain high-carbon steel for edge-holding in wood. Carbon steels from C1070 to C1095, W-1 or 0-1 steel (available from local industrial supply houses and MSC Industrial Supply Co., 151 Sunnyside Blvd., Plainview, Long Island, N.Y. 11803) will work. I think the water-hardening steel has better edge-holding abilities than oil-hardening steel. Probably the most important source for adze irons has been old files, but I dislike them because their high carbon content tends to make them brittle. It's important to fully anneal these steels, especially file steel, to relieve all internal stresses before final heat-treating.

When heat-treating the iron, quench in warm light oil and tem-

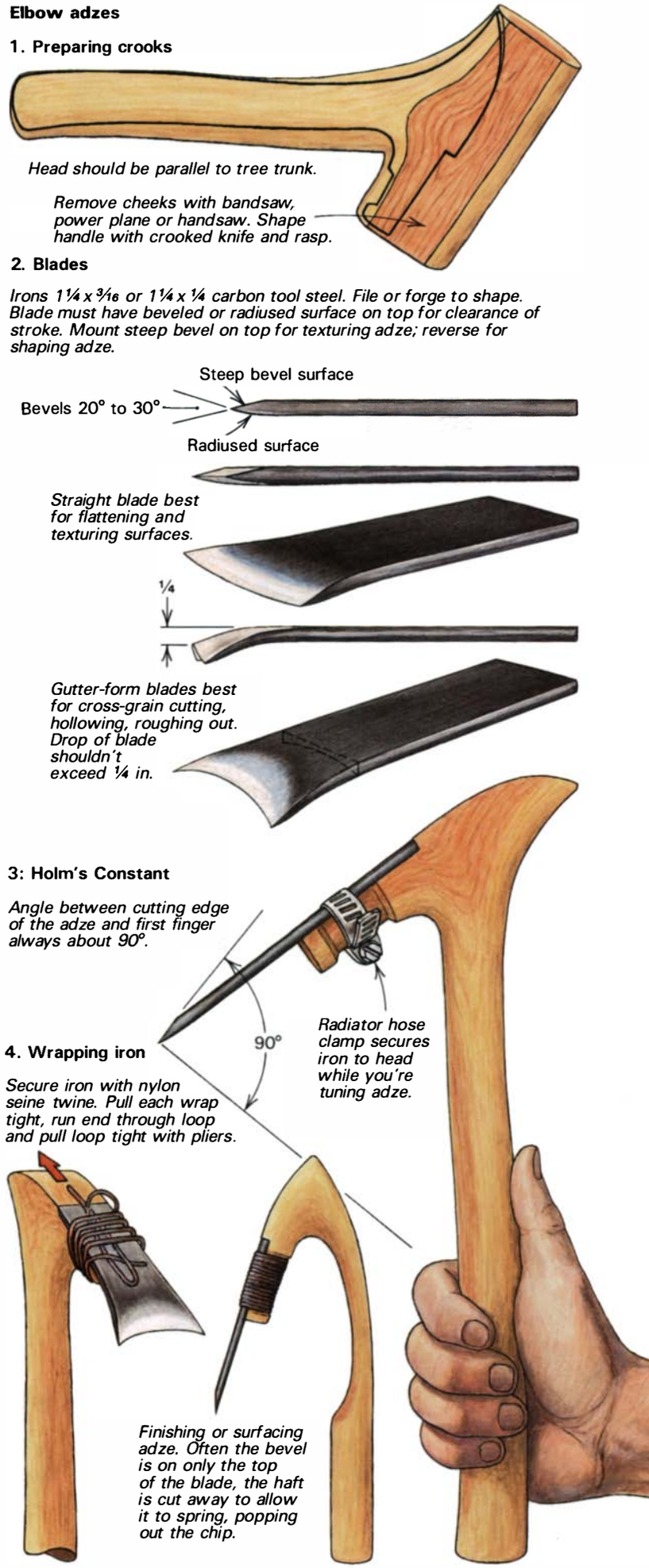
Photo: Steve Horn

Author Blomberg roughs out a coyote forehead mask with his adze. The mask, which will be attached to a coyote hide, is similar to ceremonial masks traditionally made by Northwest Coast Indians. The key to making accurate cuts with the adze is to brace your arm against your body and take many light cuts with the razor-sharp tool, rather than fewer, more forceful strokes.

per slowly over a hot plate to a medium straw color. (For more on heat-treating, see *FWW* #44 and #50.) The angle of the blade bevel should be from 20° to 30°, no matter how it's shaped; 25° seems best for edge support and easy entry of the blade into the work. A heavy adze used for hogging may benefit from the steeper angle since a low angle may tend to "stick" when driven into the wood. When hollowing beyond the normal stroke, the adze is often used for "scoring" from each side, making a number of cuts and breaking out the chips. If the adze sticks, a twisting motion at the end of each stroke frees it. Hone your iron razor sharp. The gutter blades must be sharpened from inside the bevel with slip stones. In fact, resharpening is usually done on the inside of the blade so as to not change Holm's Constant.

Once you have your iron in hand, draw your adze profile on the haft blank. Lay the iron on the blank and play with the relationships using a square. You want a layout that satisfies Holm's Constant, seems balanced and is attractive. Then cut out your haft. Shape the haft with a crooked knife or a rasp, and secure the blade to the top of the adze with a stainless steel hose clamp. Slide the iron back and forth, trying different positions. The hose clamp will hold the iron so tightly that you may not want to notch the haft until you've had a chance to work with the tool for a while. Once you've found the position you like best, mark and cut the notch, being careful not to change the angle. The ¼ in. or so difference in depth, caused by lowering the iron into its notch, won't alter the action noticeably. I coat the iron with a thin coat of nondrying Prussian blue (available at industrial suppliers) and try it in place on the haft. The blue marks the high spots that need to be carved away. Repeat the paint-and-carve sequence until the pieces fit snugly. In some combinations, it may be necessary to trim the butt end of the iron. If it's too hard to hacksaw, grind it or use a metal cutoff blade in a Skilsaw.

Once the notch is cut, hose-clamp the iron into it and try cutting. The wrist and forearm provide the driving force, while the elbow is braced against the side for added control. Working with a natural wrist motion, you should see the blade enter and leave a flat surface, turning a chip on the way. The adze should be perfectly tuned at this point, but if you're having trouble reaching the wood, re-



Drawings: Michael Janos

duce the angle of the blade to the haft (make it less acute), shorten the iron, or grasp the haft higher up. Conversely, if the adze tends to bite and stick in the wood, increase the angle, substitute a longer iron or grip the tool farther down the haft. Once your adze is tuned, you can replace the hose clamp with a wrapping of seine twine used by commercial fisherman, or some other strong, thin line, as shown in the drawing on the previous page.

In use, the surfacing adze has a distinct feel and action. You'll find that you naturally adjust your wrist angle, and the position of your grip on the haft, so that the adze strikes the wood near the outside of its cutting range. Upon entering the wood, the cutaway haft springs inward, popping out the chip. The force must be strong enough to cause the haft to spring. If using this tool seems like hard work, your haft probably isn't springy enough.

The surfacing adze cuts at an angle of up to 45° to the grain of the wood. Use light, rapid strokes. A sharp blade is an absolute necessity—I strop often as I work. It's a constant challenge to keep the cuts regular as I work around curves, knots and squirrelly areas. Laid down in a regular pattern, the resulting texture is attractive, and considered by some a hallmark of Northwest Coast work. □

Gregg Blomberg operates Kestrel Tool in Lopez, Wash., and has published monographs on making elbow adzes and kerf-bent boxes. For more information about adzes and crooked knives, and tool making supplies, write him at Rt. 1, Box 1762, Lopez, Wash. 98261. Catalogs are $1, refundable with first order.

Getting the hang of an ancient tool

by Simon Watts

The adze is one of those Stone Age survivors that's too useful to become extinct. It is deceptively simple—a free-swinging iron with a very sharp cutting edge that resembles a garden hoe. In expert hands, an adze can remove wood with precision, but a novice can lame himself for life with one hasty swipe.

Since it looks ancient and requires so much skill, the adze enjoys a certain mystique among the new breed of boatbuilders. You often see an adze hanging on the wall, like a kind of diploma, while the electric buzz plane does the work.

In the days before powered machinery for squaring beams, the adze and hewing ax dressed out large timbers. The conspicuous marks left by these tools are easily recognizable in Colonial house frames and wooden ships. One of the most common adzes in this country was the long-handled railroad adze, which had a 4-lb. to 6-lb. head forged with a maul head opposite the straight blade. The cutting end dressed down the ties; the maul end drove the spikes that fastened the tracks to the ties. These tools were only for rough work because the corners of the blade inevitably dug into the wood grain and tore it up.

Adzes are shaped to suit the job. The lips of the shipwrights' adze (1) shear fibers before the wood tears. The long-handled flat adze (2) cuts flat or curved surfaces at floor level or overhead. The gutter adze's (3) short handle increases control when hollowing bowls or chair seats. Small flat blades (4) are also available. Curved sculptors' adze (5) is for roughing out carvings. Another sculptors' adze (6) is fitted with an ax.

A curved adze, which resembles a ½-lb. to 1½-lb. carving gouge, has a straight or bent blade and is usually mounted on a handle short enough to be used one-handed. Thus, it's well-suited for roughing out large sculptures and for hollowing chair seats, canoes or bowls. It removes wood quickly, but leaves conspicuous tool marks. As with any adze, it works best in green or partially dry wood.

In the mid-19th century, American tool makers combined the straight and curved profiles to produce the lipped or shipwrights' adze, which was more versatile than any of its predecessors. Its blade is slightly curved, and each corner turns up sharply to form a lip that won't dig into the wood. When used across or diagonal to the grain, the sharpened lip shears off the wood fibers before they can tear out. In skilled hands, the lipped adze can remove great quantities of wood, as well as dress down a surface so that the individual strokes are barely visible. Thus, it's ideal for smoothing timbers or floors and trimming boat keels and ribs, especially in tight places and on curved surfaces.

It takes years of practice to master the lipped adze. It can also be outright dangerous. When working at floor level, dressing down a new deck or standing on a log being squared, the worker swings the blade toward his own feet. Apprentices were advised, facetiously perhaps, to stand in a couple of nail kegs until they got the hang of it. To see how a modern worker uses an adze, I visited Bob Darr, director of the Center for Wood Arts in San Rafael, Calif., who claims the adze is his favorite tool. Darr encourages his students to use the lipped adze because of its versatility, but the principles apply to other

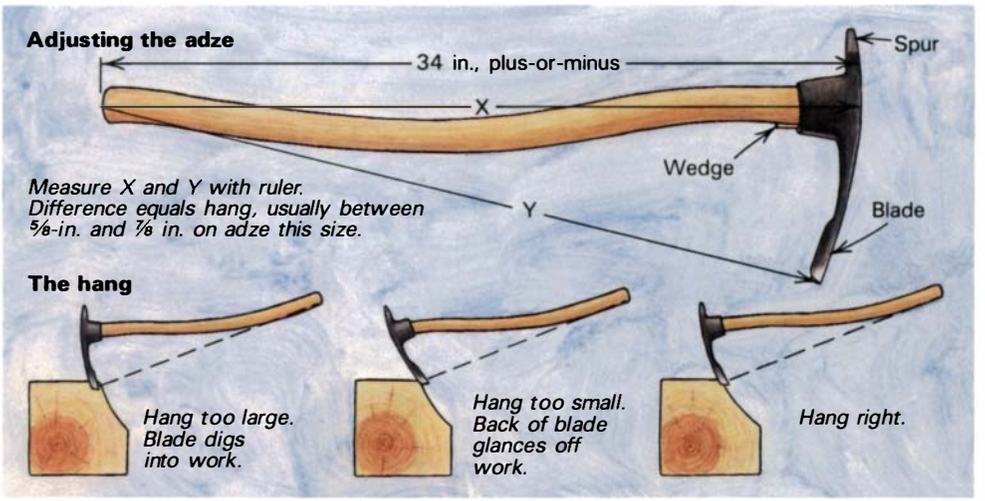
types as well. Students at the school use adzes to shape keels, cut the long notches or rabbets for planking and dress down sawn frames to correct bevels.

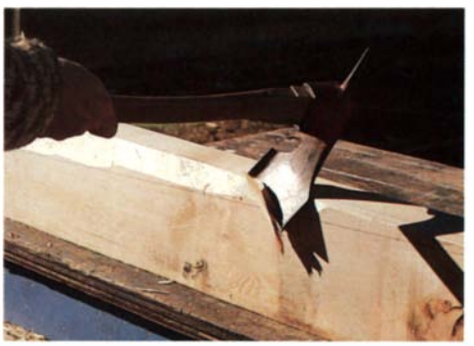
To demonstrate how to use the lipped adze, Darr set up a 6x12 block of Douglas fir and drew a couple of guidelines on adjacent faces. The general strategy is to cut across the grain, or along a diagonal. Cutting parallel to the grain may tear up slivers, if the wood fibers happen to be slanting the wrong way. (Incidentally, the process isn't called "adzing," but rather "dubbing" and the workers are called dubbers, perhaps because of the characteristic sound an adze makes). He stood about 2 ft. from the timber, gripping the tool with both hands. Then he began chopping notches in the wood, a process called "leading in." He continued taking successive bites at several spots until the blade of the adze just touched the line. Keeping his body in the same stance, Darr swung the adze head in an arc from about his elbow. "It's like you have a third arm," he remarked. After leading in at a couple of spots farther along, he dubbed off the wood remaining between the openings, smoothing the chamfer. Heavy flakes of wood, ½ in. to ¾ in. thick, fell until the ground was covered. As he approached the lines, the shavings became finer, until they barely floated down.

Before an adze will work well, you may have to adjust the blade a little. The angle between the cutting edge and the handle, the "hang" illustrated in the drawing, is critical. If the hang isn't right, the tool will glance off or dig into the work as shown. A lipped adze with a 34-in. handle normally has a hang of ⅝ in. to ⅞ in. To adjust the hang, trim the front of the handle where it fits into the head, until the head can be tilted to the proper angle, then lock the head in place with a wooden or metal wedge inserted between the front narrow edge of the handle and the head. If the handle projects through the head, it must be trimmed off flush or it will strike the work surface with a jolt.

I've found that the short-handled adzes are easier to learn how to use. Experienced workers generally prefer short-handled adzes for rough work. Longer handles are common on adzes used for finishing and for work at floor level—three feet is about right for the average male. The long handle can also be used effectively at waist height or overhead.

Adzes are usually sharpened with a file, rather than an abrasive wheel, which could require removing the head from the handle. Darr clamps his adze in a vise, so the cutting edge is parallel to the ground and facing him, then files and hones the edge, as shown in the photos at right. Filing takes about 15 to 20 minutes, but unless you hit a nail or otherwise damage the edge, you won't have to do it very often. Honing, three or four times a day when the adze is in constant use, is the best way to maintain the edge. Darr also believes the edge lasts longer if you cut rather gently for the first few strokes, until the edge is slightly burnished. Then it will withstand heavier use without damage.





A razor-sharp adze precisely cuts to the line drawn along a Douglas fir beam. The spur shown is often used as a built-in nail set. A worker can quickly sink a nail below the surface, out of harm's way, then continue cutting.

A mill file is used to joint the edge of the adze, and round the corners of the blade slightly so the center cuts into the wood first. The inside corners are sharpened with a round file, rotated slightly on each stroke to prevent grooving.

After establishing the 25° bevel and sharpening the edge with a flat mill file, Darr hones the back of the adze with a medium India whetstone, following with a flat, medium Arkansas stone.

Due to the decline in wooden shipbuilding, shipwrights' adzes are no longer produced in this country, although German imports do occasionally turn up in mail-order catalogs. Other types of adzes are readily available. Darr advises anyone wanting a good lipped adze to try to find one secondhand. The best names are Collins and White. Make sure repeated filings haven't removed too much metal. A new lipped adze should have at least 2¾ in. of blade. If more than an inch is gone, you probably don't want it. Whether it's worth your time to find an adze and learn to use it depends upon your attitude toward wood and what work interests you. If you enjoy mastering ancient skills and prefer working the wood, instead of processing it by machines, then an adze may be the challenge you're looking for. □

Simon Watts lives in San Francisco and teaches wooden boatbuilding in seminars throughout the country.

Sources of supply

Secondhand lipped adzes can be ordered from the Wooden Boat Shop, 1007 N.W. Boat St., Seattle, WA 98105. Prices range from $55 to $85, depending on brand. Lipped adze irons are available from Kestrel Tool.

Short- and long-handled adzes are available from Garrett Wade Corp., 161 Avenue of the Americas, New York, NY 10013; Lee Valley Tools, 2680 Queensview Dr., Ottawa, Ontario K2B 8H6; Woodcraft Supply Corp., 41 Atlantic Ave., PO Box 4000, Woburn. MA 01888; Frog Tool Company, 700 W. Jackson Blvd., Chicago, IL 60606.

Photos this page: Simon Watts

Home-Shop Bandsaws

Selecting and tuning a mid-size machine

by Jim Cummins

Over the years, *Fine Woodworking* has received a steady stream of complaints from readers about bandsaws. Heading the list are troubles with resawing, blade tracking, vibration, breaking blades and lack of power. It turns out that some of the problems are due to compromises in machine design or sloppy manufacturing, others stem from lack of knowledge on the part of the operator—either in misusing the bandsaw or in not recognizing a problem for what it is and fixing it.

In this article I'll talk about what to expect from home-shop bandsaws of various sizes. I'll also list some principles and suggestions for getting any bandsaw to perform at its best. The chief trick for me turned out to be finding the right blade and blade tension (see p. 65). There are far too many bandsaws on the market for me to test them all. But having looked at a good number, I've concluded that differences from brand to brand are less important than I had once thought. The fact is, the bandsaw is a pretty stone-simple machine—which is one reason everybody and his brother makes one—and if you tune it properly, almost any kind can be made to work. Fences, miter gauges and other accessories probably don't amount to a hill of beans—when you need a special set-up, it's probably best to make it yourself.

There's no denying that an expensive machine is more pleasant to use than a junky one. But as long as a bandsaw turns that blade, it can be made to do 95% of the jobs that the small shop asks of it. Remember the cowboy in the old song, with a $10 horse and a $40 saddle. Skimp on the machine if you must; in the long run you can get used to, or fix, any bandsaw's ornery qualities. But no bandsaw is worth a dime running a bum blade.

What is important is choosing a machine in the right size category. The bandsaw is close to being the all-purpose woodworking machine. Its virtues, in a sense, are its biggest vice, because they tempt the user to push a machine beyond its limits. Industrial-quality machines in the 20-in. and bigger sizes have relatively few problems because they are rigid and powerful enough to gobble up whatever is fed into them. But few basement shops boast 20-in. machines; they are just too big, too hungry for elec-

trical power, too costly for the part-time budget. Recognizing this, manufacturers have come out with a slew of bandsaws meant for home-shop and light-industrial use.

To make sense of the variety, let's first get some nomenclature out of the way. A bandsaw's throat capacity is the distance from the blade to the column that supports the upper wheel. On two-wheel machines, the throat capacity is typically about ¼ in. less than the diameter of the wheels. Three-wheel machines were developed strictly to increase throat capacity by utilizing a triangular frame shape.

Depth capacity is the height the guides can be raised above the table, and it depends on the distance between the wheels. Many two-wheel bandsaws have the option of adding an extension to the column to increase the depth of cut. The nominal guide height can be deceptive, however, because if the frame isn't rigid enough, and the wheels not round enough, a bandsaw may have trouble sawing wood that's only half its stated height capacity.

If you need a bandsaw purely for scroll work on large panels, by all means consider a light, three-wheel machine. But I'll take it as a main part of my argument that what the home-shop woodworker really wants is a machine that can resaw veneers, cut logs into bowl blanks for the lathe, shape cabriole legs and carving blanks, and do any of these jobs accurately and reliably—without shudder, screech and smoke.

With those requirements in mind, my best advice is that you absolutely ignore the $100 hardware-store-specials such as the little Black & Deckers and Skils. This advice applies to two- and three-wheel machines both.

Two of the large three-wheelers, the Inca and the Wood-Mizer, are compared head-to-head on p. 66. But if you plan to have just one bandsaw, I'll go out on a limb and recommend that you ignore any three-wheeler, unless you really need the throat capacity. Why? Because three-wheel design sacrifices column rigidity. When blades are brought up to proper tension, the weaker column invites blade tracking problems and column vibration that contributes to ragged cutting. A three-wheeler's small wheels also mean shorter blade life, because the blade must bend abruptly with every revolution. If you want a three-wheel saw, stick to blades under 0.020-in. thick. Your best bet for respectable blade life are the 0.014-in.- to 0.018-in.-thick blades pioneered by Olson (Box 262, Bethel, Conn. 06801).

To help you evaluate bandsaw trouble spots, the following is a list of important general considerations. I'll take up some of these in more detail on p. 67, in comparing three of the most popular machines—the 12-in. Sears Craftsman, the 14-in. Delta, and an AMT, one of the imported clones based on the Delta design.

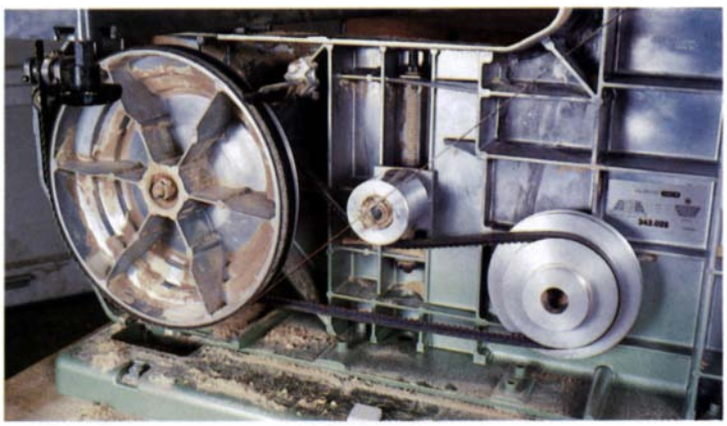
Motor: The less vibration there is, the better a bandsaw will cut. A cheap, unbalanced motor, such as those found on many Taiwanese machines, should be replaced. A decent farm-grade or industrial motor with an honest ½ HP should be enough for any bandsaw with a 6-in. height capacity. You can just get by with the same motor on a 12-in. capacity machine, provided that you change the drive pulleys to slow down the blade speed, thereby increasing the motor's effective torque. A ¾-HP or 1-HP motor isn't too much for a bandsaw, but until you've checked through the rest of this trouble list, keep your money in your wallet.

Pulleys, belts and speeds: As just mentioned, gearing down a saw increases the available torque from the motor and also promotes smoother resawing. For this reason, I recommend a multi-speed machine, or at least equipping your bandsaw with a three-step pulley on the motor and a 7-in. or 8-in. pulley on the driven wheel. The standard bandsaw blade speed is about 3,000 sfm (surface-feet per minute). You could use 1,500 sfm or 1,000 sfm for resawing, and a variety of speeds in the 100-sfm to 700-sfm range for metal cutting. Many inexpensive imports have this feature.

It's very possible that cheap pulleys are out-of-round or bored off-center and that cheap belts are lumpy. These conditions cause vibration. Small pulleys rob power. If your machine came with 2-in. and 4-in. pulleys, switching to 3-in. and 6-in. (better yet, 4-in. and 8-in.) will improve the saw's performance.

Wheels and tires: Wheels should be round and balanced, and don't take it for granted that they are. Check for roundness as shown in the photo on following page, top left. To check balance, remove the blade and the drive belt and spin the wheels by hand. Unless your bearings are very tight, the heavy spot on a wheel will end up stopped at the bottom every time. You can balance a wheel by drilling holes near the rim or by adding weight (wrapped solder, auto wheel weights, etc.). Just as with a car wheel, a bandsaw wheel can be statically balanced, but dynamically not, so don't add or remove weight all in one spot.

Keep tires clean, because buildup of chips and other gunk can change blade tension and throw tracking off. From time to time, rub the turning wheel with a hardwood block, or whatever, to scrape it clean. It's not a bad idea to mount stiff brushes inside the wheel covers to make the machine self-cleaning. If tires are



Bandsaw math

Shifting speeds makes the bandsaw more versatile. The Inca has three speeds, selected by moving the belt and retensioning it. You can accomplish much the same result on any bandsaw by installing new pulleys.

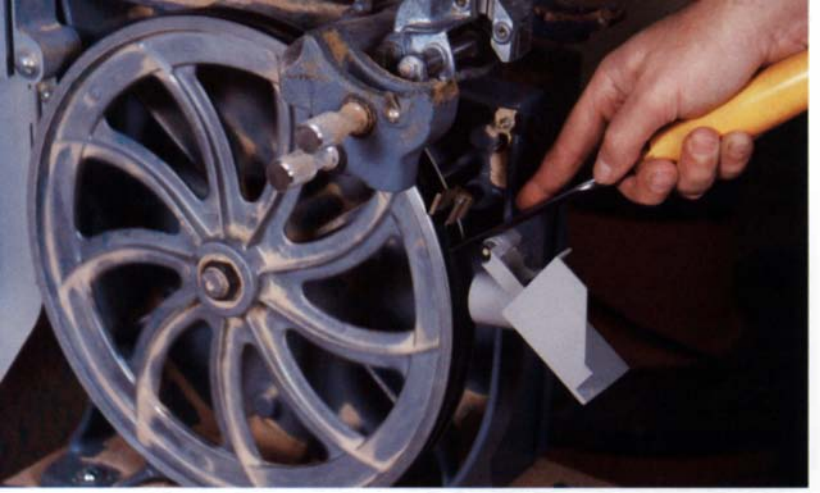
To figure the blade speed in surface feet per minute (sfm), determine the motor RPM (R), and, in inches, the diameter of the motor pulley (P1), the diameter of the wheel pulley (P2), and the diameter of the driven bandsaw wheel (D). Then,

$$\frac{R \times P1}{P2} \times 3.14 \times D = \text{inches per minute.}$$

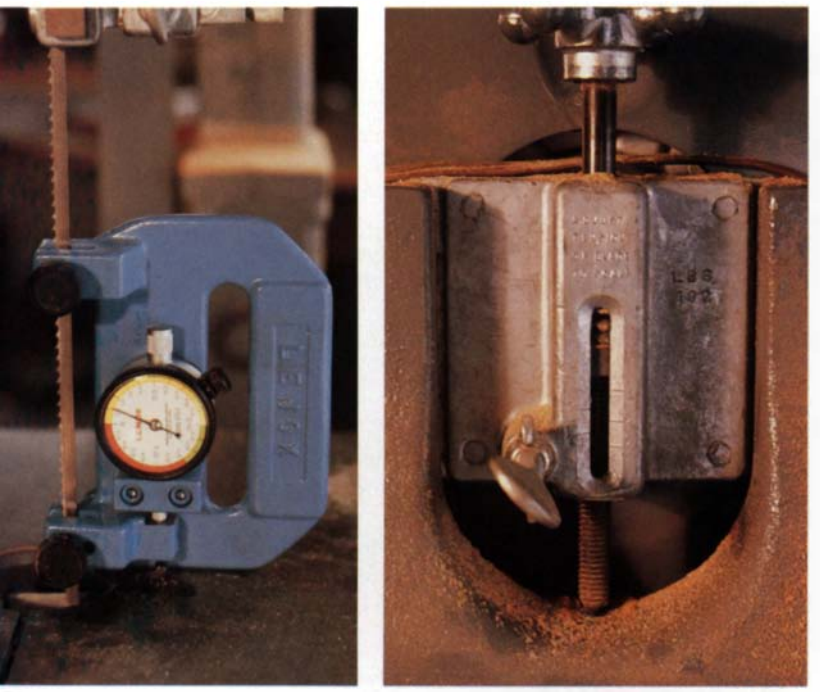
Divide by 12 to get sfm.

If you don't know the size blade a two-wheel bandsaw takes, and it is inconvenient to measure around the wheels, apply the following formula:

With the wheels in working position, measure the radius of one wheel (R1), the radius of the second wheel (R2), and the distance between the axles (D). Then, (R1 × 3.1416) + (R2 × 3.1416) + (2 × D) = Length.



You can check wheels for roundness by resting a chisel against a convenient part of the machine while spinning the wheels. The same chisel, used as a scraping tool, can true the tires.



The tension gauge on the author's Rockwell/Delta bandsaw was, as with most such gadgets, a poor indicator of proper blade tension. With the indicator set to the ¼-in. mark, blade tension is about 2,500 psi, or one-tenth what it should be (left). Getting the blade up to 25,000 psi required turning the indicator washer way above the ¾-in. mark (right). The washer position is not reliable because the spring in the gauge fatigues with use—the text explains how to tension the blade by its musical pitch.

stretched onto the wheels unevenly, they'll have high spots that change blade tension with every revolution, producing a whiplash effect that reduces blade life and promotes ragged cutting. You can true the lower tire by holding a sanding block, file or scraper against it while the machine is running (devise some sort of tool rest, as if turning on the lathe, and, of course, without a blade on the machine). On some machines, you can true the upper tire by mounting the wheel on the bottom; otherwise have someone rotate the top wheel by hand for truing. Retain the shape of any crowning. Check top and bottom wheel alignment with a straightedge.

Make-do tires can be made from crowned layers of masking tape, electrical tape and small bicycle inner tubes or whatever. Wheels on top-notch bandsaws generally get sent to the factory for re-tireing and balancing. Typical cost is $100-plus per wheel.

Tension gauges: Bandsaws tension blades by moving one of the wheels to stretch the blade. This is usually the same wheel that tilts to adjust tracking. Sometimes the movable wheel rides on a spring, sometimes not. It doesn't make much difference. What's important here is that springs fatigue, and tension indicators dependent on them become inaccurate. For example, my Rockwell/Delta's spring measured 2¼ in. long when I checked it recently; a new spring measured 2⅞ in., a difference, at the ¼-in. scale setting, of 2,500 psi for the old spring versus 12,000 psi for the new. Both these tensions, incidentally, are too low.

Worth noting here is that your bandsaw's tensioning screw may not have enough threads to properly tension a standard-size blade. I'm now buying blades 1 in. less than the recommended length; the other choice is to replace the tension spring with a solid length of pipe or shim up the tension screw.

Briefly, if you have a 14-in., two-wheel bandsaw that takes a 104-in. blade—the Rockwell/Delta with height extension, or any of its imported clones—and provided you're using the ¼-in. bimetal blade described on the facing page, tension the blade to produce the same musical pitch found on the lowest string of a guitar. You don't need a guitar, of course, you can keep a pitch pipe or harmonica handy instead. This note, E, corresponds to 15,000 psi and is adequate for all-around work; a G# is 27,500 psi—my choice for serious resawing. On 14-in. saws without the riser block, G# is about 15,000 psi. Please note that this pitch test will work on carbon steel blades as well, but ***only*** if they're ¼-in., with 6 tpi and 0.025-in. thick—any variation from these specs will change the pitch, just as heavier and lighter guitar strings sound different notes. For an accurate pitch, be sure the blade vibrates freely, without interference from the guides (on most machines, you can pluck the blade at the column side). Don't worry too much about breaking the blade—its recommended tension on an industrial bandsaw is 30,000 psi.

There is one caution here—on the Sears saw I tested (p. 68), the wheels were so far out-of-round that blade tension varied wildly with every revolution. I could play a little tune by rotating the wheels by hand and plucking the blade at the same time, which is how I'd advise you to check your bandsaw's wheels (the gauge varied between 8,000 and 25,000 psi with every revolution). If your saw is much off, there will be no way in the world to get a blade to run right without truing the wheels.

Guides: A bandsaw blade needs to be supported at the sides and back. The various guide systems all work, and I wouldn't make a big point of choosing one over another. It is important, however, that guides should not touch the blade while it's free-running, only under the pressure of the cut. Also, they must not impart, or allow, any twist or deflection of the blade.

Guides set too far from the work allow deflection. This shortens blade life and greatly reduces cutting accuracy. The top guides should be adjusted up or down to the thickness of the work with every cut. In theory, this should be a painless procedure, accomplished by sliding the guide post up or down and tightening its lock. On most cheap bandsaws, however, the guide post twists or slants, mis-aligning the guides. The cause is cheap castings that warp, sloppy workmanship, or bad design. It would be worth reboring the casting and inserting a bushing, or whatever sort of shims it takes, to true the guide post's travel.

To run 1/16-in.-wide blades, you can replace solid-block side guides with pieces of oily hardwood (lignum vitae, rosewood, etc.) notched to suit. The notch will act as side-to-side support and backup bearing at the same time.

Frame and stand type: If your stand wobbles, brace it, add a reinforcing shelf, underlay the top with plywood—whatever it takes. If the factory stand is really flimsy, throw it out and build one of wood. The frame of the saw might be cast-iron, welded

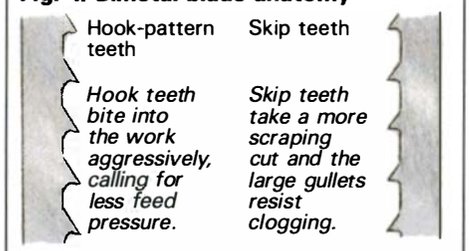
The little blade that could

Bimetal blades may do for the bandsaw what carbide did for the tablesaw. This ¼-in. blade, at 25,000 psi tension, can both resaw without bowing and cut tight circles.

The real breakthrough in getting my bandsaw to work came when I visited a blade factory—American Saw Co., in West Springfield, Mass., the home of Lenox brand blades. Engineers Bob Candiano and Marty Kane were wrapping up a year-long research project on what happens as a bandsaw blade cuts.

As a result of what I learned that day, I started a six-month blade testing program, both in my own shop and with the help of several volunteers around the country. The results fly in the face of anything you may have read or seen before: If you own a 14-in., Rockwell/Delta bandsaw, or a copy, I suggest that you fit it with a hook-tooth, ¼-in.-wide bimetal blade, 0.025 in. thick, with 6 tpi for all your bandsaw work. Getting this blade up to proper tension may use up all the threads in your tension gauge, so order the blade about 1 in. shorter than usual, or plan to shim up the tension screw. This blade will zip through 4/4 walnut as fast as I can feed it, cut clean circles down to about 1¼ in. diameter and huff-and-puff its way through 12-in.-thick oak. It costs about $20, or double the price of a carbon-steel blade, but should last between ten and twenty times longer.

Fig. 1: Bimetal blade anatomy



A bimetal blade is made by electron-welding a strip of cobalt steel onto the spring-steel blank before the teeth are cut.

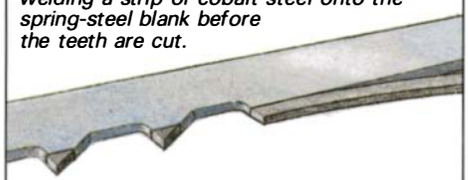
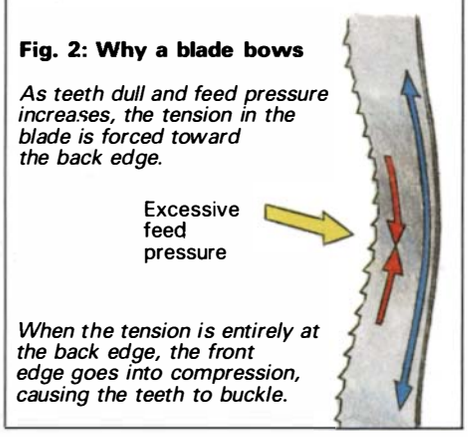


Fig. 2: Why a blade bows

As teeth dull and feed pressure increases, the tension in the blade is forced toward the back edge.



When the tension is entirely at the back edge, the front edge goes into compression, causing the teeth to buckle.

Why bimetal? Ordinary bandsaw blades are carbon steel, with teeth and backs tempered to a variety of tooth-and-back hardnesses. If the teeth produce dust rather than chips, friction-generated heat anneals the tips of the teeth and, suddenly, the blade stops cutting straight. A bimetal blade has a strip of cobalt steel welded along its leading edge to form the tips of the teeth. The cobalt steel is capable of resisting temperatures of up to 1,200°, whereas carbon steel begins to anneal and dull at about 400°.

Why so narrow? A bowed cut results from transfer of tension to the back of the blade, as shown in the drawing. Unless a blade is properly tensioned, it will bow at even moderate feed pressures.

The reason to choose a ¼-in. blade is simply because the average home-shop bandsaw is incapable of fully tensioning a much wider blade.

As a general rule, if you have been experiencing bowing problems with a ¾-in. blade, they will probably disappear if you run this ¼-in. blade at your saw's ¾-in. tension setting. See the main article for more details about proper tensioning.

Why hooked teeth? Skip-tooth blades are often recommended for resawing—they cut smoothly and have large gullets to carry away chips. I can't disagree with this, and would probably recommend skip-tooth blades to an experienced bandsawyer who is on top of his work at all times. But as a part-timer myself, I prefer a hook-tooth pattern. Hooked teeth cut aggressively. This requires less feed pressure, reducing the chance of bowing. As a disadvantage, hooked teeth alternately pull the blade to one side of the cut, then the other, which sets up vibration that contributes to the bandsaw's typically rough cut. I'll settle for a little washboarding rather than the possible bowed cut of a skip-tooth blade.

Why six teeth? As discussed in the main article, I recommend that you slow down your bandsaw for resawing, mostly to avoid heat buildup. At slow speeds, a blade with four hooked teeth may self-feed so aggressively that it becomes difficult to control. The six-tooth blade takes smaller bites and behaves better.

Where to get? Lenox blades are sold only through industrial hardware stores and the like. Check the Yellow Pages, or call (800) 628-3030 to get the name of your nearest distributor (in Mass., call (413) 525-3961). One mail-order source that will ship UPS, C.O.D., is Viking Machinery and Tool Supply, 2915 Newpark Dr., Barberton, Ohio 44203; call (800) 223-3487, or, in Ohio, (800) 362-0585.

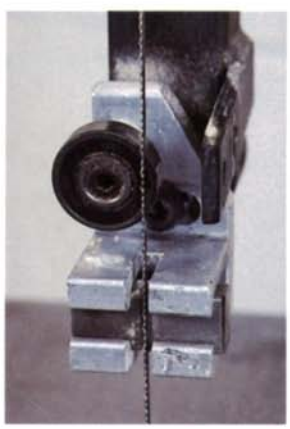
You don't have to buy bimetal from Lenox; almost every major blade manufacturer (except Olson) makes a virtually indistinguishable blade, and intense competition has kept quality and prices uniform from one manufacturer to the next. Just ask for a blade with the specs listed above, and I can practically guarantee that you'll be tickled pink with it. —*J.C.*

steel, or cast-aluminum. There's not much practical difference, just watch out for a warped frame that would affect wheel alignment. Also, if adding a riser block, check that it doesn't throw wheel alignment off—a problem with some Taiwanese saws.

Table and trunnion design: Every bandsaw I looked at had trunnions strong enough that I couldn't shift the table by hand. Most bandsaw tables tilt 45° in one direction and 10° or 15° in the other. This small amount of left-hand-tilt is important if you plan to bandsaw dovetails, although I wouldn't rule out buying a bandsaw without it—to get the job done, you could always fit a plywood table with the requisite tilt atop the one that's there.

An excellent book put out by Delta is *Getting the Most out of Your Bandsaw,* at $8 from Delta distributors, or call Delta at (800) 223-7278. As far as blade info goes, manufacturers have brochures detailing blade types and uses, usually along with trouble-shooting charts. Unfortunately, every blade manufacturer has had, at one time or another, trouble with mis-aligned welds. These are annoying but so common that they hardly count as a defect. If you get a great blade, save it for special jobs.

You can sometimes true a bad weld by stoning the back of the



The Inca (above right) costs three times the price of the Wood-Mizer. Both machines sacrifice column rigidity for a wide throat area. The Inca, with flat rubber tires, tracks blades with their teeth overhanging the edge of the wheel (photo right). If you tension a wide blade much past 12,000 psi, it will ride off. The Wood-Mizer's rough-hewn block guides (far left) contrast with the Inca's three ball bearings, but both systems work.

Three-wheelers, two personalities

by John Kelsey

I like bandsaws. I've been shopping for a monstrous old cast-iron Crescent or equivalent, but I've also been curious about three-wheelers like the Wood-Mizer and the Inca. Thus, I was an eager volunteer when it came time to test those two machines. I used them to rip, to make veneers and to saw curvy little boxes. For a rigorous test, I asked each saw to make boards from half-rounds of apple wood, 8 in. from pith to bark, that had been drying since 1981. Apple is denser than cherry, but not as hard as sugar maple.

Wood-Mizer: If you were a pretty good basement tinkerer, and you welded your way through a whole lot of steel sheet, tube and channel iron, you could probably get pretty close to the Wood-Mizer. If I had made it myself, I'd be real proud. I'd use it for everything, and I'd continue to fix, file and fit until eventually it grew into an absolute dream of a saw. It's a tempting purchase because it's cheap and American made. But if you do buy one, you'd best be prepared to fix and file as if you had built it yourself—there are rough edges and wobbly fits.

The saw has crowned wheels, which makes blade tracking easy. The steel-

blade by hand. Another trick with stones is to pinch the blade lightly between the ends of two fine-grit whetstones and run the blade backwards through them by hand. This evens out the set of any errant teeth, and, with an older blade, sharpens the teeth, because it removes each tooth's rounded outside corner.

A final trick is worth noting. At any tension, bandsaw blades can develop a harmonic flutter, a sort of internal whiplash that can greatly reduce blade life through fatigue. This is visible as a series of waves in the blade as it runs. The waves at high tension can be as short as an inch or two, and are the most fatiguing. The trick is to tension and track the blade, then, with the saw running, look down the longest part of the blade you can see. Adjust the tension minutely until the waves disappear and the blade runs straight. Of course, any time you run a bandsaw with the wheel covers off, stand behind the saw and keep the area clear. □

Jim Cummins is an associate editor at FWW. *Some of the material in this article can also be found on the videotape* Small Shop Tips and Techniques *(The Taunton Press). Bandsaw and bandsaw-blade manufacturers and importers are listed on p. 20.*

block guides adjust with six Allen screws, one of which is inaccessible. The throat is 26 in. wide, so you can saw to the middle of a piece of plywood. The table is too small and difficult to tilt accurately.

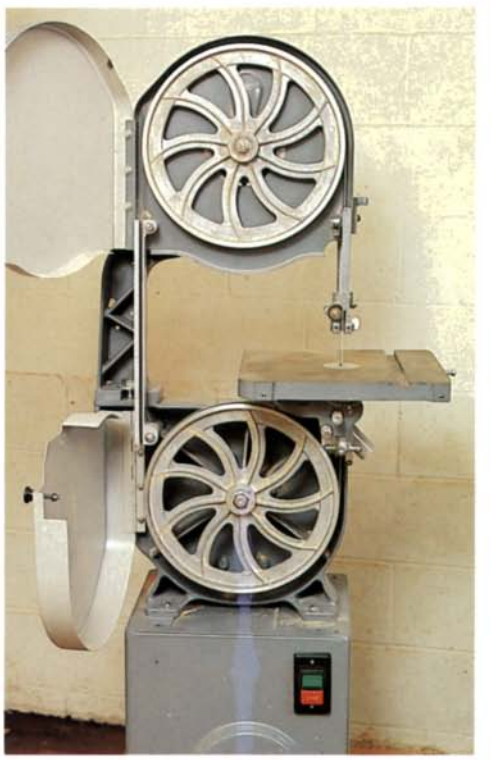
I couldn't resaw a flat board from the test apple, due to both bowing and wandering. However, all the blades WoodMizer supplied pulsed badly at the weld. Furthermore, there's a lot of vibration from the frame-mounted motor. If I owned the saw, I wouldn't give up. I'd remount the motor off the saw's frame, and shop for better blades.

Inca: The Inca is novel among bandsaws for having uncrowned wheels. There are two blade-tracking adjustments, one for tilt and one for tension, at the axle of the third wheel. Blades track with their teeth overhanging the wheels, and it takes some practice to learn how to track different widths of blades. You can't apply as much tension as I would like without throwing the blade. I had no luck with a ¾-in. blade; when it would track, it also bowed in the cut; with a little more tension, the blade ran off. On the other hand, a ½-in. blade and a slow feed produced flat apple lumber. I'd consider adding the 2-in. height extension.

For the money, you get some nice features. The blade guides are free-spinning bearings, very precise and responsive. You have to twist eight Allen screws to adjust the guides; if I owned the saw, I'd Krazy-glue eight Allen wrenches in place. A rack-and-pinion moves the top guide up and down, so it can't drop on the stock or your fingers. The stand-mounted motor doesn't contribute vibration. For the money you might also feel entitled to a legible manual with pictures matching the saw you bought (the photo-copied supplements are completely illegible).

This month of testing so whetted my appetite for a bandsaw, by the way, that I went out and bought a new 14-in. Delta with 6-in. height extension. I think it'll be pretty good, once I get the wheels trued round. □

John Kelsey sculpts and makes wooden boxes in Bethel, Conn.



The Rockwell/Delta 14-in. bandsaw (left) has served as the inspiration for Taiwanese copies, such as the AMT machine shown at right, which sells for less than half the price.

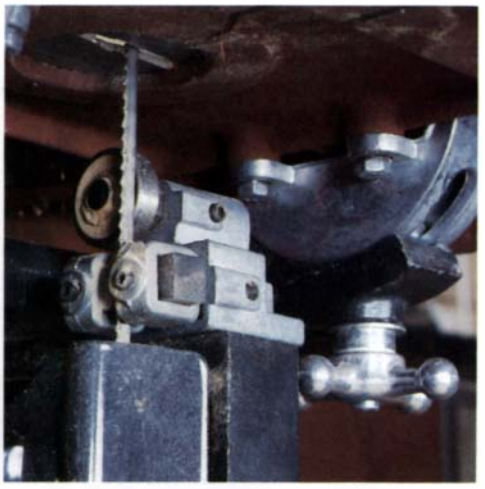
Delta, the imports, and Sears

I've owned a Rockwell 14-in. machine for more than five years; except for a few small differences, it's the same as the current Delta machine. Last spring, another editor here bought a bandsaw from American Machine and Tool (Fourth Ave. and Spring St., Royersford, Penn. 19468). The AMT bandsaw is a Taiwanese low-cost version of my Rockwell. It's made by the Yung Li Shing Electric Works Co. Ltd, (whose trademark is an elephant cast into the plastic knobs) and sells for about $300. I've seen similar Elephant machines for as little as $189 (in a "buy from the truck" ad in a local newspaper). Elephant also makes bandsaws for such familiar names as Jet, Sunhill, Bridgewood, Bratton, Grizzly, Andreou, A.J. Tool, etc.

The wheels on the AMT machine were nicely round (my Rockwell's top wheel had a slight high spot in the tire). The top wheel on the Taiwanese machine was warped, or possibly bored crooked, as it was about ⅛ in. out of flatness. Curiously, this didn't affect the running of the blade. The wheels on both machines are aligned well, and tracking is no problem.

The AMT's table is a lighter casting than the Rockwell's, and flexes under heavy load. I doubt that the flexing would ever cause problems in normal use. The design of the trunnions (the table-tilt castings) is about the same on both machines, but the AMT's castings are lighter. I can't shift either table by pushing on it.

Here's the first problem with the AMT machine: I could not adjust the table so the miter gauge slot was parallel with the blade, although I disassembled the machine and shifted everything as far as I could. If you never intend to use the miter gauge, this should cause no problem, but



Delta's lower guides are designed with one side at a 45° angle, which allows them to be positioned close to the table for good support, while still allowing the table to tilt 45° to the right. In contrast, the Taiwanese saw's budget version uses the same guides top and bottom. To allow room for tilting, the guides must be positioned low, reducing support.

to get things right, you would have to redrill some alignment-pin holes.

The second real difference between the machines is in the guides. Superficially, the systems seem equivalent, with the AMT, as usual, simply a stripped-down version of the Rockwell. In practice, however, the top and bottom guides on the AMT were poorly aligned, and, even after considerable fussing, still didn't end up quite right—they force the blade to twist a little. The bottom guides on the AMT, in addition, are the same as the top guides and have to be mounted some distance from the table to allow it to tilt (photo above). This reduces the support they give to the blade. The Rockwell has special 45° bottom guides, more expensive to manufacture. These two factors make the AMT less effective at resawing than the Rockwell.

Is the Rockwell, therefore, a very good machine, and the AMT a very bad one? Not quite. Let me knock the Rockwell a little:

My machine vibrates more than I like. I balanced and trued the top wheel, but the bottom wheel may still be out of balance, and is too tight in its bearings to be checked. The accessory light fixture I bought with the saw will not extend far enough to throw light on the blade where it is cutting. The retractable caster wheels I bought couldn't be attached to the machine—the castings all cracked. Finally, I had to bend some of the sheet metal so the top wheel wouldn't rub.

On the plus side, the Rockwell—fitted with the blade described on p. 65—will cut anything I plan to feed it. It will hold its resale value indefinitely (maybe even go up). I will always be able to get parts. These considerations convince me I bought the right saw. That, in addition to better workmanship, is what you're buying for the price difference between Taiwan and Delta.

In spite of the fussing it took to get my saw running right, the problems were relatively minor compared with the worst that might come from Taiwan.

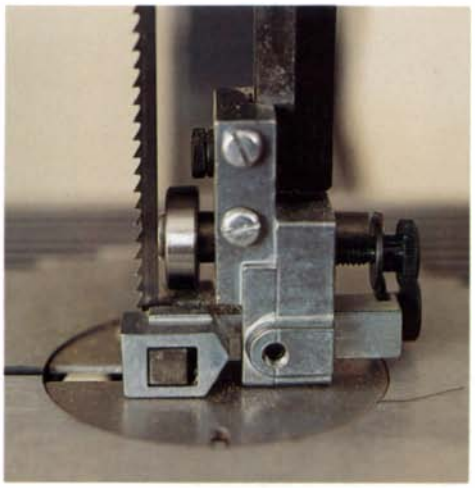
I talked to about a dozen importers of Taiwanese machines and everybody recited a litany of manufacturing shortcomings, most of which applied to an 18-in. model, but which also crop up on 14-in. Elephants. The squawks included guides machined crookedly, top wheels misaligned with bottom wheels, lumpy drive belts, pulleys machined off-center, cheap, unbalanced motors, ill-fitting fences, crooked or warped tables, and extension blocks that threw wheel alignment off. Some 220V motors were arriving with 110V plugs. The list could go on.

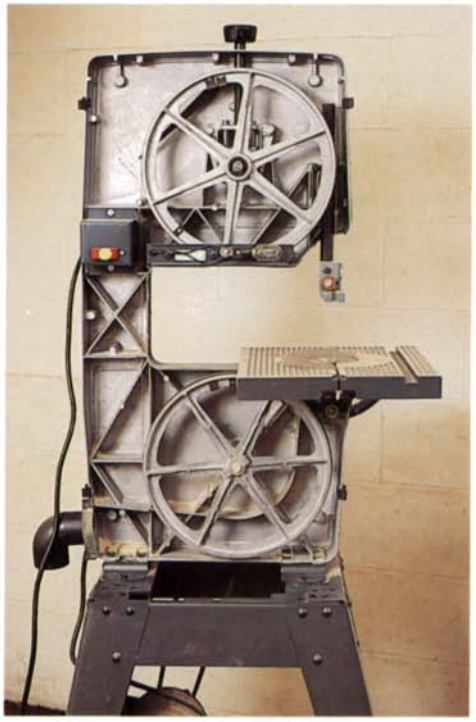
Many of the problems come about because Taiwan factories will make seemingly identical machines in a variety of grades, from almost-junk to pretty-competitive. Cost-cutting is a two-edged sword for importers—at some point you can end up with a machine that customers reject. Of course, every importer I talked with said the problems were with the other guy's machines, not his own.

These are things to watch out for if you're buying an import. But any of these problems should be immediately apparent and most can be fixed in one way or another, given patience and ingenuity.

Such things are not unheard of on domestic machines either. Take the Craftsman 12-in. saw, Sears "best," which is made by Emerson Electric in Paris, Tenn.

The older Sears machines enjoy an excellent reputation, and the new machine I bought *will* more or less cut wood. All in all, the machine is worth what it costs. I could live with it if I fixed the wheels, which are horrifically out of round—every revolution varies blade tension from 8,000 psi to 25,000 psi (to check for this, you turn the wheels by hand, pluck the blade, and listen for changes in musical pitch). I'd shim the guide-post bracket, which, from top to bottom, skews about an eighth of an inch. The table could use bracing. Work hangs up on the table insert and the grooves, so I'd fill the table surface with auto-body putty and shim the insert level.





The Sears Craftsman bandsaw had very out-of-round wheels. In addition, the guide post needs shimming (top photo). It skews back almost ⅛ in. from top to bottom settings, leaving the blade unsupported by the backup bearing.

Just for a second, let me introduce a fourth machine here: the 12-in. Mini-Max, an Italian import built with welded steel construction. The point is that this is the smoothest running machine I encountered. It costs exactly double what the Sears does, and, in my opinion, it is at least twice the saw. Yet, right out of the box, the Sears saw will do most of the jobs the small shop asks. What the extra money buys is a bandsaw you won't have to remanufacture yourself. —*J.C.*

A bandsaw forum

EDITOR'S NOTE: Back in May, we asked readers to tell us about their bandsaws—bad points, good points, tips and tricks. We received more than a hundred letters, most of them several pages long. These hands-on impressions were invaluable in writing this article, and we'd like to express our grateful thanks to all who wrote. Here are excerpts from just a few. If there's a lesson here, it's that everyone has slightly different standards. . . .

I have a Sears Craftsman 12-in. bandsaw that I purchased 6 or 8 years ago. Here are the details of the work I did on it:

The worklight is potentially dangerous, as it has no separate control and cannot be turned on without starting the motor. I replaced it with a Luxo-type lamp and added a separate switch to the front of the cabinet.

On the second day I had this saw, the centrifugal starter switch in the motor became fouled with sawdust and the motor would no longer start unless manually spun. Not realizing the cause of the problem, I replaced the motor under warranty, but of course the same thing happened again. A sheet-metal sawdust deflector has solved the problem.

I had to brace the stand with angle iron, also the table. I bored and reamed the table pivot for a bronze bushing.

Experiencing vibration, I rebored the upper wheel for bronze bushings. This did not cure the vibration, but solved an annoying blade-wander problem. I cured the vibration by replacing the motor-mounting plate. The blade thrust bearings wobbled; I replaced them with quality bearings. I replaced all cap screws and nuts with hardened ones.

I have extensively used a number of bandsaws, including this one, the Delta 14-in. saw, an older Jet saw and several large Yates-American saws. If I were to select, today, a saw to replace the Craftsman for the work I do, it would be the Delta. I do not feel, however, that my current level of use justifies the saw's replacement. This would hold true even if I had known exactly the work level required to repair my saw.

—Steven S. Cushman, Sharon, Mass.

My bandsaw experience goes back over 50 years, and includes an ancient 30-in. Tannewitz, a 30-in. Laidlaw, several other long-forgotten makes as well as both 20-in. and 14-in. Rockwells. Now in retirement, I have a 12-in. Craftsman. I haven't seen a bandsaw yet that couldn't use a tune-up.

Here's a tip: I find that holding a candle or some beeswax against the sides of the blade contributes to smooth running. Just one more thing. The miter slot on my machine is rarely used. On several occasions, I've had a piece of scrap fall into the slot and stick up just far enough to catch the work and throw me off line. So I made a press-fit insert to fill the slot level with the table. It can be removed instantly, should the need arise.

—Kenneth A. Wolfe, Wausaukee, Wisc.

I have a Grizzly 14-in. bandsaw. I season and use native woods such as dogwood, yew, madrone and apple, and find this machine, using a coarse ¾-in. blade, does an admirable job roughing pieces for turning squares, etc.

—Donald M. Thomson, Vancouver, B.C.

My 1980 Powermatic 14-in. bandsaw is a fine machine—no plastic parts and only two die-cast parts. My only real criticism is that the upper blade-guide rollers are not far enough apart—when using a ¼-in. blade, the back-up roller touches one of the side roller guides.

—John W. Wood, Tyler, Tex.

After having gained a limited amount of experience on a Shopsmith bandsaw, I feel that it represents fair value for the price. Just go slow and easy.

I'd wanted a three-wheel Inca for years and finally bought one for $2,000 plus (I bought every option available). I had initial problems, which would have been fewer if the dealer had been better qualified to set up and support the machine. In time, I took the machine apart, figured out how it should work, and realigned the wheels using a long straightedge. Since then, the unit has been a joy to use.

It is important to track the blade at the front of the wheels and to set the tension according to the manual. Too much or too little tension causes the blade to wander. Also, don't overtighten the drive belt. I use this saw almost daily, and slack off the tension overnight, so as not to create flat spots on the wheels. I've also found that the saw runs best at the slow speed, regardless of which blade I'm using.

—James M. Watson, Beaverton, Ore.

We have built a two-wheel, 18-in. Gilliom bandsaw at a cost, four years ago, of about $130 for the kit and another $30 for plywood. Built according to the plans, the machine is too flimsy for heavy work, and Gilliom doesn't pretend otherwise, but with a little reinforcing it can be made to resaw 12-in. oak with ease: We added a strip of plywood to enclose the H-shaped column, and poured it full of concrete, making it much more rigid and, of course, heavier. Three-inch angle iron set into the column and screwed to the wheel mounts top and bottom prior to pouring ensure that the wheels stay put.

Interestingly, for three years we managed with a ⅓-HP washing-machine motor and never had any problems sawing stock up to 6-in.; the motor burned out recently and has been replaced with a ½-HP motor, which seems more than adequate, provided the blade is sharp.

—Bon Dunstan, Wilson, Wyo.

When I bought my Grizzly three-wheel bandsaw, I expected to use it for one job then unload it. Frankly, I bought this saw because it was cheap—I paid $120, delivered. Three years later, I still have the saw. While it doesn't compare with heavier, vastly more expensive machines, it cuts very cleanly and quickly through 4/4 and 8/4 stock—sufficient for my general needs.

Now for some negatives. The combined tilt-and-hold mechanism for the 15½-in.-square table is poor—adjustment is iffy, and even when snugged down, the table can be made to rock slightly when pressure is applied.

Although Grizzly has dropped the three-wheeler from its catalog, Shopcraft markets essentially the same saw. The one displayed at my local home center came with fewer attachments, but still included a miter gauge and the same ultra-basic rip fence as the Grizzly. On the day I stopped by, the saw was selling for about $160, but I've seen it for as low as $130.

—Richard Cauman, Washington, D.C.

I have had a 14-in. Rockwell/Delta for several years. Reverberations inside the enclosed steel stand made the saw very noisy; I built a heavy wood table with a fixed motor mount and the saw now runs very quietly. I replaced the flat blade-guide arm with the older V-shaped version. A wheel tire came off, but was sucessfully recemented.

There's still more vibration than I'd expect, but overall the saw operates very well and we are quite pleased with it.

Our second saw was an Inca 10-in. two-wheel model. We really wanted this saw for exclusive use with ⅛-in. blades, but after extensive trial, including trips to the dealer for parts replacement and alignment, we had to return it (they gave a full refund). When the Inca was running, it was smooth as silk and cut beautifully, but we just couldn't stand the suspense of not knowing when the blade would jump forward off the wheels. The dealer said they had never seen a saw with this problem before.

Our next saw was a 12-in. Sears Craftsman, which, aside from a warped table that Sears replaced immediately, ran perfectly right out of the box.

—H.E. Teagarden, Speedway, Ind.

If you have the block-type blade guides, replace the metal blocks with lignum vitae. Press them lightly against the blade and tighten. After running the saw a couple of minutes, the wooden blocks wear-in and self-lubricate.

—James J. Heusinger, Berea, Ohio.

Bandsawn Boxes from Burls

Diamonds from the rough

by Jeffrey Seaton

Wild-figured western burlwoods are the raw material for Jeffrey Seaton's bandsawn boxes, like the tall, nesting boxes shown above.

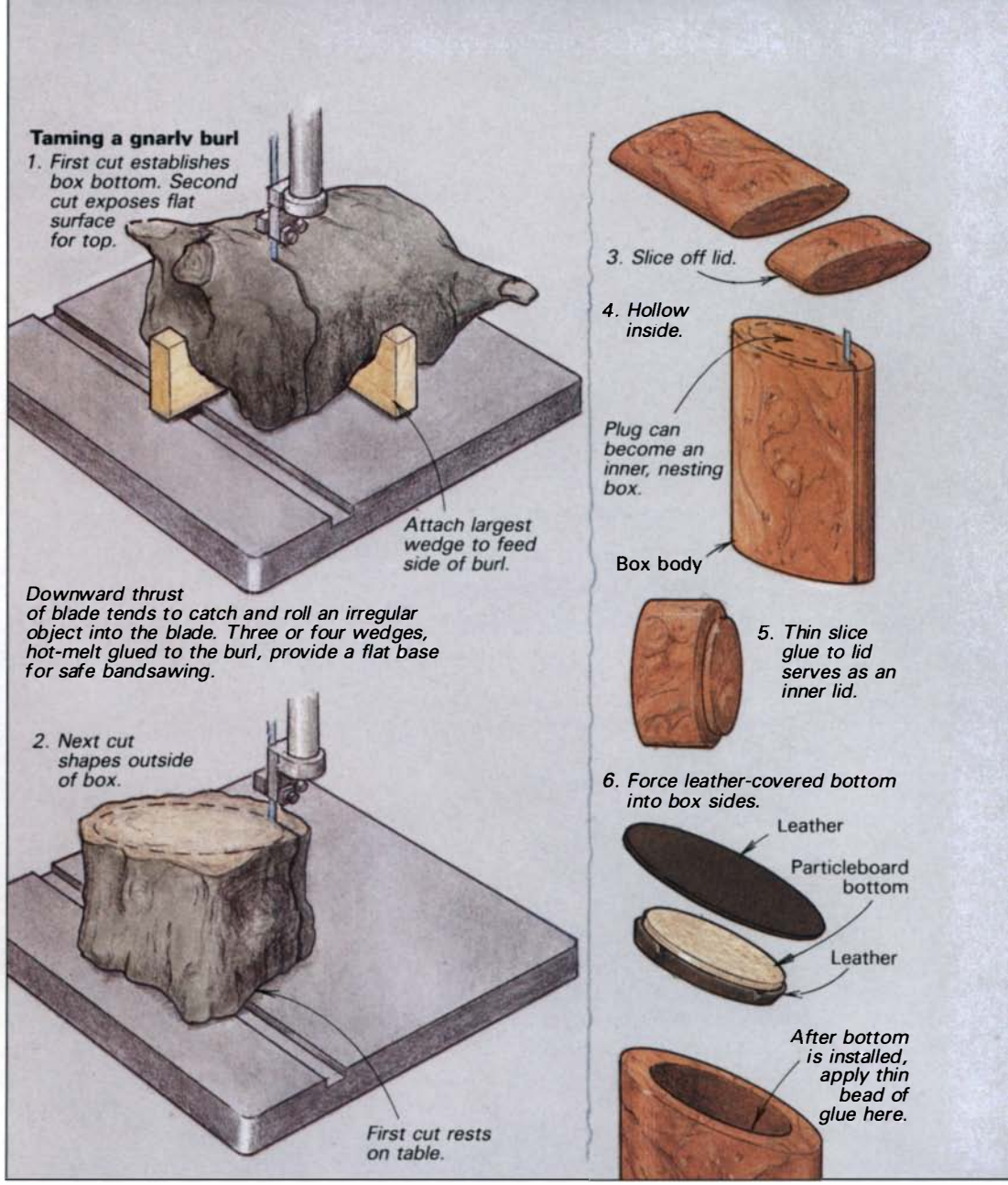
When I first met Bruce Byall in 1973, I was a frustrated finish carpenter living in Mendocino, Calif. Byall, a creative artist working in wood, had been making wonderful little free-style bandsawn boxes from chunks of local redwood burl. I was enchanted by the speed, simplicity, and, most of all, the creative freedom of working with the bandsaw. I'd been looking for an alternative to the redwood burl tables that I'd been making part-time, and the bandsawn box offered the obvious advantages of being a marketable small object that was intrinsically more interesting to make than a burl table.

I still have my first crude, poorly sanded redwood burl box. Although my designs and quality have improved during the last decade, my basic techniques have remained the same. In a nutshell, a bandsawn box is a container cut from one solid piece of wood, including the box bottom and the lid. Whether made from burl or a thick board, the box's outside shape is bandsawn first, then the lid is sawn off, the center plug is removed and the kerf is glued closed. This technique allows the grain to flow between the lid and box, resulting in a visual unity difficult to achieve in a conventional box made from separate pieces of wood.

Since I earn my living making boxes, I've tooled up to produce them in large numbers. I own two Rockwell (now Delta) 14-in. bandsaws, one of which is fitted with the extension kit (part #28984, $63.85) that increases the saw's depth of cut to 12½ in. I keep a ½-in. 4 tooth-per-in. blade on the older saw, with which I usually make the flat, primary cut for the bottom of each box. On the other saw, I use a 3/16-in. 4-tpi blade, which can saw to the radius of a nickel. The smaller blade allows great maneuverability, an essential element in competent bandsawn box making. The guides on my saws are standard Rockwell issue. However, I recommend 3M silicone spray to lubricate the blade and the guides. This will also help when cutting abrasive woods.

For me, the most satisfying stage of creating a box is the actual design. Over the years, I've developed several distinct styles that fall into two rough categories. The more refined styles usually have a finished appearance, like the tall set of nesting boxes shown above. These boxes are usually drawn out on paper and exact measurements made before committing an expensive piece of exotic wood to the saw. The other style, which is the most fun, is more free-form and spontaneous, and incorporates some of the natural exterior surface of the burl or root section. I look for natural features like a branch, a knot, an interesting arch or a balanced space between these features to be the focal point of the box. Around this focal point, I cut a graceful curve, aiming to give the piece a harmonious, flowing line for the eye to follow.

Virtually any burl wood, or any large chunk of wood for that matter, is suitable for a bandsawn box. Some of my favorites are Californian mountain lilac, desert ironwood and redwood, all of



Ornery burls are made manageable by gluing on scrap-wood wedges, forming a flat base that allows the burl to be safely bandsawn without danger of the blade grabbing. To make a perfect-fitting inner lid for his boxes, Seaton saws off a thin slice of the center plug and glues it to the outer lid, bottom photo.

which I obtain from sources in northern California. Burlwood might not be available in your area, so you might try perusing the classified ads section of this magazine for a source. One company that sells burls is Cal Oak Lumber Co., P.O. Box 689, Oroville, Calif. 95965.

Bandsawing an irregularly shaped burl is an adventurous, if not dangerous, task. It's definintely not recommended for beginning shop classes. But there is a way to do it safely. Since the blade moves downward, a roughly round object will be pulled toward the blade, spinning it downward, perhaps dragging a misplaced finger into the blade. Once the cut is past the center, the force suddenly reverses, and the block tries to turn the other way. *Always* keep your hands well to either side of the blade's line of cut. The best way to keep a round burl from rolling uncontrollably is to give it a flat surface on which to rest. I do this by hot-melt gluing three or four scrap wood wedges onto the front, side and back of the burl, as shown in the top photo and in figure 1. I bandsaw these wedges in various sizes and generally in two shapes: convex and concave. I use whichever shape fits that particular burl best, aiming for the broadest flat surface. Glue the largest wedge you can in front of the burl so there's no chance of the blade catching and pulling it up and over the base of the wedge. To ensure a good bond, I clean off any dirt or bark with an awl and compressed air before gluing the wedges. A wire wheel on an electric drill will work if compressed air is not available.

To begin, first visualize the bottom and top of the box-to-be. Glue on the wedges, then use a ½-in. blade to make the bottom cut as straight as possible. This is a great time to check for moisture content. I use my hand to feel for any dampness. If you can feel moisture, you know the wood is too damp to work into a finished box right away. So, I shape out the rough burls into form and store them inside my shop, where the constant air flow from my ventilation fan helps dry them. Mountain lilac burl, my best-selling burlwood, dries at about 1 in. to 2 in. in thickness per year. I use a clear acrylic spray to seal the endgrain to minimize end checking.

When the wood is dry, and the bottom surface flattened, proceed with sawing the main body of the box. Pick a spot free of cracks and trim a chunk off the rough top surface to expose some figure and see that the wood is structurally sound. Then, with the wedges firmly intact, slowly cut the lid free. On a 12-in.-long box I usually cut a lid ⅝ in. thick, or whatever feels balanced to the rest of the box. The next cut, as shown in figure 2, defines the outside surfaces of the box.

One of the most frequently asked questions is: "How do you hollow them out?" There are two methods. The most involved is to thread a cut bandsaw blade through a 3/16-in. hole bored through the box's center, then weld and grind the blade. This

As an alternative to his refined boxes, Seaton includes textural, run-of-burl edges in some of his designs.

shortens the blade life and requires a welder/grinder unit, preferably on the bandsaw. It's much easier to bandsaw directly through the side of the box, gluing the kerf closed later.

I look for a solid, check-free area at the narrowest end of the box. I saw straight in before turning to saw counterclockwise around what will become the inside of the box until I reach the entry cut. By cutting counterclockwise, the majority of an oblong box is always on the outside of the blade, giving you more throat clearance on larger boxes. Now stop the saw and back out of the open kerf. The center plug should fall right out. To cut the inner lid that holds the lid in place on this hingeless box, glue wedges to the plug and saw off a slice about ¼ in. to ½ in. thick.

I glue the inner lid on with yellow glue, applying a light coat to both parts. Take care to precisely align the outer lid with the body. Turn the box upside down and drop the inner lid down through the hole in the bottom, then position it so there's equal saw-kerf distance on all sides. Carefully lift off the box body and clamp the work for 24 hours. To glue up the seam left by the blade entry, I squirt glue into the kerf with glue injectors (available from Woodworker's Supply, 5604 Alameda N.E., Albuquerque, N.M. 87113). A combination of a band clamp and a bar clamp works well on round or oval forms. Let the box sit for a week, if possible, to acclimate. If the lid is going to warp at all, it will do so now. The warp can be sanded out later.

More than 60% of the time that goes into my bandsawn boxes is given over to sanding. My employee, Mark Wietstock, does most of the sanding. The extra effort he expends makes the difference between an ordinary production item and an heirloom. The first step is to sand the bottom completely flat on a stationary belt sander. I use the Jet Equipment and Tools combination sander, which has a 6-in. by 48-in. belt (25-grit silicon carbide) and a 12-in. disc sander (40-grit silicon carbide). The Jet is far cheaper than the Delta equivalent and for the last two years I've had no complaints. To shape, sand and bevel curved surfaces, the disc sander is the best tool for the job. Once the bottom is flat, I wire brush all the burly surfaces with a 6-in. #11-gauge wire wheel for hardwoods and a softer wheel for redwood, buckeye, or any spalted woods. I've mounted the wheels on an arbor-and-pulley setup that consists of a ½-in. chuck powered by a 1½-HP, 3,400-RPM motor stepped down to 2,600 RPM.

My rough burl boxes require no further shaping, but my more refined designs are sanded beginning with a 40-grit silicon carbide sanding disc mounted onto an 8-in. rubber-backed disc (available from Power Pad, 1223 W. 256th St., Harbor City, Calif. 90731, #8H50) with 3M feathering adhesive, #51135. Ideally, only bandsaw marks have to be removed at this point, but there may be a few bumps and valleys to even out. You can, if you wish, do more shaping on the disc. Subsequent sanding on an 80-grit disc will remove the deep scratches left by the 40-grit paper. Next, I switch to a 5-in. disc (Sears #28419) on a flexible shaft, sanding first with 120-grit garnet, then 180 and followed by 320-grit silicon-carbide paper. My "secret" finish is just the patience to continue on with 400-grit and 600-grit wet-or-dry paper.

After blowing off any sawdust with compressed air, I dip the entire box (including the lid) into a vat of clear Watco oil. The excess oil is blown out with compressed air and the box is hand wiped with a cotton cloth. Because of the noxious fumes, I strongly recommend a dual-cartridge organic vapor respirator and rubber gloves to minimize your exposure to the oil. I let the wood air out for three or four days before installing the bottom.

I used to slice the box bottoms off the center plug but found that these warped too much, so now I make the bottoms of ¼-in. particleboard. I simply trace the outline of the box interior right on the particleboard and bandsaw it, sanding off any rough edges. For tall, top-heavy work, I sandwich a ¼-in. layer of lead sheet between two layers of particleboard. My wife, Katrine, takes care of gluing leather to the box bottoms. I find that garment-grade, split-suede leather works best because it cuts easily, is flexible, and has a quality look to it.

Trace the outline of the particleboard bottom onto the leather, leaving 3/16-in. surplus around the circumference. Spread a thin layer of yellow glue, apply the leather and then press the box down over the bottom. After the glue has dried overnight, trim the excess leather away with a sharp, single-edge razor blade.

To bring up a lustrous sheen on the wood, I use an 8-in. circular cotton hard pad (available from J.H. Lowe, Box 292, Old Bethpage, N.Y. 11804) mounted on a 1-HP, 3,400-RPM motor. A slight charge of tripoli compound on the wheel removes excess oil. On a second motor, I use an 8-in. lamb's-wool bonnet to apply hard carnauba wax for the final satin luster. Then, the sanded inner lid is signed and dated with a hand-held Dremel tool. □

Jeff Seaton sells his boxes at shows and in galleries. He works in Goleta, Calif.

Painted Carvings

Translucent color from linseed and oil paints

by John Heatwole

Several years ago, I received a commission to design and carve figures for the Christmas window display at Neiman-Marcus in Washington, D.C. I wanted my painted carvings to be colorful, yet subtle, so I began trying to duplicate the finishes on some carvings I had seen as a child at the home of a neighbor who had traveled extensively in Europe.

I was always fascinated by the way the grain of the carved wood showed through the translucent colors on her carvings. There was also a nut-brown richness underlying the finish that, through the years, I saw in almost every carving that came out of Germany, Austria or Northern Italy. I figured the colors were produced by stains, but could never duplicate them. Oil paints, acrylic art colors and watercolors didn't work, nor did the undercoatings, sprays, waxes, or dry-brush techniques I tried. The oil colors I'd been using were often so thick and opaque that you couldn't tell if the carving was wood or plaster. Diluting the colors hadn't helped; thinner coats just ran and blurred through the wood grain.

One night, just as I was dozing off, an idea came to me. I decided I'd try staining the carvings with a thin, brown undercoat before applying any colors. The next morning I put the idea to the test. I squeezed a long strand from a tube of raw sienna oil color onto a palette. The raw sienna color was pretty close to the rich brown I'd seen on the old carvings. Next, I added boiled linseed oil and blended the two until the brown mixture was nearly the consistency of the plain linseed oil. I liberally applied the brown stain to a 14-in.-tall basswood carving, and let the color soak in for a few moments before wiping off the excess with several soft paper

Heatwole's carvings reflect his love of history and storytelling. The wizard roams his medieval fantasies; the Gypsy queen enlivens an old family story.

towels. Then I mixed the colors I wanted for the details, diluting each with boiled linseed oil until it was the same consistency as the initial base stain, and applied them with an artists' brush.

This technique changed my work. Now I had colors that were simultaneously rich and subtle, and the grain of the wood showed beautifully. By using small artists' brushes, 00 or 000, I could do the most intricate details and not worry about colors diffusing or running together, not even on endgrain. The color stayed in the spot where my brush touched.

There was no scientific thought in this, just my idea that perhaps the nut-brown, antique-ivory patina of the old European carvings was due to an undercoat of brown stain. Besides coloring the wood, I believe this raw sienna/linseed oil undercoat fills the wood's hollow fibers. When I touched other colors to the wood, they stayed in place because adjoining fibers, which are normally hollow, were filled with the undercoat, which prevented bleed-over yet allowed color to be absorbed wherever the brush touched.

Eventually, I discovered that time was a crucial factor in the process. If I started staining a piece late in the day and left it partially unfinished overnight, colors applied the next day would just sit on the surface and not sink into the wood. Apparently once the raw sienna begins to harden, it won't allow the other colors to be absorbed. Now, I start my staining early in the morning and work rapidly, so I can complete the process before the oils harden.

Discovering this staining method was significant for me because I'd always used color to help convey the story behind each of my characters. I enjoy telling people about my characters and where they came from because I think that if you know the story behind the carving, you'll feel closer to it. The stories are also personally significant. My fantasy pieces come from the books of my childhood—kings and castles and wizards of the dark ages in England and Wales, where part of my family originated. The folk pieces developed from my family's Germanic heritage, and the experiences we've had since settling in Virginia's Shenandoah valley in 1760. I've been fascinated with this blend of legend and history, folklore and family, fantasy and humor as long as I can remember.

The Gypsy Queen of Ottobine is a good example of how I rely on color. Note her red comforter. It's an essential part of the character because it was given to the Gypsy by my great-great-grandmother, Elizabeth, during the dark days following the Civil War. The Gypsy came one afternoon and said, "Mrs. Heatwole, you have a coverlet that I've admired for years, and if you give it to me, I'll tell your fortune." After the offer was refused, the Gypsy revealed her fortune anyway, asking only that she be given the comforter if Elizabeth thought the information worthwhile. The fortune was: "You've got two men off because of the war. Tonight they'll both come home. One'll come a-walking and one'll come a-riding. One'll have money in his pocket; one'll have none." That night her brother-in-law, a Confederate cavalryman, rode in from Appomattox broke and tired, and was soon followed by her husband, John, who had a pocket full of coins from picking apples in West Virginia. John, a potter and a hunter, had left the valley because he was wanted, dead or alive, for avoiding military service. When I carved him, I showed him with a panther slung over his shoulder, the man and his quarry staring quizzically at the world. □

Painting procedure

My painting system works best on basswood and Virginia mountain laurel, but it doesn't do very well on open-grained woods like oak. The paint goes on nicely if the carving is sanded to at least 400 grit, to break all of the extremely sharp edges. This fine sanding is crucial on the face, where even the slightest amount of fuzz can distort the colors. All colors work equally well, except for black, which seems to make everything dark and murky—instead, use burnt umber for darkening. I prefer Shiva and Grumbacher oils, available at artists' supply stores. Grumbacher's raw sienna is the best shade of brown for the undercoat; other brands seem a little too green to me.

In the photos I show how to paint the Gypsy queen, a 14-in. figure that I carved from basswood. I begin by squeezing a long strand of raw sienna oil paint directly from the tube onto a paper palette, add boiled linseed oil and whisk it briskly *(1)* until the mixture is translucent, no thicker than the original linseed. Thorough mixing is important; otherwise the wash leaves dark-colored streaks on the wood.

I apply the stain liberally to the entire carving *(2)*, flooding all of the surfaces, then immediately wipe off the excess *(3)*. It's important to get all the excess out of the cracks and crevices so it doesn't interfere with the later color coats or make them look muddy. Once the undercoat is applied, I figure I have four to five hours to complete the painting before the wash coat hardens. On large pieces, I treat a half or a quarter of the carving, then completely paint that area before adding more wash. It can be difficult to blend the colors so sections painted at different times don't clash with each other, so divide the work into logical whole units, like the head or chest, rather than doing the bottom half

1. Blend raw sienna and linseed oil on a paper palette.

2. Apply the thin brown stain liberally to the carving.

3. Let stain soak in a few minutes, then towel off excess.

4. To make the basic fleshtones more lifelike, Heatwole adds red highlights to the cheeks and lips.

of the carving, then trying to make the top half match. You can't re-wet the areas with wash if you run out of time. If you wait too long, nothing will work.

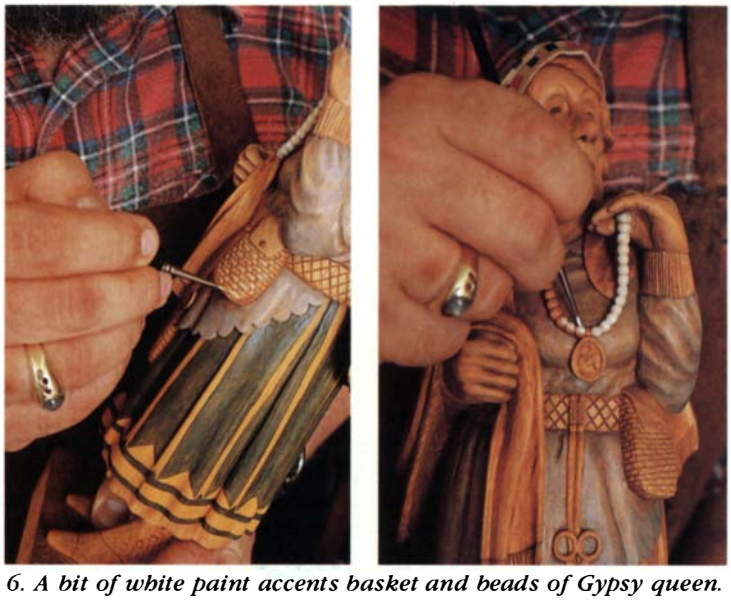
The face is always one of the most scrutinized areas of a carving like the Gypsy queen, so I'm especially careful here and use very dilute mixtures of oil colors and boiled linseed oil. I begin by applying a fleshtone for the face, a mixture of white, red and raw sienna, then immediately, in sort of a wet-on-wet technique, a ruddy red color to highlight the cheeks and add details like the lips *(4)*. The colors as they appear on the palette give you a pretty good idea of what the colors will dry like on the wood, although sometimes the blues and greens are a little more vibrant when dry. I generally try to do the light shades before the dark colors. This way I can use the dark colors to cover over any mistake I might make in the lighter ranges. Again, working with a wet-on-wet technique, I apply dark colors—such as burnt umber or burnt sienna—to create shadows on the carving, which makes the colors seem more realistic.

On detailed areas like the Gypsy's kerchief, I paint the area white before putting in the blocks of color. With a fine 000 brush *(5)*, I can put down a pattern of squares or diamonds as small as $\frac{1}{16}$ in. Fine detail seems to work best when done on a slightly heavier, higher-contrast background than the rest of the carving. Many subtle accents are possible, like the white highlights applied to the carved basket pattern *(6, left)*. Note how the color stripes and bands make the dress more interesting. Color, also, is largely responsible for visual details like the decorated beads worn by the Gypsy *(6, right)*.

After the painted carving has dried for a couple of days, I spray it with Grumbacher's Tuffix Matte fixative, used by artists to protect charcoal and other fragile drawings. I apply several fairly heavy coats, rubbing down each coat with 0000 steel wool after the fixative dries. This spray gives each piece a very fine, satiny sheen that is pleasant to look at and makes the piece easier to clean. I have been using this system for more than seven years now, and, so far, the colors have remained translucent and have not faded.

John Heatwole is a professional woodcarver with a studio in Bridgewater, Va. His work was recently featured in an international juried exhibit of fantasy art at the Delaware Art Museum in Wilmington.

5. Heatwole paints the kerchief pattern with a fine brush.



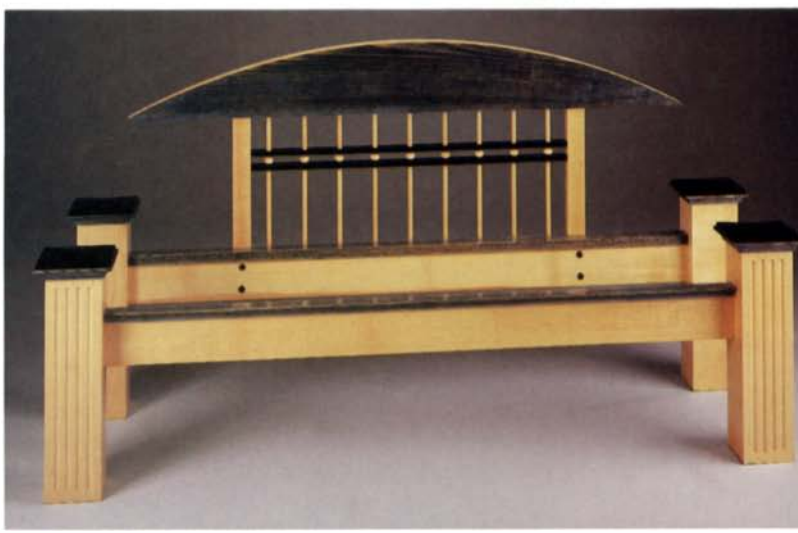
6. A bit of white paint accents basket and beads of Gypsy queen.

Oregon Show

Fall color brightens Northwest guild exhibit

by Sandor Nagyszalanczy

Photos above and below: David Brown



Beth Yoe created an unconventionally shaped writing desk (top) to show off the fancy Tamo (Japanese ash) veneer at eye level. To introduce color and provide a durable writing surface, she chose green acrylic auto enamel. Yoe's husband, Tom Freedman, built the ash bedframe (above) in a style he calls "shopping mall modern." It mixes a Memphis-style facade headboard with classical fluted-column legs. The wispy blue color at the top of the headboard was done with analine dye to let the grain of the ash show through, while the tops of the posts and rails were painted with enamel. The Honduras mahogany writing desk by Steve Grove (right) pays hommage to the Orientally inspired designs of Arts and Crafts architects Charles and Henry Greene. Grove carved the pulls from Indian rosewood and used traditional joinery throughout. In order to darken the color of the mahogany without muddying the grain, he applied a chemical-reaction stain.

The northwest city of Portland is often a rainy place, where it's said that old Oregonians don't die—they just rust. But the inspiration for many pieces at the Guild of Oregon Woodworkers' show came from places beyond the rainbow: the bright wit of Italian Memphis, billowy clouds in Kansas, the blond beauty of Japanese ash. The Guild's strongest showing since its 1982 inception, last October's exhibit featured the woodwork of more than 50 of its 100 members. The show was sponsored and hosted by the World Forestry Center.

The work reflected widely ranging tastes and interests, and there were stark contrasts between pieces like a manically colorful Post-Modern bed by David Dochow and a traditional mahogany Queen Anne table by Broadleaf Design. Taking a cue from the retail trade, much of the work was displayed in room groupings: The tables and *shoji* of John Masciocchi and Ed Gordon were set up in an Oriental room motif, complete with blue Chinese rug and *ikebana* floral arrangement. Participants often made their pieces from woods indigenous to the Northwest Coast, such as myrtlewood lumber used by Bill Fox for his sinuous and organic "Cascade Spinning Wheel," as well as from faraway exotics such as the jarra burl used for an urn made by Emmett Turner.

A unique and unusual part of the show was a design competition called "Two by Form," where participants challenged their creative abilities by trying to make a clever project out of a single 2x4 (see Notes and Comments, p. 116).

With a membership of mostly professional woodworkers, the group's monthly meetings have recently focused on business and marketing, with seminars on presentation strategies and a critique of members' portfolios given by a local advertising firm. □

Sandor Nagyszalanczy is an assistant editor for FWW.

Photo above: Joe Felzman

The decorative dots on Mark Hanson's wenge stereo chest (above) are made of ivory from an old, cracked billiard ball given to him by the client. The top features a holly stripe inlaid around the edge. He experimented with curved-line layouts and chose the one most pleasing to his eye. Sam Bush, while driving across the plains on a cross-country trek, saw a stormy horizon that inspired his "Kansas Thunderstorm" box (left) made of white oak and split cedar. The silhouette cutout appropriately follows the boils and curls of the oak's figure. The flutes in the satinwood column of the Art Deco-ish lamp by Beth Yoe (below), are reflected in the pattern of lines etched in its glass shade, done by Savoy Studios. The base and shade-frame are ebonized ash.

Photo below: Joe Felzman; right: David Brown

Laminated Spinning Wheel

Spokes without a lathe

by Albert Peetoom

Except for parts of the whorl and bobbin, this laminated spinning wheel was built without a lathe. A doubled-over loop of cord drives the spindle and whorl.

I built my first spinning wheel, the one in the photo above, while studying for my journeyman's papers as a boatbuilder. As the old hands patiently passed down their skills to us apprentices, it astonished me to think that after just four years I would be entitled to their rate of pay—how could I ever learn to be an accomplished woodworker in four years, or even forty?

So, in my spare hours, I sought other woodworking projects that would help round out my skills. One confidence-builder was a marquetry panel I made of a 150-year-old house in Aurora, Ontario, where I had lived when I was a child. The second project was inspired by the sight of a laminated ship's wheel at a boat show. I stared at the wheel for ten minutes, building it in my mind. But, of course, I couldn't justify building a whole ship as an excuse to make the wheel!

I don't remember who mentioned it first, but it turned out that my mother-in-law wanted a spinning wheel, and that's how this project began. Spinning wheels have been built for hundreds of years throughout the world. They were not only designed as machines, but also as attractive pieces of furniture. Today, antique wheels are sought for living-room decor rather than their spinning ability. Yet mine was to be a working wheel, and to ensure that it did its job, I started with the dimensions of the Norwegian raised-table wheel pictured in Bud Kronenberg's book *Spinning Wheel, Building and Restoration.* This book is, unfortunately, out of print, but at the end of this article I have listed another that should help in getting this wheel to run correctly. There are several options for the spinning mechanism. The design shown here is meant for spinning fine-to-medium yarn at a skilled level.

Very briefly, a spinning wheel works by rotating a bobbin shaft (see figure 3) very rapidly. Wool fibers are fed in through the end of the shaft, which twists them up into yarn. The twisted wool feeds out through a hole in the side of the bobbin shaft and runs up a row of hooks on the flyer, which is glued to the bobbin shaft. On my wheel, the pulley attached to the bobbin is smaller than the one on the shaft, and so the bobbin turns faster than the flyer, winding up the wool as it's spun. The bobbin pulley has a flat-bottomed groove, so that it can slip a little as the bobbin fills.

I hope I can cover enough here that you will at least be able to make a spoked wheel without needing a lathe. For those interested in completing the full project, there should be enough hints in the drawings, photos and sources to finish the job, provided you are willing to add a measure of your own ingenuity.

I made my first wheel with one small jig that bent and glued each U-shaped spoke section separately. When I had them all done, I epoxied them together to form the wheel, then added the rim and the hub. One of my first reactions was to be grateful that epoxy was so good at filling gaps. Yet each lamination improved, and by the time I got to laminating the treadle, I could produce tight, seamless joints.

A spinning wheel does not have to be as strong as a wagon wheel, but it does have to be balanced and must run true. One of the things I learned along the way is that the best lamination is

The key to a balanced wheel is an accurate form. Here the author bends steamed laminations into place for drying, after which they will be epoxied together into a rigid framework. The hub and rim are then added to complete the wheel.

achieved when the strips are pressed between a male-and-female jig. For my second wheel, I made the full-wheel jig shown in the photo above. To make a laminated wheel that turns true, it's most important that the clamping jig is made as accurately as possible. My jig is centered out around a ¼-in. hole through the plywood; this hole represents where the axle will be, and its importance will become clear as we go along. The dimensions of the jig can be taken from figure 3. Lay the lines out clearly and number all the jig pieces and their positions on the form. Use screws to fasten the teardrop-shaped sections, because they will be removed and re-fastened several times. Wedges, as shown, give adequate clamping pressure.

The wood to be bent and laminated should be clear stock with a relatively straight grain. I have used black walnut, red oak and Honduras mahogany. Walnut has excellent bending qualities. Oak must be cut slightly thinner than walnut to take the same stress without breaking. Mahogany is less pliable than oak and breaks more frequently, so extra pieces must be cut.

In making the first wheel, I began by soaking the strips in hot water before bending. I soon discovered that steaming makes things go much faster. My steam box is a simple long box made of plywood and heated by an electric tea kettle. I steam the strips for about four minutes, bend and wedge them into the form, then allow them to dry. Steamed strips will dry overnight, whereas soaked ones sometimes take days. When the strips are removed from the form there is some springback, but they retain enough of the shape to be returned to the form for gluing.

For gluing, every part of the jig must be wrapped in light plastic sheeting to prevent the jig from becoming part of the finished wheel. In your glue-up procedure, make sure that the plastic doesn't puncture, because the wheel must pop off the jig with little effort and return there after clean-up so that the hub and rim parts can be added.

I used epoxy for the entire spinning wheel. If a laminate does not press quite tight, the glue will fill the void with no structural problems. The epoxy I used is made by Industrial Formulators of Canada, Ltd. (3824 William St., Burnaby, B.C.).

The epoxy's short working time—45 minutes—meant that I could not glue up the whole spoke assembly at one time. Instead, on the first day I glued three of the U-shaped spoke sections together, supporting the outer spokes with unglued laminations in the jig. After the epoxy had set up somewhat, but not fully cured, I removed the three-spoke assembly from the form and cleaned up the excess glue. In general, with epoxy, it's best to sand off the excess within 24 hours, when the glue is still pliable and cuts well without raising dust. If you allow the epoxy to fully cure (usually in two or three days, depending on the temperature) it chips off, taking wood with it. The hard glue dulls a cutting edge as well, so plan clean-up time carefully.

The second day, I glued three more spoke sections to the first; on the third day, I added the last two sections. Don't be surprised, as you add sections, if you have to unscrew parts of the

Photos, except where noted: Keith De Jong, drawings: Joel Katzowitz

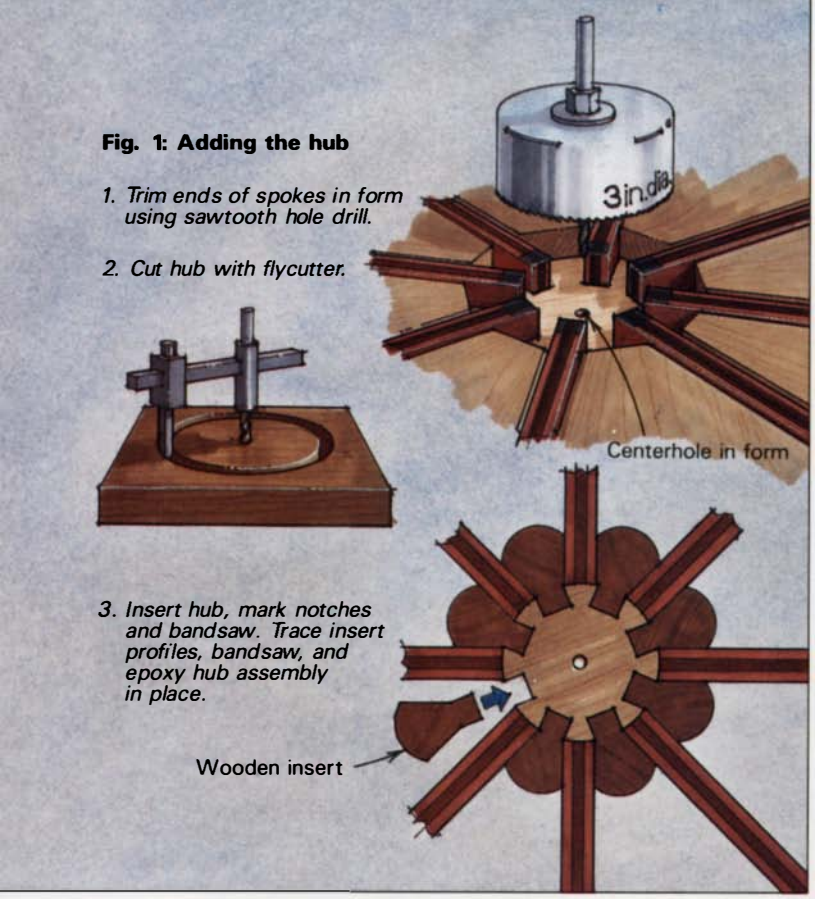


Fig. 1: Adding the hub

1. *Trim ends of spokes in form using sawtooth hole drill.*
2. *Cut hub with flycutter.*
3. *Insert hub, mark notches and bandsaw. Trace insert profiles, bandsaw, and epoxy hub assembly in place.*

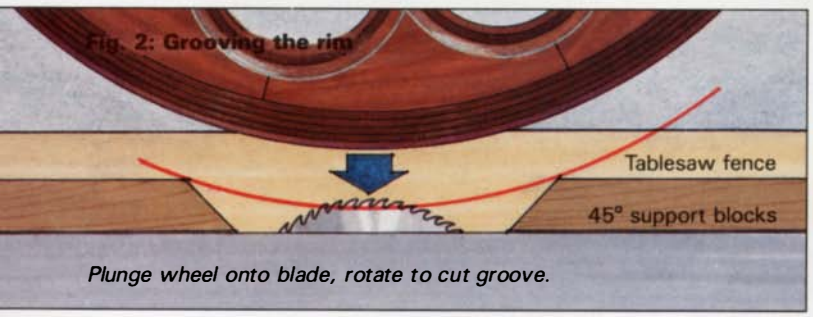


Fig. 2: Grooving the rim

Plunge wheel onto blade, rotate to cut groove.

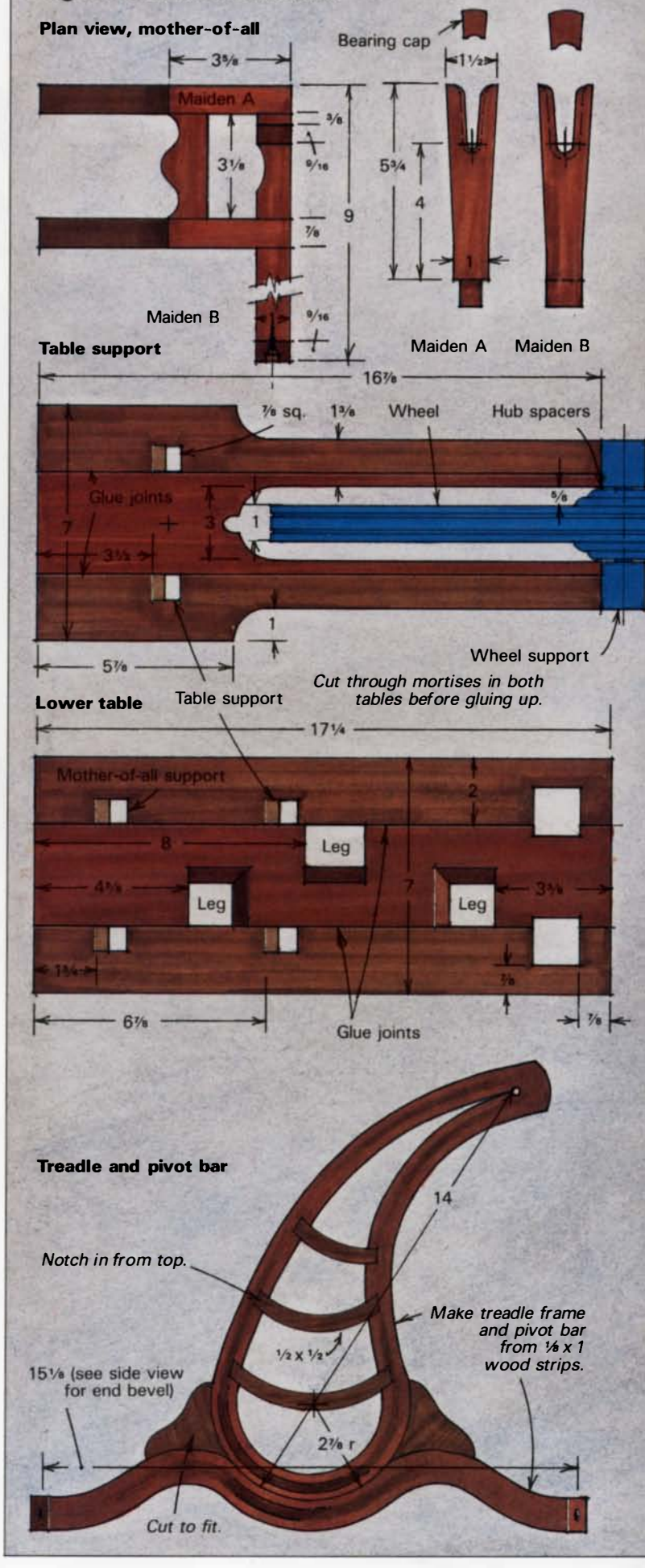


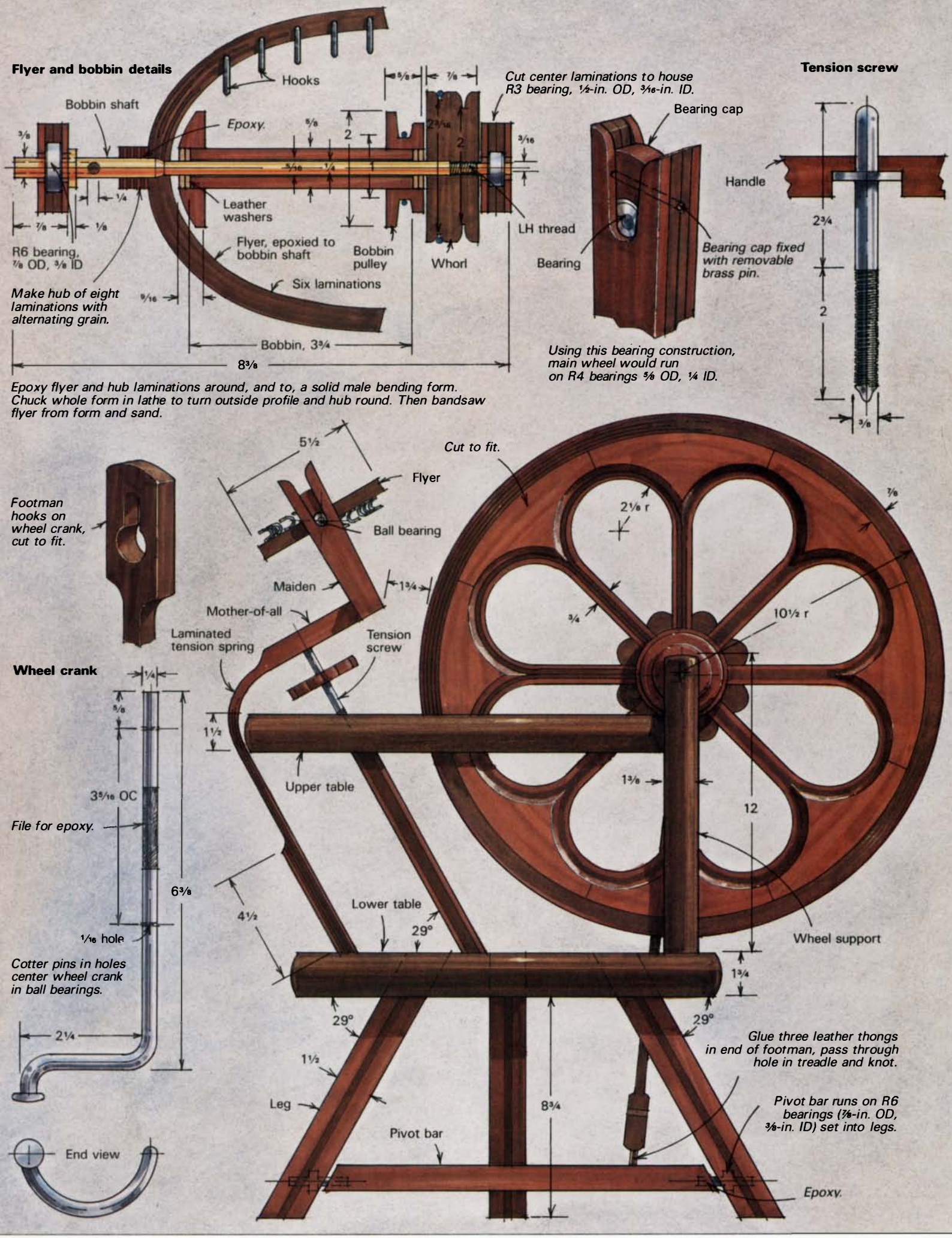
Fig. 3: Wheel dimensions

form to remove and replace the wheel. It will be tight. The hub assembly, which will hold a ¼-in. axle, is added to the wheel as shown in figure 1. To make room for the hub to fit in the form, I bandsawed the points off the teardrop-shaped blocks. If this had been a production effort, I would have made entirely new blocks for the purpose, or even a whole second form. The importance of the centered axle hole now becomes clear—it's the pilot hole for trimming the spoke ends to length. When the hub insert is added, its centerhole lines up with the original hole in the jig, and becomes the pivot hole for truing the wheel on the bandsaw. I'll get to that in a moment, but first we have to add the rim.

The rim is composed of sections of solid wood surrounded by five strips of laminations to form what could be called the tire. The entire rim is ¼ in. thicker than the spokes for two reasons. First, aesthetics—I thought it would look better. Second, function—I needed the extra width on the tire for the two grooves for the spinning wheel's drive cord.

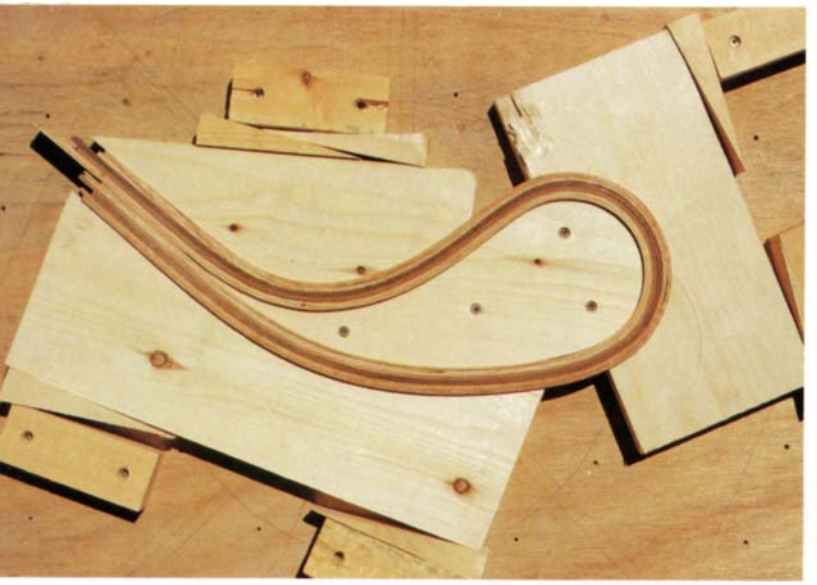
The solid-wood rim sections are bandsawn to shape and epoxied to the spoke sections on the form. I removed the original wedge blocks and added new ones for wedging the rim segments in place. To center the ¾-in.-thick spokes in the 1-in. rim, I shimmed the spoke assembly with ⅛-in.-thick strips, and added another layer of ⅛-in.-thick pieces on top, to allow a level surface for weighting the wheel flat as the glue cured.

After the epoxy had hardened somewhat, I removed the wheel and cleaned up the glue. Then I made a cove joint between the



Drawings: Joel Katzowitz

Cutting the tricky angled mortises for the legs (see figure 3) is a matter of sawing and chiseling before the table is glued up.



Forms to clamp parts with compound curves must be designed so that the clamping pressure occurs where needed, perpendicular to the centers of the bends. The crossbars in the finished treadle are bent and notched into place separately.

rim segments and the spokes using a ⅜-in. #7 gouge. My next step was to true the wheel round in a circle-cutting jig on the bandsaw (see *FWW on Proven Shop Tips*, pp. 82-83, The Taunton Press).

I applied the outside laminations one at a time, cutting each layer to fit with butt joints. It doesn't matter whether each layer of the rim is a single strip or not—mine were two pieces each. I didn't bother to steam these strips, as the bend was not severe. The four inner layers are ⅛-in. strips of light and dark walnut; the outermost layer is purpleheart. For pressure, I used a web clamp. After the last outside lamination went on, I found that the wheel did not need truing; if it had, I would have used the axle hole as a pivot and trued the wheel with sandpaper and scrapers.

Those are the basics of making the wheel. To make the hub covers, I cut discs with a flycutter, then shaped them with an ogee bit in a router. The covers are epoxied to the hub and act as spacers so the wheel can stay centered in the uprights.

Here's a quick course in completing the spinning wheel. The uprights and the legs are notched right through the upper and lower tables. Instead of drilling and chiseling through a solid piece, I laid out the notches in such a way that they could all be cut from an edge before glue-up, as shown in the photo above. The two front legs come through the lower table at a compound 29° angle. Because of this, these legs are parallelograms in shape and must be cut by trial-and-error to fit.

Up to that time in my woodworking apprenticeship, these were some of the most complicated joints I had made. I have to confess that they would not meet my standards today. But I had viewed the project as a step in the learning process, and counted on the gap-filling properties of the epoxy to fill the gaps in my skills. When it came to fitting the legs, I had some difficulty keeping the epoxy from draining out of the joint. To remedy this problem, I simply covered the top of the notch with wide cellophane tape and turned the table upside down. The tape formed a dam to keep the glue in, and was sanded off after the glue cured. You can probably see some wide glue lines in the photo of the first wheel; the second wheel shows much improvement, and when I make a third wheel it will be better yet.

Here's another learning experience: On my first wheel, I supported the wheel-crank bearings by laminating them into the uprights. This method called for improvement because the bearings are inaccessible and the wooden support tends to wear with use. On the second wheel I used a bearing cap instead, as shown in figure 3, in much the same way as the bobbin shaft is kept in line on the maidens.

The drive cord is a single length looped double. A spinning wheel needs a sensitive, practical means of adjusting the drive tension. The standard practice is to use a wooden bolt and nut to draw or tilt the mother-of-all carrier. Instead, I mounted the mother-of-all on a springy lamination, to help even out the drive impulses. To tension and steady this assembly, a screw is threaded into the upper table; its top end fits into a metal sleeve in a 1-in. slot in the mother-of-all.

To make the threads for the tension screw, I drilled a 7/16-in. hole through the upper table and covered the bottom with cellophane tape. I filled the hole with epoxy and, as it started to get thick, I put a waxed ⅜-in. bolt into the hole, cleaning away the excess epoxy as it was displaced. When the glue was good and hard, I heated the bolt with a soldering iron and turned it out. The epoxy threads were very tight at this point, but by rolling up some 120-grit sandpaper and running it up and down in the hole, I was able to get enough clearance.

For the hardware, your best bet would probably be to enlist the aid of a local metalworking shop or order from the firm listed in the sources. As a boatbuilder, I had an easy time getting the hardware custom made for a reasonable cost—about $100 and a case of beer. All the hardware that requires a bond to wood can be attached with epoxy. The section of metal that gets glued must be filed to create a jagged surface that will allow a mechanical bond with the glue.

My major problem, in terms of the time involved, was tracking down someone with an abrasive surfacer large enough to sand the wheel flat. That problem was finally overcome through dogged perseverance, and the first wheel eventually came out fine. This second wheel, built on a much more accurate form, may not need surfacing at all. We'll see. □

Albert Peetoom lives in Maple Ridge, British Columbia.

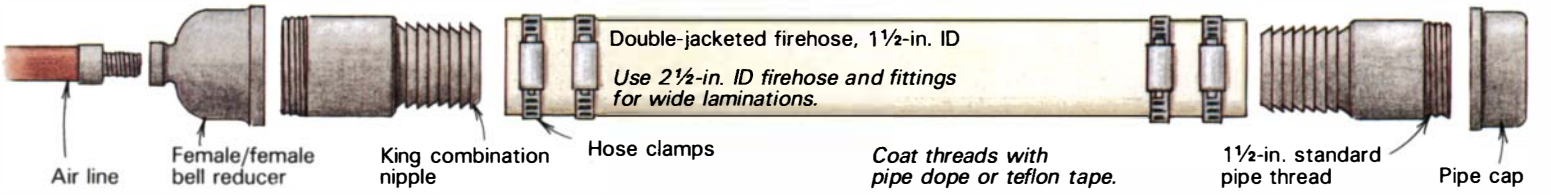
Sources of supply

A complete set of metal parts for this wheel can be ordered from Fairfield Manufacturing, 213 Streibeigh Lane, Montoursville, PA 17754. (717) 368-8624. Total cost for sealed bearings is $58.50; the crank, spindle, etc. total $83.45.

For fine tuning and running the wheel, try: ***The Care and Feeding of Spinning Wheels*** by Karen Pauli; 76 p., 1981, illustrated, paperback, $7.50. Published by Interweave Press, Inc., 306 North Washington Ave., Loveland, CO 80537.

Pneumatic Laminating

by John Kriegshauser



When I made the parts for this chair, I confronted a problem with several aspects. I planned to build these chairs in batches, so I needed a mold that would squeeze the laminae tightly even though the thickness might vary slightly from batch to batch. Also, a simple male/female mold would not deliver much pressure to the tip and the center of the S-curves of my parts, which are at steep angles to the direction of clamp pressure. And, finally, since the interior radii of the curves were barely 2 in., I needed very thin laminae. In fact, 3/64-in. veneer, special ordered from a local veneer mill, proved cheaper and more uniform than anything I could saw myself.

Many indifferently made laminating molds perform well because the laminae are relatively thick, and their resistance to bending provides the necessary pressure on the glue lines. But my stock was so thin that it sagged under the weight of the glue. I needed a clever new approach, and found one on p. 47 of the *Wood Bending Handbook,* by W.C. Stevens and N. Turner (available for $9.50 from Woodcraft Supply, P.O. Box 4000, Woburn, Mass. 01888).

The solution was to make extra room in the mold for a length of firehose. This was loaded into the mold on top of the laminae and inflated after the clamps had drawn the two halves of the mold together. The clamps are not screwed tight, since some expansion room has to be left for the hose. In making the mold, I allowed about ¾ in. extra space so the hose would inflate to a pancake-shaped section instead of its normal 2-in.-round section. This flattened shape would provide pressure across the full width of the laminae. By using 40 to 50 psi from my compressor regulator (I tested each hose to 200 psi with no explosion) I could get even distribution of pressure along the entire curve, yielding absolutely tight glue seams.

Then came the unanticipated problems. When I surfaced the newly formed posts, I discovered that within hours they surface checked, sometimes badly. The glue (I used Titebond) had added so much moisture through the many glue lines that my parts were almost damp. But, when I allowed the glue squeeze out to remain on the pieces as a moisture barrier for a few weeks, they would dry and could then be surfaced without a flaw. I also found I had to modify my mold because the parts consistently bent more as they dried.

If you want to try this method, you can usually get lengths of damaged hose from any busy fire department, and the pipe fittings are standard plumbing items. Be sure that your mold is secured in place, because the inflating firehose is a live element that can cause the mold to rock or even fall over. Also, always add pressure slowly; I've had fragile molds break apart from the force. □

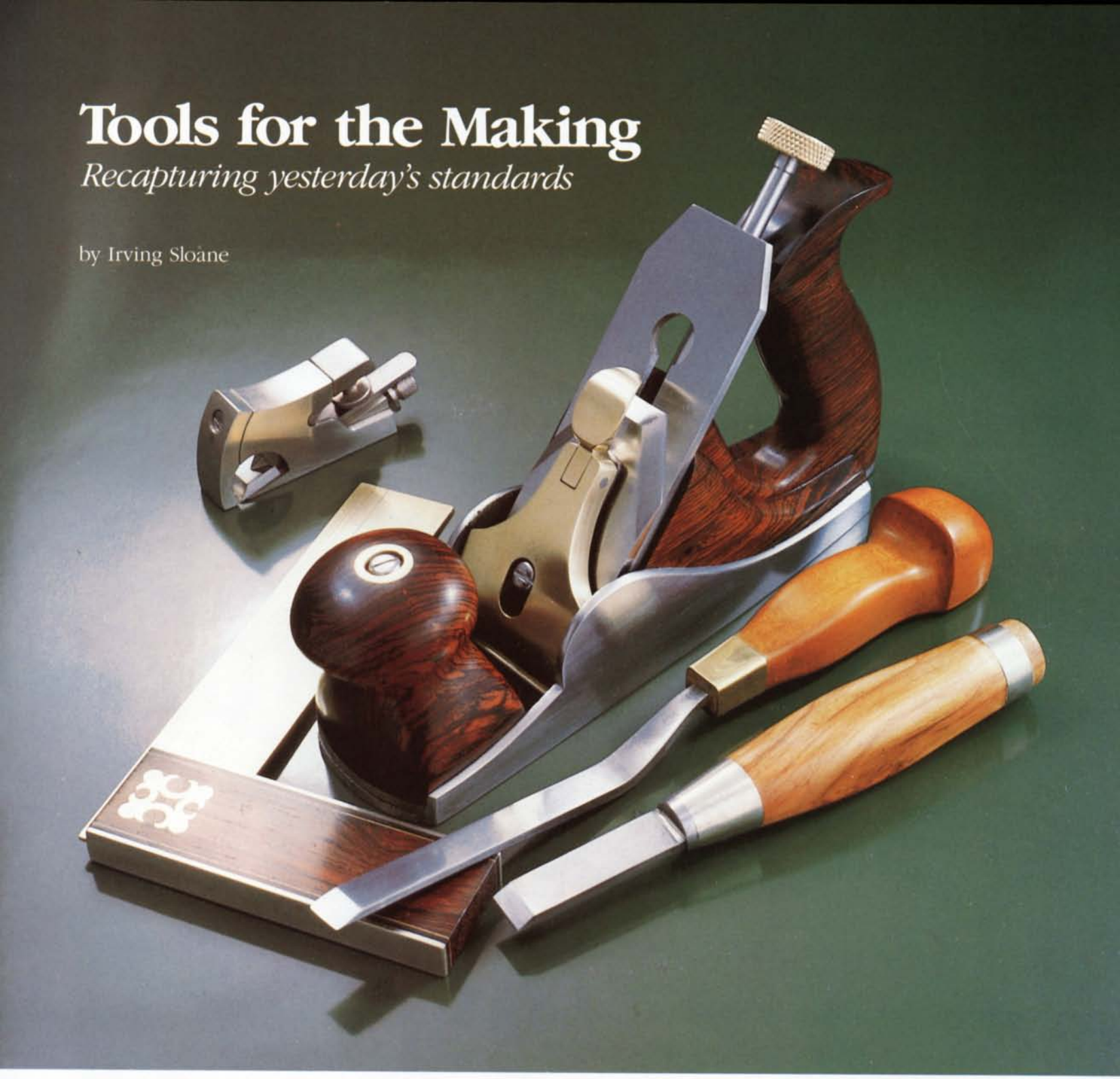
John Kriegshauser works wood in Kansas City, Mo.

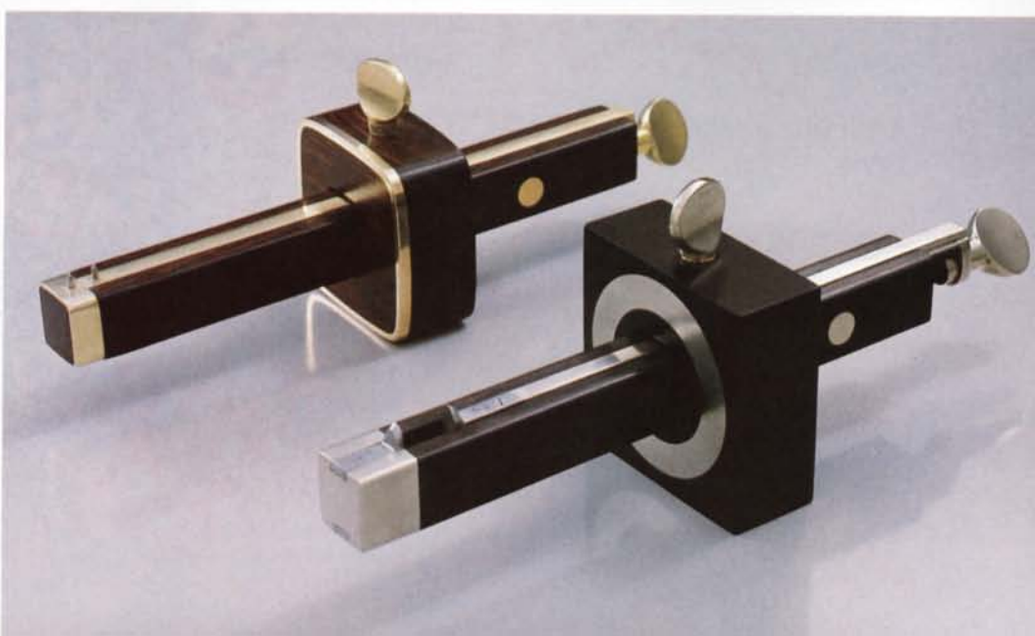
The chair above is made from bent laminations. S-curves are difficult to clamp uniformly, a problem the author solved by lining his plywood jigs with air-pressurized firehose.

Tools for the Making

Recapturing yesterday's standards

by Irving Sloane





The author makes tools for several reasons—to recapture the quality of days gone by, to meet the demands of special applications, and to improve on the designs available from mass-producers. The objects shown on the facing page recapture the combined elegance of function and appearance that every first-rate cabinetmaker once expected from his tools.

I am probably the only active woodworker with both a Norris and Primus smoothing plane gathering dust on a shelf. The reason for this curious circumstance is that I have built replacements that come much closer to my personal vision of what a plane should be.

I make guitars, working almost entirely with hand tools: a comprehensive collection of planes, saws, chisels, scraper blades and miscellany accumulated over 30 years. The scale of my instrument building does not call for heavy power tools, with their concentration-shattering din. Making musical instruments is essentially a quiet activity, a calming ambiance in which I draw great physical and metaphysical pleasure from planing, sawing, scraping and otherwise working wood by hand.

My idea of a good tool is a solid, well-made object that does the job it was designed to do. It should be comfortable to use and, I hope, look attractive. Finding hand tools that fit these particulars is not as easy as it once was. Power tools have pushed out many hand tools, and manufacturers have dropped others because turnover is too small by today's high-volume standards. Lightweight plastics are fast replacing wooden handles (to the detriment of a handsaw's balance), and high labor costs in industrialized countries will increasingly shift manufacture to low-wage countries, where price will be more important than quality.

The whole ethos of merchandising has changed since the days when tools of durable excellence streamed from the factories of Victorian Britain. Tool manufacturers then shared the universal assumption that having a good product was the high road to competitive success. Skilled journeymen, the "marketplace" back then, demanded fine quality; lesser tools made for dilettantes were whimsically described as "Gent's" tools.

Today, competitive pressures focus on that end of the market where the preemptive word is not so much "good," but "right"—the right tool, the right price, and the right merchandising. The appeal is aimed at the great mass of basically unskilled buyers who are building shelves in their garages. The choice of color for a plastic handle (involving market research and color consultants) is counted a weightier matter than the alloy in the blade. For these and other reasons, I came to understand that if I wanted my dream plane, I would have to make it myself.

I wanted tools that would not only function better than those on the market, but look beautiful too. Using planes as much as I do, I soon realized their shortcomings. The Norris smoothing plane, a famous example from the golden age of British tool manufacture, has deficiencies that make it less than wonderful today. The front grip is a brief stub of wood offering a restricted hand-hold, and the closed handle is designed for the three-finger grip favored by British woodworkers but alien to me. The screw-adjusted cap is inefficient—a half-turn too little can affect the plane's functioning. The cutting edge is concealed from view and can easily strike the bottom of the fixed screw cap or the top of the mouth, and the mouth is not adjustable. The things I really like about the Norris are its heft, coffin-sided shape, thick blade and the configuration of the wooden frog. My own design for a metal bench smoother was based on these Norris features.

The wood-bodied Primus plane is a well-made German tool with a cumbersome adjusting mechanism. Removing the blade for sharpening is an above average bother, and replacing it involves complete repositioning of the blade using two knobs. I find the Primus' horn-style tote unsatisfying in terms of comfort and control. As a plus, the mouth opening can be changed by simple adjustment of a wooden insert. I wanted my plane to have an adjustable throat, depth-adjustment without slack, lever-action blade cap for fast blade removal, and a lateral adjustment by means of a concealed device that could not be knocked askew.

I made many sketches, and tried different styles of tote and handle before constructing the metal bench smoother shown on the facing page. The patterns for the brass lever cap and malleable-iron body casting were made of wood, with the bent sides made of maple veneer laminated over a curved form. Both of these, plus the pattern for the sliding toe piece, were sand castings. The regulating mechanism parts and cap lever were built of boxwood, and cast by a lost-wax foundry using inexpensive silicone molds. Steel regulator shafts and knurled brass knobs were turned by a machine shop. Precise hand-fitting of all the regulator parts eliminated slack motion. Wooden parts are Brazilian rosewood, the handle being a three-piece lamination. The blade is a 2-in. chrome vanadium replacement blade, ⅛ in. thick (available from Woodcraft or Garrett Wade).

For the wood-bodied plane, I used a laminate construction to avoid the difficult job of mortising the throat out of a solid block. Quartersawn teak was chosen for its dimensional stability, and the sole was lined with stainless steel. The metal lining is epoxied to the sole and secured with a "key" mortised into the front and back end of the body. These keys are hard-soldered to the sole plate. Loosening the screw in back of the tote permits movement of an insert in the sole to open or close the mouth. This plane is a joy, comfortable to work with for long periods and has the balance and heft that make it a good all-around plane. It holds a 1¾-in. chrome vanadium blade, ⅛ in. thick.

My total cost for four planes (jack and jointer in process) will average out to about $65 per plane. Not cheap, as planes go, but certainly a worthwhile investment to me. So far, I've built 22 tools—planes, trysquares, mortising gauges, bevels and spokeshaves. Good commercial chisels are not in short supply, so my chiselmaking has been confined to special-purpose kinds. I particularly like the exceptional comfort of a chisel-handle shape based on the handle of an engraver's burin used in conjunction with a square instead of round ferrule. A square ferrule automatically orients the hand in its proper working mode. I plan about 10 more tools, including block plane, instrument-maker's vise, level, hand router, and hand drill of improved design.

The time is not far off when China, India and other developing countries will be shipping basic hand tools of very acceptable quality to world markets. It is interesting to speculate that domestic producers may then abandon the homeowner market and choose to focus on tools for the skilled woodworker. We might see a bench plane that is not a Ford, but a Mercedes. In the meantime, I've found that it's entirely possible to make your own tools using the best materials available, and without the cost constraints manufacturers have to live with. Not the least benefit of surrounding yourself with elegant tools is the constant stimulus to do work that measures up to the tools. □

Irving Sloane makes guitars in Brussels, Belgium. He has written several books on guitar construction, and these, too, focus on the benefits of making special-purpose tools. Making his inlaid bevel gauge was described in FWW *#60. Photos by the author.*

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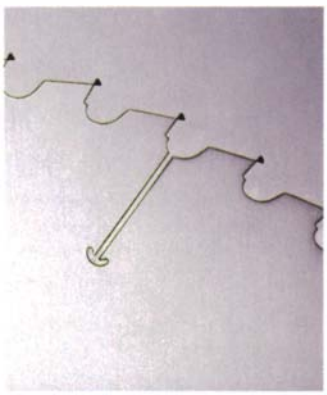

After heat treating and tempering, we chuck each blade up on this microprocessor-controlled surface grinder for flattening. The machine makes up to 20 separate passes across the surface of the spinning blank. The first "rough" pass may take up to 2 thousandths of an inch. Final passes are automatically gauged to less than one TEN thousandth! Result? A blade that's absolutely and completely FLAT!

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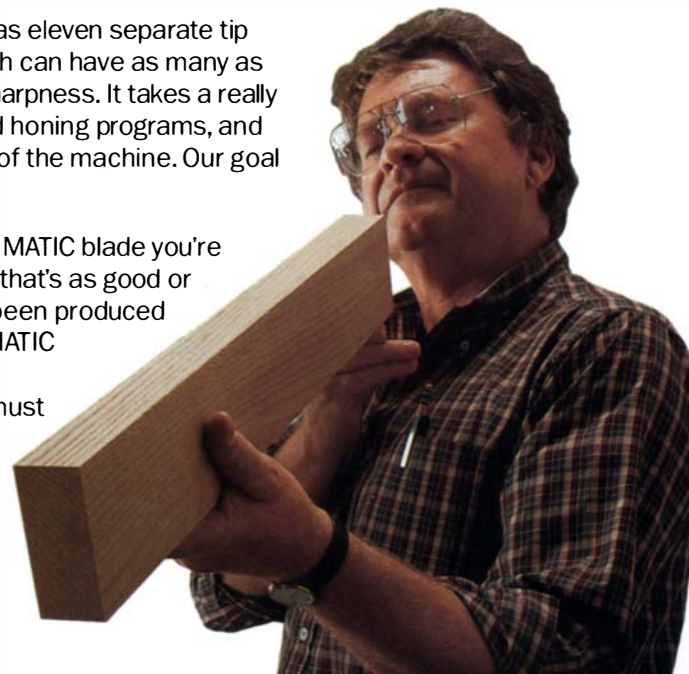

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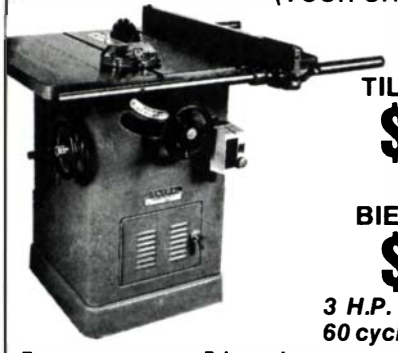

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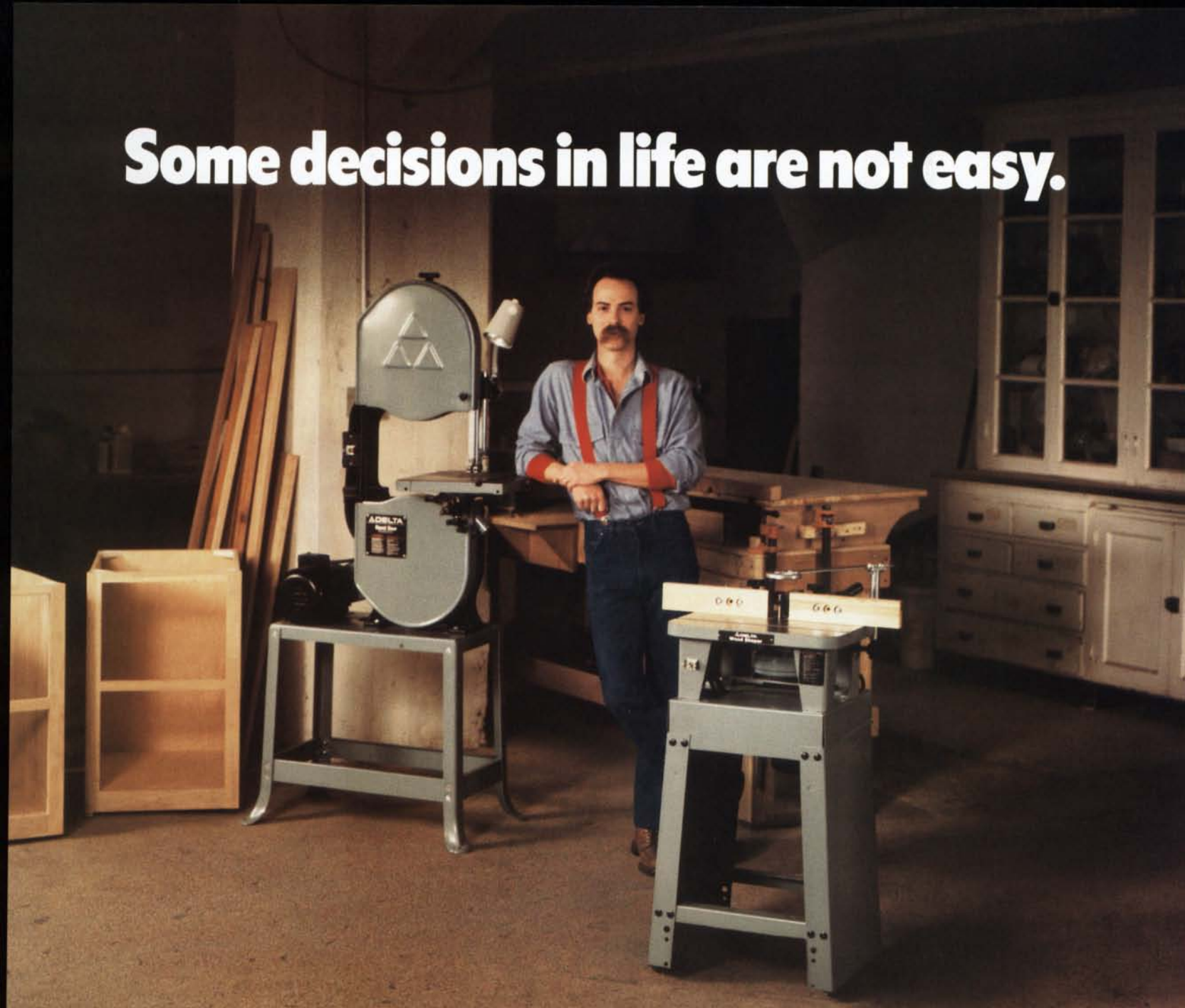

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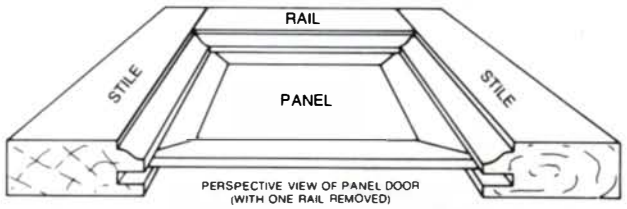

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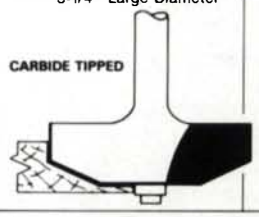

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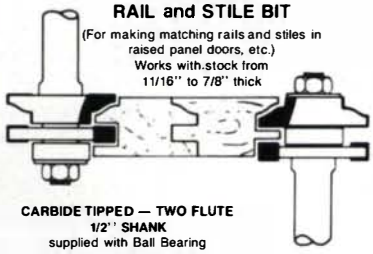

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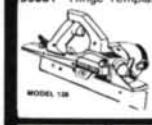

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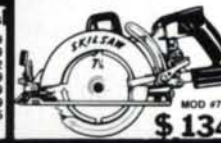

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ANDERSON RANCH ARTS CENTER. Summer program. Furniture-making and design courses in the Colorado Rockies. See display ad page 7.

ANDERSON RANCH ARTS CENTER. Residency program. Nine month winter residencies available beginning September 1987 for furniture designer/craftsman. Write or call Peter Korn, Anderson Ranch Arts Center.P.O. Box 5598, Snowmass Village, CO 81615. (303) 923-3181.

Miscellaneous

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Publications

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FHB issues 19-23; *Workbench* 1983-1986; *Woodsmith* issues 13-42; *FWW* issues 1-53; $335, negotiable. Mrs. F.K. Hill, 12408 Hall's Shop Rd., Fulton MD 20759.

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Used books--woodworking, hobby and crafts. List, $2. Leon Williamson, 1899 Lower Kings Bridge Rd., Dalton, GA 30720.

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Specials on EMCO machinery. Small ad--big savings. Visa/MC. The Woodworker Shop, 912 Lakeshore, Fairfield Glade, TN 38555. (615) 484-9309.

Wanted to Buy

Powermatic 10-in. or Unisaw sliding table attachment. Need two. W. Nagel, Box 1173, Honokaa, Hawaii 96727.

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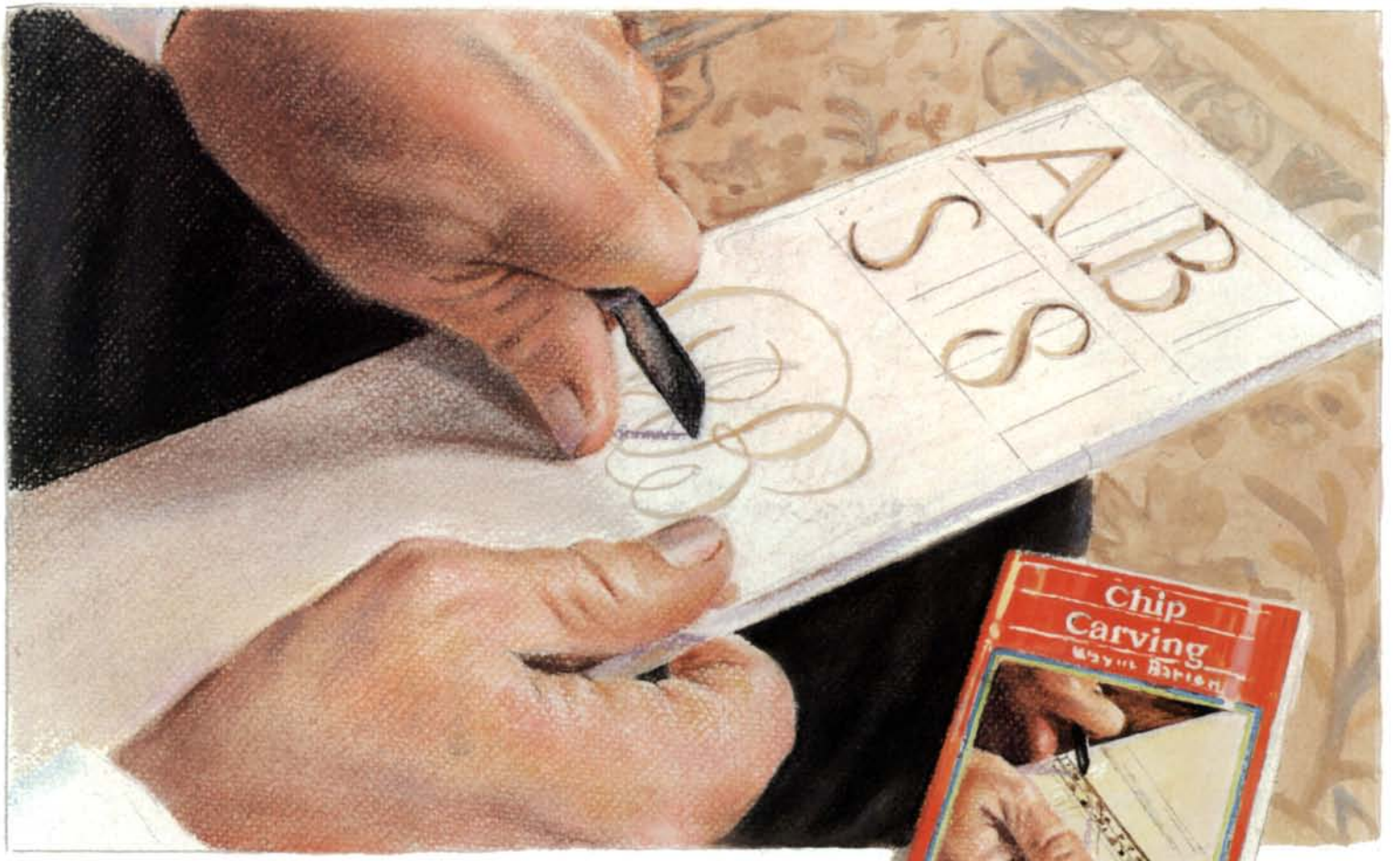

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Listings of gallery shows, major craft fairs, lectures, workshops and exhibitions are free, but restricted to happenings of direct interest to woodworkers. We'll list events (including entry deadlines for future juried shows) that are current with the months printed on the cover of the magazine, with a little overlap when space permits. We go to press two months before the issue date of the magazine and must be notified well in advance. For example, the deadline for events to be held in March or April is January 1; for July and August, it's May 1, and so on.

ARIZONA: **Seminars**—Woodcarving, Mar. 16–18, Jack Bayman; Apr. 2–4, Dave Rushlo. Contact Dave Rushlo Woodcarvers Supply, 2530 N. 80th Place, Scottsdale, 85257. (602) 994-1233.

ARKANSAS: **Show**—Arkansas Ozarks arts, crafts and country antiques festival, May 1–3. Exhibitor space available. Contact Arkansas Ozarks Promotions, Box 1041, Bentonville, 72712.

CALIFORNIA: **Workshops**—Woodworking for women, beginners and advanced, traditional furnituremaking, focus on handtools. Contact Debey Zito, 103 Wool St., San Francisco, 94110. (415) 648-6861.
Show—6th annual Woodline-East Bay woodcrafters, Mar. 7–8, 1731 Clement Ave., Alameda. Contact Dick Compton, 4351 Whittle Ave., Oakland, 94602, (415) 531-6455, or Nancy Horowitz, Woodline, The Japan Woodworker, 1731 Clement Ave., Alameda, 94501. (415) 521-1810.
Workshops/lecture—The assembly of a Japanese style house, slide lecture by Len Brackett, Mar. 9; duck decoy carving, Chester Wilcox, Mar. 14, 21; woodturning, Dave Dempsey, Mar. 28. The Woodsmith Store, 1836 Fourth St., Berkeley, 94710. (415) 540-6247.
Show—Northern California woodworking show, Apr. 10–12. San Mateo County Fairgrounds, Fiesta Hall, 2495 S. Delaware St., San Mateo. (800) 826-8257; Calif. residents call (213) 477-8521.

COLORADO: **Workshop**—From concept through construction of tables, chairs, cabinets, John Nyquist, Apr. 25–26. WoodWorking Weekends of Colorado, Ray Scott, 12922 W. Montana Ave., Lakewood, 80228. (303) 986-9102.
Workshops—Anderson Ranch Arts Center summer program. Frid, Hucker, Kopf, Maloof, Maruyama, Peters and more. Contact Peter Korn, A.R.A.C. Box 5598, Snowmass Village, 81615. (303) 923-3181.

CONNECTICUT: **Exhibition**—30th annual crafts exposition, July 16–18. Application deadline Feb. 21. 30th Annual Guilford Handcrafts Expo, Box 221, 411 Church St., Guilford, 06437. Contact Fernn Hubbard or Joyce Wright, (203) 453-5947, 453-6237.

DELAWARE: **Auction**—Antique tools, Apr. 11. For information, contact Bates & Brown, Inc., Rte. 3, Box 159G, Hockessin, 19707.
Seminar—Inca demonstration, May 9. Holiday Inn, Dover. Contact Olde Mill Cabinet Shoppe, RD #3, Box 547-A, York, PA 17402. (717) 755-8884.

DISTRICT OF COLUMBIA: **Juried exhibition**—Washington craft show, Apr. 24–26. Departmental Auditorium, 1301 Constitution Ave., N.W., Washington, 20036. (202) 357-2700.

FLORIDA: **Show**—Woodworking, Mar. 20–22. Machinery, power and hand tools, demonstrations, workshops. Florida State Fair and Expo Park, Florida Living Center, 4800 Highway 301 North, Tampa. Contact (800) 826-8257; in Calif. (213) 477-8521.

GEORGIA: **Show**—Atlanta woodworking show, Mar. 13–15. Machinery, power and hand tools, seminars, workshops. Atlanta Civic Center, South Exhibit Hall, 395 Piedmont Ave. N.E., Atlanta. For more information, contact (800) 826-8257; in Calif. (213) 477-8521.

ILLINOIS: **Juried show**—8th annual Fountain Square arts festival, June 27–28; outdoor show. Application deadline Apr. 10. Contact Evanston Chamber of Commerce, 807 Davis St., Evanston, 60201. (312) 328-1500.
Seminars—Plastic laminates, Mar. 13–14; routers, May 11–12; finishing, May 13–14. Write Coordinator of Program Registration, College of Cont. Ed., Adams Hall, Rm. 131, Northern Illinois Univ., DeKalb, 60115.

INDIANA: **Exhibition**—Country Collections: A Gathering of Folk Artists and Craftsmen, May 30–31. The Breeding Farm (country roads 800 N. & 100 W.), north of Columbus. Sponsored by Bartholomew County Historical Society. Contact the Society at (812) 372-3541.

KANSAS: **Juried show**—Topeka Crafts Competition II, Mar. 29–Apr. 29. Entry fee $15, deadline Mar. 8. For further information or prospectus, contact Larry Peters, Gallery of Fine Arts, Topeka Public Library, 1515 West 10th, Topeka, 66604. (913) 233-2040.

The 1987 Mid-Atlantic Woodcarving Show and Competition is being held in Abington, Penn., April 4th and 5th.

LOUISIANA: **Exhibition**—25th anniversary exhibition, Louisiana Crafts Council, through Feb. 26, Southdown Plantation/Terrebonne Museum, Box 2095, Houma, 70361. Contact Sheri Watkins (504) 868-4926; Mar. 8–Apr. 4, Bolton Library, Louisiana State University at Alexandria, Alexandria, 71032. (318) 473-6438.

MAINE: **Workshops**—Summer session, beginners, intermediate, advanced. Application deadline Apr. 15. Haystack Mountain School of Crafts, Deer Isle, 04627. Contact J.M. Michaud, (207) 348-2306.
Exhibition—Furnituremaker Robert Hannan, Mar.–Apr. Maple Hill Gallery, 367 Fore St., Portland, 04101. (207) 775-3822.

MARYLAND: **Juried shows**—12th annual spring arts and crafts, Apr. 10–22, Montgomery County Fairgrounds, Gaithersburg. 10th annual spring crafts festival, May 1–3, Maryland State Fairgrounds, Timonium. For information, send three stamps (66¢) for postage to Deann Verdier, Dir., Sugarloaf Mountain Works, Inc., 20251 Century Blvd., Germantown, 20874. (301) 540-0900.
Juried show—Artscape '87, July 17–19. Slide deadline Mar. 31, fee $75. For information send SASE to Crafts—Artscape '87, c/o Mayor's Advisory Committee on Art and Culture (MACAC), 21 South Eutaw St., Baltimore, 21201. (301) 396-4575.

MASSACHUSETTS: **Workshop/exhibitions**—Sam Maloof, Feb. 23 through Apr. 5; Worcester Craft Center's 17th annual craft fair, May 15–17. Contact Craft Fair Registrar, Worcester Craft Center, 25 Sagamore Rd., Worcester, 01605. (617) 753-8183.
Workshops/seminars—Numerous events. Contact The Woodworkers' Store, 2154 Massachusetts Ave., Cambridge. (617) 497-1136.
Workshops—Cabinetmaking, Apr. 27–May 1; finish carpentry, May 11–15. Heartwood Owner-Builder School, Johnson Rd., Washington, 01235. (413) 623-6677.
Workshops—Intensive one-day sign carving workshop. Contact Paul McCarthy's Carving Place, 132 Front St., Scituate Harbor, 02066. (617) 545-2480.

MICHIGAN: **Juried show**—28th annual national fine arts and crafts fair, July 22–25. For application write the Ann Arbor Street Art Fair, Box 1352, Ann Arbor, 48106.

MINNESOTA: **Workshops/seminars**—Numerous events. The Woodworkers' Store, 3025 Lyndale Ave. S., Minneapolis. (612) 822-3338.
Exhibition—Minnesota woodcarver's annual show, Mar. 14–15. Northtown Center, Blaine.

MISSOURI: **Show**—Woodworking, Mar. 27–29. Hand and power tools, machinery, demonstrations, seminars, workshops. Chase Park Plaza Hotel, Exhibit Hall, 212 N. Kingshighway, St. Louis. (800) 826-8257; in Calif. (213) 477-8521.

NEVADA: **Show**—3rd annual miniatures and dollhouse show and sale, sponsored by the Miniature Clubs of Northern Nevada; May 30, 10 AM to 5 PM, May 31, 11 AM to 5 PM. Bally Grand Hotel, Reno. Write c/o Box 8664, Reno, 89507 or contact Mary D. Shipp (702) 826-2959.

NEW JERSEY: **Exhibition**—Craft Concepts '87–8th annual exhbition and sale, June 13–17, all media. Entry fee $10 and slides deadline Apr. 3. For prospectus, send SASE to Craft Concepts '87, Jewish Community Center, 501 North Jerome Ave., Margate, 08402.

NEW MEXICO: **Workshop**—Woodturner Richard Raffan, Apr. 17–19. Includes demonstration and hands-on instruction. For information write Albuquerque Woodworkers Association, Box 40407, Albuquerque, 87196, or call Patricia Quick, (505) 835-0987.

NEW YORK: **Exhibition**—Appalachian Mountain Dulcimers, Bernd Krause, month of April. Chase Lincoln First Bank, 2 Court St., Binghampton. Contact (607) 772-2011.
Workshops—Small projects, Japanese hand tools. The Luthierie, 2449 West Saugerties Rd., Saugerties, 12477. (914) 246-5207.
Exhibition—11th annual American crafts festival, July 4, 5, 11, 12. Lincoln Center for the Performing Arts, New York City. Contact Brenda Brigham, American Concern for Artistry and Craftsmanship, Box 650, Montclair, NJ, 07042.
Exhibition—MFA Sculpture Exhibition, through Mar. 13. Parsons Gallery, 2 West 13th St., New York, 10011. (212) 741-7572.
Exhibition—Southtowns Wood Carvers 10th annual, May 2–3. Erie County Fair Grounds, Hamburg. Contact Bernie Schenk, chairman (716) 632-5149.
Juried show—Crafts: National II, Sept. 9–Oct. 8. Buffalo State College. Sponsored by State Univ. of N.Y. Faculty of Arts and Humanities. Fee $20, maximum three entries, due June 1. Write or call, Chair, Design Dept. Buffalo State College, 1300 Elmwood Ave., Buffalo, 14222; (716) 878-6032.
Show—Woodworking, May 1–3. Machinery, hand and power tools, seminars, workshops. Rockland County Community College, Field House, 145 College Rd., Suffern. (800) 826-8257; in Calif. (213) 477-8521.
Show—Woodstock-New Paltz arts & crafts, May 23–25. Ulster County Fairgrounds, New Paltz. Contact Scott & Neil Rubinstein, Quail Hollow Events, P.O. Box 825, Woodstock, 12498. (914) 679-8087 or 246-3414.

NORTH CAROLINA: **Juried exhibition**—Showcase of woodcarvings, Feb. 28–Mar. 1. Park Center Auditorium, 310 North Kings Dr., Charlotte, 28204. Contact Showcase of Woodcarvings, 1418 Armory Dr., Charlotte, 28204, or Bonita Heffner (704) 336-2584.
Juried show—12th annual Highland Heritage Art & Craft Show, June 11–13. Ashville Mall. Contact Dana Kropf, High Country Crafters, 29 Haywood St., Asheville, 28801. (704) 254-0072.

OKLAHOMA: **Seminars**—Bowl turning, Alan Lacer, Feb. 21, 9 A.M. to 4 P.M.; between center turning, Alan Lacer, Feb. 28, 9 A.M. to 4 P.M. Fee $30 (each seminar). Moore-Norman Vo-Tech School, 4701 12th Ave. NW, Norman, 73069. Contact Deanna, (405) 364-5763.
Seminar/demonstration—Sam Maloof, furnituremaker, Mar. 20–21. Paxton's Beautiful Woods of Oklahoma City. Call (405) 235-4411 for details.

OREGON: **Exhibitions**—Numerous shows, exhibitions. The Gallery, World Forestry Center, 4033 SW Canyon Rd., Portland, 97221. (503) 228-1367.
Workshops/seminars—Japanese tools and joinery with Jay VanArsdale, Feb.; tablesaw jigs and fixtures, Mar. 28; woodworkers on film, weekly showings through Mar. 13. Contact The Wood Workshop, 1108 NW 21st, Portland, 97209. (503) 242-1849.
Workshops—Numerous classes, Mar. 30–June 6; register early. Oregon School of Arts and Crafts, 8245 S.W. Barnes Rd., Portland ,97225. (503) 297-5544.

PENNSYLVANIA: **Juried show**—9th annual Long's Park art and craft festival, Sept. 5–7. Final jury deadline June 1. Entry fee $10. For application send #10 SASE to Dick Faulkner, Long's Park Arts and Craft Festival, Box 5153, Lancaster, 17601.
Seminar/demonstration—Woodturning with O'Neill, Stirt, Sharpless, Ellsworth, Stone, and more, Mar. 20–22. Contact Jon Alley, Fine Arts Dept., Bucks County Community College, Swamp Rd., Newtown, 18940.
Workshop—Basic wood turning practicum, Dale Nish, May 14–16. Continuing Education Dept., Millersville University, Millersville, 17551. Contact Grace Evans at Millersville University, or call (717) 872-3030.
Exhibition—Wharton Esherick Museum, sculpture, furniture, utensils, 1920–70, daily. For reservations or directions, write or call The Wharton Esherick Museum, Box 595, Paoli, 19301. (215) 644-5822.
Show—Woodcarving, Apr. 4–5. Sponsored by Penna. Delaware Valley Wood Carvers. Penn State (Ogontz), Abington Campus Gym., Abington. Contact Howard Clarke, 1306 Friendship St., Philadelphia, 19111.
Seminars—Chip carving, Mar. 7; Inca owner's, Mar. 14; sharpening, Apr. 4; Inca demonstration, Apr. 11; Japanese joinery with Toshio Odate, May 15–17. Olde Mill Cabinet Shoppe, RD 3, Box 547-A, York, 17402. (717) 755-8884.

TENNESSEE: **Show**—Master furnituremakers show, Apr. 24–26. Sponsored by Dogwood Arts Festival, 203 Fort Hill Building, Knoxville, 37915. Contact Carol Evans (615) 637-4561.

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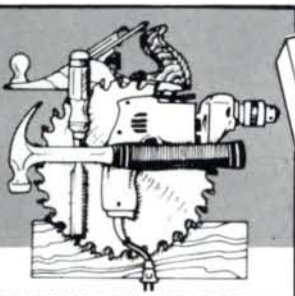

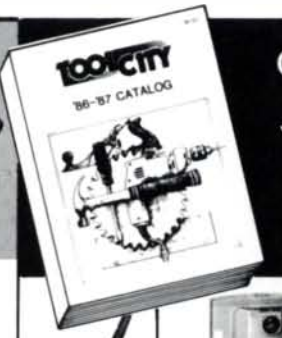

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C6DA	6¼" Cordless Saw	239	**119**
SB75	2SPD 3X21 Belt sander	198	**139**
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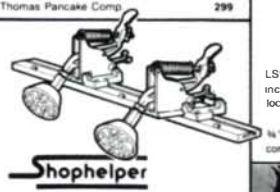

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Workshops—Bowl and plate turning, Alan Stirt, Mar. 9–13; creative woodturning, Rude Osolnik, Mar. 16–20; practical woodturning, Hap Sakwa, Mar. 23–27; wood and/or stone carving, Bob Lockhart, Mar. 30–Apr. 3. Contact Sandra Blain, Director. Summer assistantships, June 8–Aug. 14; application deadline Apr. 1. For application and/or brochure, write Arrowmont School of Arts and Crafts, Box 567, Gatlinburg, 37738. (615) 436-5860.

TEXAS: **Exhibition**—Vessels and Forms, lathe-turned wooden pieces, Mar. 6–May 1; sponsored by The Houston Festival. 1600 Smith Building, Houston, 77002. Contact Peter J. Hutchinson, Curator, Vessels and Forms Exhibit, 13818 St. Mary's Lane, Houston, 77079.
Exhibition--Crafts and arts exposition, 1987 Houston festival, Mar. 19-29. Contact Barbara Metyko, Production Dir., The Houston Festival, 1964 West Gray, Suite 227, Houston, 77019. (713) 521-0993.
Show—North Texas woodworking show, Apr. 24–26. Machinery, power and hand tools, demonstrations, seminars, workshops. Arlington Convention Center, Exhibit Hall E-1, 1200 Stadium Drive East, Arlington. Contact (800) 826-8257; in Calif. (213) 477-8521.

WASHINGTON: **Workshops/demonstrations**—Tools-In-Action series, free, every Saturday, 10 A.M. Boatbuilding, woodcarving, sharpening, other woodworking topics. The Wooden Boat Shop, 1007 NE Boat St., Seattle, 98105. (206) 634-3600.

WISCONSIN: **Juried show**—15th annual festival of the arts, Mar. 29. College of Fine Arts, University of Wisconsin, Stevens Point campus. For information, write 15th Annual Festival of Arts, Box 872, Stevens Point, 54481.
Seminars—Tosio Odate, Mar. 27–29. Co-sponsored by Northeastern Wisconsin Woodworkers Guild and Northeast Wisconsin Technical Institute. Contact Ralph Tingley, Guild President, 1541 West Marhill Rd., Green Bay, 54303. (414) 499-7922.
Show—Woodworking, Apr. 3–5. Machinery, demonstrations, seminars, workshops. MECCA Convention Hall, West Hall, 500 W. Kilbourn Ave., Milwaukee. Contact (800) 826-8257; in Calif. (213) 477-8521.

AUSTRALIA: **Exhibition**—Bicentenary international forestry conference, Apr. 25–May 1. Albury–Wodonga. Contact Australian Forest Development Institute National Secretary, Box 515 Launceston 7250 Tasmania. Tel. (003) 313666, Telex AA58666.

ENGLAND: **Seminar**—British seminar on woodturning, Aug. 14–16. David Ellsworth (USA), Ed Moulthrop (USA), Ray Key (England), Mick O'Donnel (Scotland), Jim Partridge (England). Loughborough College of Art & Design, Loughborough, Leicestershire, England. Contact American Association of Woodturners, Box 982, San Marcos, TX 78867, or Margaret Lester, Administrator, 5, Bridport Road, Beaminster, Dorset DT8 3LU, England.

ONTARIO: **Show**—Woodworking Machinery and Supply Expo (WMS '87), Mar. 28–30; daily seminars. Automotive building at the Canadian National Exposition Grounds. For more information, contact Joan Landis (203) 964-0000, or Alex di Meo (514) 937-5383.

Master American Woodcarver Emil Janel by Ira Weissman and John Matthews; photography by Brian Cocker. *New York Woodcarving Corp., 240 Lafayette St., New York, N.Y. 10012; 1984. $14.95 plus $1.50 postage, paperback; 60 pp.*

Emil Janel was truly a master woodcarver, but the root of his talent was more European than American. Although he spent the greater part of his life in Canada and the United States, Janel's mind was firmly of the Old World. His figures, which are mostly caricatures of elderly men, reflect the style of the early 20th-century carvers of western Europe. Like those carvers, the religious carvers excepted, Janel created pieces that have a distinct folk flavor in that they tell small tales.

Here the similarity with the European masters ends, for Janel's genius was that he was an acute observer of the often overlooked elements that make up the human spirit. He was not trying to shake the earth with his vision; in a reverse sense, Janel made strong statements about our condition in a gentle way. The faces of his people are both vulnerable and strong, and, at other times, foolish or wise. This is what made his work special; he was a carver of the soul of man. Along with these wonderfully animated faces are subtle attitudes in body positioning that look as if they were effortlessly executed, although this area of the art is seldom mastered by carvers.

On the other hand, the surfaces of Janel's work retain the facets and planes of quick knife and chisel work, and this, too, harkens back to his upbringing in Sweden and to the carvers of that part of the world. But whereas this can, at times, be seen as naiveté on the part of some artists, in Janel's case the near-perfect balance of attitude and emotion make the rough surfaces in his work a conscious form of expressionism. Weissman and Matthews are to be commended for having the foresight to limit the text and let the carvings speak for themselves.

Both beginning and advanced woodcarvers will relate to this book. It's not a "how-to" book, for the "how-to" in Emil Janel was instinctive and cannot be duplicated by following instructions. What this book does best is inspire and move its readers. *—John Heatwole*

The Woodwright's Workbook by Roy Underhill. *The University of North Carolina Press, Box 2288, Chapel Hill, N.C. 27514; 1986. $12.95, paperback; $19.95, cloth; 248 pp.*

Up to now, my only experience with Roy Underhill has been viewing a few episodes of "The Woodwright's Shop" on PBS, and reading a few of the columns he has written for *Wood* magazine. I had thought him a little contrived and superficial. I'm very pleased to announce that I shall have to eat these words, and, if my admiration for this book continues to grow, I may feel obliged to eat my shoes as well. This book is terrific—full of wry wit, thorough expertise, charming anecdotes and a far-reaching consciousness that illuminates not only tools and processes, but also the human condition. I cannot recommend it too highly.

Underhill traces tools and workmen back through time, beginning the book with an adaptation of a Chaucerian-type poem/story concerning a set of carpenter's tools and a carpenter who drinks his wages away. If you don't think this sort of thing can be interesting, here's a sample of some of Underhill's commentary, relating to one of the characters in the poem, the pulley:

> The block and tackle were well known to the ancient Greeks and Romans. They also knew the technique of combining them to multiply their power, and understood that "as in the lever, time is lost as power is gained." Pulleys from the Tudor warship the *Mary Rose,* which capsized off Portsmouth, were splendidly preserved in the mud. Like most tools of the carpenter, pulleys are made by a specialist. A 1568 church account notes payment "to William, torner, for turnynge of the powleys." Pulleys are essential to the carpenter raising a heavy oak timber frame. A scene from 1577 would be familiar to anyone of an agricultural persuasion: "They have a Pully. . .wherwith they hoyse up the Corne to the very Rafters of the house."

Underhill weaves such tiny threads into a cumulative tapestry that becomes a magical backdrop as the poem goes on. When the stage is fully set, he takes the reader to the shop, and examines, in turn, the workbench, screwboxes and taps, lathes, tool chests, chairs, domestic devices, boats, forts, barns and the forge. He doesn't just talk about these things, he *makes* them with you, with never a dull word.

This book is far more than how-to, and constantly surpasses itself. The best way to demonstrate what I mean is to quote the final anecdote:

> One morning I had the help of a half-dozen people crosscutting pine logs in the cool sunlight. A father was teasing his small sons with mock threats of no supper until they had all the wood cut. I was enjoying the scene when a man suddenly laughed and turned to me with watery eyes and a contorted smile.
>
> "It's funny how people see different things," he said in heavy Eastern European accents. "These people see fun for their children cutting this wood. I remember when I was a boy we were prisoners during the war and made to cut trees in the forest."
>
> "Do you see that fungus?" He pointed to a sick-looking extrusion from a rotting log. "You would not see that, but we would have fought each other to get that fungus to have food to eat. Even now, I see that and before I could think, I was moving to take it before you could."
>
> I looked at him. He knew that I did not know what to say. He reached out and shook my hand.
>
> "You are doing good work here," he said. "This is a good thing."
>
> We stood silently watching the laughing family for a few minutes before he nodded to me and walked on.

Underhill is doing better work with this book than any other writer I can name. *—Jim Cummins*

Refinishing Antique Furniture by Michael Bennett. *Distributed by David & Charles Inc., North Pomfret, Vt. 05053; 1980. $13.95; hardcover; 72 pp.*

Written with a distinct British accent, *Refinishing Antique Furniture* covers the finishing aspect of traditional aesthetic furniture restoration. Some of the "good to know" recipes and techniques thoroughly discussed include hot hide glue, wax stick, shellac stick, pumice grain filler and water wash. While I find some of these recipes and their proposed uses questionable ethically, they are great, old formulas. Many controversial and potentially damaging techniques are covered, with somewhat faint-hearted warnings. Stripping, bleaching, leaving or adding dirt, and grain-filling with pumice all need deeper pondering than Michael Bennett has given them here.

In listing the individual points that I have problems with ethically, I realized they all lead back to reversibility, the single, most important element we've learned from today's museum conservation. Some of the many good points that make the book valuable reading include topics like matching a wood repair on four levels (species, color, grain and reflectivity), the use of light-fast dry pigments while sealing the wood both be-

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fore and after coloring, proper stripping technique and making a French-polishing rubber and using it properly. Please take the time to educate yourself elsewhere on the subject of toxic fumes, as it is weakly covered here. The appendix lists British sources of supplies and an interesting roster of the chief characteristics and principle uses of woods commonly and not so commonly found in English furniture. —*Dale Boyce*

Make Your Own Electric Guitar by Melvyn Hiscock. *Sterling Publishing Co., Inc., 2 Park Ave., New York, N.Y. 10016; 1986. $9.95, paperback; $17.95, hardback; 160 pp.*

First, let us get the record straight about the competence of the reviewer: I have no particular liking for Rock music, I have never played—let alone built—an electric guitar, and I knew nothing about them before reading this book. I imagined any piece of wood vaguely in the shape of a guitar would do, some uncanny electronic circuitry doing the rest. Therefore, I do not know whether proficient guitar makers will learn something from the book, but I certainly did, and I have no hesitation in recommending it to the interested layman.

Melvyn Hiscock has the kind of communicative enthusiasm which I like to find in a specialized handbook of this nature. Anybody who has had the remotest connection with teaching knows that this is an essential condition for getting the message across. You feel not only that the author definitely knows what he is talking about, but also that he is trying, in fact, to share with you what is probably his greatest interest in life. No mere pot-boiler here!

I also liked his approach. He does not provide a tedious list of instructions without giving the whys and wherefores. The technical reasons for the choice of timbers, of joints, etc., are fully discussed—a major point if you want to go it alone later and design your own project. Though I have not actually made a guitar from the instructions, I have tried to visualize the various steps indicated and ascertain whether they would prove clear enough for a complete newcomer, like me, to that specialized craft. I am not too sure about the last phase—the wiring and soldering, which are really outside my usual type of handiwork—but I feel pretty sure that there would be no problem about the woodwork proper. With the novice woodworker in mind, he gives very sensible advice: those of us who started "with a few blunt tools and on the kitchen table" (his words) will appreciate the section on tools, which gives pride of place to the workbench, "The most important part of the guitar-maker's arsenal" since "there is no point in even trying to cut or plane a straight line if the workbench resembles a nervous jelly."

As the author says, "The job was once done, in the main, by hand," and if, like me, you believe that the motivated hand worker can beat the mass-produced article any time, this thorough-going book will, no doubt, give you the sound foundations that will eventually enable you to create the ultimate flashy model. If I ever become a Rock 'n Roll fan, this is certainly the first book I will turn to in order to put to good use the modest skills acquired during my greener, more sedate days in the basement workshop. —*Antoine Capet*

John Heatwole is a professional woodcarver with a studio in Bridgewater, Va. (see article p. 73). Jim Cummins is an associate editor of Fine Woodworking. *Dale Boyce is a cabinetmaker in Portland, Me. Antoine Capet teaches at the University of Rouen in France.*

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Photo courtesy of Worcester Art Museum

This curved mahogany bench was part of an exhibition of contemporary work by Robert March at the Worcester Art Museum, Worcester, Mass., last September through November. Part of a set of four benches designed for outdoor use in a garden or park, the frame and backslats of the piece were left with a rough, bandsawn texture (the boards on the seat are smooth). No finish was applied so that the bench would weather naturally, mellowing the mahogany's color. Much of March's work is influenced by the traditional forms and joinery evident in Chinese, American Federal and country furniture.

Running a shop on a thimbleful of power

I work today making Windsor chairs in a shop of my own off a dirt road in the woods of western Massachusetts. It's quiet here, and the second-story workroom lets in good light. I have a variety of handsaws and edge tools, a Skilsaw, router, drill, bench grinder, bandsaw and drill press, all electrically powered, a lathe that runs by treadle or electricity, and a chainsaw.

What's unusual is that all my electricity is 125V direct current supplied by a ⅓-HP, three-phase electric motor used as a water-powered generator. A 4.5-in.-dia. Pelton wheel on the motor arbor is spun by one or two ⅜-in.-dia. jets (depending on available water, which is seasonal), generating wild-frequency alternating current. This is rectified to 125V DC, which, in turn, puts a normal charge of about 0.7 amps into a bank of 10 deep-cycle lead/acid batteries wired in series. I draw power from the storage to run DC motors and light the shop. The water driving the generator comes from a reliable spring, and drops a total of about 75 ft. through some 1,300 ft. of 3-in.-dia. PVC pipe buried below the frostline. The total power generated continuously with one jet open (the case nearly all year) is little more than 75 watts.

When I set up this shop, I had worked 10 years in shops with a virtually unlimited supply of cheap electricity. What moved me, at that beginning, was the ideal of independent power cleanly generated by wind or water, renewable stuff tangibly linked to the natural world. Circumstances limited my choice of sites, and I ended up with a location downhill of a spring and half-a-mile from the nearest grid electricity. The spring always flows at least 26 gallons per minute and repeated calculations told me that the power available from the water amounted to a light bulb, more or less. Not much juice. But I was determined to make do, just on principle. A few knowledgeable people advised me to forget it, but Mark Drabick of Homestead Energy Systems in Orford, N. H., designed the system I now use, which has been trouble-free in over four years of use.

The only practical way to tap 75 watts of continuous power is battery storage, since only DC electricity can be stored, and conversion to AC would cost precious energy. New fractional horsepower DC motors were available on Canal St., in New York City, and ordinary incandescent bulbs work fine on DC power. I don't like fluorescent light anyway. Older hand-held power tools with brush-type motors, like Skilsaws, routers and drills, often work on either DC or AC. Direct current will arc over a larger gap than AC, so switches not designed for DC are prone to burn out.

With everything in place, the only routine chore peculiar to this system is checking the batteries every week or two, reading the specific gravity in all 60 cells and topping them off with distilled water. When it's quiet in the shop, as it often is, I enjoy hearing the splash of water and the faint whine of the generator from the power house below.

Making Windsor chairs by hand is work well-suited to low-power circumstances. Following the methods of early chairmakers, I work up all the sticks by splitting billets fresh from the log, then shaving or turning them green, systematically drying some of the parts prior to assembly.

For a solid year I worked with two apprentices, full-time. With three of us in the shop that much, conserving electricity was paramount, especially during the dark winter months, but we never had to shut down for lack of power. Timing our work to spread out electrical demand was the single most important factor. We always used daylight to advantage, and electric light deliberately to illuminate the work, not so much to brighten the shop and make us feel cheery.

Even with limited power, we developed a routine of drying the tenons of chair legs and stretchers in a light-bulb oven. Two 40-watt bulbs in a small, insulated box produce a temperature near 200°F. We tried various methods of boring for posts and rungs, including spoon bits in a brace, twist bits reground with a brad point and a radius nose used in a hand-held electric drill. In the end, we settled on twist bits in a hand-held drill. By any method, the boring uses little power and with electricity turning the bit, it's easy to concentrate on good aim at the correct angle without having to depend on the drill press, which always felt a little too mechanical for the lively art of Windsor chairmaking.

My lathe is the power tool I use most. It's a shopmade machine with a ½-HP motor, as well as a treadle. Changing from electric to foot power takes no more than a few seconds to swap belts. Before the water-generated electricity was completely set up, the lathe worked by treadle alone. During that period my turning routine went like this: I split a billet using the froe, then chopped it roughly round using a small hewing axe. I chucked this blank in the lathe, turned the maximum-diameter central portion close to finished size, then took it back to the block and chopped away more waste with the turned part as a guide to size. Finally, it went back

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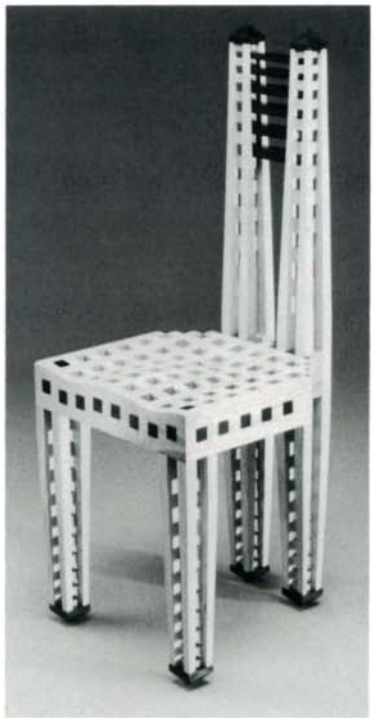
on the lathe to be finished up. During my years in full-power shops, I had always scraped and sanded my turnings. I never got the hang of paring cuts with the skew because I was always unnerved by the high risk of a slight mis-cut snapping the tool around and spoiling the work. It was easier not to bother.

Once I had gained some agility treadling, the control over turning speed opened the way to learning proper use of the skew. It was a revelation. Fine paring cuts using the skew on straight-grained green sugar maple are one of the great pleasures in woodworking. When I finally mounted a motor on the lathe, I used it mainly for roughing away the waste, never permanently abandoning treadling the finish cuts. Whenever I spend several hours at the lathe, I find the rhythm of alternating motor drive and treadle invigorating, a contrast to the enervating job of standing still with a motor flapping in my ear.

I'm far less a zealot now than I was starting out, and what keeps me in my 75-watt shop these days has less to do with ecological principle than the hands-on routine of working wood with a sort of one-man efficiency from log to finished product. Some limitations only wear one down, but the right sort offers freedom from distractions. If I had it to do over, I certainly would. Setting up shop on a light bulb is not as bad an idea as it might sound, put in so many words. After all, it worked.

—Peter Murkett, Monterey, Mass.

Photos: Jennifer Levy



Sophisticated seating

The ash and ebony Meson Chair, (above, right) by Form and Color Inc., was among almost 400 chairs on display at the "Chair Fair" last fall at the International Design center in New York City. The exhibition, sponsored by the Architectural League of New York, exhaustively explored the whole gamut of seating furniture, and included anything that could be sat upon that would fit within a four-foot square of floorspace. Entries, both handcrafted and manufactured, ranged from classic forms designed by architectural superstars to absolutely bizarre conceptual statements in mixed media by yet-to-be-discovered artists and visionaries. A panel of designers and architects judged the individual entries in several categories of merit, including "Best Handcrafted," awarded to the Derektor Chair (above, left), made of Honduras mahogany and produced by Derektor furniture.

Photo: Tom Freedman

Putting on a creative squeeze play, Oregon guild woodworkers made each of these furniture pieces from a single 2-in. by 4-in. by 8-ft. stud.

The Two by Form challenge

How much furniture can you squeeze out of a single stud? That's the question Jeff Hilber posed to his fellow Oregon Woodworking Guild members, creating a design competition called "Two by Form." The concept sounded simple enough: Starting with one softwood, 8-ft. long, true-dimension 2x4, construct the most ingenious and original piece of furniture possible. But, as the eight craftsmen who participated in the event will tell you, the exercise was anything but easy.

After lots of careful planning and head scratching, the pieces they came up with range from impressive to hard-to-believe. The screen made by Ed Mattson, for instance, has slats cut cardboard-thin to leave enough wood for the frame. Mattson said that when he finished the tedious layout and cutting of his 2x4, nothing was left but a pile of sawdust and a cubic-inch of scrap wood. The project has changed his whole approach to efficiency in woodworking. Now he's designing other pieces

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based on the "minimum waste, maximum product" concept.

Aside from the competition's basic premise, entrants were given few other allowances. They could use fasteners and glue, incorporate one other material, like the glass top used in Hilber's coffee table, or replace a portion of the original stud if it was wasted due to error.

The "Two by Form" competition promises to have many new entrants next year. This is especially gratifying when you consider that furniture made from plain old softwood studs was the object of so many appreciative gazes.

—*Sandor Nagyszalanczy*

The plane truth about Rhykenology

When the word rhykenology appeared five years ago in issue #32, several readers wrote to tell us they couldn't find it in the dictionary. Elliot Sayward reveals its true roots:

For years Bob Graham, in California, and I on the East Coast, shared a pen-pal interest in the wooden plane. About 12 years ago we recognized that there was no general term for plane technology, use and history. So we did a little coining based on the Greek word for plane or scraper, *rhykane*, and came up with rhykenology, loosely defined as the study of planes.

Discovering that a considerable number of enthusiasts here and abroad shared our general interest, we issued a prospectus for the British-American Rhykenological Society. This loose confederation of plane nuts now has more than three hundred members and puts out a quarterly journal called *Plane Talk*.

Ten years and forty issues later, the editorship of *Plane Talk* is passing to Emil Pollak, whose book *American Wooden Planes*, has become one of the bibles of rhykenology.

Anyone interested in the journal should write to *Plane Talk*, Box 338M, Morristown, N.J. 07960, or for information about the society, write to B-ARS, 60 Harvest Lane, Levittown, N.Y. 11756.

—*Elliot Sayward, Levittown, N.Y.*

Notes and Comment

Anything going on that you think might be of interest to other woodworkers? Notes and Comment will buy articles about noteworthy events, exhibits and people, and we'll consider all kinds of commentary. Send manuscripts and color slides or black and white photos (preferably with negatives) to Notes and Comment,* Fine Woodworking, *Box 355, Newtown, Conn. 06470.

Photos: Wayne Bennett, Jr.

Laminated bowl.

Spider-leg carriage table.

Kentucky quilt cabinet.

Moser-inspired chair.

Carbon copies

During business hours, Burrell A. Fletcher is a mild-mannered Certified Public Accountant, who practices in Lonoke, Arkansas. In his spare time, he's one of the most prolific woodworkers we know.

Last fall, he sent us a score of photos of his work, and our editorial eyebrows kept rising and rising. It was like looking into back issues of the magazine.

The segment-laminated bowl is one of a couple of dozen inspired by the article by Bud Latven and Addie Draper (*FWW* #54). They were all turned on a Carlyle Lynch lathe (*FWW* #57), modified somewhat to have an 18-in. swing. Fletcher's largest bowl is 22 in. high and 16½ in. in diameter.

He has made three of Warren May's Kentucky quilt cabinets (*FWW* #54), one for each of his children. Asher Carmichael's spider-leg carriage table, upper right, (*FWW* #40) is a particular favorite of Fletcher's—he's made seven, one for each grandchild.

Fletcher's college education was interrupted by World War II, when he served as a heavy bomber pilot in the Air Corps. He's never had formal woodworking training, not even a shop course. The impetus to begin furnituremaking was an empty apartment and a student's bankbook. He had a couple of hand tools to start, using orange crates and other found wood.

An 8-in. Sears tablesaw was something of a graduation present to himself, and he hasn't looked back, adding other machinery through the years and eventually building much of the furniture in his home.

He built a Thomas Moser continuous-arm chair about a year *before* it appeared in the magazine. Now that's spooky. We wonder if we should find out what he's working on tonight? □

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About five years ago, Stephen Paulsen of Santa Barbara, Calif., began pushing his woodturning to limits that went beyond function—intricately detailed pieces, some so delicate they would crumple if touched. At the same time, he noticed how groups of his turnings related to each other with a thought-provoking interplay. After much musing, he began a series of mysterious, artifact-filled "stone" chambers (the stone is buckeye burl), protected by glass, yet inviting the viewer to enter and imagine. Paulsen, a woodworker for 20 years, has made 65 chambers so far. This one, called "The Second Chamber of the Game," hangs on the wall, and is shown actual size.