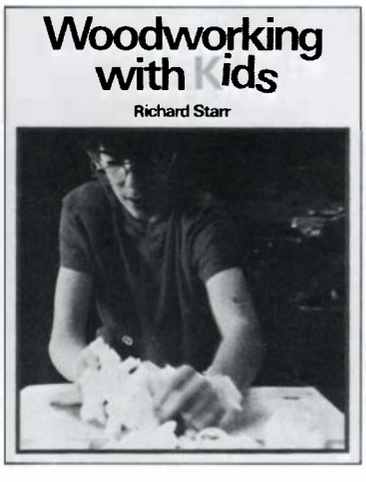
Fine Woodworking

NOVEMBER/DECEMBER 1982, NO. 37, $3.00

Art Carpenter

Woodworking with Kids, by Richard Starr
8 1/2" x 11", 216 pgs., Hardcover, $19.00



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Cover: Art Carpenter bandsaws a part for a music stand. Above, one of his wishbone chairs, a design that exemplifies the direct, personable character of his work. Carpenter, of Bolinas, Calif., has been designing and making furniture for more than 30 years, and through the Baulines Craftsman's Guild has helped to initiate a generation of woodworkers. For more on the man, see p. 62.

Fine WoodWorking®

NOVEMBER/DECEMBER 1982, NUMBER 37

DEPARTMENTS

ARTICLES

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Letters

I'm glad to see shop injuries and safety being reviewed again (*FWW* #36). Hospitals can repair the wound. They don't prepare you for the emotional trauma of not being able to recall how it happened for a couple of weeks, and then the sudden total recall in living color, which you cannot shake, especially in the early morning hours. This is normal, I am told, and it is how the mind copes. . . .

—Rod Goettelmann, Vincentown, N.J.

. . . I take strong exception to the statement that "woodworking tools are responsible for most industrial injuries." This condemns woodworking machines. The truth is that the users are responsible for probably more than 90% of the injuries. One usually finds in court that the user violated at least one and usually several safety rules which appear in the machine safety instructions and operating manuals. . . and thus was responsible for the injury himself.

—W. McCord, Vermont American Corp., Louisville, Ky.

Danger: The Makita 10-in. stationary miter saw, model 2400, is a potential guillotine. Today, while in operation, the heavy spring which supports and returns the blade to the open raised position snapped suddenly. This caused the entire assembly to drop onto the work from a height of 10 in.

As one's hands are constantly in and about this area, moving debris and making slight adjustments to the workpiece, the danger is real. . . *—Peter Bennet, Ompah, Ont.*

EDITOR'S NOTE: We spoke with Roy Thompson, a Makita marketing spokesman, who says that the 2400 saw has been sold for five years with no trouble, so Bennet's broken spring appears to be an isolated incident. However, Makita would like to hear from anybody who's had a similar bad experience, and so would we.

. . . With fifty years of experience in shops I have not yet been injured on a machine. Perhaps the assistance I once received from a physician may help others.

On this particular job I had been pushing the schedule. It was a doctor's office, and part-way through the work the doctor called me into his existing office, saying he had something to discuss. I sat down across from him as he sat at his desk, and waited. He said nothing, simply leaned back in his chair. After a few minutes, I impatiently inquired what he wanted, because I still had a lot to do on the job and sitting there was accomplishing nothing. He replied, "You are working too hard and I want you to take a few minutes to rest." I was stunned. I told him that I appreciated his concern but that I was too busy for idle conversation. He insisted that I remain seated and do nothing.

After a few minutes he offered an explanation for this strange confrontation: "You are well qualified in your work and use power tools as though they were extensions of your hands. It is a pleasure to watch you work. But, there is something you have either forgotten or never knew. The human body is capable of sustained activity for long periods of time, but once it fatigues (the point where training and experience have no effect), it is only the body's reflexes and instincts for survival (call it 'second wind' if you like) that protect one from injury. With sustained activity even these safeguards fail and an accident is bound to happen. The difficulty is that we rarely perceive when this threshold is passed."

This is the "why" that may explain Dr. Justis's advice to never work around machines when you are tired.

—William Marsella, Lynbrook, N.Y.

I am a timber faller by trade. Fascinated by the forms and weathered surfaces of the deadfall logs that litter the forest floor, I began imagining ways of making functional objects out of them, bringing something of the forest and its primal magic into the human environment. I began making chairs and stools (above), selling them at craft fairs as a way of supplementing the winter unemployment checks. As time passed I became more and more creatively involved and eventually opted for furnituremaking as a full-time livelihood.

Deadfall chair by Peter Tarbox

I have always worked on a one-of-a-kind basis, but now I'm attempting to enter the architectural seating market (lobbies, condo gardens, etc.), for which I hope to produce some standard pieces with the aid of helpers, while continuing to create original designs.

I began making these furniture sculptures without any knowledge of the dynamics of wood shrinkage, and many of my early creations began to develop alarming radial cracks. After wasting an incredible amount of time and energy on intersecting steel rods, dowels and other naive schemes to fight the inexorable progress of tangential shrinkage, I finally learned that I had to design with cavities that relieve shrinkage stress, or else accept radial splitting. It was probably only the fact that my early pieces happened to be out of a very low moisture content wood (incense cedar) that saved me from having to relocate south of the border.

—Peter Tarbox, Pasadena, Calif.

One very effective loosener for rusted and corroded bolts is Coca Cola. A friend even used it to free the piston of a junked outboard that had long been immersed in sea water.

I have found that Renaissance polish works beautifully to reduce friction on saw tables, plane soles, saber saw shoes and other areas. . . . Finally, surgical tubing provides excellent, even pressure when you're gluing up odd-shaped pieces.

—Tom Mahnken, Del Mar, Calif.

I was really enjoying Bruce Winterbon's canoe article (July) until I got to the part about glassing with polyester resin. That almost blew me out of my chair. Never, never use polyester resin to laminate fiberglass to woods. You must use epoxy. Polyester resin has a shrinkage of around 10%, I think. Anyway, it's very high. After one or two seasons it is a certain bet that the skin will delaminate. This is because the stresses

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built up due to the shrinkage never go away, but the adhesion between the polyester and the wood fades, and voila, pop. Epoxy shrinks about 1% and the adhesion does not fail. There are many good epoxy systems but the Gougeon Bros. WEST system has been used on more boats than all others combined. My heart goes out to Winterbon because his canoe is a work of art built to last for a lifetime, but it won't. *—Peter S. Vail, Andover, Mass.*

'. . . bought a used jewelers' lathe, trial and erred on different woods, horn and ivory, and made a string of beads. I was ready to try a chess set combining carving, inlay and turning. . . ' —Judi Bartholomew, Milwaukee, Wis.

. . . It is imperative that the glue used to hold the canoe strips together be waterproof, or at least strongly water-resistant (such as Weldwood). The odds are strong that the boat will eventually suffer a mishap which ruptures the fiberglass skin. If the glue fails to hold the strips together when water enters the wood, delamination of large areas will probably cause the boat to become unrepairable. . . . A distinct advantage of epoxy is its ability to bond to oily woods such as cedar. The standard argument against epoxy is cost, but considering the 200 to 300 hours it takes to build one of these boats, is another $150 too much?

It is hard for me to imagine building a stripper without the services of a disc sander. Used with care, this tool can do the necessary sanding in a fraction of the time of any other method. It is often maligned as a fast way to create gouges, but it can be mastered by those willing to learn. Like any other power sander, it must never be used without a good respirator.

Western red cedar has to be the wood of choice, with spruce not far behind. But I have seen successful strippers made of redwood and even of Douglas fir. Don't let lack of the perfect wood deter you. In the words of an old-time boatbuilder, "It's only a boat. Go ahead and build it!" *—David A. Cox, Bellevue, Wash.*

The first moose I shot, my son and I brought out in a cedar strip canoe, 580 pounds of meat plus gear, over deadfalls, beaver dams, rocks and a lake so large we couldn't see the other side. Later that fall we broke a mile of ice getting into a duck marsh with the same canoe. A racy 60-lb., 17-footer with 12-in. depth just won't stand up to those jobs. Designer-builders may want a rugged canoe that'll stand some pounding as well as look elegant. In that case, the bottom should not be flat, because it will buckle inward and flex excessively. Stick to a slightly rounded hull with shallow arch fore and aft, without tumblehome. Keep strips a full ¼ in. thick. I use two layers of 38-in. wide fiberglass inside and out, overlapped on the bottom for strength. . . . The stripper is a lovely product. You can spend 300 hours and finish it like your dining room table, or you

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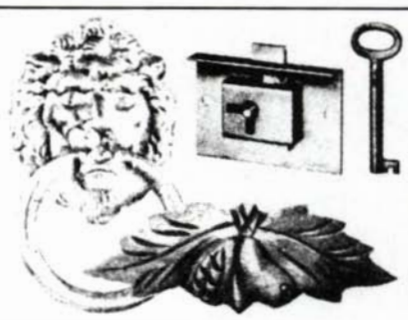

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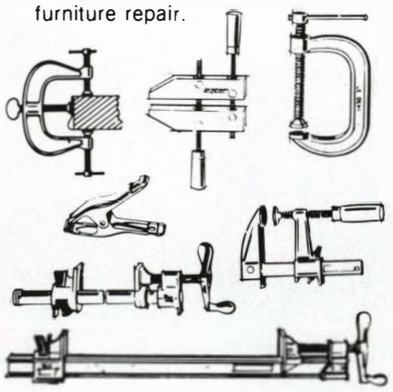

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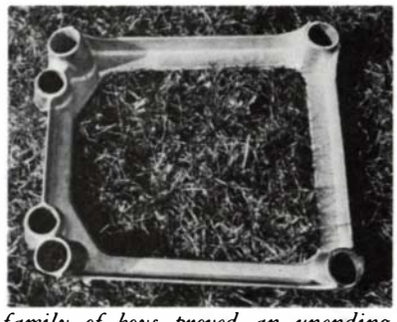
and a buddy can crank one out in 10 days of spare time and it will function just as well, even if the underside of the inwales doesn't have a mirror finish. And it won't hurt so much when the kids run it up onto the rocks.

—Buster Welch, Winnipeg, Man.

BRUCE WINTERBON REPLIES: First, I'd like to set the record straight by explaining that John Ormond and I built two similar canoes together, although my article was edited to leave him out. I agree that polyester resin is a poor wood-to-wood adhesive and has a high shrinkage, but these are not problems per se. In 1969 I helped Ormond replace the canvas on a wood-and-canvas canoe with fiberglass and polyester. That canoe is still in use with no delamination. Our two new canoes are now three and four seasons old, also with no delamination. The shrinkage occurs while the resin is setting, so the only result is a reduction in resin thickness. We decided to use polyester rather than epoxy because epoxies are much fussier about resin-catalyst ratios and curing temperature. A scraper blade probably removes excess resin more neatly than sanding, but finish-sanding is still necessary.



'Raising a young robust family of boys proved an unending problem of loose and broken chairs. Becoming disgusted with loose rungs and glue joints, I decided there must be a better way to make a chair, using aviation methods. I drew up various plans using a tapered socket for legs and back support, with an aircraft aluminum forging I made (and later patented), into which I drove the turned legs and back support, and attached a scooped-out seat and curved steamed back support. The seat and posts are red oak, and finished easily . . .'

—Harvey M. Severson, Minneapolis, Minn.

It sure was a pleasure to see "Dough Trays" by Delbert Greear (*FWW* #35). Speaking from experience, we know that dough trays appeal as far north as the Alaskan interior. We've had requests, but alas, our trees just aren't big enough. We'll look to see more traditional country woodcraft.

—Randy Brown, Eagle, Alaska

I am commenting on Ian Kirby's excellent Q&A reply in the July issue on the problems inherent in breadboard construction, in which a wide panel is secured to cross-grained end boards. Since shop humidity is frequently higher than house humidity, shrinkage of the panel later can place undue tension in the panel if it is anchored very securely to the end boards. . . . The tongue and groove joint, using a rather thin tongue, is my solution. To reduce the stress due to movement I use contact cement for glue and place ⅛-in. brass pins on 6-in. to 8-in. centers. These pins are free to slide in ⅛-in. by ¼-in. slotted holes in the tongue. Thus sliding movement at the glueline is deliberately permitted.

Of potentially more serious consequence is the unintentional anchoring of a panel in a frame, such as a cabinet door. If

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the frame is glued up at the corners, it is not uncommon for glue squeeze-out to get in the panel groove and securely anchor the thin edge of the panel, maybe at all four corners. Heartbreaking consequences can ensue. As insurance I paint all panel corners that contact the groove with hot paraffin or several coats of shellac. *—John W. Wood, Tyler, Tex.*

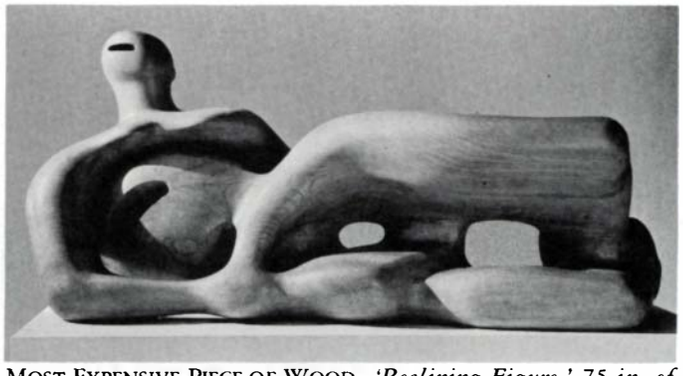
I have a modest contribution to make to the ongoing discussion about how to build a door with a carved center panel. I wanted to build a rather large, heavy door (2¼-in. redwood) that would be exposed to the weather, so the center panel obviously had to float in the frame. However, I was concerned about carrying the weight of the panel on the lower rail of the door. I finally glued up the panel, and glued it solidly to the hinge stile, allowing it to float in tongue-and-groove joints in the lock stile and top and bottom rails. I never saw a door made this way, but it has worked very well—after five years in the summer heat and winter rain, the carved panel is still in first-class condition. The total movement at the outer stile between summer and winter is about ⅜ in., so that float is important. . .

—John W. Black, Somis, Calif.

I want to comment on your recent report about workbenches (*FWW* #36). My company, Tennessee Hardwood, manufactures oak utility-grade worktables on a large scale (500 to 2500 units per month). . . . The way to analyze workbenches is to look at them as semi-processed hardwood, which goes for about $1850 per thousand board feet from all major area mills. Since a thousand board feet weighs approximately 4,000 lb., the product has a cost to the assembler/shipper of 46¢ per lb. The assembler/shipper boxes the product after sanding it and adding hardware and perhaps some drilling. His mark-up (usually 40%) can then allow him to mail-order the item for just under $1 per lb. and still make money.

A workbench is really no more than a three-dimensional solid made of semi-processed hardwood. Ours is made from kiln-dried Appalachian oak, truck flooring actually, and is similar to ones that are selling for $3.75 per lb. But ours retails for $89, about $1 per lb., which is supposed to be ridiculously cheap. In fact it's in line with other unfinished hardwood dimension products—everything else is priced too high. . . . Don't ever pay more than $1 to $2 per lb. for anything made out of American hardwood.

—Tom Howell, Woodbury, Tenn.



MOST EXPENSIVE PIECE OF WOOD—*'Reclining Figure,' 75 in. of elm wood sculpted by Henry Moore, brought $1,150,000 at auction during May. Sotheby's in New York said the price was the highest ever paid for a sculpture by a living artist.*

Fine WoodWorking®

Design Book Three

Last call for entries–Deadline January 3, 1983

This is an open invitation to woodworkers to show photographs of anything and everything made of wood, the very best work you have done during the past four years. Several hundred of the best photographs will be selected by the editors of *Fine Woodworking* magazine for publication in *Design Book Three.* As in our first *Biennial Design Book* (1977) and in *Design Book Two* (1979), the emphasis will be on excellent design and craftsmanship. Our intention is to document the current state of the woodworker's art, as a source of inspiration for today, and a record for tomorrow.

Design Book Three* will also include a comprehensive, state-by-state *Directory of Woodworkers.

Although we would like to publish everybody's photographs, a book can do no more than sample the depth and breadth of contemporary work in wood. Whereas only a fraction of those who enter this competition will see their photos in print, all who enter are eligible for a free directory listing. Since the directory will be arranged by state, readers of *Design Book Three* will be able to locate and commission local artisans. However, the only way to list your shop in the *Directory of Woodworkers* is to enter your photographs in the competition for *Design Book Three.*

Be part of *Design Book Three*, the state of the woodworker's art.

Entry blank for *Design Book Three*

Name _____

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I am: an amateur woodworker ☐, a professional woodworker ☐, retired ☐,

a teacher ☐ (of _____), a student ☐ (of _____),

other _____

Title and/or function of entry _____

Woods used _____

Other materials _____

Dimensions (height, width, depth) _____ Price (optional) _____

Principal woodworking techniques used _____

Remarks (on design, construction, art, craft, life...we may excerpt what you write here for publication with your photos) _____

Number of photos submitted _____ Is each accompanied by a description? Yes ☐

Do you want your photos returned? No ☐ Yes ☐ (enclose SASE)

Do you want to be listed in the *Design Book Three's Directory of Woodworkers*? No ☐

Yes ☐, list me as:

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Send your entries to: *Design Book Three*, The Taunton Press, 52 Church Hill Road, Box 355, Newtown, CT 06470.

Rules

- An entry in the competition for *Design Book Three* consists of a maximum of six black-and-white photographs of things designed and made by an individual woodworker or a woodworking partnership, plus an entry blank. The entry blank printed here may be photocopied or hand-copied.
- The work shown in an entry must be of original design, the primary material must be wood, and the work must have been done since 1978. There are no restrictions on tools, techniques, function (or the lack of it), style or scale. If it's wood and you made it, you can enter it.
- An entry may focus on a single object (overall views plus detail close-ups) or on several objects. The entry blank has spaces for describing one object. If you enter photos of more than one thing, please enclose additional descriptions.
- Photographs should be sharp black-and-white prints with good contrast, at least 5x7 in size, made from 35mm or larger negatives. The background should be featureless so it doesn't interfere with the work itself. To help us compose the book, please leave space around the object within the picture area for cropping. (For more about how to photograph your work, see *FWW* #36, pp. 92-97.)
- Print your name on the back of every photo. Be careful that ballpoint pens don't emboss the image, and that wet ink doesn't smear from the back of one print onto the face of the next.
- Snapshots, Polaroids, color slides, color prints and blurry photographs cannot be published and so will not be judged.
- All entrants are eligible for a free listing in *Design Book Three's Directory of Woodworkers.*
- Entrants whose photographs are published will receive one free copy of *Design Book Three.* Each entrant, whether published or not, may purchase up to ten copies at 25% off cover price.
- Deadline for entries is Jan. 3, 1983.
- If you want your photos returned, please enclose a self-addressed stamped envelope. All photos will be kept until *Design Book Three* is published, in late summer of 1983.
- The decision of the editors is final.

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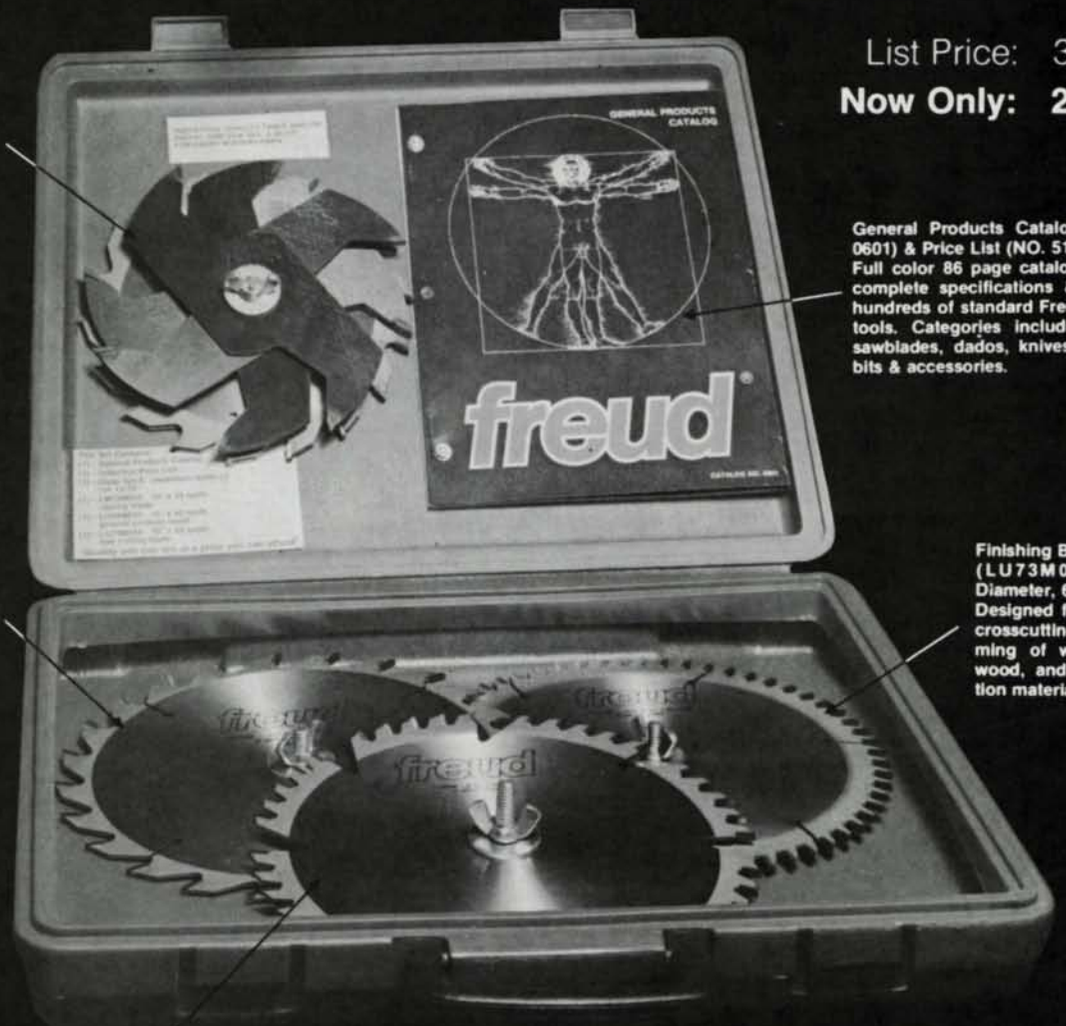

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SHIMS AND OTHER CLEVER PATCHES

BY SAUL ISLER

One day the notorious pirate Captain Kidd, after an otherwise uneventful boarding and pillaging party, found himself listing dangerously to starboard, the result of his leg having been lopped off.

Kidd replaced the missing drumstick with the tip of his mizzenmast, thereby inventing the shim. Measuring the shim too long, however, he then found himself listing a ludicrous 25° to port.

Man has, of course, mis-measured his shims ever since, a ridiculous situation, seeing as the shim's purpose is to correct mis-measurements in the first place.

Forget Kidd's short leg, what about your dining table's short leg? Shim it. If you shim it too high but the shim is too thin to saw off a little more, saw a little off the other three legs. Keep at this. At worst you'll wind up with a nice coffee table. Or a very large serving tray.

Some of my best friends are shims. Plugs, plates, moldings and anything else that will mask the common mistake.

Especially wood filler, which I keep in an old bathtub next to the tablesaw. The problem with most filler is that, no matter how carefully you sand and stain, it still looks like wood filler. Manufacturers swear that their filler faithfully accepts stain, that's why you can't be faithful to manufacturers.

The old trick is to match filler by mixing airplane glue with the sawdust from the workpiece. If you're like me, you need much more filler than that method yields. To make up the difference, simply shove the entire workpiece tightly against your belt sander until you notice that your palms are bleeding. This will generate enough dust to make all the wood filler you'll ever need. If this also eradicates your workpiece, it eradicates your mistakes as well.

With me a wrong angle is the norm, a right angle is an accident. Take paneling. Whether I'm applying a trash grade to a wall or a fine marine ply to the back of a cabinet, I get gaps. I'm talking about yawning gaps, the kind you can mask only with molding, another coveted friend of the woodbutcher.

Molding is to wood what an eraser is to paper. If your panels look as if cut with pinking shears, wrap molding around them. This method of covering mistakes is called framing, and it looks even better when applied to oil paintings, which I hang crooked so they'll look straight on the crooked panels of my walls.

A good way to join two pieces of wood, they say, is with screws. The purists prefer glue, but we woodbutchers would weld our wood if that would keep it together.

In anticipation of tearing up both wood and screws, it is best to countersink the screw holes, afterward filling the countersink with a tapered wood plug which should fit flush but will probably sit proud, which is nothing to be proud of.

A hint: don't glue the plug in place. You'll need to remove it to get at the screw when it loosens. And it will.

The most serious mistake you can make is to believe that you won't make a mistake. It's never a mistake to cover a mistake. I know what I'm talking about. Make no mistake. □

Saul Isler is a Cleveland ad man who sometimes writes a newspaper column under the trademark 'The Woodbutcher.'

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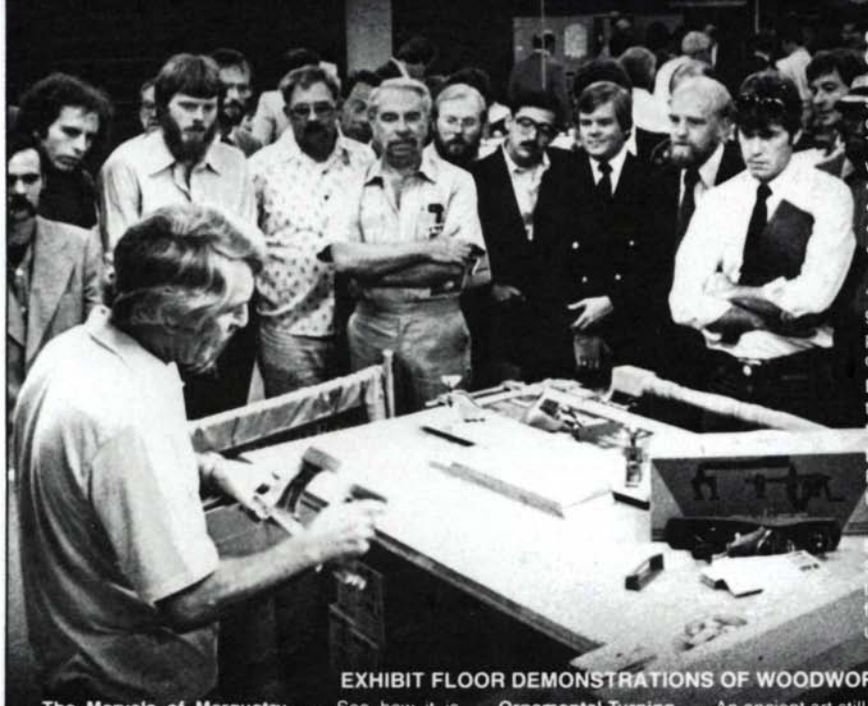

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Wood cutting . . . theory and application. How various materials are cut . . . saw blades, routers, shapers, planers . . . cutter design . . . cutter materials . . . selecting the best cutter for the job.

SEMINAR II: Saturday, 9-12 noon

Ian Kirby, Furniture designer and maker, author and educator. Consulting Editor to *Fine Woodworking*, Director of Kirby Studios, a woodworking studio and school of furniture design and furniture making, North Bennington, Vermont.

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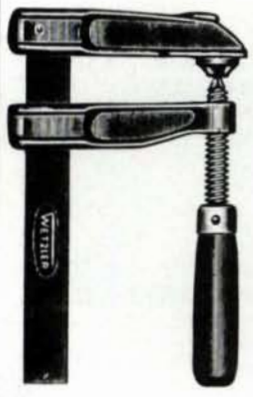

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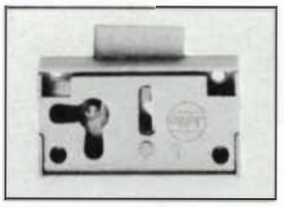

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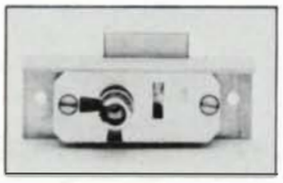

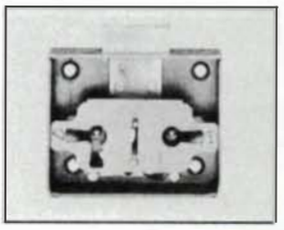

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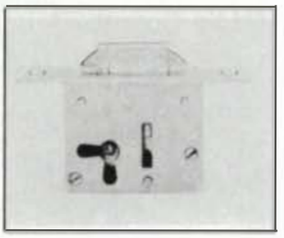

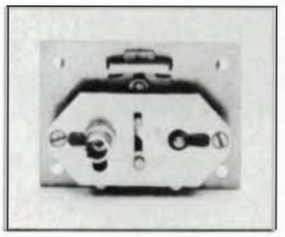

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1040H	10"	40	⅝"	General Purpose	$67/$39
1050H	10"	50	⅝"	Particle Board Lumber	$71/$42
1060H	10"	60	⅝"	Plywood Cut off	$82/$45
1080H	10"	80	⅝"	Plywood Laminates	$111/$57
1010H	10"	100	⅝"	Laminates Fine Joinery	$129/$71
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½"	¼"	¾"	2⅜"	3	$ 7	
¼"	½"	¾"	1¾"	4	$ 7	
¼"	⅜"	1"	2"	5	$ 8	
½"	¾"	1¼"	3"	6	$ 9.50	
½"	⅜"	1"	2¾"	7	$ 7.50	
½"	½"	1¼"	2⅞"	8	$ 8	
½"	¾"	1"	2⅝"	9	$10.50	
¼"	½"	1"	2⅝"	10	$ 9	FLUSH TRIM BIT WITH B.B
½"	½"	1"	2⅝"	11	$10	FLUSH TRIM BIT WITH B.B
¼"	¼" radius	1"	2⅝"	12	$22	ROMAN OGEE WITH B.B.
¼"	⅜" radius	1"	2⅛"	13	$17	ROUND OVER BIT WITH B.B
¼"	¼" radius	¾"	2½"	14	$15	ROUND OVER BIT WITH B.B
¼"	½" radius	¾"	2⅛"	15	$19	ROUND OVER BIT WITH B.B.
½"	¾" radius	1"	3"	16	$33	ROUND OVER BIT WITH B.B
¼"	1¼" Diam	⅜"	2¼"	17	$17	RABBETING BIT WITH B.B.
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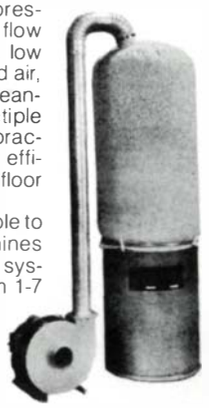

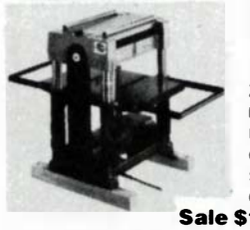

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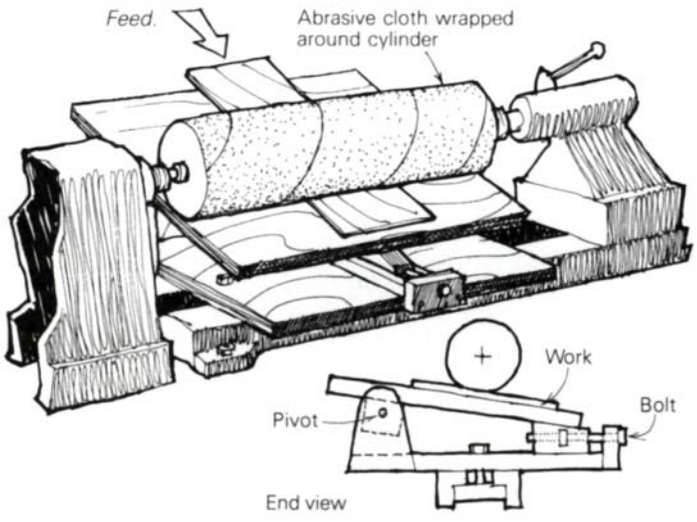
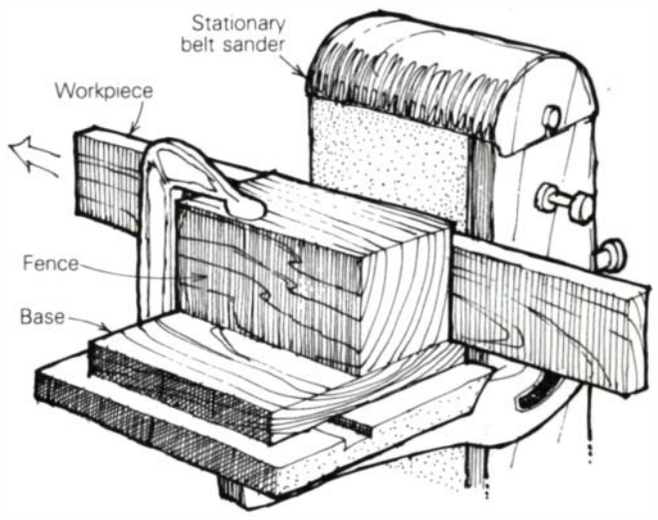
Thickness-sander attachment for lathe



The sketch above shows the thickness-sander lathe attachment I made to sand dulcimer tops and sides. The design is similar to the sanders shown in *FWW* #21, p. 50, but because the device uses the lathe's motor, spindle and bed, it is much easier to make. By using the lathe's variable-speed pulleys you can always find the perfect sanding speed. The sanding drum is simply a turned wooden cylinder spirally wrapped with abrasive cloth. The plywood and hardwood base bolts to the lathe bed and adjusts with a simple wedge mechanism.

—Charles R. Adams, Westmoreland, N.H.

Thickness-sanding on the belt sander



Lacking a commercial thickness sander, I use my standard 6-in. stationary belt sander as shown to face-sand thin strips of resawn stock. The base of the fixture touches the sanding belt. The fence is slightly angled, to provide a wedging effect for pressure. Cross-grain sanding removes wood fast, and the work can't kick back.—*William B. Allard, Tacoma, Wash.*

Circle guide for the router

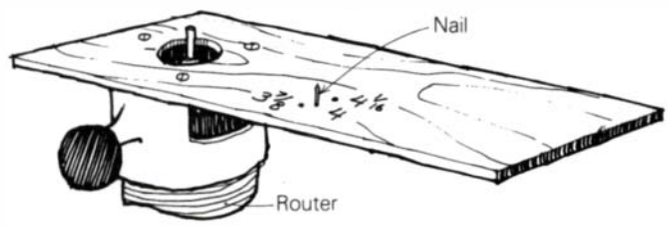
This fixture for routing circles has several advantages over commercial circle guides: it's cheaper, it cuts circles smaller than the router base and it allows repeat set-ups to precise radii without trial and error.

The guide is easy to make. Screw a piece of ¼-in. plywood to the base of your router, carefully countersinking the screws. The plywood should be as wide as your router base and somewhat longer than the largest radius you intend to cut. Saw or drill a clearance hole for the router bit.

Let's say you need a 4-in. radius circle. Measure from the edge of the bit out 4 in. and drill a small hole at that point. Insert a brad in the hole, point up, to serve as a pivot. Drill a centerhole in a piece of scrap, place it on the guide, rout a short arc and measure the radius produced. You'll be lucky if it is right the first time. Regardless, label that hole with whatever radius it produces, say, 4 1/16 in. Then make another hole closer or farther, as the case may be, until you get the radius you want. Remember to mark each hole as you go.

Since the markings are accurate for only that particular bit, you can divide the guide into sections and head each group of holes with the bit used—½-in. straight, for example.

—Brian J. Bill, Old Bridge, N.J.



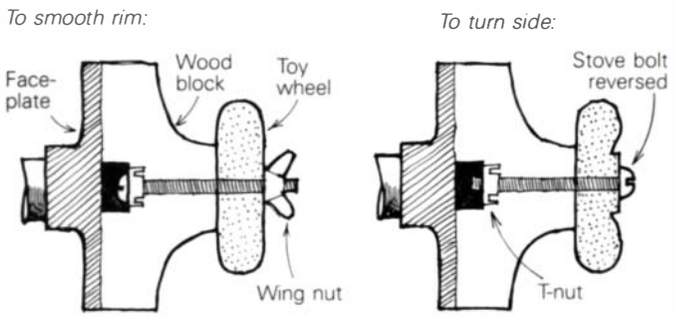
Bending wood without steam

Here's how to bend wood using a solution of hot water and Downey fabric softener. First build a container of black 6-in. ABS pipe by cementing a cap on one end and putting a removable cap on the other. Don't try regular PVC pipe; it won't hold up to high temperatures. The length of pipe can be whatever fits your need.

Mix one part Downey to twelve parts water, and heat the solution to boiling. Put the wood to be bent in the container and pour in the hot solution. Seal the open end of the container. It is important to keep the container warm. Here in California, I set the pipe out in the sun. On cloudy days I've sat the pipe next to a mirror and heated it with sunlamps. Leave the wood in the hot solution for a minimum of one hour. You'll find that wood softened in this solution will hold its shape better and not snap in the bending process. The solution turns thin wood to spaghetti.

—David Ferguson, San Clemente, Calif.

Finishing toy wheels



To finish wooden toy wheels on the lathe, I use a simple fixture similar to the one described by George Pilling (*FWW* #30, p. 16). After I cut the blanks using a hole saw with a ¼-in. pilot bit, I mount the blank on a special wooden faceplate in one of two ways, depending on the work to be done. If I'm smoothing the rim, I install a ¼-in. bolt through the fixture from the back, slide the blank on the protruding threaded shank and fasten the blank in place with a wing nut, for quick changes.

On the other hand, if I'm turning the face of the wheel, I

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9924DB	3"x24" Dustless Belt Sander	208	139
9401	4"x24" Dustless Belt Sander	273	179
B04510	Finish Sander	79	49
B04520	Finish Sander	79	51
9045N	4 1/2x9 1/4" Finish Sand.. Dustless	160	110
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3601B	1 1/4 H.P. Router	196	130
3600B	2 3/4 H.P. Plunge Router	299	190
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OP4700	1/2" V.S.R. Drill 4.8 AMP	142	95
6010DW	3/8" Cordless Drill Kit	136	84
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#0	8"	4 1/2"	15.97	10.50	56.70
#1	10"	6"	18.25	11.95	71.70
#2	12"	8 1/2"	20.94	14.25	76.95
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#4	16"	12"	34.55	24.95	134.73

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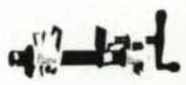
#6210	10'	$52.24	$34.95	$188.73
#6215	15'	57.29	37.95	204.93
#6220	20'	62.32	40.95	221.13
#6225	25'	67.34	42.95	231.93
#6230	30'	72.39	45.95	248.13



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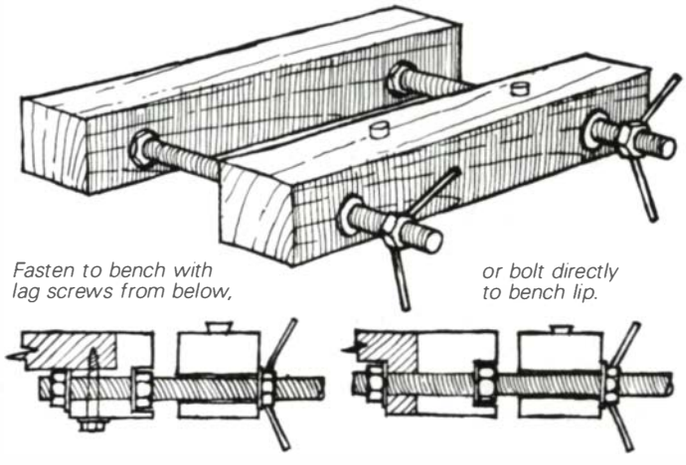
remove the bolt from the back and screw the blank to the fixture from the front, which allows more room. A T-nut installed in the back side of the fixture anchors the bolt. To save time, do one operation on all the wheels before reversing the bolt. *—Carlton M. Herman, Hendersonville, N.C.*

Homemade bench vise

Unless you're lucky enough to own a European workbench with well-designed, sturdy vises, you are likely relying on inadequate ways of holding your work. Trouble is, most of the commercially available wood vises are just too small. And it is awkward to hold workpieces vertically because the center screw is in the way.

My alternative to the commercial vises is shown in the sketch below. It is a simple, inexpensive, effective means of keeping work where I want it. At first the two wing-nut vise screws might appear to be inconvenient, but in most cases you can hold narrow stock by tightening only one screw. In fact, because of the independent movement allowed by two screws, it is routine to secure work with non-parallel sides.



The feature that has been most useful is the ability to hold panels up to 17 in. wide in a vertical position right down to the floor. This feature is invaluable for planing end grain and cutting dovetails and tenons.

I made my vise from two 24-in. lengths of 4x4 scrap hardwood, salvaged from a freight skid, and two 19-in. long sections of 1-in. threaded rod with matching nuts and washers. A friend spot-welded the wing handles on two of the nuts. You could epoxy the nuts into wooden wings instead. Be sure to angle the handles away from the jaw.

Drill 1-in. holes in the rear jaw, but drill $1\frac{3}{16}$-in. holes in the front jaws to allow for free jaw movement. Be sure to align the holes properly. I clamped both jaws together and drilled through one jaw, allowing the tip of my drill bit to register the hole in the other jaw.

—Joe Loverti, Miamisburg, Ohio

Two hot-glue gun tips

A common technique for attaching a turning blank to a faceplate to avoid screw holes is to glue the blank to a waste board with paper in between. The method works well, but the long curing time of the glue is inconvenient.

I have found that a hot-melt glue gun will attach the blank to the waste board rapidly and securely. The glue sets in about 15 seconds, so no clamps are needed—just hand pressure. No paper is needed because the glue bond can be

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As in the case with all our INCA machines, the Model 510 Jointer/Thickness Planer is made to industrial standards from tough, pressure cast alloys for rigidity and long wear. The planer table has a surface of stainless steel and everything about it is more than adequate for the most demanding professional applications. Its compact size makes it all the more suitable for cabinet shops or to take on the job.

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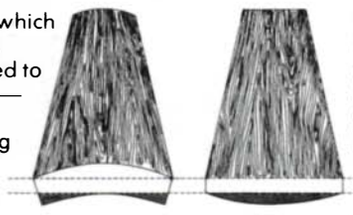

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easily broken later with a chisel. Since the glue doesn't become hard, cleanup of the bottom of the turning is easy.

—John Foote, Clarksville, Tenn.

When I am bandsawing complex shapes where material must be removed from two or three sides, I use hot-melt glue to temporarily reattach the discards to stabilize the piece during further sawing. The hot-melt glue is superior to tacks or tape in this application. It's very fast and it just takes a couple of dabs here and there to hold the discard in place. Later you can easily pry or strike the waste piece off.

—J.A. Spratt, Smithville, Ont.

Veneering with sandbags

The easiest way to apply even pressure on veneer being glued to a curved surface such as a serpentine drawer front is to use several pillow sacks filled with sand. Store the sandbags near the stove. Their warmth will shorten the glue-curing time.

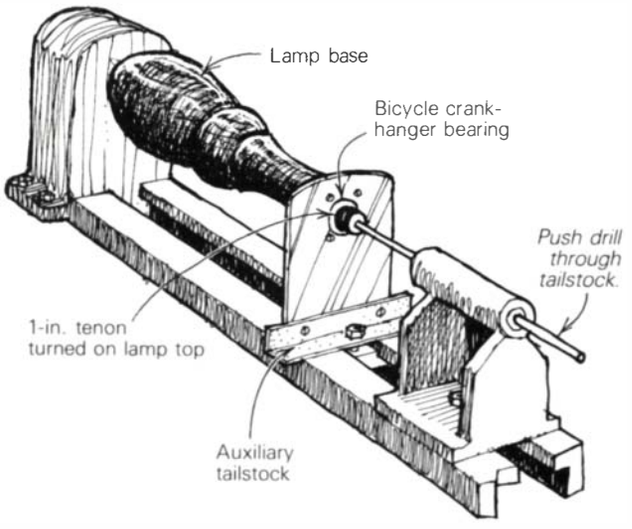
—Granton James, El Paso, Tex.

Auxiliary tailstock for boring

To bore holes through lamp bases and similar turned items, I made an auxiliary tailstock to hold the work so I could pass a long drill bit through the regular tailstock. The key feature of this special tailstock is the bearing from a bicycle crank hanger. This bearing has a 1-in. bore, so I turn a 1-in. tenon on the end of my lamps to fit it. The rest of the device consists of a ¼-in. thick aluminum-plate upright, a short section of a 1-in. angle-iron base to span the lathe ways, and a wooden dog, which tightens under the ways to lock the unit in place. To keep wood chips out of the bearing, I turned a cover for the bearing that also holds the bearing in the upright.

In use, the ram from the tailstock is removed and the drill bit is passed through the tailstock into the lamp, which is supported in the auxiliary tailstock.

—Ralph Luman, Virginia Beach, Va.



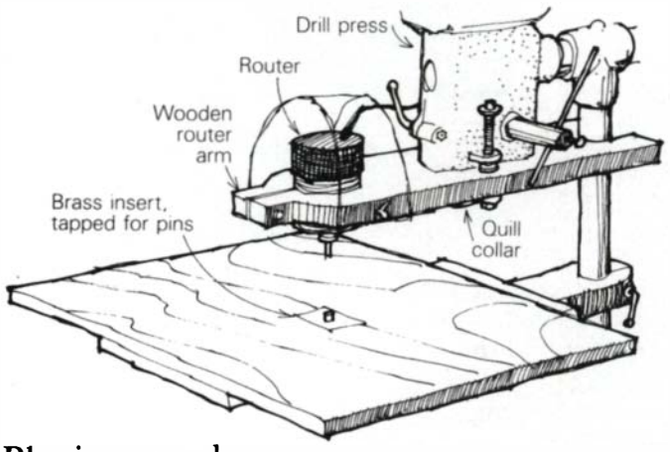
Pin router attachment

By bolting a simple router arm and an auxiliary table to my drill press, I can convert it to a pin router. This lets me take advantage of the drill press' quill movement to lower the router into the work. Make the router arm from a 20-in. length of 2x6 lumber. Drill the arm to fit your drill-press quill and feed stop, then notch the back of the arm so it can

slide up and down the post. On my drill press the arm is held in place well enough by the drill-press feed-stop collar and the feed stop. Other drill presses might require bolting the arm directly to the housing. In the end of the arm, cut a hole the same size as your router. Then cut a slot in the arm and install a bolt to pinch the router and lock it in place.

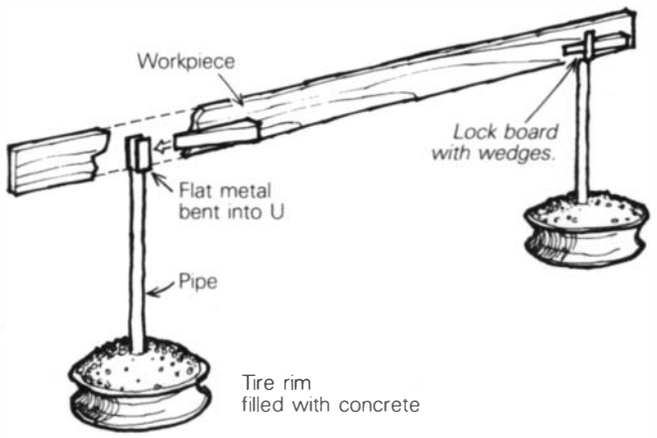
The table is a 20x30 panel of ¾-in. plywood covered with plastic laminate and strengthened by a thick plywood spine on the bottom. A tapped brass plate located in the center of the table accepts different diameter pins (I used standard router pins from Sears).

—Andrew Makarevich, Villa Park, Ill.



Planing stand

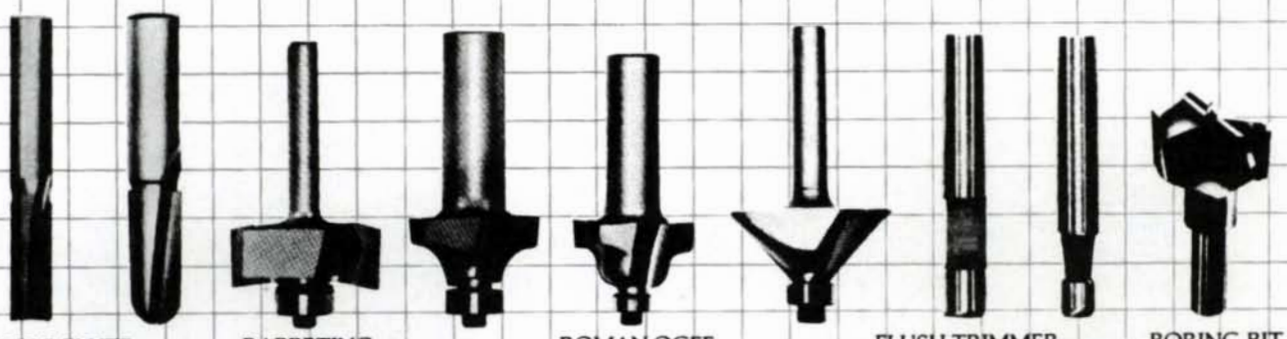
To hold boat planks and decking for planing and beading, we use what must be the world's simplest workbench. It consists of two stands made from concrete-filled wheel rims, some 1½-in. pipe, a couple of pieces of flat steel bent into U-shape, and a couple of wedges. The stands are very stable (approximately 150 lb. each), yet they can be easily tilted and rolled wherever needed. One advantage of the stands is that you can work a plank from both sides—there's nothing in your way anywhere. *—Kim Aaboe, Halifax, N.S.*



Veneering convex workpieces

Here is an alternative to a custom-fitted caul for veneering curved work. The device will cope with a wide range of convex forms, is quickly made in any size and requires much less material and construction effort than a specially shaped caul.

Take a piece of hardwood slightly longer than but not quite as wide as the item to be veneered. Tap the board for wooden screws to provide pressure along the midline at



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04-106	1/4"	3/4"	10.30	8.90

ROUND NOSE BITS — 1/4" SHANK CARBIDE TIPPED

Item No.	Cut Dia.	Cut Length	List	Sale
18-104	1/4"	1/2"	16.80	14.50
18-108	1/2"	3/8"	22.88	19.50

RABBETING BITS — 1/4" SHANK CARBIDE TIPPED

Item No.	Depth of Cut	Large Dia.	List	Sale
32-100	3/8"	1 1/4"	26.30	22.50

ROUNDING OVER BITS — 1/4" SHANK CARBIDE TIPPED

Item No.	Radius	Large Dia.	List	Sale
34-110	1/4"	1"	26.30	22.50

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Item No.	Radius	Large Dia.	List	Sale
38-100	5/32"	1 1/16"	34.30	29.50

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Item No.	Degree of Angle	Cut Length	List	Sale
40-106	45°	1"	25.16	22.80

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Item No.	Cut Edge	Overall Length	List	Sale
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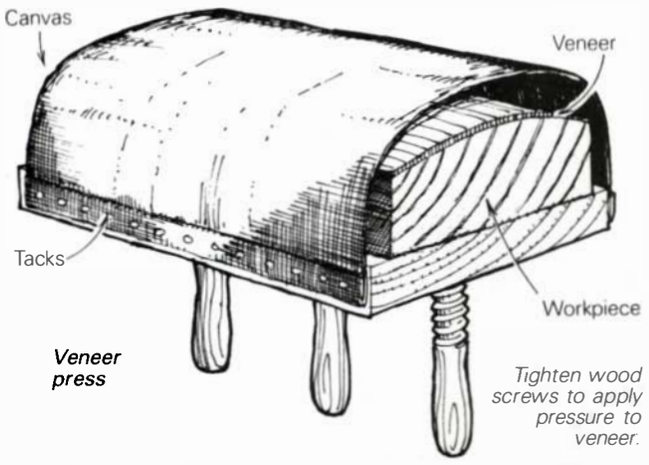
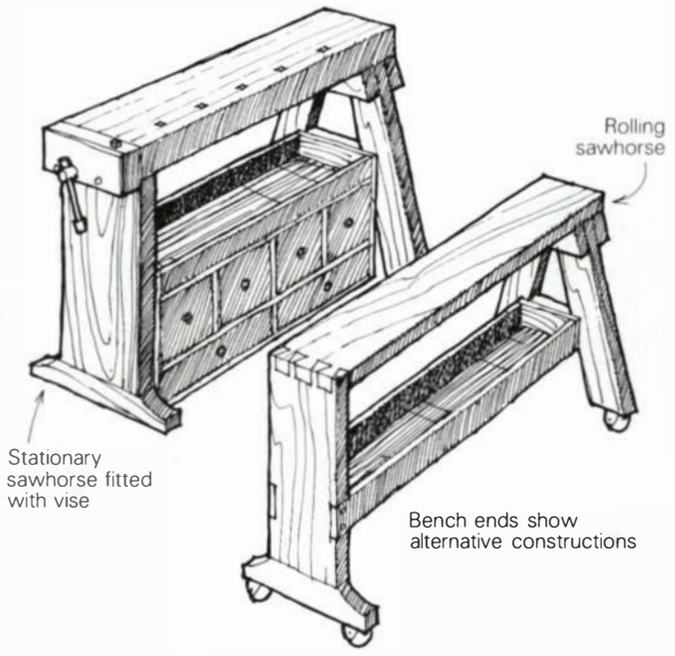


about 6-in. centers. (You could use wedges or threaded rods and nuts if you have no threading tools.) Tack a strip of stout canvas along both edges to form a tube as shown in the illustration. Place the veneered workpiece in the tube and tighten the screws. A glance at the open ends will show when the tube is taut and has clamped the veneer against the base. Put aside to dry. Tubes of various sizes can be built up sharing the same wooden screws.

—R.W. Shillitoe, Ilkley, West Yorkshire, England

Portable benches

Shown at right are two valuable additions to my shop. The sawhorse on the left is fitted with a small bench vise. I keep small power tools in the tray, and store hand tools in the drawers below. Because of the three legs and the extra weight



the horse is very stable. A short board can be clamped between the dogs. For longer work, the caster-fitted second horse rolls easily into position to support the distant end.

—S. Grandstaff, Happy Camp, Calif.

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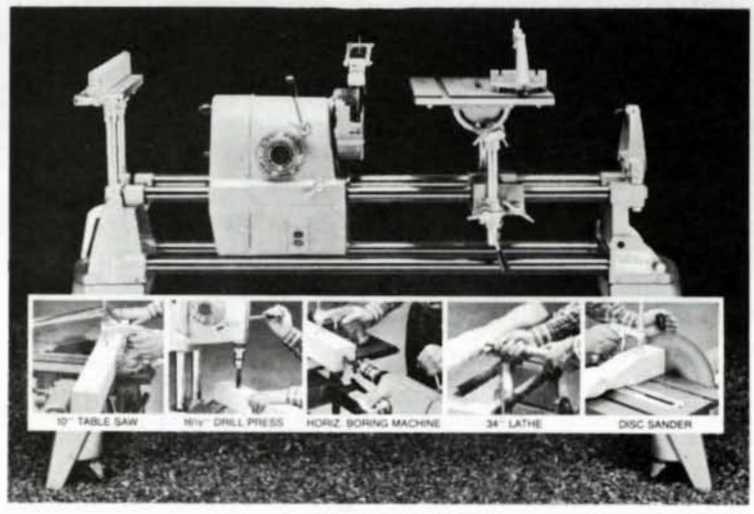

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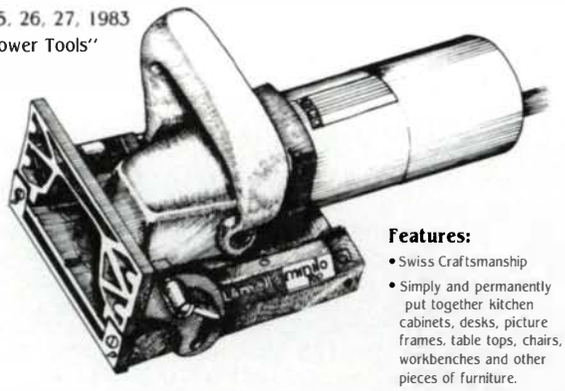

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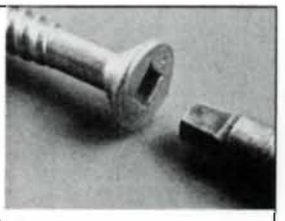

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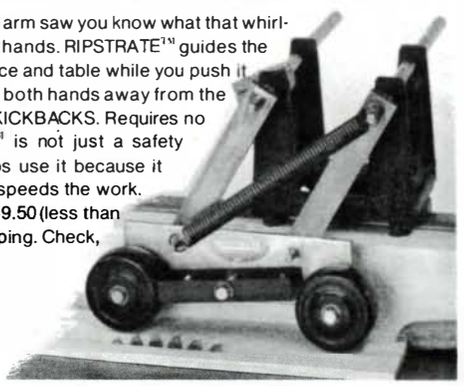

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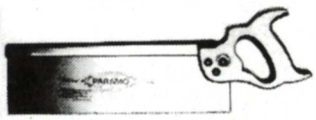

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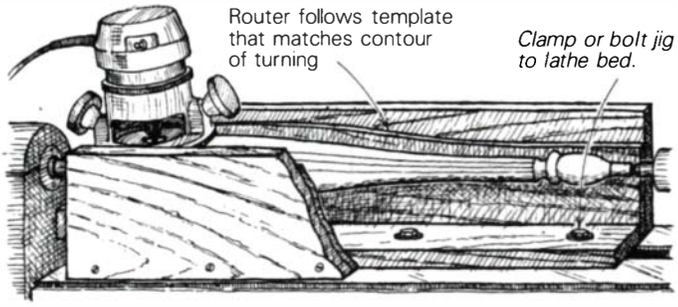
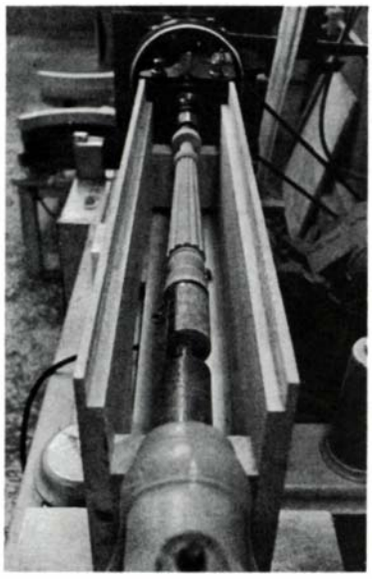
Reeding on turned bedposts—*I am turning bedposts that I want to reed, and though I have seen articles on the subject, they don't address the problem of cutting the reeds into a curved tapered post. Can you tell me how to do it?*
—Don Carkhuff, Plainfield, Ill.

R. PERRY MERCURIO REPLIES: The reeding you see on factory-made furniture is usually done on a shaper with an indexing head, or else on a special machine with automatic indexing and a traveling tool head. In the home shop, you can set up a router on your lathe with an indexing device on the headstock, and a jig as in the drawing below.



Some lathes have a built-in indexing wheel that locks the headstock at 5° increments, or you can jury-rig one by attaching an old sawblade or other toothed wheel to the headstock spindle. Make the reeding template by bandsawing two pieces of thin stock, say, ½-in., to a contour that matches the cross section of your turning. Then nail or screw these pieces to the stock that will form the sides, and mount the assembly on your lathe. The exact height of the sides will vary from lathe to lathe, and each turning, unless it's a duplicate of an original, will require its own template. This method has limitations. The curve of the column cannot be too radical or else the router base will rock and produce an uneven cut as it's pushed along. And no matter how the reeds are cut, the small end of the turning will have narrower, faceted reeds which you will have to shape by hand-sanding or with a flap-wheel sander. [R. Perry Mercurio is a retired engineer who worked in the woodturning industry for many years.]

RICHARD HEISEY REPLIES: Straight tapers are a little easier than curved ones. I use the setup shown in the photo below on my large pattern lathe. When you're setting up, make sure the bit tracks exactly on the radial line along the center of the turning, or else the flutes will be skewed. It's best to make a test turning of the same size to try out the jig before tooling the actual workpiece. Reeds that stop at a bead or other detail must be completed by hand with chisels or gouges. Off-the-shelf router bits don't work very well for this job. They're usually too wide at the tip, or the radius is not quite the right size. I grind my own bits from a commercial steel bit that is close to the profile I need, or from a broken bit. [Richard Heisey makes period furniture in Winchester, Va.]

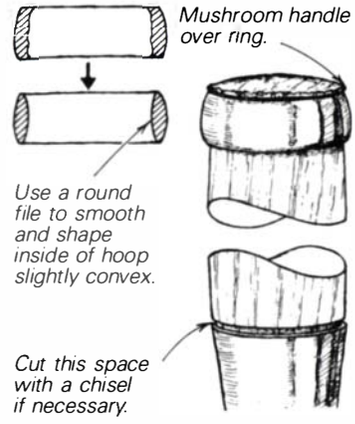


What's lighter than balsa?—*In a materials class I'm taking at a local college, I challenged an instructor's statement that balsa is the softest wood. It's my understanding that balsa trees grow rather tall, and therefore I think that smaller trees and shrubs could produce softer wood.*
—Andrew Brennan, Westlake Village, Calif.

R. BRUCE HOADLEY REPLIES: Balsa, with a specific gravity in the 0.10 to 0.17 range, is usually considered the lightest wood of any commercial importance. But there are little-known species of even lower density. *Aeschynomene hispida* from Cuba, for example, is reported to have a specific gravity averaging only 0.044. Among species native to the United States, corkwood (*Leitneria floridana*), with a specific gravity of 0.21, is thought to be the lightest. Lightness can generally be directly associated with softness; I would caution against assuming any correlation between tree size and wood density, however. Two of the heaviest woods, desert ironwood and lignum vitae, with specific gravities up to 1.3, are very small trees. By contrast, the largest trees of all, the sequoias, produce wood of moderately low density, in the 0.40 specific gravity range. [R. Bruce Hoadley teaches wood science at the University of Massachusetts, Amherst.]

Setting the hoops on Japanese chisels—*I recently bought a set of Japanese chisels and find they work quite well—with one exception. About every third time I hit one with my mallet, the metal hoop on the top of the handle goes flying off. What am I doing wrong?*
—W.B. Lord, New York

TOSHIO ODATE REPLIES: Japanese chisel handles are tapered with a steel hoop at each end. The lower hoop works like a socket and is tightly fitted at the factory. The upper hoop has a larger opening at one end and goes on the handle first. The old Japanese name for this hoop is *sagariwa,* meaning "coming down ring." When this hoop slides down, it tightens around the handle and keeps it from splitting. On new chisels, the upper hoop usually fits loosely, and its inside edges are rough and burred. This is not good for sliding down, so with a round file make the inside of the hoop smooth and slightly convex, as in the drawing. Do not file too much; try to keep the hoop fitting tightly. It should seat about 1/16 in. below the top of the handle. Then dip the tip of the handle in water for a few seconds and use a hammer to mushroom the wood over the hoop.



The lower hoop of the chisel usually comes correctly fitted, but sometimes you must also adjust this. There should be 1/16 in. of clearance between the top edge of the hoop and the handle. This stops the socket from digging into the wood and splitting it. Cut this space on your chisels if it is too small. [Toshio Odate is a sculptor and maker of traditional Japanese sliding doors (*shoji*).]

Stain won't take—*I use white glue on all of my woodwork, but no matter how well I sand, white areas appear after I've applied stain. What causes this and what can I do to prevent it?* *—S.M. Gurtan, Norcross, Ga.*

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uniform absorption of stain. There is no single cure-all, but the following hints, alone or in combination, should reduce the problem. First, avoid excessive squeeze-out by not using too much glue. Franklin makes a product called Shop and Craft Glue that is the consistency of toothpaste and won't run at all. Clean up squeeze-out as soon as you can with a cloth dampened with hot water. Use a stiff brush to get into hard-to-reach places. Careful sanding and scraping will usually remove adhesives that have already dried and will also smooth grain raised by the damp-cloth cleanup. Sometimes you can prefinish troublesome areas, such as up. to tenon shoulders and miter joints. Finally, if all else fails, color the glue before you apply it, with a water-soluble stain that matches the finished color of your wood.

Preventing split miter joints—*Last winter I made some walnut school clocks with octagonal faces joined by splined miters and glued with epoxy. One of my customers brought a clock back to me, complaining that one of the joints had split along the outside edge, at the toe of one of the miters. What went wrong and how can I repair the open joint?* —*Michael Charney, Ford City, Pa.*

DAVID POWELL REPLIES: The clock frame appears to have been taken into an atmosphere with a much higher humidity than that of the workshop in which it was built. This caused the wood to swell in width, changing the angle of the miter and opening the joint. Ideally, the way to prevent this problem is to ensure that the relative humidity is the same in the shop as in the eventual home of the clock. Practically, this isn't always possible, so four things need doing. First, make sure your wood has been properly kiln-dried. Second, make the joint as strong as possible by joining with a spline that's about one-quarter to one-third the thickness of the frame material. The width of the spline should be four to six times its thickness and its grain should run perpendicular to the joint line. Third, don't make the frame parts wider than 3 in. or so, to minimize the total amount the wood can swell. Fourth, retard the wood's absorption of moisture by applying a film finish such as lacquer or varnish to all sides of the frame as soon as possible.

The best way to repair the failed joint is to remake the frame. If the gap in the joint is filled and stained, it may be satisfactory for a period. But any change in relative humidity will either squeeze out the filling and cause a ridge, or further open the joint, showing a gap next to the filling. [David Powell teaches cabinetmaking at Leeds Design Workshops in Easthampton, Mass.]

Correcting blotchy stains—*I've been trying to use a few different types of non-grain-raising stains on lighter woods such as cherry. The effect is often blotchy and the colors seem to bleed. I've tried many combinations of stains, but nothing seems to help. What can you suggest?* —*Brian Shultz, Exton, Pa.*

OTTO HEUER REPLIES: These types of stains are really intended for industrial users who have the proper spray equipment. They are difficult to apply by wiping or brushing. If you want to experiment a little, however, try wetting the wood with denatured alcohol just before staining. The alcohol slows down penetration of the stain and may give you better color control. If you have spray equipment, spray the stain at very low air pressure or just fog on a light coat. After the stain has

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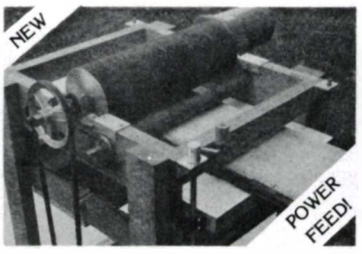

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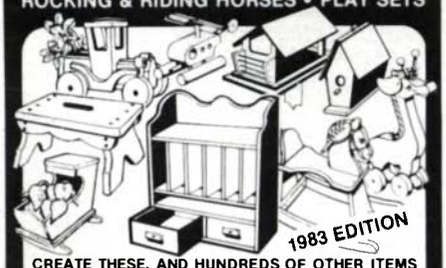

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dried, spray on a thin washcoat of reduced lacquer sealer (1 part sealer to 2 or 3 parts thinner) or reduced shellac (1 part bleached shellac to 5 to 7 parts denatured alcohol). This will keep the NGR stain from bleeding into the top or finish coat. [Otto Heuer is a finish chemist.]

Restoring an old desk—*I've salvaged an old, walnut roll-top desk from the basement of a great aunt. It's in many pieces, some rotted and waterstained, and the wood is coated with coal dust from a nearby furnace. How can I clean up the desk and restore it? I've tried using a mixture of linseed oil, turpentine and vinegar as a cleaning agent. The desk has an inlaid leather top and I'd like to restore that too.* —*Sam Stafford, Louisville, Ky.*

GREG LANDREY REPLIES: First, vacuum all of the desk parts to remove any loose dirt. Stubborn dirt and stains can be removed with a soft cloth dampened with a weak detergent and water solution. A 1% (1 gm. to 100 ml. of water) solution of Soilax 3 works well. This product can be bought at the grocery store or a janitorial supply house. Odorless mineral spirits is another solvent for this cleanup job, but I advise against using any kind of linseed oil solution, because if it isn't entirely removed, it can remain on the surface and leave a tacky film that will attract dust and turn dark.

Glue disassembled parts with liquid hide glue, an adhesive similar to the one originally used on the desk. If you need a stronger bond, try white glue, but remember that white-glued joints are more difficult to take apart later. Rot, if not too far gone, can sometimes be hardened with several coats of a surface finish. Use a consolidant called Xylamon XL (which is available from Conservation Materials Ltd., Box 2884, Sparks, Nev. 89431) if you want your repair to be stronger. As a last resort, you can inject a two-part resin epoxy into any rotted areas. If the old wood is beyond repair, splice in new wood and match its color later with stains.

If the old finish remains in good condition after cleanup, protect it with a coat of carnauba wax applied with 0000 steel wool or a soft cloth. Don't apply wax to bare wood, however, because it will penetrate and be difficult to remove later if you want to apply another kind of finish. If the old finish can't be saved, try removing it with denatured alcohol or a non-flammable paint remover. Rubbing water stains with denatured alcohol may tone them down; stains can be used to match colors where patches or repairs have taken place. Shellac is probably the appropriate finish for a desk of this era, though it has limited resistance to heat and water. Harder finishes such as lacquer or varnish could also be used. If the leather top is in good shape, a cleanup with saddle soap may be enough to restore it to serviceable condition. If you can't save the old leather, consider replacing it. Refer to *FWW* #11, p. 61, for an article on inlaying leather. [Greg Landrey is a furniture conservator at the Winterthur Museum in Winterthur, Del.]

Dissolving wax—*What is the proper solvent for carnauba wax?* —*H.B. Skinner, Seattle, Wash.*

DON NEWELL REPLIES: If you want to dissolve an old wax film to remove it, you can use mineral spirits, dry-cleaning solvent (perchlorethylene) or lacquer thinner. If you want to soften or dissolve new wax to apply it to a surface, the same three solvents can be used, the only difference being that the finish will have different drying properties. Of the three, min-

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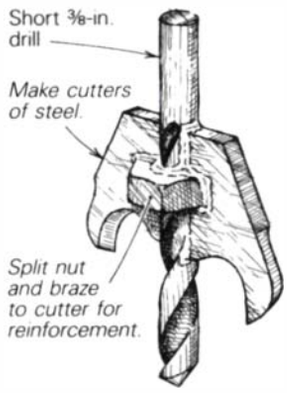
eral spirits produces the slowest evaporating mixture, so a solution made with it will set slowest. Dry-cleaning solvent sets faster and lacquer thinner is the fastest of all. The final wax film will be the same no matter which solvent you use. Be particularly careful with lacquer thinner, though—it's extremely flammable. [Don Newell is a former paint and varnish chemist.]

Follow-up:

Re Randy Dehes' request for a two-wing toy wheel cutter (*FWW* #33, p. 30). I make my own out of 3/16-in. thick oil-hardening tool steel and a 3/8-in. steel drill bit. I cut the steel to shape, and make a holding jig out of scrap wood to position the cutters while I braze them to the drill bit. To use the cutter, set the drill-press depth stop to just less than half of the thickness of your wheel stock, and drill from each side. Then just knock your wheel out with a hammer.



—W.H. Braley, Huntington, W. Va.

Re Robert Gillespie's answer about the open time of aliphatic resin glue (*FWW* #35, p. 24). According to the Franklin Glue Co. and my own experience, longer open times lead to thicker glue and weaker joints. The right amount of open time depends upon temperature, humidity and glue age, and has to be judged by experience. As my glue ages in the bottle, I thin it slightly with water to keep it workable.

—Jim Lewis, Troy, N.Y.

Re Removing a stubborn red finish from an old high chair (*FWW* #33, p. 24). Why not let the red be? Strip off the old top coat and apply a new finish. This method involves much less work and would yield, I think, a very pretty chair.

—Grey Doffin, Fargo, N.D.

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—Queen Anne furniture legs can be bought from Richard T. Johnson, 222 Wisconsin Ave., Lake Forest, Ill. 60045. Johnson bought the inventory of Rollingswood, an out-of-business firm which formerly sold period furniture kits.

—A stripper that will remove milk paint is available from Iris Hill Paint Stripper, Box 202, Brookline, N.H. 03033.

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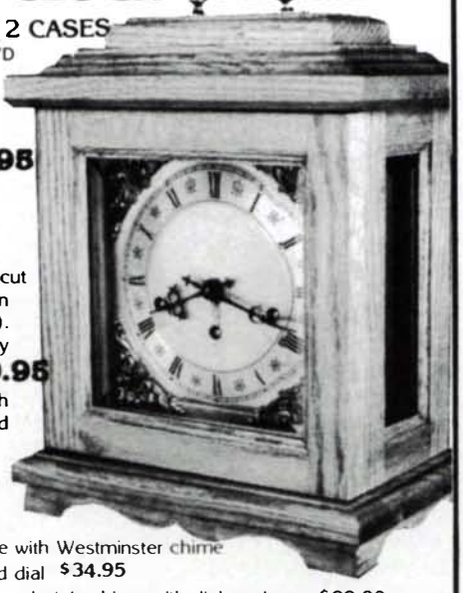

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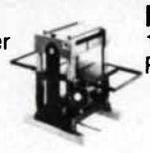

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Masters of Decorative Bird Carving by Anne Small. *Winchester Press, 220 Old New Brunswick Rd., Piscataway, N.J. 08854, 1981. $29.95, hardcover; 148 pp.*

Carving Duck Decoys by Harry V. Shourds and Anthony Hillman. *Dover Publications, Inc., 180 Varick St., New York, N.Y. 10014, 1981. $4.25, paper; 5 pp. text, 16 full-size patterns, 16 decoys in color.*

Duck decoys are a native American invention, dating from about 1000 AD, and originally made from tied reeds, feathers, bones and skins. They were designed to lure wary ducks within range of hunters. Carved wooden decoys came later, in the market-gunning days, when the seemingly inexhaustible shorebirds were heaped on platters in the finest hotels and restaurants. Modern game laws limit the species that can be hunted today, but primitive decoys of swans, herons, and even sandpipers and songbirds still exist, left over from the days when anything that flew was fair game.

Decorative bird carving grew directly out of the decoy tradition. In the first American Decoy Show, held in Bellport, Long Island, in 1923, carvings were functional above all else—you would lose points if your bird was too fancy, or had features such as an extended neck or stretched feathers (which might break off when the decoy was thrown around in the bottom of a duckboat). Carvers kept testing the limited rules, year after year outdoing each other with more lifelike and fragile birds, until a separate field gradually was forced upon the judges. Many carvings in this new category showed birds in their natural environment, or several birds interacting. The first exhibition devoted exclusively to decorative bird carving was held in 1966, sponsored not by some sportsmen's club but by the Maryland Ornithological Society.

The carvers who made the transition from game to gallery are profiled in *Masters of Decorative Bird Carving,* a stunning book that surveys the field from the early 1920s to the present. My favorite photo is one of old A.E. Crowell holding a bewildered, glassy-eyed merganser. He and the carving have exactly the same expression on their faces, as if to ask: "What is all this fuss about?" The book proceeds with a chapter on the major shows, then continues in chronological order, with a final chapter on waterfowl specialists. Profiles of most makers are sketchy and superficial, but there is hardly a page that doesn't have a photo, and the color plates are so real as to be almost unbelievable—author Small mentions in her introduction that a photograph of a painting was almost included as a carving in the book. One pintail carving, writes Small, not only lured a duck within range, but was actually attacked as a potential rival for the hen's affections.

The current state of the art leaves carvers in a bit of a spot. The means and the ends of decorative bird carving are approaching finite limits. The means include not only using specialized woodburning tools that can delineate every visible line on a feather, but chewing balsa wood to simulate the downy feathers of a baby owl. Dental floss is inching into the field (part of a dandelion), and so is fiberglass insulation (cattails). It all may be a dead end—I would not be too surprised to hear of a duck who, battery-powered, waddled and quacked his way to a championship. One of the modern masters, Grainger McCoy (*FWW* #32), spent two years on a recent carving, and sold it for $80,000.

With daunting examples like this to emulate, how can any

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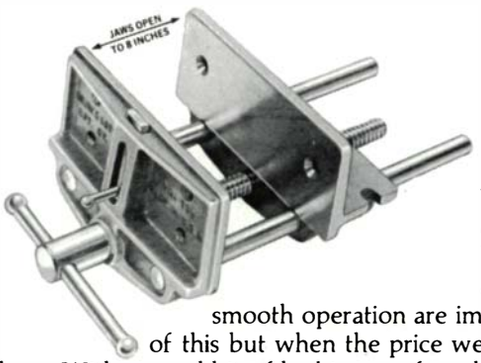

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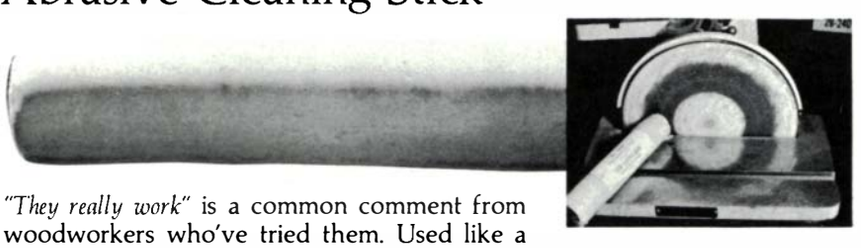

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beginner possibly dare to carve a bird?

Carving Duck Decoys, a book of patterns for hollow-body ducks, will introduce you to the other side of the field. These are patterns for working decoys (though they may end up on the mantlepiece), not for masterpieces. The book is seventy pages long, but most of this is taken up by the double-page templates. There are only five pages of text, enough to do the job but with plenty of room for your own working techniques and individual expression. The book has one major flaw—many of the decoys in the color photos are wickedly out of proportion (the mallard reminds me of a domestic Rouen). You would do better with an Audubon guidebook. The templates, however, are pretty good. *—Jim Cummins*

Wood 83 calendar, compiled by Nancy Kolliner/Graham. *Evergreen Studios, PO Box 6248, Los Osos, Calif. 93402, 1982. $9.95 (postpaid).*

Need a calendar? Tired of fleshy sirens and pipe wenches on the workshop wall? *Wood 83* features more than a dozen ravishing pinups that will quicken the woodworking pulse without offending anybody's sensibilities: each month's picture is of furniture or sculpture by a contemporary artisan. Spend January with a walnut desk made by Wharton Esherick, June with a Federico Armijo stack lamination, November with a mahogany table by Judy Kensley McKie, its top perched on four marvelous carved birds. There's a blurb about each maker, the photos are excellent and so is the printing job. If you're forever giving your family woodworker the wrong tool at Christmas, this calendar might solve your problem. It sure beats cheesecake. *—Roger Holmes*

A Treasury of Woodcarving Designs by Alan and Gill Bridgewater. *Van Nostrand, 135 W. 50th St., New York, N.Y. 10020, 1981. $19.95, hardcover; 192 pp.*

In every corner of the world, and in every age, people have embellished wooden objects of utility, veneration or play with carving. Simple, carved geometric patterns, for example, are universal. They appear on 12th-century English chests and 19th-century Polynesian war clubs. The Swedes used fine tool steel to incise patterns on washboards; in New Guinea, stone or bone accomplished the same task on shields and drums.

The Bridgewaters' book, with over a thousand drawings and photographs, makes for a fascinating study of carving by peoples separated by vast distances and long spans of time. The carvings are grouped by pattern, age and culture, and range from anonymous peasant chip carving to the high art of Grinling Gibbons or the Chinese lacquer carvers. Each carving is further identified by a brief reference to its application and the method of execution. An introductory essay gives just enough historical and cultural background to whet the appetite for more.

But this isn't a history; neither is it a how-to. It's a pattern book, and a very useful one. I got it just as I was learning to chip carve. Chip carving requires few tools, but the simple, geometric patterns can be combined in countless ways. I had the necessities: some soft wood, a knife or two and the inclination to fool around with them. This book provided the rest—page after page of ideas, gleaned from Polynesian warriors, African master carvers and European peasants. Working through them should keep me happy for some time.

—Roger Holmes

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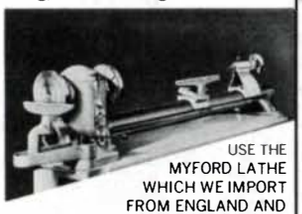

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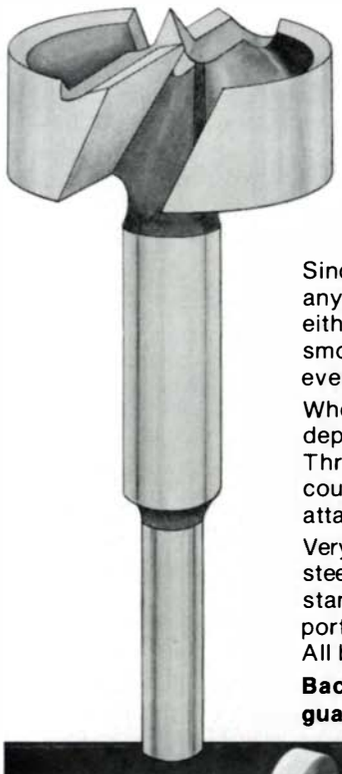

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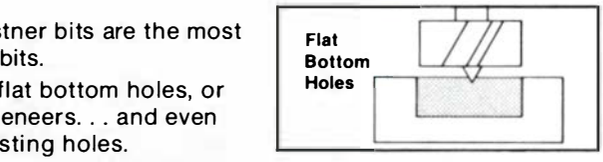

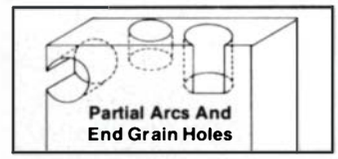

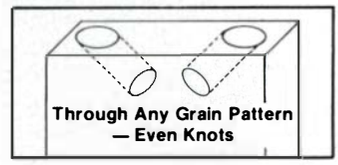

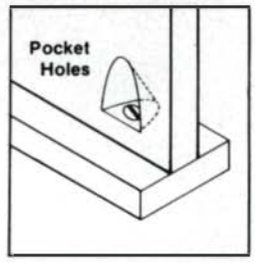

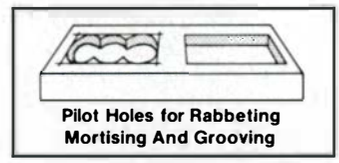

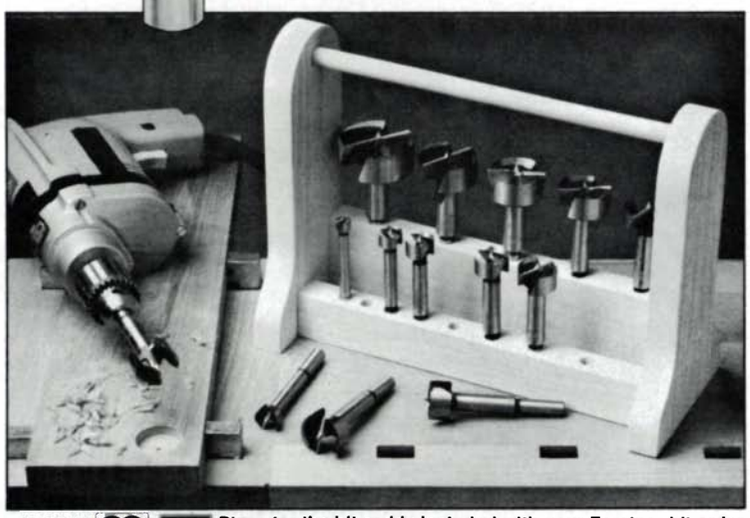

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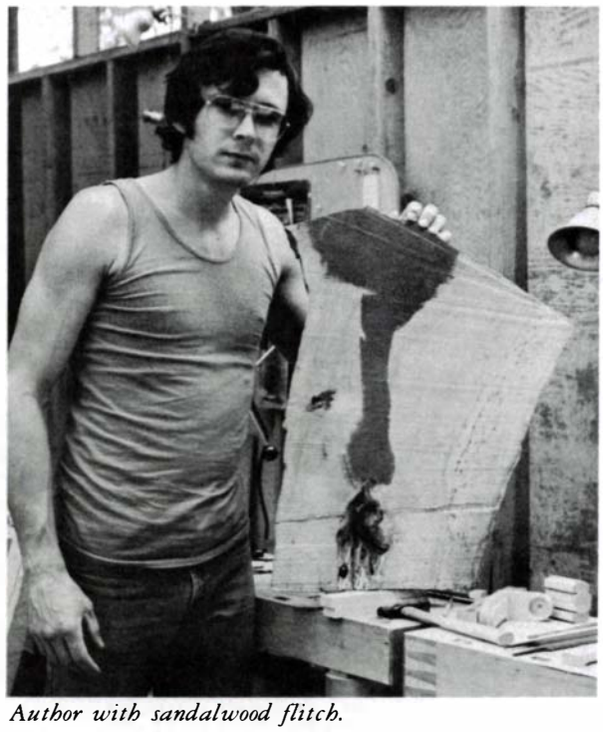
PACKING OUT PERFUME

BY WAYNE J. JACINTHO

My friend Mike and I were hunting pheasants on our home island of Kauai. We had just climbed out of a deep gorge to hunt a flat I hadn't been on for ten years, before I'd gotten interested in woodworking, trees and wood. We started our sweep, but before I'd gone ten yards I froze, all thoughts of pheasants forgotten. Unmistakably, in a small grove of trees about a hundred yards away stood a sandalwood tree!

Mike couldn't believe his eyes. "There's no *iliahi* around here," he insisted. "Everybody knows it's extinct."



Author with sandalwood flitch.

The sandalwood trade of the 1800s is a shameful part of Hawaiian history. Island chiefs ordered the commoners to leave their fields and labor in the forests, sawing and hauling sandalwood for export. Pits the size of the holds of various ships were dug, then packed to capacity with the precious wood. Seeing none of the profits and suffering famine as a result of neglecting their farms, the laborers began to rip out every sandalwood sapling they saw. In a few short years the sandalwood forests were gone. Many people now believe *iliahi* to be extinct, but small trees, 3 in. to 6 in. in diameter, still grow in the high, dry plateau of Kokee. After a botanist friend pointed one out to me, I was able to identify the unique color and shape anywhere, even in the thickest tropical forest. But I had never seen, or heard of, any large trees with usable heartwood. At least not until now.

The tree was, in fact, three trees. From a short trunk three branches grew straight up. On one of them a banyan had started growing, and the branch had broken off under its weight. As we stared at the long-dead log, we realized our good luck. You can't cut a live tree on Forest Reserve land, but you sure can cut fallen timber.

Mike had never smelled sandalwood, so I grabbed a branch to break. It barely even moved. I put my gun on the side and gave it more grunt. It bent, but didn't break. I gave Mike the high sign and he put his charterfishing boat muscles to good use. The branch splintered, and we were enveloped in a cloud of the heavenly odor that had made this wood so valuable. Mike smiled and smiled, and I realized my mouth was stretched as wide as his.

Our problem was clear—the tree was nearly two miles from the nearest road. To get the lumber out, we would have to park the jeep, hike a quarter-mile almost straight down, cross a stream, climb straight back up, circle a domed hill, and then trek downhill for about a mile to the tree. We wanted to mill the log where it lay (I own a Granberg Alaskan mill with a Stihl 075 AVE powerhead), but the mill and its necessaries were too much for us to carry that far. We debated half-seriously about horses or mules and we even considered a helicopter, but blanched at the $400/hr. price.

But Mike and I think alike, and in a sandalwood-aroma high we mused, "We could cut the log into sections . . ." "Debi Wood just returned my packframe . . ." "And I've got mine and the one we found at the dump . . ." "We can carry your small Stihl easily . . ." "And your sister-in-law Jane and her boyfriend John are coming in from Colorado tomorrow. He's a mountain man . . ." "I doubt we'll ever see another sandalwood tree like that . . ." "It's settled then. *We'll carry it out on our backs!*"

Getting there was easy. John and Jane had come from cold Colorado to tropical Kauai, and their festive mood soon infected everybody. My wife Deborah loaded herself down with food and drink (lots of Gatorade), and Jane carried the gas-and-oil.

Under a glorious blue sky with white cotton clouds we laid out the cuts, fired up the saw, and soon were covered with the sweetest sawdust in the universe. It was the first time I'd ever seen anybody actually *trying* to get layered with itchy, scratchy sawdust.

Those few cuts seemed to take forever. But we finished and managed to lash the sections onto the packframes. Then it took two of us to lift each load high enough so the third guy could slip his arms into the packstraps. I ended up on my hands and knees while the others hoisted the pack onto my back. We were silent by that time, finally realizing the weight of our task. Mike looked at me mournfully for encouragement. I told him that the log on my back felt heavier than the 137½-lb. wild boar I had once helped pack out. Mike's face grew even longer.

We still talk about our adventure once in a while. We talk about that first, long, uphill, windless mile in the open afternoon sun, about the packs breaking and the loads coming undone. We talk about the downhill zigzags that turned our legs to hot jelly and about that last brutal straight-up hill, when we took each pack in relays, one-two-three up to the top, on hands and knees where the gravel was loose. We talk about unloading onto the truck and the long haul back down to the river for the next load. We can still see Jane carrying a branch almost as long as she is tall, so she could take a bit of heartwood home to Colorado. And we can practically taste again the much-anticipated iced beer that awaited us in the truck. When we finally milled those three sections, they scented the neighborhood for blocks around.

We swear we'll never have this adventure again, and then smile at each other in silent accord, thinking: "I wonder when those *other* two branches are going to fall down!" □

Wayne J. Jacintho of Kauai, Hawaii, builds cabinets and furniture at the Kauai Cabinet Works, in Kilauea. Fine Woodworking *buys readers' adventures. Suitable length is 1,500 words or less—up to six typed pages, double-spaced. Please include negatives with photographs.*

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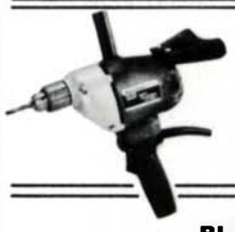

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Events

Listings are free but restricted to events of direct interest to woodworkers. The January issue will list Dec. 15-Mar. 15: deadline Nov. 1; the March issue will list Feb. 15-May 15: deadline Jan. 1.

ARIZONA: Workshop—Joints & joinery, Kerry Gordon, Oct. 25–Dec. 6. Write Registrar, Cosanti Foundation, 6433 Doubletree Rd., Scottsdale, 85253.
Juried festival—Hayden's Ferry Old Town Tempe, Dec. 3–5. Original work only. Slides. Send SASE to MAMA, Box 3084, Old Town Tempe, 85281. (602) 967-4877.

ARKANSAS: Juried exhibitions—Decorative arts, functional and sculpture, Sept. 17–Nov. 14. Toys designed by artists, Dec. 3–Jan. 2, deadline Nov. 5. Delta art and sculpture exhibit, Dec. 3–Jan. 9, 1983. Contact Townsend Wolfe, Arkansas Art Center, Box 2137, Little Rock, 72203.

CALIFORNIA: Lectures and seminars—Toshio Odate, Japanese craftsman and his tools, Nov. 5, shoji screen, Nov. 6–7 (San Diego), Nov. 19–21 (Berkeley); Sam Maloof, furnituremaking, Dec. 3, chairmaking, Dec. 4 (Berkeley); James Krenov, joinery, Nov. 19–20 (Los Angeles). The Cutting Edge. Berkeley: (415) 548-6011; Los Angeles: (213) 390-9723; San Diego: (714) 695-3990.
Juried crafts show—Nov. 7, Dec. 5. Write Beverly Benton, City of Buenaventura, Box 99, Ventura, 93002.
Show—West Marin Woodworkers Assoc., Nov. 27–Dec. 8, Adraskand Gallery, 11315 State Rt. 1, Point Reyes Sta., 94956.
Fair—Power & hand tools, Nov. 20; sale, woodworking gifts, Dec. 11–12, deadline Nov. 15. Ganahl Lumber Co., 1220 E. Ball Rd., Anaheim, 92805. (714) 772-5444.
Show—Artery Woodworkers, Nov. 5–28. The Artery, 207 G St., Davis.

CONNECTICUT: Workshops—Albert LeCoff & Giles Gilson, Nov. 6–7; John Marcoux, Nov. 13–14. Brookfield Craft Center, Box 122, Brookfield, 06804. (203) 775-4526.
Juried exhibition/sale—Celebration of American crafts, Nov. 12–Dec. 23. Creative Arts Workshop, 80 Audubon St., New Haven, 06511. (203) 562-4927.

DELAWARE: Tour—Yuletide Tours, Nov. 23–Jan. 2. Write Winterthur Museum, Winterthur, 19735. (302) 654-1548.

WASHINGTON, D.C.: Exhibition—Celebration: A World of Art and Ritual, Aug. 26–Feb. 21. Renwick Gallery, Smithsonian Institution, Pennsylvania Ave. at 17th St., Washington, 20560. (202) 357-2627.

GEORGIA: Workshop—Ian Kirby, frame-and-panel construction, Nov. 20–21; $90. Highland Hardware, 1034 N. Highland Ave. N.E., Atlanta, 30306. (404) 872-4466.

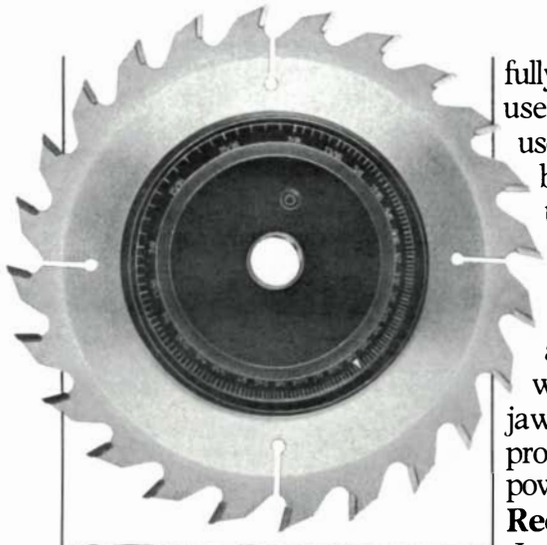
ILLINOIS: Trade shows/seminars—Excellence in Woodworking/East: tools, equipment, Nov. 12–14. Hyatt Regency Hotel, Chicago. Marvin Park & Assoc., Inc., 600 Talcott Rd., Park Ridge, 60068. (312) 823-2151.
Seminars—Chisels, planes & scrapers, use and sharpening, Nov. 2; routers & trimmers, Nov. 9; woodturning, Nov. 17; woodfinishing, Nov. 23. The Hardwood Connection, 420 Oak St., DeKalb, 60115. (815) 758-6009.

MAINE: Workshops—Woodfinishing, Oct. 30; tables: design and construction, Nov. 6; case construction, Nov. 13; kitchen cabinet construction, Nov. 20. Wood Butcher Tools, 38 Center St., Bath, 04530. (207) 442-7939.

MASSACHUSETTS: Show—Bowls, tables, more, Michelle and David Holzapfel; November. Ten Arrow, Cambridge. (617) 876-1117.
Craft fair—Old Sturbridge Village; Nov. 6–7.
Christmas crafts—Boston Commonwealth Pier Exhibition Hall, Nov. 26–28. Juried by slides. Send 37¢ in stamps, name & address to American Crafts Expositions, Inc., Box 368, Canton, Conn. 06019.
Craft program—Hands On Summer in the Arts for Teenagers. Wood, etc. July & Aug. '83, Kents Hills School. Contact Jane Sinauer, 374 Old Montague Rd., Amherst, 01002. (413) 549-4841.

NEW JERSEY: Craft fair—South Mountain area, West Orange, Nov. 12–13. Write Rose Squared Productions, 85 Cardinal Ln., Hillsborough, 08876. (201) 874-5247.
Conference—Woodworking, design. Dec. 3, Trenton State College. Admission free. Contact Dr. Robert Weber, (609) 771-2779.

NEW YORK: Workshop—Japanese tools, subscription series, Nov. 20–21. Contact Robert Meadow, The Luthierie, 2449 W. Saugerties Rd., Saugerties. (914) 246-5207.
International competition—Office furniture. Ideas deadline, Dec. 29. Exhibition at the Musee des Arts Decoratifs, Paris, France, 1984. Write Cultural Competition, 972 Fifth Ave., New York, 10021.
Exhibition—Decorated Surface, Oct. 15–Dec. 30. American Craft Museum II, Int. Paper Plaza, 77 W. 45th St., New York, 10036.
Exhibit—Marquetry: Images in Wood, November through December. Pritam & Eames, 29 Race Lane, East Hampton, 11937.
Benefit sale—Society for Art in Crafts, Dec.



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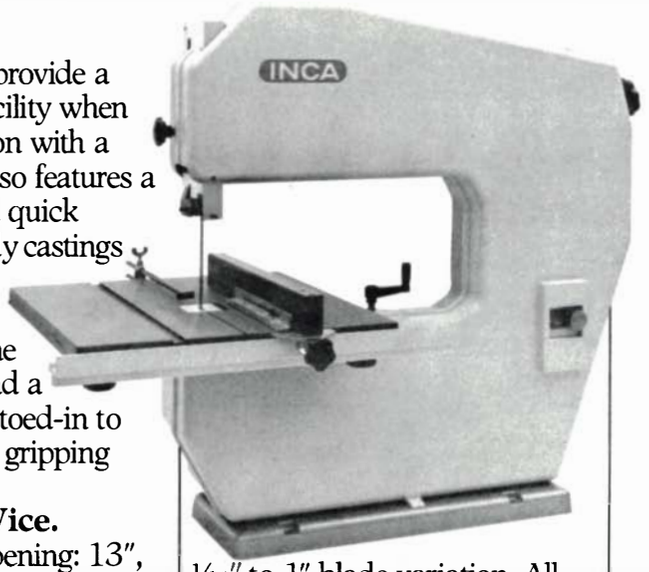

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1–Dec. 5. Pindar Gallery, 127 Green St., Soho, NY 10012.
Exhibit—Wood Innovations. Through Nov. 3. Hopper's, 647 South Ave., Rochester, 14620. (716) 546-3202.
Craft fair—June, Dutchess County Fairgrounds, Rhinebeck. Deadline for slides Jan. 7. Contact American Craft Enterprises, Inc., Box 10, New Paltz, 12561. (914) 255-0039.
Exhibition—The Spirit of Orientalism—contemporary painting and sculpture, Nov. 7–Jan. 16. Purchase College. (914) 253-5575.

NORTH CAROLINA: Workshop—Timber frame construction, Ed Levin, Nov. 2–6. Contact Bill Asherp, Box 955, Black Mountain, 28711. (704) 669-5214 weekends.
Courses—Indian basketry, woodcarving, woodworking, blacksmithing. The John C. Campbell Folk School, Brasstown, 28902. (704) 837-2775.
Crafts fair—Piedmont craftsmen, Nov. 5–7, Winston-Salem. Contact Banks O. Goddfrey, Jr., 300 S. Main St., Winston-Salem, 27101.

OHIO: Exhibition—Marietta College crafts and sculpture, Oct. 30–Nov. 28. Write MCCN '82, A.H. Winer, Marietta College, 45750.
Show—Woodcarving, Nov. 13–14. Ramada Aqua Marine Resort, 216 Miller Rd., Avon Lake. Contact Lucille Thorne, 144 Spring St., Amherst, 44001.

OKLAHOMA: Workshop—Furniture repair and antique restoration, Nov. 11–12. Contact J.A. Kennedy, 4701 12th Ave. NW, Norman, 73069. (405) 364-5763.
Seminar—Solid woods, man-made boards and veneering, Ian Kirby, Dec. 3–5. Fine Tool and Wood Store, 7923 N. May Ave., Oklahoma City, 73120. Contact Cheryl Hays, (405) 842-6828 or (800) 255-9800.

OREGON: Show—Wooden toys, Nov. 26–28; Christmas woodcarving, Dec. 3–5. Contact Linda Smeltzer, Western Forestry Center, 4033 S.W. Canyon Rd., Portland.
Show—Curtis Erpelding, Oct. 21–Nov. 23. Hoffman Gallery, Oregon School of Arts and Crafts, 8245 S.W. Barnes Rd., Portland, 97221. (503) 228-1367.
Show—Nov. 26–28, by the Siskiyou Woodcraft Guild. Oregon Shakespeare Festivals Great Hall, Main & Pioneer Sts., Ashland, 97520. (503) 482-4829.

PENNSYLVANIA: Arts and crafts expo—Pittsburgh Convention Center, Nov. 26–28. Quail Hollow Events, Box 437B, Woodstock, N.Y. 12498. (914) 679-8087.
Courses/seminars—Musical instruments, Nov. 13–14. Amaranth Gallery and Workshop. Write John Basinski, 4101 Lauriston St., Phila., 19128. (215) 483-5400.
Festival—Nov. 12–14, 109th Fields Artillery Armory, Kingston.

RHODE ISLAND: Craft fair—July 22–24, 1983; Newport Yachting Cntr. Slide deadline, Jan. 7. Contact American Craft Enterprises, Inc., Box 10, New Paltz, New York, 12561. (914) 255-0039.

SOUTH CAROLINA: Exhibition—Wood and fiber, Nov. 27–Jan. 2, 1983. Columbia Museums of Art and Science, Senate & Bull Sts., Columbia, 29201. (803) 799-2810.
Show—Turned Objects, Nov. 10–Jan. 4. Greenville County Museum of Art, 420 College St., Greenville, 29601. (803) 271-7570.

TENNESSEE: Craft fairs—Through Dec., various locations. Tennessee Arts Commission, 505 Deaderick, Suite 1700, Nashville, 37219. (615) 741-1701.

TEXAS: Juried crafts fair—March 19–27, Houston Festival. Entry deadline Jan. 30, 1983. Contact Barbara Metkyo, 1950 W. Gray, Suite 2, Houston, 77019. (713) 521-9329.
Craft fair—March, 1983. Market Hall, Dallas Market Cntr., Dallas. Slides deadline, Nov. 15, 1982. Contact American Craft Enterprises, Inc., Box 10, New Paltz, New York, 12561. (914) 255-0039.

VIRGINIA: Exhibit/Sale—Ways of Wood, Nov. 6–7. Colvin Run Mill Park, Rt. 7, Great Falls.
Show—Artistry in wood, Nov. 27–28. Marymount College. Conract Burt Foster, 2245 N. Harrison St., Arlington, 22205.

WASHINGTON: Workshops—Caulking, Oct. 23; one-day skiff, Nov. 6–7; repair and maintenance, Nov. 20; planking carvel and lapstrake, Dec. 4; lofting, Jan. 15. Northwest School of Boatbuilding, 330 10th St., Port Townsend, 98368. (206) 385-4948.

WEST VIRGINIA: Workshop—Marquetry, Nov. 5–7. Write Crafts Center, Cedar Lakes, Ripley, 25271.

WISCONSIN: Seminar—Isaburo Wada, Kyo art craft joiner from Kyoto, Japan, Nov. 20–21, Univ. of Wisconsin, Milwaukee. (414) 963-6052.

ONTARIO: Show/Sale—Arts and crafts, Dec. 9–12, Toronto International Centre. Contact McLaughlin Caravan, 3518 Capricorn, Mississauga, L4T 1S4, Canada. (416) 677-9416.
Exhibition/Sale—Artisan '82, ninth annual exhibition, Nov. 13–14. Japanese Canadian Cultural Centre, 123 Wynford Dr., Don Mills, Canada.

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SURVIVING IN MINNESOTA

BY LORIN LABARDEE

There's a deep suspicion in the Midwest about anything trendy from the East or West coasts. In this landscape of grain elevators and cornfields, people believe that only when something takes hold on Main Street does it enter reality and history. Quality woodworking is beginning to take hold here at the center of the continent.

It's been a long time arriving. Woodworkers here in Minnesota still have limited educational opportunities and few local heroes of national prominence. What they do have now is access to a place to show and sell their work, through the Archetypes furniture gallery, and they have a way to get together, through the Minnesota Woodworkers Guild.

Keith and Linda Pollari opened their gallery in June, at 528 Selby Ave. in St. Paul, next door to their custom furniture and millwork shop. Teke Kilmer, a furnituremaker from Minneapolis, formed the Guild about two years ago in an effort to organize about a half-dozen shop owners into a marketing group. Today it comprises 22 members who each pay yearly dues of $50 (nonvoting) or $100 (voting). It has retained its professional focus, although it now also includes a lay member category. The group meets once a month for either business or panel discussion.

The Guild continues to debate the question of just how exclusive membership should be. The idea behind exclusivity is to impose a seal of approval, so the public knows that only woodworkers who have met rigorous standards may display the Guild emblem. Membership applications are subject to scrutiny by a jury of three members, who evaluate not in the smoky realm of design, but in terms of woodworking technique and a proper understanding of materials. This policy has succeeded in making membership somewhat prestigious, not to be sought prematurely, but it has also caused some hard feelings. The founders had hoped that craftsmen rejected by the jury would still join, and perhaps learn, but it hasn't worked out that way.

The problem of marketing has also been divisive, although all the members agree on the need for some group effort. The Guild's founders, generally owners of established shops, hoped for a vigorous program that would help the public see woodworking and furniture design as a serious profession. But the smaller shops have balked. John Scherber of the Crocus Hill Woodshop described the dilemma of the smaller shops this way: "There are guys in the Guild who make just $5,000 a year, so no wonder they're scared to spend a buck on promotion. But unless they find a way, they're always going to make $5,000 a year." President Ted Gordon is among the fence-sitters on the issue. He would prefer to continue to test the market at the Archetypes gallery, through local craft and home improvement shows, and with a brochure the Guild is producing called "Working with a Woodworker."

Fine furniture on display at the Archetypes gallery, St. Paul.

The Guild and Archetypes don't yet represent the sort of grand acceptance of woodworking that people here imagine has occurred on the coasts. But these two forums do mean that woodworkers and consumers are taking notice of themselves and of each other. Despite struggles about weighty issues of craft standards and marketing, the basis of the Guild remains good fellowship—it's a way for woodworkers to get together, to help each other survive. When it's wintertime in Minnesota, survival is what it's all about. □

MORE GUILDS AND ASSOCIATIONS

In recent years woodworkers have formed a number of local organizations. These groups generally meet monthly at the shop of a member to exchange technical information, to discuss design, and to socialize. In addition to organizing exhibitions and sales of members' work, guilds have bought lumber and tools in bulk to save money. To help readers connect with local groups, we've published a directory (*FWW* #34, p. 46), which the following listing updates. Letters in *FWW* #29 and #31 describe how some guilds were founded. If you belong to a group that hasn't yet been listed here, or if you are forming a new association, please drop us a line. We'll publish another revision next spring.

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Homer, Alaska 99603

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Milwaukee, Wis. 53201

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Minneapolis, Minn. 55408

Northern Minnesota Woodworkers' Guild
Brevick Route, Box 26
Longville, Minn. 56655

Siskiyou Woodcraft Guild
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60 Fifth St.
Ashland, Ore. 97520

Society of Philadelphia Woodworkers
c/o John Basinski
4101 Lauriston St.
Philadelphia, Pa. 19128

Tahoe Woodworkers Association
c/o Royce H. Johnson
PO Box 1212
Kings Beach, Calif. 95719

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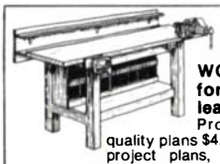

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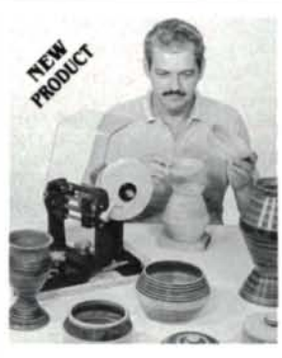

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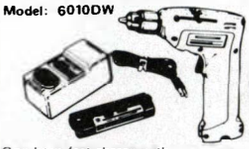

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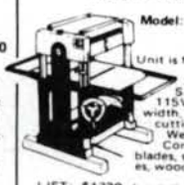

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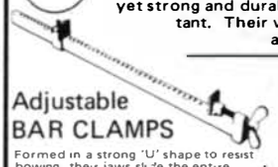

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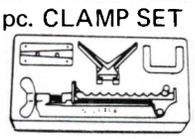

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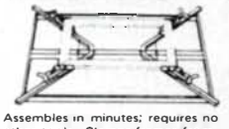

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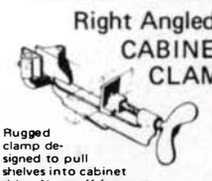

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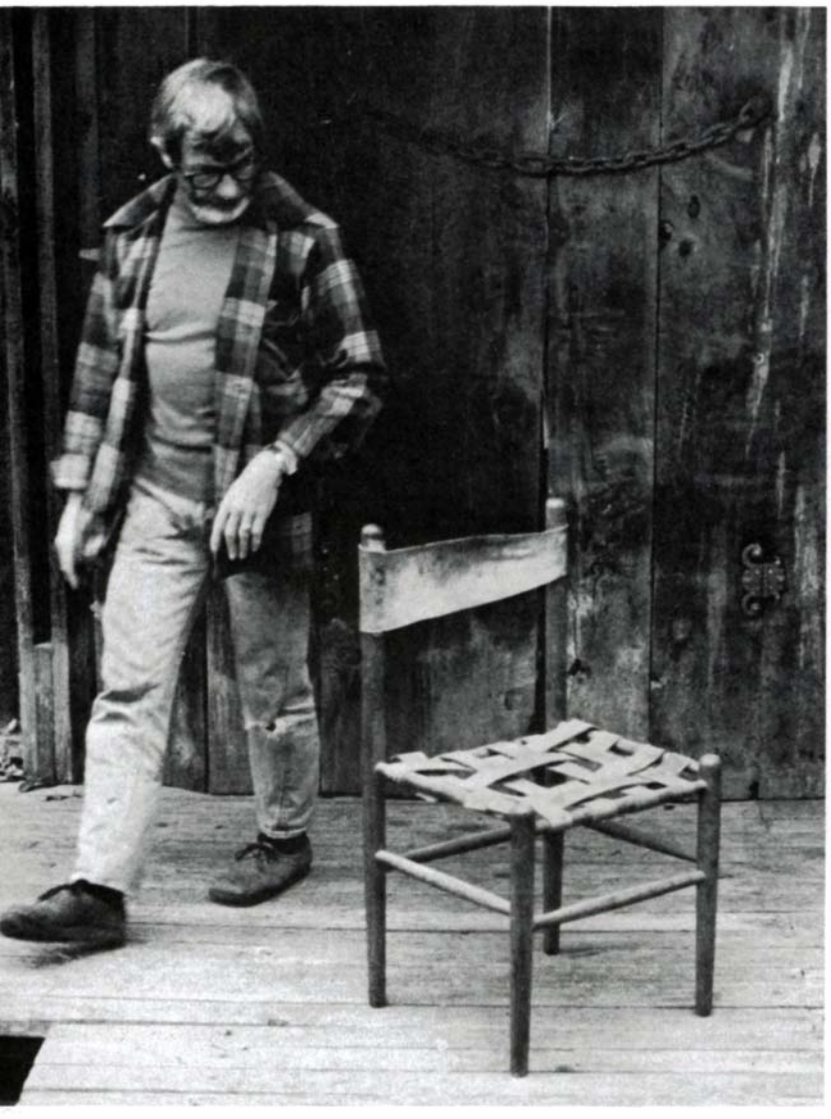


Art Carpenter's first chair, an experiment using rawhide and lathe-turned parts, satisfies his criteria for good furniture: 'First, it looks like a chair—it doesn't look like an eagle or a tree—you know right away where to put your butt. Second, it lasts, it's rugged, it will stand the use for which it was meant for many years without repair. This has been a desk chair in my shop for 22 years, and its joints are as tight today as they were when they were made. Third, there is a directness and clarity of construction, which gives pleasure to the hand and to the eye. And fourth, it is relatively fast to produce, given the primitive methods of my shop.'

Art Carpenter

The independent spirit of the Baulines Craftsman's Guild

by Rick Mastelli

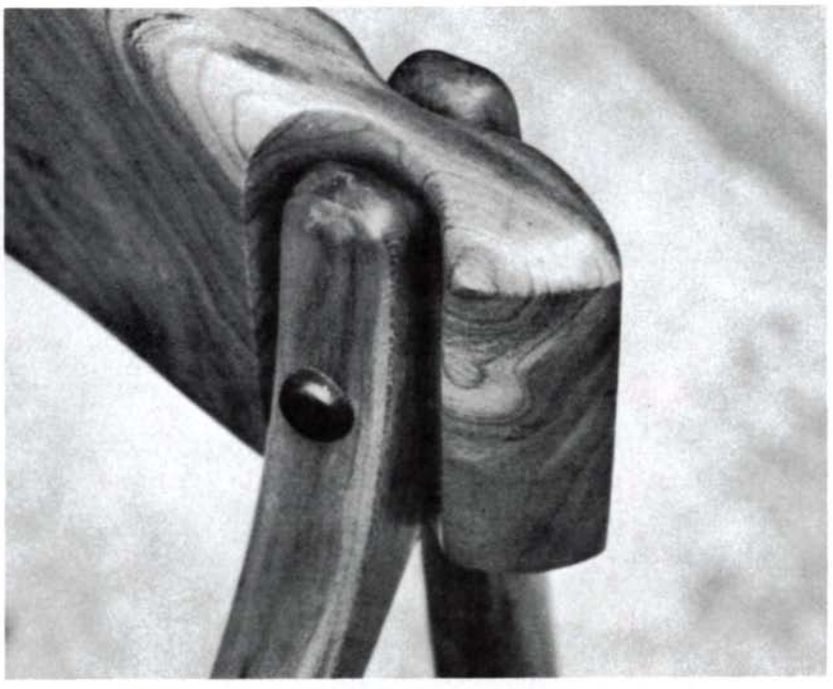
Ten years ago, in days left over from the Sixties, the Baulines Craftsman's Guild set out to establish a Northern California version of the apprenticeship system, and it is unique among craft organizations for having succeeded. Hundreds of craftspeople have gotten started through the Baulines Guild. Most of the woodworkers among them apprenticed with Art Carpenter, who by the time the Guild was founded had already established himself as one of the principals of contemporary woodworking. In 1971 his work appeared along with that of Wharton Esherick, George Nakashima, Sam Maloof and Wendell Castle at the inaugural show of the Smithsonian's Renwick Gallery in Washington, D.C.

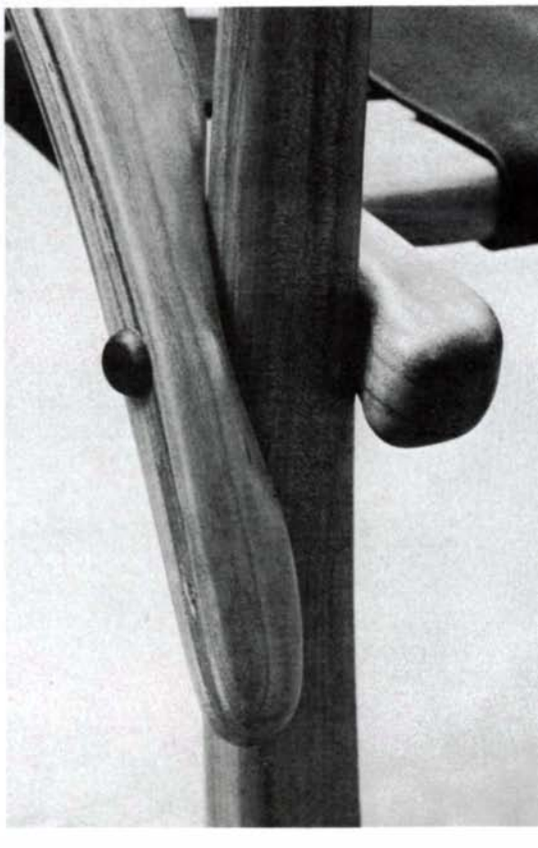
For many woodworkers, Art Carpenter (who does business under his mother's maiden name, Espenet) is more than a role model—he has nurtured the growth of a generation of independent designer-craftsmen. Ask the successful woodworkers in the San Francisco Bay Area how they began and you'll hear, "I taught myself, except for some time I spent with Art." Even those who don't spend more than an afternoon at Carpenter's shop leave with practical direction to make it on their own—which is really the spirit of the Guild. The Baulines Guild works because it is the simple extension of the self-styled craftsmen who characterize the Bay Area. It probably would not have worked so well were it not for the special place Bolinas is, but it's hard to imagine the Guild at all without Art Carpenter.

Bolinas is a reclusive coastal town (the guild that took its name disguised the spelling), about 30 miles north of San Francisco. Hidden behind the hills of Marin county, it is a bastion for unusual talents and fruition-seeking souls. There are no signs nearby to lead tourists to Bolinas; an ad hoc group, sometimes seen in T-shirts emblazoned with a giant mosquito, the logo of the Bolinas Border Patrol, has torn them down. Its lagoon is where whales played, according to the Portuguese name. In the summer of 1579 Sir Francis Drake parked his galleon near here, claiming Marin for England. But Bolinas has always been a separate place.

When two oil tankers collided in the fog under Golden Gate Bridge in 1971, thousands of people—bus drivers, children, businessmen, hardhats—dropped what they were doing and rushed to save the waterfowl and to scoop oil-laden straw from the coastline. At Bolinas, hundreds on the beach sawed and hammered day and night, building a many-sectioned boom to protect the entrance of Bolinas Lagoon, a haven for egrets and blue heron. According to Tom d'Onofrio, whose proposal one year later initiated the Baulines Craftsman's Guild, many who came from San Francisco to participate in this paroxysm of spirit stayed. "When we started," d'Onofrio says, "most of us were radicals out of the Sixties in Berkeley and we wanted to effect social change. I for one have always felt that if the individual is self-fulfilled through his work, he will spread that influence to others, leading to greater harmony in the society. I've watched hundreds of our students move out into the world to do their thing, and I've seen the positive influences of self-supporting craftsmen."

D'Onofrio's idea came to him while he was working for Art Carpenter, who had moved west in 1948, a pioneer dropout. Born in New York City in 1920, Carpenter graduated from Dartmouth College with a degree in economics, and had intended to become an accountant, like his father. Then he served four years in the Pacific during World War II, an experience that he says "relieved me of some regard for the





Early wishbone chair, above, is made of hickory, and was obviously inspired by the bone structure that lent its name. Fifteen years of refinement have yielded the version in cherry at right. The front and back legs are seven and five bent, tapered laminations, respectively, and the chair is held together by ¼-in. hex bolts and nuts. The plugs that fill the counterbores are removable, so the chair can be knocked down into its eight basic parts. The detail photos show what Carpenter means when he says, 'I'm into sloppy joints.' Independent members allow finishing before assembly, and the members are free to expand or contract with changes in moisture content, without affecting the soundness or seemliness of the joints. Exemplary of the best of what has been dubbed the 'California roundover style,' these edges are shaped by machine, but then hand-tooled to give their surfaces 'vibrato.'

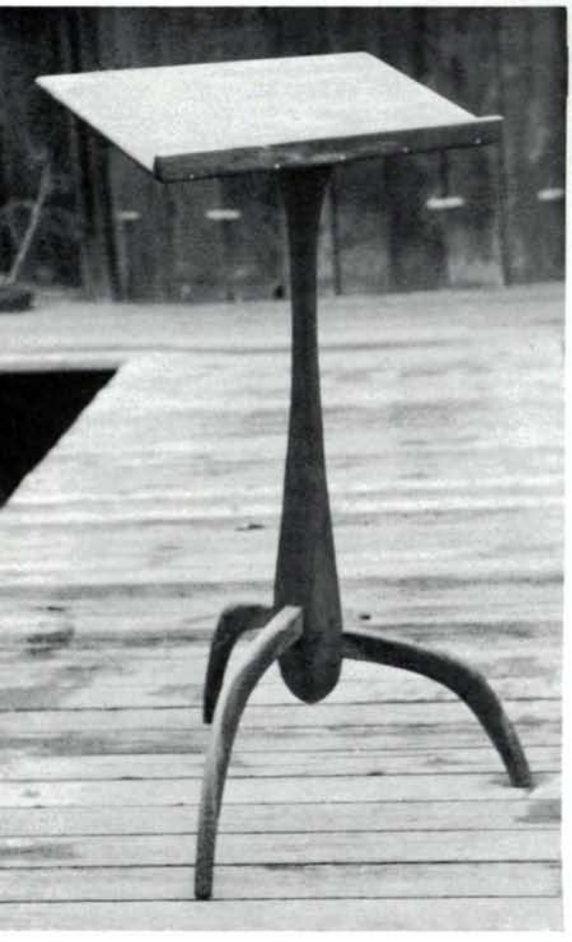
expectations of my culture and my peers." After the war he bought and sold Oriental art. In 1947, he went to see the New York Museum of Modern Art exhibition of ordinary objects of noteworthy design. Included was the furniture of Marcel Breuer, Ludwig Mies van der Rohe and Charles Eames. The show gave him direction. "I was no artist," he says, "I was no craftsman. But maybe I could make things anyway, things that might be considered beautiful."

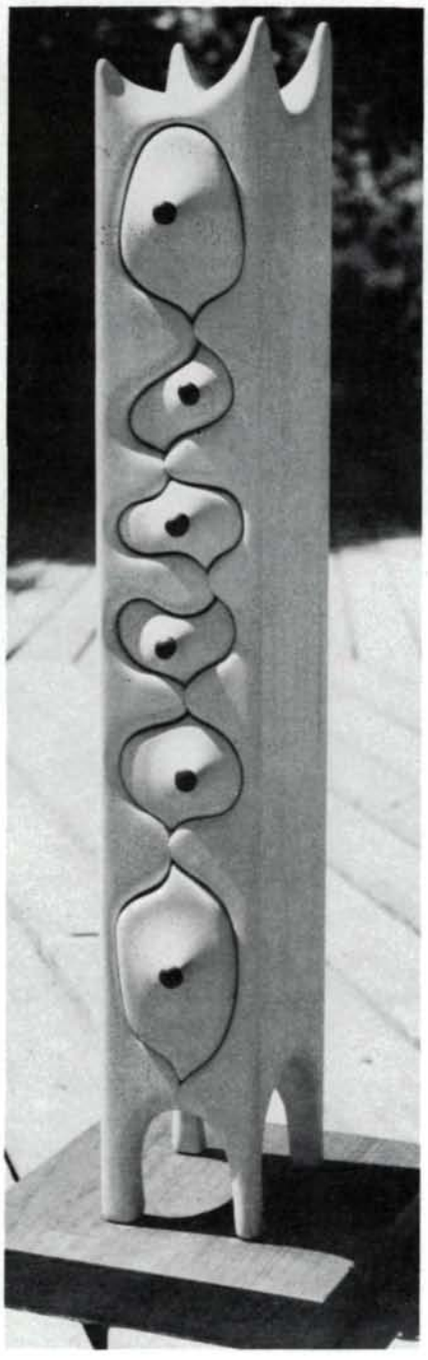
And so at age 28, he drove to San Francisco, wanting to try his life far from New York. There he bought a lathe, which was the simplest tool he could think of, for making the simplest objects. Turning taught him the working properties of wood and other materials such as brass and ivory. Within a year he was selling bowls around the country, and his work found its way for four consecutive years (1951-1954) into the Museum of Modern Art's Good Design Shows, the very exhibitions that had inspired his venture. He says of these designs that the best are the simplest: "Never use a compound curve where a single sweep will do—never use a prefigured mathematical shape where a spontaneous one will do."

During this time Carpenter was augmenting his equipment and his repertoire. He added a bandsaw, drill press and radial-arm saw to his shop in San Francisco's Mission District. He still owns these, and like his lathe they are primitive, the sort of acquisitions only a resourceful craftsman could appreciate. In 1952, he made his first chair (photo, facing page). By

Carpenter's first machine was the lathe, on which he learned how to work wood. He quickly achieved national recognition as a craftsman. Bowls like these (of prima vera, teak and mahogany), above, appeared in the Museum of Modern Art's Good Design Shows of the early 1950s. Carpenter defines his challenge as the making of things both useful and beautiful.

Modern artists like Miro and Klee seem to have inspired some of Carpenter's work, such as the book stand, below. The bandsaw box, right, is a breakthrough in economic production.





Early chair and bench, above, suggest animal-like forms, a theme Carpenter continues to refine. Below, the perky prototype for a recent stool is a happy combination of free-form slab top and asymmetric, geometric base.

1957 he was married, raising a family, and building everything from commissioned furniture to assemble-it-yourself kits. He even sold lumber and woodworking supplies. "That was a time of feeling directions," he says. "How could you best survive in this racket? I guess I started to get a little more recognition as a craftsman, which was rather flattering, so I went in that direction. . . . You have to remember, I didn't start off as a craftsman but as a small manufacturer. I tried making everything I could. I remember consciously thinking, 'Could somebody actually survive making things with their hands, can I make a living doing that?' I hadn't heard of Maloof or Esherick. I had no role models. It was an experiment in a way of life."

By 1958 the experiment found him employing seven people and spending more time managing the books than working in the shop. He decided to leave it all in San Francisco, to move to Bolinas. There he built a great round house, lost it through a divorce, and built a series of single-room structures (traveling from the bedroom to the kitchen ensures a pleasant walk outdoors), each an experiment with a different type of construction. They all follow Carpenter's precepts of simplicity, attractiveness and functional sense. Lightweight bubbles set on pilings, they'll be simple to lift back into place after the next earthquake.

It wasn't long before both clients and acolytes were seeking him out, and the Baulines Guild naturally evolved. "It wasn't me that started the teaching trip," Carpenter says, "it was the Sixties. It was that big group of dislocated flower children who eventually figured out that they needed to do something, and they didn't want to do it with IBM. I'm very sympathetic to that. I was a flower child before there were flower children. Which is why I try to be helpful. I have a fundamental belief—the more independent people there are, who are not connected with any organization, the better society is. . . . The idea that there are so many more designer-craftsmen today than there were ten years ago just turns me on. I want in every possible way to see them survive. Independence of thought requires independence of economics."

It is Carpenter's spirit of independence more than anything else that has influenced others, and it has shaped the Baulines Guild. A *Newsweek* article in 1973 dubbed him "the Guild's grandmaster." Carpenter himself has said, "I don't want an institution, I want a shop." And so instead of an institution, the Guild is simply workshops. Its facilities can be reduced to a file cabinet and an address (see box, p. 68). Its purpose is simply to put interested (and interesting) people in touch with one another. The details of the apprenticeship are worked out by the craftsperson and the apprentice. What began as a cadre of ten accomplished craftspeople in 1972 grew to thirty within a couple of years. Now hundreds of woodworkers have worked with and for one another, often for only a few months, sometimes for years, to become partners or shopmates. The dozen or so other guilds that have grown up in California (see p. 106), not to mention those in the rest of the country, can find spiritual predecession in the Baulines Guild. Most of these other guilds, however, are marketing organizations, sponsoring craft fairs, fronting stores. The emphasis of the Baulines Guild is education, exploring the economic viability of sharing your experience.

A typical apprenticeship with Carpenter amounts to three months, during which time you work for Carpenter in the morning, and on your own projects in the afternoon. Three

Carpenter's equipment is as modest as some of his designs. His router table is a piece of particleboard with router and fence attached, all placed on an empty oil drum, to catch shavings.

After routing, Carpenter shaves an upright for a run of music stands, the master for which is at right, an earlier version at left. He prefers doing small batches of furniture, up to 15, because he can get production momentum without getting bored.

Carpenter moved to Bolinas in 1958, to escape becoming a businessman rather than a woodworker in his San Francisco shop. He's built a number of single-room structures, like this studio, light enough to be lifted back onto their pilings after an earthquake.

'I can stand here for hours,' said Carpenter while developing his latest captain's chair, which uses the same bending form for front and back legs, only turned upside down. These two pictures, of the first version, left, and the second, right, were taken seven months apart. 'I sometimes resent the lack of immediacy in wood, and wish it were clay that I could squish and re-form, or paint that I could splash on in one stroke and there it would be. . . . Wood is a very bullheaded material.' At right are some of his ⅛-scale models, which he has found can be mailed, to clinch commissions. These are experiments in various kinds of bases: an asymmetric pedestal for a free-form top; a free-form sheet-steel base for a more regular boat-shaped top; and a four-legged base for a round tabletop that is a structural member.

months will provide a sense of what Carpenter does, and of the pace necessary to run a business. Longer than that, says Carpenter, and you end up having no ideas of your own. You pay $450 a month, and provide your own housing, materials and insurance. This arrangement, which is cheaper and less restrictive than most formal schooling, is attractive enough to keep enthusiastic novices coming.

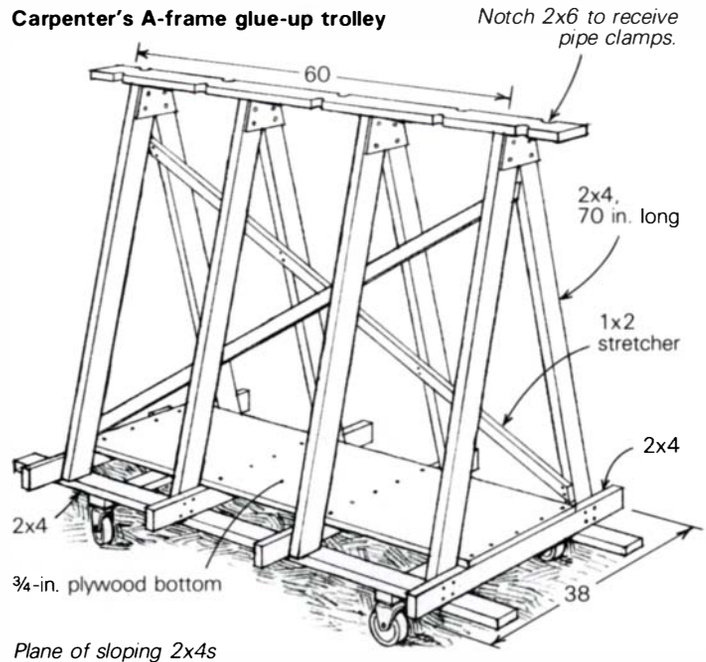
One thing that makes the apprenticeship so enriching is that Carpenter is himself self-taught, and still learning. Because he has had no training in woodworking, he is not bound by what may be the "correct" way to do things. His ingenuity and sense of economy have provided unique, now widely assimilated solutions to common problems. His shop is rich in both original and shared ideas. He tells the story of a German cabinetmaker who visited his shop in San Francisco and taught him to use a backsaw and chisel to make dovetails. Carpenter began dovetailing his furniture, but soon discovered he could not saw and chop fast enough to survive. So he devised a router jig that would cut dovetails accurately and consistently in one-fourth the time. Various forms of the dovetail jig (see p. 69) have become indispensable to those who rely on the router as a joinery tool.

As a contemporary cabinetmaker he confronted the problem of being adequately compensated for making all those four-sided drawers that must precisely fit precisely made cases. He turned to his bandsaw, and figured out how to cut and excavate his drawers from solid and laminated blocks of wood. Because of its economy of material and effort, and its versatility of application, the bandsaw box (*FWW* #25, pp. 64-67) is another of his widely practiced innovations.

Though Carpenter sometimes ascribes the motivation for such breakthroughs to laziness, economy of production is the real impetus. Economy of production makes it possible for a small-scale furnituremaker to survive, he says, without catering to an elite clientele. It is part of Carpenter's trip toward independence. "I want to make furniture that a broad spectrum can afford," he says. "I don't have industry's markups or distribution charges, so I can compete. It's important to me to keep prices at a consumer's level, not a collector's level. I want what I make to be lived in and on and around. Anyone can make a $1500 chair. But a $500 chair [the wishbone chair, p. 63] deserves its own accolades."

His sense of independence also informs the way he teaches. D'Onofrio remembers the first day he worked for Carpenter, being given not a mundane sanding task but the finishing-up of a piece scheduled to appear at the Oakland Museum. Carpenter doesn't coddle; there are only three months to practice surviving as a woodworker. He is terse, careful to help in solving apprentices' technical problems without imposing his ideas on their designs. Regarding the glue-up of a tabletop, for instance, he will share what he's learned from years of trial and error: He springs his edge joints for a tighter fit at the ends (to accommodate shrinkage from moisture loss), he dowels for easy alignment, he uses plastic resin glue because it has a longer set-up time and it creeps less than aliphatic resin glue, and he glues up on an A-frame cart (drawing, above right) that makes large tops wieldy. He cures his assemblies in a curtained alcove warmed with an electric heater, and he finishes his tops with up to 12 coats of a mixture of equal parts of varnish, linseed oil and turpentine, wet-sanding with progressively finer grits, 220 to 600, to fill the pores. But how to arrange the boards to compose the top, that is the process of design, where you find your own way.

Carpenter's A-frame glue-up trolley

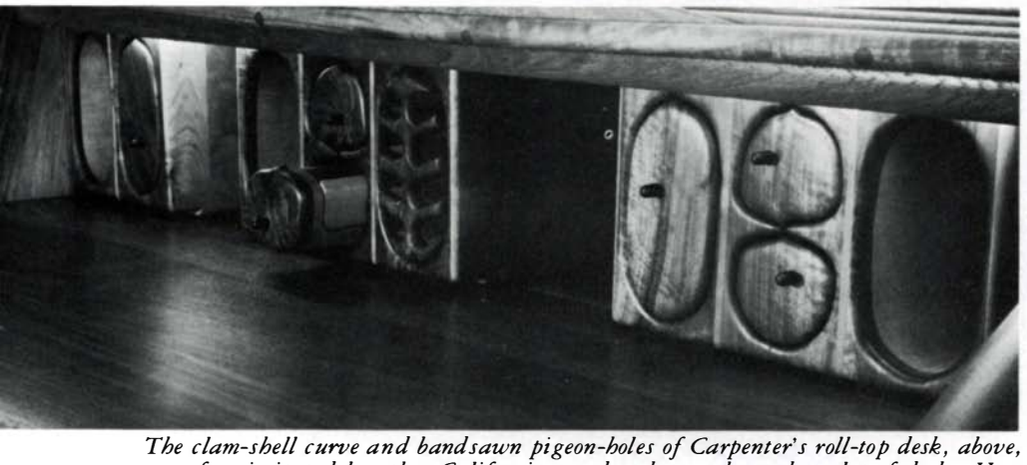


Plane of sloping 2x4s should be flat.

When Carpenter does talk about design, he evokes a radical relationship between craft and art. He asks that furniture do what it's supposed to, with joy. He speaks of singing utility. He points to glumpfs, which want to be gotten rid of for curves to be fair. He has no use for gratuitous curlicues. He wants edges to be hospitable, and to wear and age well. He wants furniture to last. He points to those objects we respond to most profoundly as those that, through clarity of conception and purpose, transcend their time and place. He calls for craft that is not distinguished from art, and for art that is not relegated to frames hung on walls.

In contemporary woodworking, there are two tendencies which Carpenter's work stands in opposition to. One is the notion that wood is beautiful enough merely to display. The other is that the machined surface is attractive in its precision and can be left as is. Seemingly opposite tenets, they have in common the relinquishing of design responsibility. There are a lot of redwood burls on the West Coast, and there is a lot of furniture that is just sliced from them and placed out to sit on. Carpenter confesses to seeing no point to it: "It's like the splash-and-dab school of painting, where everything done is the way God intended it." The same with the machine-shaped edge, left the way the router would have it: "Machined surfaces are deadening," he says. "They're like notes sounded without harmonics or vibrato." And so he shapes his wood, often using machines, and then he hand-tools the surfaces. A master of the California roundover style, he never leaves his edges machined.

Carpenter's work is inspired by natural forms and shaped by practical means, yet he is not seduced by the materials or wed to the machines. He finds in trees not only wood but design ideas. Their lines, their stance, their tonal balance can be seen abstracted in his tables. He makes pedestal tables mostly. And he darkens the base (for walnut, dousing the wood with rusty water) to give it more visual weight, just as the trunk of a tree is naturally darker than the top. He's made desks in the shape of seashells, drawer pulls that look like mushrooms, and benches that borrow the shapes of



The clam-shell curve and bandsawn pigeon-holes of Carpenter's roll-top desk, above, are often imitated by other California woodworkers, who make a lot of desks. Here it's paired with the most recent, armless version of the wishbone chair.

A word from the Baulines Guild

The Baulines Craftsman's Guild is primarily committed to teaching crafts, through both apprenticeships and seminars. In its early days the Guild pursued various marketing projects. These days we concentrate on education, and have obtained non-profit status. We hope that in the long run, education will have positive economic effects, making more people aware of crafts. Also, having an apprentice regularizes your work and helps with expenses, especially in the later stages of the apprenticeship.

All of the current 25 teaching members of the Guild, 12 of whom are woodworkers, have worked at least 5 years in their craft, and all take on apprentices. These programs vary in length and cost, according to the master craftsman, but apprentices must pay a $100 fee to join the Guild, plus $10 annual dues. A group health insurance plan is available.

If you want to know more about the Baulines Guild's programs, send a self-addressed stamped envelope to PO Box 305, Bolinas, Calif. 94924.

—Grif Okie, President

horses. His favorite joinery ideas come from bone structures, where two parts fit strongly into one another, while retaining their individual shapes. There is the advantage that wood joined this way can expand and contract without affecting the appearance or soundness of the joint, and you can finish the parts before assembly.

Sometimes his pieces look rustic, sometimes elfin, sometimes like playful imitations of the grand schemes of nature. But the more you see of Carpenter's designs, the less naive they look. There are echoes here of modern artists: Joan Miro (his amoeboid, linear forms), Paul Klee and Salvador Dali (their shapes from the subconscious), Piet Mondrian (his regular rectangles of primaty color) and Alexander Calder (his sweeping planes of steel). But in Carpenter's work you will find little reiteration of traditional furniture styles. "When I sit down with my clipboard in my lap, fiddling over a design," he says, "I shut out all references to furniture previously seen—I've done my seeing—I concentrate on the givens. The givens are the requirements of the utilitarian function of the piece, and I make these points or lines first on the paper. Then I attempt to arrange the form and joinery in a relatively unclichéd and aesthetically pleasing manner. . . . I find it hard and exciting work." Carpenter describes his sense of good design by referring to George Orwell, who identified good writing as being like a pane of glass. "When you see a chair," says Carpenter, "you should say *sit;* when you see a table, *put things on.* You shouldn't say chair, you shouldn't say table. If you make something that says *sleep,* by God you've made a bed."

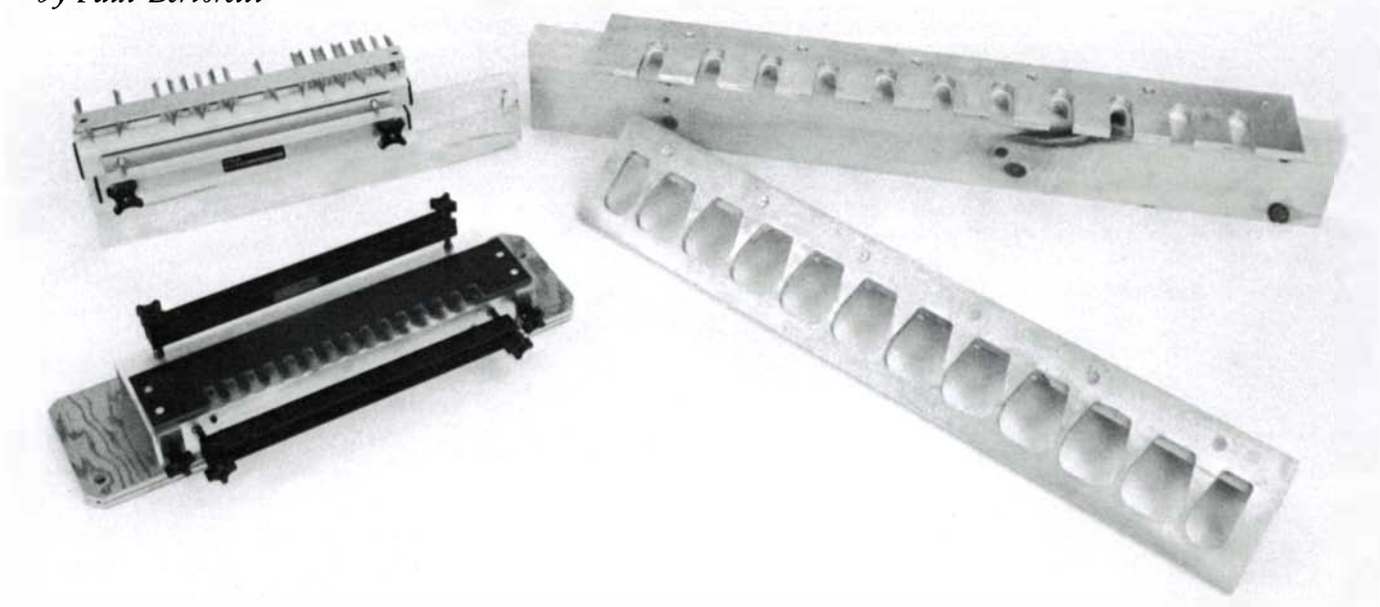
But most of Carpenter's own furniture has too much character to be that ideal pane of glass. "I see my furniture as a series of experiments," he says, "trials and mostly errors. I haven't been happy with any of them." After 34 years of surviving as an independent woodworker, that may seem a hard view to take. But by the time you're 62, says Carpenter, you disentangle yourself from your work. You stop wortying about making mistakes. You achieve another sort of independence. "Design can become compulsive," he says. "I find I have to consciously stop. There's more to life than placing one object next to another. . . . When you design what you make, it's not the object that's necessarily better, though it can be. It's the life of the maker." □

Rick Mastelli is associate editor of Fine Woodworking.

Dovetail Jigs

We test three fixtures for routing carcase and drawer joints

by Paul Bertorelli



Router dovetail jigs are available in three types. The Sears jig, left foreground, will cut fixed-spaced half-blind dovetails for drawers or small carcases. Behind it is the Leigh tool, which will cut variably-spaced through dovetails. Keller's two-piece aluminum template, right, is designed for routing large dovetails in carcases. Pin spacing can be varied by shifting this tool.

Machine-cut dovetails have always gotten a bum rap. They're either too fat or too thin, or the angle is off, or something else is wrong that only cutting them by hand seems able to avoid—provided you've got the time and skill. These complaints, valid or not, have inspired the invention of router jigs that attempt to solve the problem.

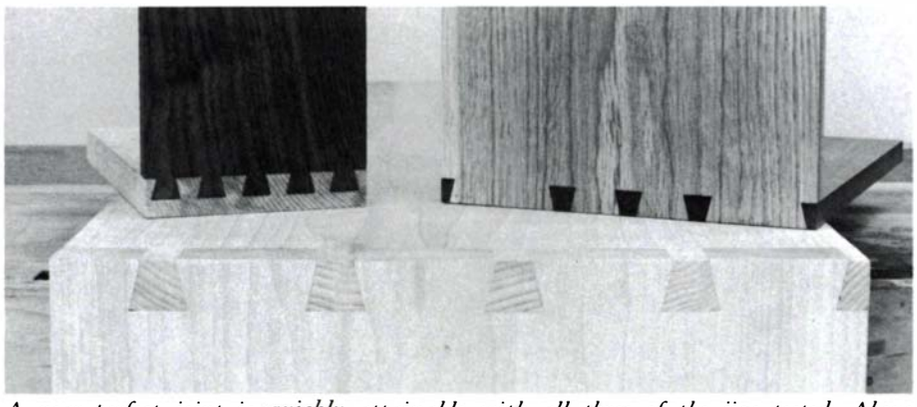
Three basic types of dovetail jigs are now on the market—a large one for cutting through dovetails in carcases, and two smaller ones for through and half-blind dovetailing of drawers and smaller carcases. We bought one of each and I spent several days trying them out.

I wasn't surprised that I had to fuss to get the jigs to work well, but once router and jig have been accurately set up using test pieces, all three jigs will cut joint after joint with good results, providing that the stock has been planed accurately and cut off squarely. I was surprised, however, to find that I could join boards as well with the cheapest jig as with the most expensive.

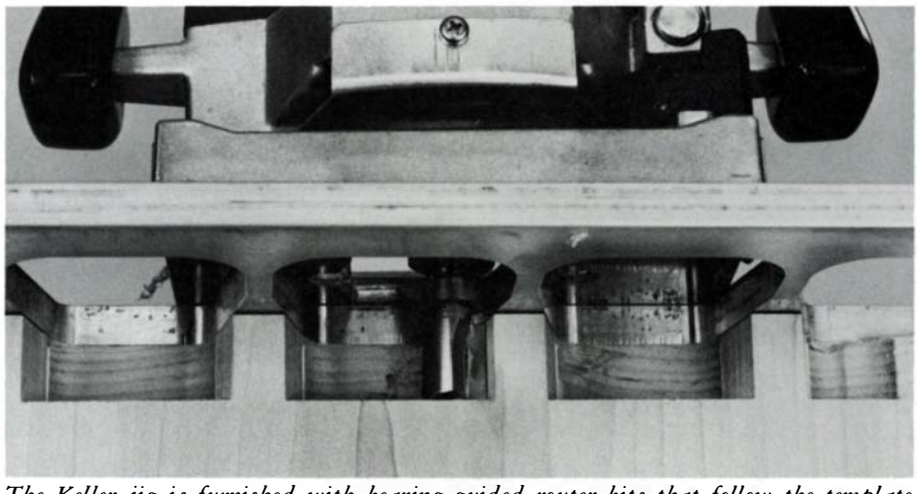
Two of the jigs tested—David Keller's $325 two-piece aluminum tool and Leigh Industries' $149.50 adjustable device—are recent inventions. They were designed partly to address the common complaint that machine-cut dovetails lack visual excitement because the angle and spacing of the pins and tails don't vary. With either of these two jigs, the pin angle is determined by the router bit, but you can change the look of the joint by varying the pin-tail proportions and spacing. Both of these jigs cut only through dovetails. Keller's is for large carcase joints, while the Leigh jig is for drawers. Sears' jig, the third type I tested, cuts only half-blind dovetails, and the space between pins and tails is fixed. At $45, its design and price are representative of jigs by at least three other manufacturers—Porter Cable ($68), Black and Decker ($68), and Bosch ($82), all of whom sell through local distributors. Bosch also makes a large jig (for $94) that will dovetail boards up to 16 in. wide.

Keller jig—David Keller, a Bolinas, Calif., woodworker, began selling his dovetail jig in 1976. When first conceived it was made of Plexiglas, and later of phenolic plastic. The version he sells now is made of two ½-in. thick, 36-in. long, machined aluminum plates—one for the pins and one for the tails. A pair of bearing-equipped ½-in.-shank router bits (a 1-in. diameter, 14° dovetail bit and a ¾-in. straight bit) are included in the jig's $325 price. The templates can be repositioned, so there's no limit to how wide the stock can be. Boards ranging in thickness from ⅝ in. to about 1¼ in. can be joined. The dovetail bit, however, has a limited depth of cut, so for stock thicker than ⅞ in., the pin board must be rabbeted.

To use this jig, you need a beefy router with a collet that will mount ½-in.-shank bits—I tried a 2-HP Milwaukee and a 2¾-HP Makita. The templates are first screwed to backing boards. These give you a way to clamp the tool to the work, and they keep chunks from being torn out of the stock as the bits exit from the cut. If the jig's built-in 3-in. spacing is used, it's simple to lay out the joint. The tail-cutting template is clamped to the end of the board, and the tails are milled with the dovetail bit. The template is removed and the tail locations are scribed directly to the pin board, as in hand-dovetailing. It isn't necessary to scribe each tail. If two or three are located accurately, the jig automatically lo-



A near-perfect joint is quickly attainable with all three of the jigs tested. Above foreground are the large dovetails with pins on 3-in. centers made with the Keller jig. The joints made with the Sears fixture, left, are of fixed spacing, giving them the unmistakable look of machine-made dovetails. With its variable pin spacing, the Leigh jig makes dovetails, above right, that come closest to looking handcut.



The Keller jig is furnished with bearing-guided router bits that follow the template more accurately than the guide bushings used with the other two jigs. This photo shows how the bearing guides on the template to cut the pins. And it also illustrates how close the bit comes to the templates, a condition that requires constant vigilance when using any of these jigs.

cates the others. The straight bit is used to cut the pins. If you prefer, the fixed spacing can be ignored and you can put the pins anywhere you like. In that case, the templates must be moved after each cut, and all the tail locations must be scribed to the pin piece, a tedious and inaccurate routine. You might as well dovetail by hand.

To tighten the joint, you make wider pins by moving the edge of the template toward the work; moving it away shaves them down and loosens the joint. Keller suggests you experiment with mounting the template on its backing board until a good fit is produced. But I found it handier to set the jig up to make a tight joint, and then loosen it with masking-tape shims.

Of the three jigs tested, Keller's was by far the simplest to use. Once I had it set up correctly, I could make tight dovetails that were attractive, but somewhat square and clunky-looking for my tastes. I like to start and end a dovetail series with a half-pin, and by departing from the jig's fixed spacing I was able to do that, with only a minor loss of accuracy. The alternative is to let the pins fall where they may, as in the photo above, or to design in widths that are multiples of the jig's 3-in. spacing.

Avoiding tearout with this jig requires some care. After the backing board has been used a few times, too much material is cut away for the board to offer much protection as the bit exits. Slower cutting, or a new board, helps.

This jig does its job, but its price and size limit its appeal. Keller says it is aimed at small production shops that don't have the time to hand-dovetail carcases, or the capital to buy specialized machinery. The weekend woodworker should be wary—dovetailing with this jig calls for experience with large routers. I was reminded rather violently of the risks. As I was finishing cutting the pins on one test piece, I inadvertently tilted the router. The bit grabbed the corner of the jig. The confrontation snapped the router's shaft and hurled the collet and bit out the bottom of the machine, shattering the Bakelite base as it went. I suffered a shrapnel wound in the face. While I don't see this jig as being more dangerous than other power tools, it does demand undivided attention and careful movement, along with good eye and face protection.

Keller's jig is available direct from him at Star Route, Box 800, Terrace Ave., Bolinas, Calif. 94924.

Leigh jig—Ken Grisley, an English boatmaker now living in Canada, designed a jig that will make pins and tails with variable spacing. Earlier this year, he formed Leigh Industries Ltd. to manufacture and market this device, the only small jig we could find that can make randomly spaced, through dovetails.

The Leigh jig consists of ten pairs of movable, die-cast aluminum fingers mounted on a heavy aluminum extrusion. The boards to be joined are clamped to the jig, pin board on one side, tail board on the other. The aluminum fingers project over the stock to guide the router bit through the cut. The fingers can be positioned anywhere along the extrusion and are locked in place with socket-head screws. The pin side of each finger pair is angled at 15° to match the dovetail bit used with the tool (bits aren't included in the price). The opposite or tail side of the fingers is straight. The jig is intended for making drawers, since it works best cutting through dovetails in stock up to ½ in. thick and 12 in. wide. But by cutting a rabbet in the pin board, it's possible to dovetail stock up to ¾ in. thick.

Instead of bearings to guide the bits through the wood, a guide bushing is attached to the router base and the bit is centered inside the bushing's bore. Bushings tend to be less accurate than bearings because it's difficult to get and keep the bit concentric.

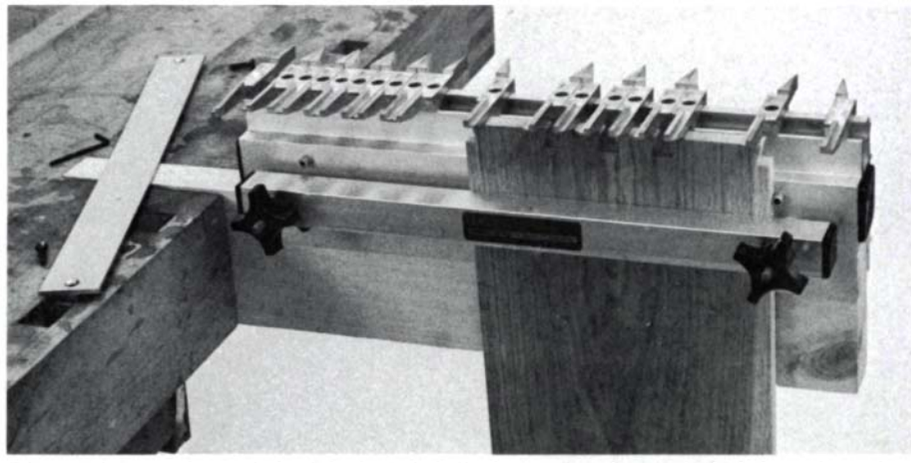
Setting up the jig involves loosening and retightening 20 socket-head screws (two for each finger pair) to achieve the desired spacing. It takes time. For the effort, though, you get pins and tails where you want them, and you can start and end the joint with a half-pin, no matter what the width. You can also vary the width of pins and tails. I used a 1-HP Sears router and ¼-in.-shank carbide bits to test the Leigh jig: tails first with the dovetail bit, then pins with a

5/16-in. straight bit. Since the fingers automatically locate the pins on the piece clamped in the other side of the jig, no scribing is necessary. Leigh supplies a stack of 1/64-in. paper shims for adjusting the tightness of the joint. The shims fit under an aluminum plate to which the pin board is clamped. Removing shims moves the work closer to the jig, thus tightening the joint.

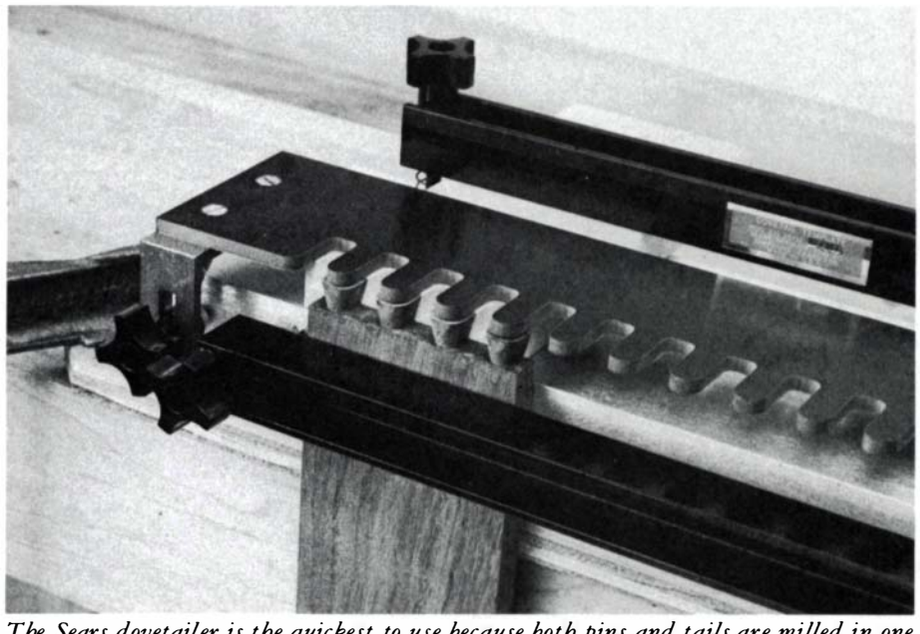
After some confusion over finger spacing, I was able to cut tight dovetails in both hardwoods and softwoods. Once I got the hang of it, changing the spacing was easy. The biggest problem I had with this jig was tearout. As the bits leave the cut, a ragged edge often results. Backing the cut with a strip of wood clamped between the work and the jig corrected this, but I had to replace the strip frequently.

For all its complexity—it has some 25 separate parts—the Leigh device held its adjustments throughout the day I used it to join a batch of drawers. The last corners I made were as tight as the first. The tool seems robust enough for a small production shop. But it may be pricey for the woodworker with just a few drawers to dovetail; and besides, in the time it takes to adjust the jig, you really could chop quite a few hand dovetails. Moreover, I found that having to rabbet the pins in stock thicker than ½ in. limits the tool's versatility.

The jig is sold through mail-order tool distributors; Leigh Industries (Box 4646, Quesnel, B.C., Canada V2J 3J8) has a full list.



Pin spacing can be varied with the Leigh jig by moving fingers locked down by socket-head screws. Fit of the joint is determined by the pins' width, which is controlled by adding 1/64-in. thick paper shims stacked behind an aluminum plate between work and jig. The plate at left fastens over fingers to give the router a smooth surface to ride on.



The Sears dovetailer is the quickest to use because both pins and tails are milled in one operation with the same bit. The workpieces are clamped together, limiting tearout and making joints consistently clean.

Sears jig—Singer Motor Products Division has made the Sears dovetail jig for more than 20 years. It consists of a phenolic template machined with fingers and mounted on aluminum channel iron. The pieces to be joined are clamped at right angles to each other under the template. The router (through a guide bushing) cuts half-blind pins and tails in a single operation with one cutter—a ½-in. diameter dovetail bit. Boards up to 12 in. wide and from 3/8 in. to about 1 in. thick can be joined. The dovetails made by this jig are square-dimensioned and closely spaced, with tails undercut on the inside face. Another template sold separately ($13) can be fitted to the jig to make ¼-in. half-blind dovetails in stock as thin as 5/16 in. Though intended only for half-blind dovetails, the Sears fixture can cut through dovetails. It requires routing perilously close to, or even into, the aluminum base of the tool, however. And the ill-fitting, half-round pins thus produced are hardly worth the effort.

Pin and tail spacing is fixed with this jig, so set-up involves little more than ripping the stock to width and squaring the ends to be joined. The critical and most difficult task is getting the joint tightness just right. You do it by changing the router's depth of cut, lowering the bit to tighten the joint, raising it to loosen it. With the crude rack-and-pinion depth control on a Sears router, adjustments take lots of trial and error. A router with a better depth control, I suspect, would simplify this job.

Once set correctly, though, the Sears jig is faster and easier to use than the other two because the 15° dovetail bit mills pins and tails at the same time. No bit or jig changes are needed. The boards are clamped tightly against each other during the cut, thus backing the bit's exit and eliminating tearout.

The performance of this jig surpassed my expectations. I once bought a cheaper version, and after using it twice with mediocre results, tossed it back behind the scrap pile. The version I tested, though, is better made yet still priced low—well within the budget of most woodworkers. True, the pin-tail spacing can't be varied, but the precise regularity of the joint made by this jig has a certain appeal. It looks exactly like what it is—a machine-made dovetail. □

Paul Bertorelli is an assistant editor of FWW. *For more on dovetails, see issues #2, p. 28; #15, p. 20; #21, p. 73; #22, p. 21; and #27, p. 68.*

How to Make a Molding Plane

Sticking with an 18th-century tool

by Norman Vandal

You still can spot old molding planes in antique shops or junk shops, but they aren't as common as they used to be. Prices can be as low as $8 to $15, so people snap them up to use as decorations. I can see displaying these old tools because they are aesthetically pleasing, but it's really a shame not to fix them up and use them. They were fine tools once and can work just as well again.

I make a lot of period furniture, and I can't get along without my set of old planes. When I needed a reverse ogee molding with cove for a cornice on a cabinet, I decided to make a plane to do the job, designed around an old iron I'd found that had become separated from its original block.

I'll describe how to make such a plane from scratch, so that if you come across an old molding plane or iron you will be able to get it working again, regardless of its condition. Whether you are starting with an old plane block or an old iron, or from scratch, this is the general scheme: First you must know the molding profile, which will determine the width of the iron. Next you must shape the sole of the plane to the reverse profile of the molding. Then you can true the iron to the sole and start making molding.

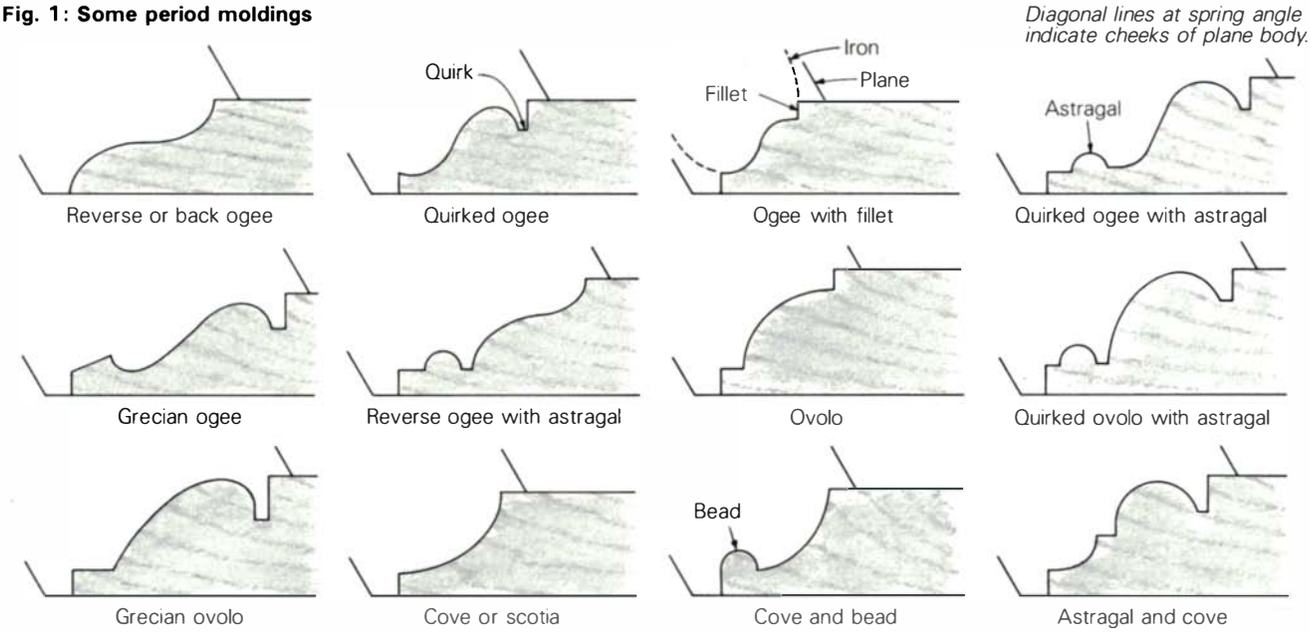
If you come across a plane with a poorly shaped iron, don't change the shape of the sole to conform. The contour of the sole represents the molding the plane was designed to make. A poorly matched iron is usually the result of inept sharpening or grinding. Recondition a damaged iron by annealing it (softening it by heating), filing it to fit the sole and then retempering it.

The style of plane I've chosen is based on the finer 18th-century examples, and all the standard dimensions discussed are characteristic of this period. You may, of course, alter the design, but this pattern is a good starting point.

Molding shapes—Planes with an average length of 9 in. to 10 in., a height of 3 in., a thickness of from 1 in. to 2½ in. and no handle have erroneously been accepted as "molding planes." Many of these planes are for rabbeting, tongue-and-grooving, dadoing and other purposes that have nothing to do with making moldings. Molding planes produce moldings on the edges of frame members called sticks, hence the process is called sticking. Figure 1 shows some standard moldings, and the bibliography at the end of this article includes books that contain full-size drawings.

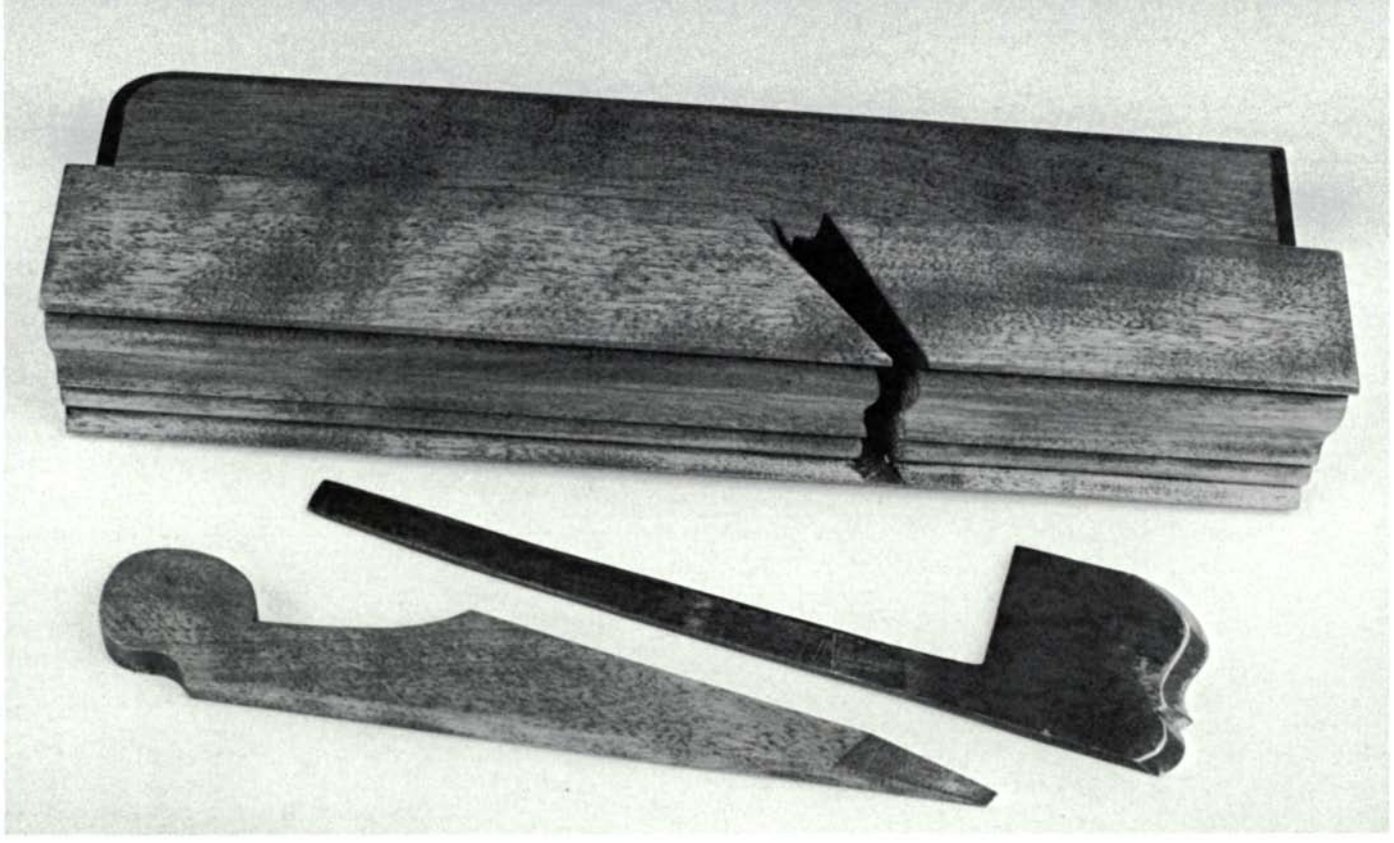
Simple moldings (composed of segments of circles or ellipses) are beads, quarter rounds, hollows and rounds, coves or scotias, and astragal beads. Planes for making these profiles are called simple molding planes. Complex moldings, often broken up or set off by flats or fillets, are ogees, reverse ogees, ovolos or compositions of various curves. Planes to stick these shapes are called complex molding planes. There is another

Fig. 1: Some period moldings

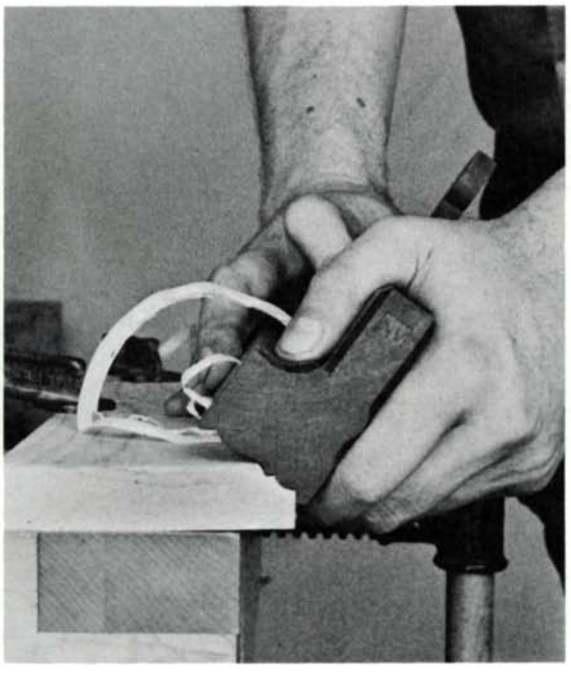


These molding shapes, based on sections of a circle or an ellipse, date back to a classical revival that began in Renaissance Europe, and before then to Greece and Rome. They have been the stock-in-trade of cabinetmakers, architects, builders and designers, and they can be seen everywhere—from cornices on buildings to trim on cabinets. Some period furnituremakers make do by shaping the moldings with scratch-beaders, but the king of tools for day-in and day-out precision work is the molding plane.

Drawings: David Dann



The plane shown above began with an old iron. Vandal annealed and reshaped the iron, then made a yellow-birch block to suit. In the photo sequence below, the plane is tilted, or sprung, so the fence will be pressed against the work. A series of passes then takes progressively wider shavings, until the depth stop contacts the work, and the plane ceases to cut.



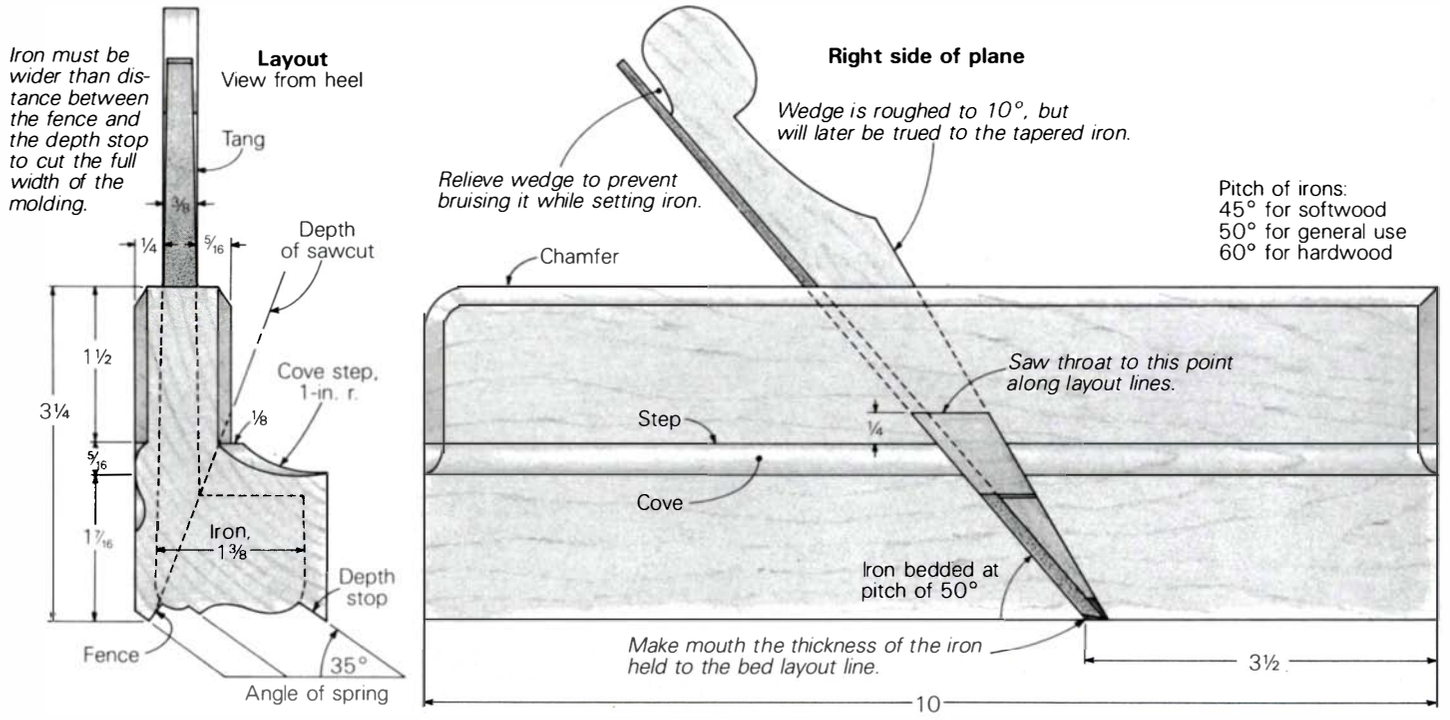
class of planes generally used to cut wider moldings. These planes are from 12 in. to 14 in. long, and have a throat, wedge system and handle similar to common bench planes. They have been dubbed "crown molding planes," though this type of plane cuts many sorts of moldings other than crowns or cornices.

The design—The first step in making any molding plane is choosing the molding. Draw its section full-size, and refine the drawing before beginning the plane. Simple planes can make moldings up to about 2½ in. wide. Wider moldings will have to be made with more than one plane, or with a crown molding plane.

Use the molding section to construct a full-size drawing of the heel, or rear, of the plane, as this will settle the size of the block needed. The sole of any molding plane is the reverse profile of the molding it cuts, plus the integral fence and the depth stop. Looking at my plane from the rear, the fence is on the left and the depth stop on the right (figure 2, top of next page).

In use, the stock is fastened horizontally to the bench and the plane is tilted, or "sprung," so that the fence is vertical and the depth stop horizontal, as shown in the photos above. An unsprung plane can wander, but a sprung plane gives greater control because the guide fence is pressed against the stock. The plane, even though tilted, cuts straight down the side of the work, gradually taking a wider and wider shaving until the full profile has been stuck. When the depth stop contacts the top of the work, the iron stops cutting. Not only is a sprung plane easier to use, but its geometry will also

Fig. 2: 18th-century molding plane **Based on examples of Jos. Fuller, who worked in late 18th-century Providence, R.I.**



allow its mouth to be more uniform in width (figure 3, top of facing page). Not all 18th-century molders were sprung, however, and a sprung plane won't cut some molding shapes.

Draw the molding with the appropriate spring, which can vary—good working angles are shown in figure 1. Then add the fence and depth stop to the molding profile. I allow ¼ in. on the fence side, and 5/16 in. on the depth-stop side. Your drawing now shows the total width of the plane.

The top of a molding plane is stepped down in thickness. The width of the stepped portion will be the width of the iron's tang plus ¼ in. at the left and 5/16 in. at the right. The extra width makes up for the wood that will be cut from the throat. You can judge from figure 2 the height of a typical step.

The stock—Yellow birch was used by 18th-century planemakers, but by the turn of the 19th century beech had become the wood of choice. I prefer quartersawn yellow birch, but beech, maple or cherry will work as well. Select as fine a block of wood as you can—straight-grained and consistent throughout. Avoid figured wood, or you'll have problems shaping the sole.

My rough block length for a 10-in. long plane is 12 in., which gives me an inch at each end to experiment with when shaping the sole profile, and also allows for cutting off bruises inflicted during shaping. The finished height of most blocks is about 3¼ in. Standard dimensions meant planes could be stored and transported in fitted boxes without rattling around.

The iron—Since I figure that I'll use any molding shape sooner or later, I frequently buy old irons that have lost their blocks, then make new blocks to fit. I've had some good luck, but looking for a usable iron that's also a shape you need can be futile, so I recommend that you make your own.

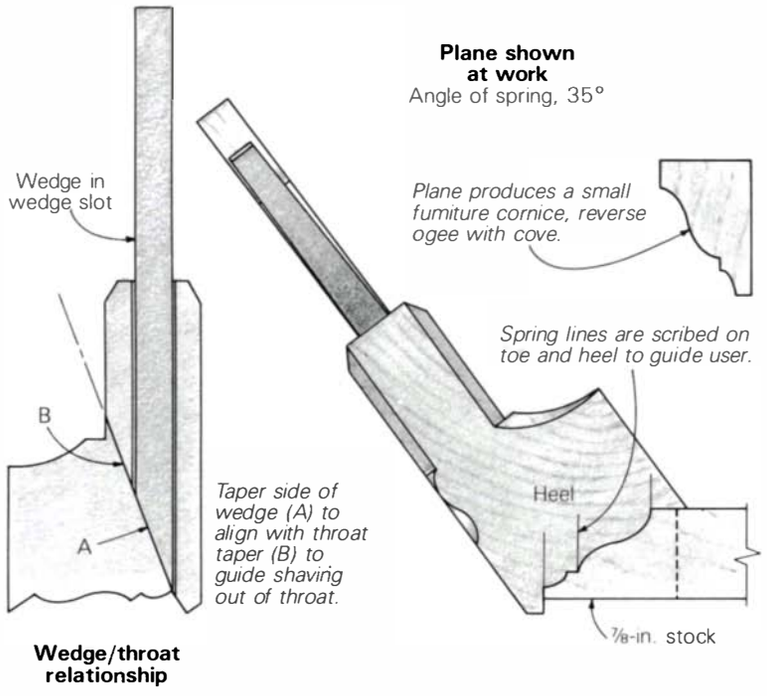
The easiest way to make an iron is to start with a piece of dead-soft sheet tool steel, work it with a file and hacksaw, and then temper it after shaping. Alternatively, you can have a blacksmith forge an iron out of spring steel, which can be annealed and shaped, then tempered as a last step. Hayrake tines and old buggy springs forge into excellent irons.

Iron thickness can be from ⅛ in. to 3/16 in. The thicker irons will chatter less, but will be more difficult to shape. Old plane irons were tapered in thickness. A light tap on the end of the tang would loosen a tapered iron slightly while driving it deeper into the block. Then a sharp tap on the wedge could secure the iron without altering the set. The tapered iron, while nice to have, is not a necessity. And a uniformly thick iron is much simpler to make. Keep in mind that the iron must be wider than the cutting portion of the sole—if the profile ends at the side of the iron, you won't be able to set the iron deep enough to cut the full width of the molding.

Layout—When your block is planed and trued square, lay out the cuts and mortises. Start by making a full-size template of the sole profile, directly from the full-size drawing of the molding. To make the template, I use aluminum flashing. It is easy to work, and the edges of the template remain crisp during tracing. Position the template in the same place on each end of the block and trace the sole profile.

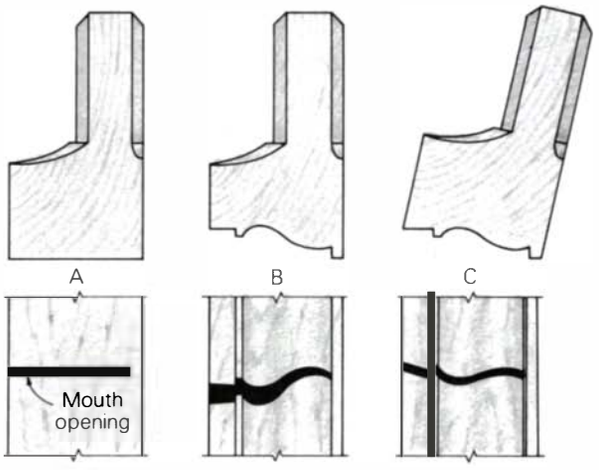
Next, lay out the throat, mouth and wedge slot using the dimensions given in figure 2. I suggest a 50° pitch for the iron—a compromise for cutting either hard or soft woods. The wood which the iron rests against is called the bed. The opposite side of the mortise will be cut at an angle 10° greater, to allow for the wedge taper. Carry the layout lines all around the body of the plane to define the mouth opening and the tang mortise on top of the block. Lay out the mortise width according to the width of the tang.

Last, use a marking gauge to scribe the step. The step makes the plane easier to handle, helps the shaving out of the throat, and makes cutting the mortise for the wedge and iron



Wedge/throat relationship

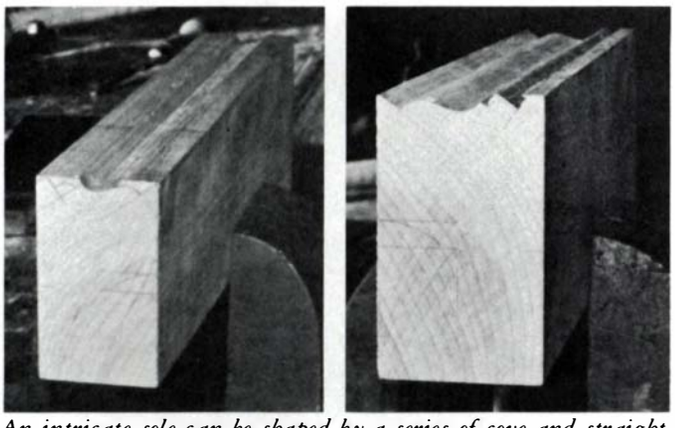
Fig. 3: Spring allows uniform mouth



A. Rabbet plane shows uniform mouth.

B. Ogee molding plane, unsprung, shows irregular mouth because sole must be cut up the side of the plane.

C. Ogee molding plane, which cuts the same molding as in B, shows that mouth of sprung plane remains uniform. This plane must be a bit wider than plane B to cut the same contour.



An intricate sole can be shaped by a series of cove and straight cuts on the tablesaw, and then sanded with shaped blocks.

Boxing the sole

Slivers of Turkish boxwood can be let into the sole of a plane to reinforce it at points where use would wear it down. Boxwood—the familiar yellow wood used in old Stanley folding rules—is dense, tight-grained and extremely wear-resistant.

Planemakers plowed narrow grooves into the sole of the plane, inserted thin slips of boxwood, then trued up the sole. In order to make the slips even more wear-resistant, makers set the grain of the boxwood nearly at right angles to that of the plane body, so that the tougher end grain was exposed to take the abuses.

Boxing was not common in 18th-century planes, but it caught on fast—it is found in almost all molding planes produced after the turn of the 19th century. —*N.V.*

easier, as we shall see. The edge of the step can be decorated in a number of ways—molded with ogee or quarter-round profiles, chamfered, or simply beveled off. I decorate my steps by cutting a cove the full length of the plane. Lay out the decoration now, too.

Shaping the sole and step—Period planemakers duplicated many profile molders. Instead of shaping each sole with files and gouges, they devised a "mother plane," made in reverse profile, to stick each profile. The mother plane saved time, and it ensured that all the planes for a specific molding would be the same, at least those from any one workshop. I've never bothered to make a mother plane, though, because I've never needed more than one plane of each shape.

Cut the sole and the step decoration prior to sawing out the mouth and throat—these gaps would interfere with the shaping. It's vital that the sole be uniform from end to end, or you won't be able to set the iron properly. Various tools and techniques can be used to shape the sole. For the fence and depth stop, or any other flat portions of the profile, I use the tablesaw to make cuts the full length of the sole.

The concave areas can be gouged and filed, or cut on a router table using various cove or fluting bits. By making a number of repeated cuts, not quite to the layout line, you can remove most of the material. The sole can then be scraped or sanded smooth, with the sandpaper wrapped around a dowel. For shaping convex areas I generally use hollow planes, but other methods work too. Again you can remove most of the material using router or tablesaw, then clean up with chisels, scrapers and a shaped sanding block.

Check the sole with a straightedge, and then true any hollows or high spots.

The steps on period planes were probably cut with a large rabbet or fillister plane—chatter marks from the iron are often visible. I cut the step on the tablesaw and scrape the surfaces

smooth, saving the waste to make the wedge. At this point you can cut the decoration on the step.

Sawing out the mouth—Surprisingly, a good deal of the mouth and wedge slot can be made by simply sawing out the area between the layout lines. Mark out how far up the body of the plane you wish to saw. This cut is a compromise between leaving enough wood above the step for strength and providing a gentle angle to guide the shaving out of the throat. I usually stop the sawcuts ¼ in. above the step.

Figure 2 shows how deep to cut across the sole. I use a miter box to start the cuts at the proper angles for the blade and the wedge—the miter box also ensures that the throat will begin straight across the sole. I use the backsaw freehand to finish the cuts.

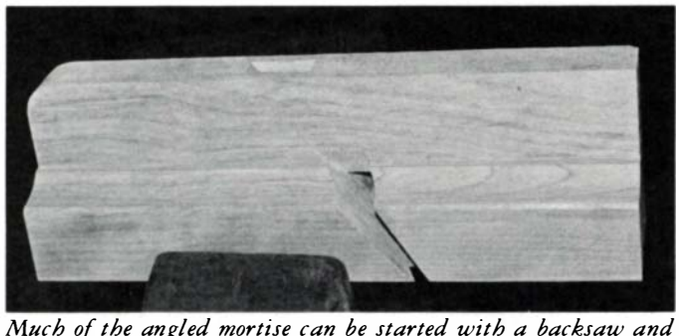
The wood between the kerfs can now be chiseled out, and pared as smooth as possible. You will find that a ⅛-in. chisel is a great help in clearing out the mouth.

Mortising the wedge slot—The angled mortises in period planes were, I believe, chopped out without pre-boring—production planemakers of yesteryear had plenty of practice. I find it a lot safer to pre-bore the wedge slot with a bit slightly smaller than the width of the mortise, using a guideblock bored at the correct angle. A drill press could be used, or any number of jigs worked out. It's important to bore accurately, without cutting into either the bed or wedge ends of the mortise. Bore all the way through to the throat.

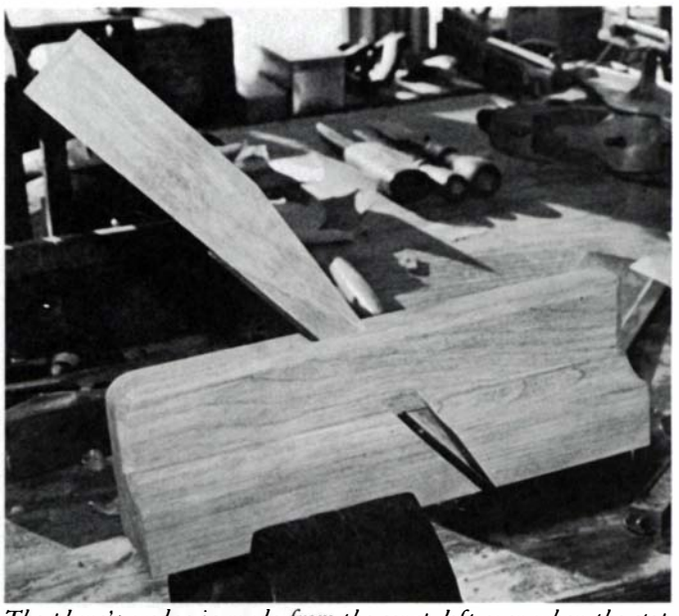
Now pare the sides and ends down to the layout lines. Some chopping is required, but don't rush it—many a plane has been spoiled at this point. You have to chisel the wedge end of the mortise into end grain at a 40° angle. Patience and an absolutely sharp chisel will prevail.

After my wedge-slot mortise has been cut, I use a set of planemaker's floats (*FWW* #30, p. 63) to true up the bed and the mortise. Floats are single-cut files of various shapes and sizes with widely spaced teeth, each of which functions like a tiny chisel. Original floats are extremely scarce, and command high prices. I have a set that a friend made me on his milling machine, and I value them highly. Although they make truing up a lot easier, floats aren't strictly necessary—careful paring with a chisel can produce as good a result.

The width of the mortise isn't crucial, just make sure there is adequate clearance for the iron without removing too much wood. The bed, however, must be perfectly flat—or the iron will chatter. For the final fitting, use your iron to check out the bed surface, the mortise width and the mouth. But check the iron itself for flatness first. The wedge end of the mortise must also be flat, and square to the plane's sides.



Much of the angled mortise can be started with a backsaw and then pared away, but the inside should be drilled and chopped.



The plane's wedge is made from the scrap left over when the step was cut. Its lower end will be tapered to guide the shaving out.

Making the wedge—Take the cutoff you saved when you made the step, and thickness it to the width of the tang. Taper it to 10° so it will fit the mortise. I make the angled cut with a fine-tooth handsaw and plane it true and smooth with a block plane. Now set the iron in the plane and insert the wedge against it with the grain of the wood parallel to the iron. The wedge must fit tight to hold the iron firmly against the bed, and to prevent shavings from catching between the wedge and iron, jamming up the mouth and throat. Carefully pare away wood from the mortise until you get a perfect fit.

Shaping the iron—The blank has to be annealed, so that it can be worked to shape, then rehardened. To anneal the iron, you can use a propane torch, or better yet a hotter MAPP gas torch, heating the iron to a dull red glow, then letting it cool slowly for an hour or two. If the steel is properly annealed you should be able to cut it with a file or hacksaw.

Once you've shaped the tang so the iron fits neatly in the plane, the cutting edge can be laid out to the shape of the sole. This must be done while the iron is set flat on the bed. I make a full-size template of the iron out of aluminum flashing. Place the template in the plane as a substitute iron, holding it tightly in place with the wedge and making sure that its full width protrudes slightly beyond the sole. Using a sharp marking awl, scribe the contour of the sole on the underside of the template. Remove the template and cut out the traced profile with a tin snips or knife. The line of the cutting edge must pass into the body of the plane at the fence and depth stop—carry this line out to the sides of the template. This will not give you an entirely exact profile for the cutting edge, but it's as close as you can come at this point.

Next, paint the bottom inch of the wedge side of the iron with either machinists' blue layout dye or flat black paint. When this is dry, lay the aluminum template on it and, using the awl, scribe the cutting edge's contour. You can use a grinder for roughing out, but a file will give you the greatest accuracy for the final cuts to the scribed line. Place the iron in a vise, paint side toward you, and go at it. Don't worry about the bevel of the iron yet, just file square to the contour.

Now turn the underside of the iron toward you to file the

bevel: all but the cutting edge itself must clear the sole. Thus the bevel angle is dependent upon the angle at which the iron is bedded, the pitch. For a plane with 50° pitch I give the iron at least a 55° bevel (a 5° clearance angle), which usually proves sufficient. Set a bevel square to the bevel angle and file up to the cutting edge.

When the edge is formed, position the iron with the wedge in the plane, so that the iron protrudes about 1/32 in. Check for clearance, and sight down the sole of the plane from toe to heel to see that the iron protrudes uniformly. Remove the iron and touch it up with a file where necessary.

When everything is right, remove all traces of the paint or layout dye. File all parts of the bevel as smooth as you can, because once the iron is tempered, a file will not easily cut the steel. Next, polish the iron. I use a muslin wheel charged with gray compound (tripoli). The shiny, buffed surface will allow you to see the colors of the steel—your clue to the correct temperatures—while you temper the iron.

Tempering—I confess I have little scientific knowledge of tempering. I learned from a local blacksmith who was even less scientific than myself. I don't have my own forge, but a MAPP gas torch works quite well on small pieces such as plane irons. Heat the iron until it glows dark cherry red in dim light. This is about 1550°F to 1600°F. Don't direct the flame at the cutting edge—the edge reaches a hotter temperature anyhow, and there's no sense in burning it. When the color is right, plunge the iron vertically into a pail of cool, salted water. When cool, the iron will be in the hard state. Buff it until it shines again, and test it with a file.

Next, temper the iron by heating it until the polished surface turns a light straw color. This will be about 500°F to 600°F—nowhere near as hot as when heating to harden. When the color is right, plunge the iron into the water. Then check it for hardness with a file, which should be barely able to cut. If it isn't hard enough, start over.

Buff the tempered iron clean, and use a set of Arkansas slip stones to hone the tricky spots. Use plenty of lubricating oil until the entire bevel gleams.

Finishing the wedge—With the rough wedge against the iron in the plane, mark the wedge's decorative profile. Then shape the wedge on the bandsaw or scroll saw, and sand the edges smooth. The wedge in figure 2 is typical of a prolific 18th-century planemaker, Joseph Fuller, of Providence, R.I.

Taper the tip of the wedge to allow the shaving to escape the mouth and be directed up and out of the throat. The tip will sometimes have to be cut back a little. Taper from the end up to the bottom of the angled mortise—if the taper extends into the mortise you will trap shavings.

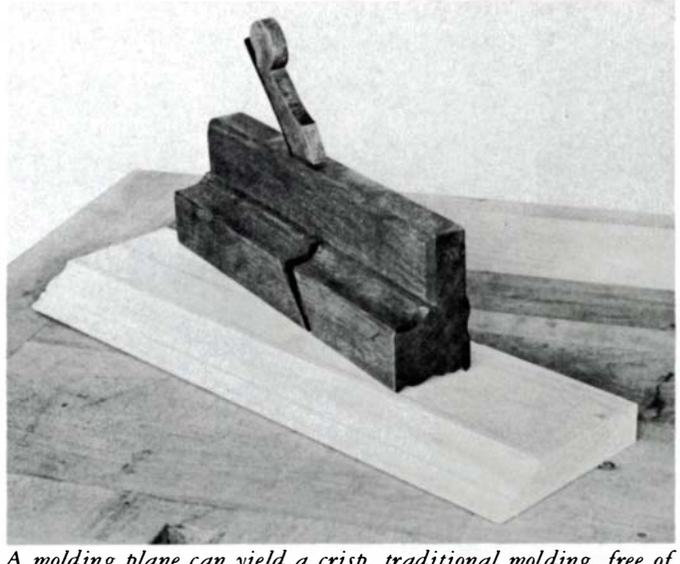
After chamfering and carving some decoration on the block, I stain the yellow birch and apply three coats of Minwax antique oil as a sealer and final finish. The plane is now about ready to go to work.

Setting the iron—Place the iron in the plane and insert the wedge loosely. Sighting down the sole from the rear of the plane, set the iron so the cutting edge is just shy of the mouth, and drive the wedge, but not as tight as it will be during use. It helps to have a light positioned behind you, to reflect off the bevel as it protrudes. Get the final set by tapping the end of the iron, then drive the wedge tight. Use a mallet on the wedge and a ball peen or other small hammer on the iron. To loosen the wedge, hold the plane in your left hand and give the heel a sharp blow with the mallet. Be careful the iron doesn't fall out of the mouth of the plane.

Lubricate the sole to minimize friction and to prevent pitch buildup. Cabinetmakers used to use tallow, kept in cups fastened beneath their benches. I use paste wax, and sometimes mineral oil, though mineral oil tends to darken the sole.

Depending on the wood and the amount of set, it might take twenty to forty passes to stick your molding. Start with the plane sprung so the fence is flat against the edge of the board. Keep pressure against the fence with each pass, and be sure to keep the spring lines vertical, otherwise the molding may end up with a tilt.

Making wooden planes in the old manner is an all-but-forgotten trade. I hope you will be inspired to give it a try—to experience the immense pleasure of using a tool you have restored or, better still, designed and built on your own. □



A molding plane can yield a crisp, traditional molding, free of machine-tool marks and needing no sanding.

Further reading

Wooden Planes in 19th-Century America, Kenneth Roberts, Kenneth Roberts Publishing Co., Fitzwilliam, N.H., volume one. Note: Volume two, available soon, features the most comprehensive material ever published on making wooden planes.

Dictionary of Tools Used in the Woodworking and Allied Trades, R.A. Salaman, Charles Scribner's Sons, New York, 1975. Includes planemakers' tools and the processes involved.

Alex Mathieson & Sons, 1899 Woodworking Tools, a catalog reprint, Kenneth Roberts, Kenneth Roberts Publishing Co., Fitzwilliam, N.H. Many full-size drawings of period moldings.

Chapin-Stephens Catalog No. 114, 1901, a catalog reprint, Kenneth Roberts, Kenneth Roberts Publishing Co., Fitzwilliam, N.H. Molding planes in sticking positions; useful for designing.

Explanation or Key, to the Various Manufactories of Sheffield, Joseph Smith, 1816, a reprint by Early American Industries Assn., South Burlington, Vt., 1975. Historical information.

Woodworking Planes, a Descriptive Register of Wooden Planes, Alvin Sellens, Augusta, Kans., 1978. A valuable compilation.

Norman Vandal, of Roxbury, Vt., makes period architectural components in the summertime and period furniture during the winter. He wrote about panel planes in FWW *#18. For more on tempering, see* FWW *#4, pp. 50-52.*

Two Designs for Chests of Drawers

Chest of bags

by Len Wujcik

As a designer and builder of furniture, I find that a most challenging part of my work is problem-solving: experimenting and/or playing with form by manipulating materials and processes to answer a specific need. Having a clear statement of the problem and objectives is important because it focuses design efforts. Here's how I went about developing a piece I call the chest of bags.

I'd noticed that knockdown furniture designs included no chests, particularly chests with drawers. This seemed odd and interesting, so I pursued the idea. The problem was to design and build a chest of drawers that would meet three criteria: One, the chest should be easy to assemble and disassemble, mainly for reduced shipping size. Two, construction should be good-quality, whether the joinery be traditional or non-traditional. Three, the design should lend itself to mass production. Industry can make good products, if only it would stop feeding consumers period-style clones cheapened by dishonest constructions and materials. I wanted to dispel the idea that knockdown furniture necessarily compromises quality.

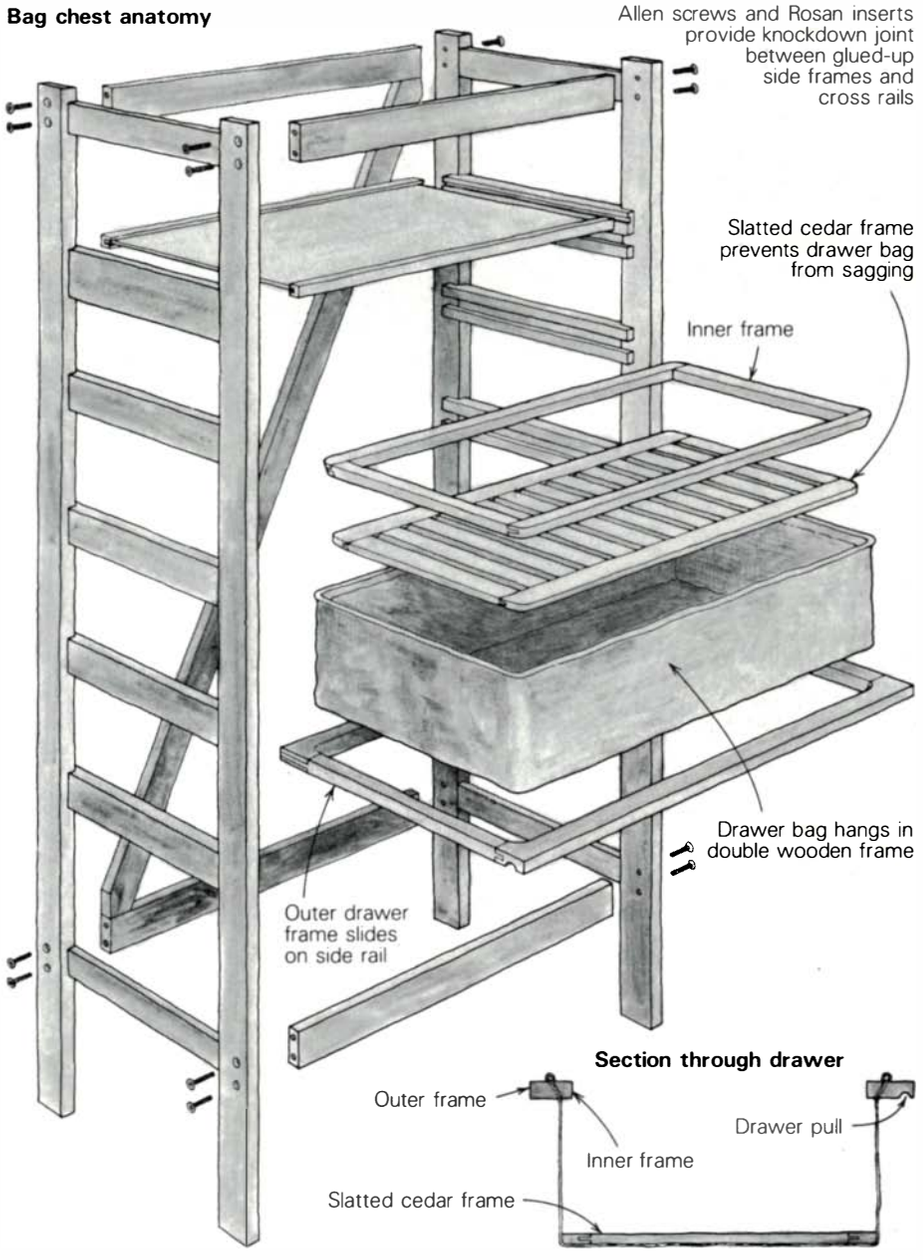
The chest, despite its contemporary appearance, is based on traditional construction. The only difference is that the elements of frame, panel and drawer have been rethought as skeleton, skin and organ, respectively. This anthropomorphic wording may seem playful, yet it proved helpful in designing the bag chest. In fact our body has a lot to do with the form of many products, from eating utensils to architecture.

Making the chest's components easy to assemble and disassemble was accomplished with a skeletal case composed of pre-assembled frames, which reduces the size of the shipping package without requiring its recipient to fiddle with an excessive number of parts. There are two side frames, the rails of which act as drawer slides and are glued to the stiles using groove-and-tenon joints. These two frames are connected by another set of rails: Rosan inserts receive flat-head Allen screws, making these joints knockdown. A diagonal brace across the back provides rigidity.

Now that the case could be made to collapse, I needed a drawer system that could do the same, since the volume of a chest is determined by its drawers. Thinking of the drawer as just a container was an important breakthrough. Containers are made of metal, paper, plastic, glass, leather and fabric, any of which can be used in a drawer system. I chose fabric because it could be worked easily and folded. With my wife Beverly's skilled assistance, we made our first collapsible bag drawer. It hangs in a double wooden frame, which slides on the side rails. A slatted cedar frame laid in the bottom of the drawer bag prevents sagging and also scents the clothing stored in it.

I'd decided on a skeletal case and a bag drawer; the chest was complete except for an enclosure. Considering the visual and physical lightness of the chest, and its anthropomorphic nature (it already had a skeleton on which its functioning parts hung), it was obvious that if it were to be enclosed, the chest should have a skin. I opted for the same fabric as the drawers are made of, to maintain a unity of materials, and avoid the problems of wood movement and weight. Actually, I can accept the chest

Bag chest anatomy



Section through drawer

as complete with or without the skin. An advantage of cloth is that it is removable, washable, and replaceable in all sorts of colors, patterns and textures.

Since 1977 I have made five types of chests, each with its own character—a "family" of bag chests. They were not an attempt to be different for the sake of difference alone. I arrived at their form and function through strict problem-solving and a little fantasy. There is a misconception that design means different. Good design may be different, but different may not be good design. □

Len Wujcik teaches three-dimensional and furniture design and construction at the University of Kentucky College of Architecture.

Len Wujcik

Wujcik's family of bag chests have in common a skeletal case that is easily knocked down for shipping. The drawers are frames on which fabric bags hang, making them collapsible too. Chests and drawers can be fitted with fabric of various colors, patterns and textures. Prices of the chests range from $350 to $1200.

Open carcase, musical drawers

by Michael Pearce

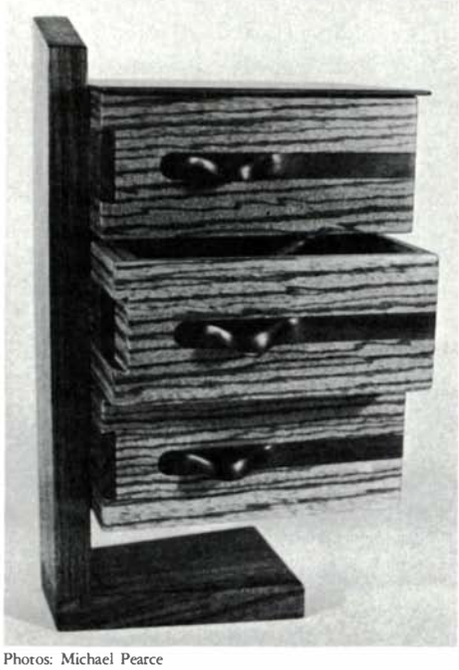
Most people like opening drawers—to find out what's inside them, or simply to see how they slide. A chest of drawers invites you to use it, just as a chair entices you to sit down.

In 1973 I built a chest with a skeletal carcase that supported but did not conceal the drawers. The idea was to give a sense of form created by the absence of mass, and also to expose the workings of the thing. Somehow this stylization of function—common to so much contemporary furniture—seemed to make the piece more inviting and kinetic.

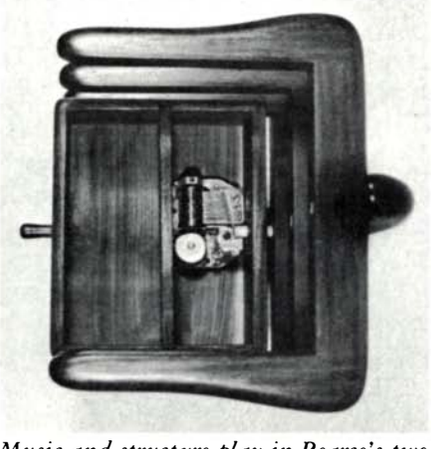
Jewelry boxes with the same open construction were a natural spin-off. The smaller scale opened up another possibility. One day, while playing with a music-box movement, it occurred to me that it could work as well in a drawer as in the traditional hinged box. The only difference is that in a standard music box the movement is started and stopped by the shifting of a lever or rod activated by the lid; in a musical drawer the rod remains stationary while the movement is shifted from the stopped position to the released position.

Since people never expect to hear music from the mouths of drawers, it's fun to see them giggle when a Cole Porter tune jumps out at them. The Swiss movements by Reuge that I use cost about $12 apiece, but I've found them more reliable than cheaper ones. Their use need not be confined to boxes and drawers. Anything hollow can house a musical movement, and almost anything that moves can start it singing. □

Michael Pearce makes furniture in San Francisco, Calif. Reuge music-box movements are available from The Woodworkers' Store, 21801 Industrial Blvd., Rogers, Minn. 55374.



Photos: Michael Pearce



Music and structure play in Pearce's two open-carcase jewelry boxes, approximately 13 in. high. A musical movement in the bottom drawer of each is activated when the drawer is opened. The box on the left is of chechen, zebrawood and rosewood; the one on the right, rosewood and shedua. A ⅛-in. dowel stops the music when the drawer is closed (above).

The Guild of American Luthiers Convention

Cyanoacrylate and fellowship

by Jim Cummins

People flew or drove from all parts of the country, and a few came from as far away as Europe and Australia, for the Guild of American Luthiers' 1982 convention in Estes Park, Colo. From June 17 to 20, about 75 makers of guitars and other stringed instruments had the chance to display their newest work to their peers, and more important, to share state-of-the-art information. By the end, everybody was exhausted—not drained, but overflowingly renewed.

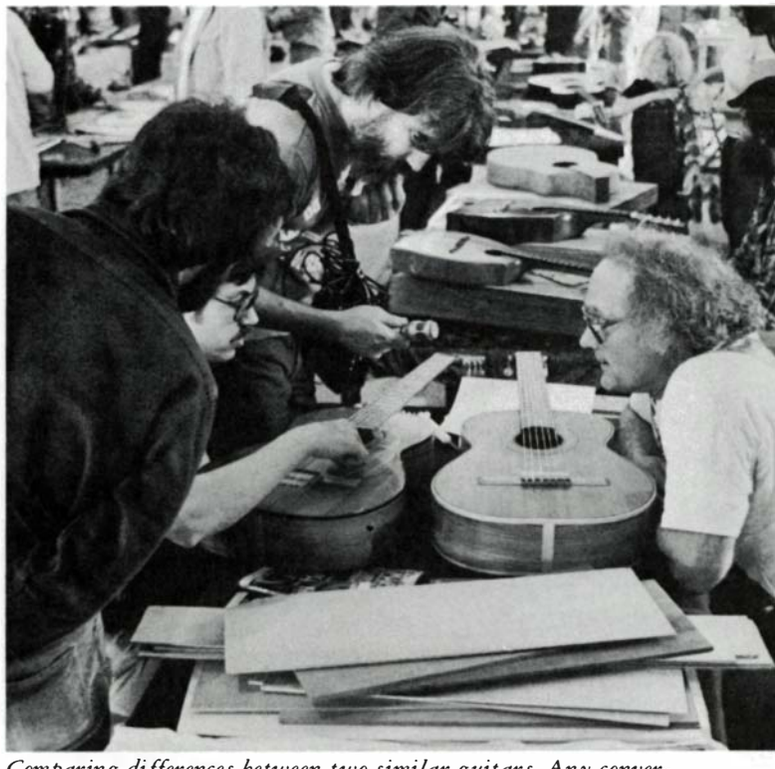
The Guild holds such a convention every two years. This year's convention organizer, Duane Waterman, had several goals: a schedule that would let people have a lot of time for talking with each other, meaty lectures, low cost, and good entertainment by the members themselves instead of by paid musicians. He succeeded on all counts. Cost for the four days at an isolated YMCA camp in the Rocky Mountains was only $75 per person, including meals.

Most of the members of the Guild of American Luthiers can play the instruments they make, but few would call themselves musicians. They know enough about an instrument's sound and playing action to make instruments that invite you to play, but luthiers don't have the time for intensive practice, and few seem compelled to perform. They live in a smaller world: joinery, acoustic design, finishing. I saw better woodworking there than I have ever seen anywhere.

The convention's formal program consisted of four or five lectures each day. The latest developments in acoustics were the subject of three well-attended lectures. Dr. Tom Rossing, David Russell Young and G.W. Caldersmith talked of a language that will allow people to measure and compare instruments objectively. All three stressed that although the language itself is precise, there is still no clear way to measure and state what musicians want, and there are no "hard facts" yet about guitars. Bob Mattingly delivered a series of slide lectures about a new instrument-building form he's devised. Guitarmaker Charlie Hoffman and banjomaker Dick Kenfield lectured on machinery, on jigs, and on making a living.

Some of the luthiers are amateurs, some are professionals, and interestingly, there seemed no easy way to tell one from the other, not age, not quality of work, not intensity. But after a couple of days I realized that one definitive characteristic of the professional is the frequent lament: "If I don't start to make a real living soon, I'm going to go do something else." More than a few of the best makers have already done so. Max Krimmel, who used to run a shop in nearby Boulder, had a final sale a year ago and hasn't built a guitar since. "The idea of getting a bargain, maybe the idea that I wasn't going to make any more guitars, brought customers out of the woodwork," Krimmel said. "But I just reached the point where I felt I had *made* guitars. I wanted to do something else." Krimmel, 33, is now enrolled in art school.

If any factor distinguishes the successful pros from the struggling ones, it is a head for business. Tim Olsen, one of the founders of the Guild and currently editor of its quarterly magazine, feels that many luthiers resist the economic necessities. He said, "Ten years ago, when we started the Guild, most of these guys were hobbyists. As their work improved they started selling a few guitars. Now they've progressed to the point where they are facing whether to do this for a living or to give it up. A lot of them got into business in a small way because they didn't want to work for somebody else. They're finding out that the 'boss' isn't some capitalistic leech but someone who has a real job to do. A lot of guys just don't want to do that job."



Comparing differences between two similar guitars. Any conversation stood a good chance of turning into an informal seminar.

As the technical discussions went on, the rallying cry of the weekend became "cyanoacrylates." These speedy glues are derived from barnacles, whose tenacious grip on a ship's hull means a lot to them. The glues were made famous by eye surgeons, who use them to hold tissues together during operations, but manufacturers are rapidly developing new cyanoacrylate compounds for woodworking.

The luthiers' preferred brand is Hot Stuff, sold in hobby stores in fast-setting (3 sec.) and slow-setting (20 sec.) types. Many of the luthiers had discovered independently that it's great for inlay, crack repair, setting nuts, and (when mixed with sawdust) filling. Mike Dresdner devoted about 20 minutes of lecture time to it, summing up his experiences, whereupon heads bobbed up and down in enthusiastic agree-

Restorer and finisher Mike Dresdner's demonstration table was always packed. Here he does a spot-repair with burn-in shellac.

ment. One problem with using the glue for wood is that it may soak in and leave a starved joint. Dresdner manages to get good wood joints by priming the gluing surfaces with chalk. Glue and chalk apparently combine to form a plastic adhesive that stays in the joint. Dresdner even makes a "plastic" filler for repairing inlay by mixing baking soda with the cyanoacrylate. He fills a gap with dry baking soda, then lets it soak up a drop of glue for an instant repair.

Luthiers are using yellow glue more and more in instruments, but the favorite for joining parts that may later have to be taken apart for repair is still hot hide glue. Though this traditional glue remains available, suitable wood is increasingly difficult to find. The days when violinmakers could specify a slab from the north side of a spruce growing on the north slope of a mountain and felled in winter, please, are a long time gone. A main attraction at the convention was the Santa Fe Spruce Company's table, heaped 4 ft. high with matched, split-out pieces of Engelmann spruce for guitar tops. Partner Tom Prisloe explained that the wood is almost indistinguishable from traditional German spruce, which is getting scarce. There still are vast forests of Engelmann spruce, but they are mostly controlled by logging companies that don't have the time or the patience to search out and process the few trees suitable for instruments. Irreplaceable trees are being haphazardly turned into construction lumber and newsprint, so the Santa Fe Spruce Company is trying to salvage what it can. Nibbling at the edges of the timber holdings, Prisloe and his partners buy single, perfect trees, fell them, and split blanks for drying. A typical "top set," two pieces of bookmatched spruce trimmed up on the bandsaw, costs about $15. The piles on the table shrank steadily all weekend.

Luthier William Eaton turned up at this year's convention with a stageful of experimental instruments—double-necked guitars, 24-string guitars, elongated harps, a curly maple lyre—some of which were electrically amplified, with two or four channels. Eaton was scheduled to play them for a while one evening so people could hear what the unlikely-looking contraptions sounded like. He played softly, and from the first sounds the audience was enthralled by convoluted modulations and ghostly harmonies. Within minutes somebody had turned out the lights. Eaton ended up playing for an hour and a half. The audience, most of whose own instruments were firmly bedded in mainstream tradition, didn't wriggle around and never even coughed. They might never want to build an instrument like any of the ones on stage, but they knew how to listen. As the last piece was winding down, flutist Kathleen Kingslight joined in the free-form composition. The duet ran through imitative melodies, different keys, and changes of mood and tempo for about ten minutes in a sort of progressive "Dueling Banjos." It ended the show because there was nothing that could have topped it.

The Guild's quarterly magazine contains letters from members covering everything from appeals for apprentices to evaluations of suppliers. There is usually a transcription of a convention lecture, often an interview with a well-known maker or performer, and always some proof of the Guild's main goal—the free exchange of information. The basic idea is that while you are spending a few months working something out, somebody else is working out a problem you haven't had time to deal with. Pooling information enriches everybody.

Thus, tucked into every mailing of the *Quarterly* are a few loose "data sheets," pre-punched to fit a ring binder. These tips and techniques are meant to be saved, and you never know what's coming. It could be something as universal as how to sharpen bandsaw blades, or as esoteric as electrical circuitry for acoustic research equipment. There are more than 200 data sheets available either singly or in bound collections, which cost about what it would cost you to photocopy them. Every data sheet has been a voluntary submission from a member who wanted to pass something on.

The Guild is headquartered at 8222 South Park Ave., Tacoma, Wash. 98408. Membership costs $25 per calendar year. There are no qualifications or standards for membership—those might lead to rankings, certifications, and the stultifying "right-way-to-do-it." The Guild's premise is that everybody knows something, nobody knows everything. Therefore everyone has something to tell and something to learn. Recently, the board started a fund to buy a $3000 computer to help organize addresses and information. The *Quarterly* reported the state of the fund, along with an appeal for donations. One enthusiastic new member promptly sent a check accompanied by a note that read: "I'm not much of a joiner, but any organization with the guts to admit that it has $66 in a fund to buy a computer can't be all bad." □

Jim Cummins, an assistant editor of Fine Woodworking, *makes flutes.*

Building a Lapstrake Boat

A traditional design that's ideal for the beginner

by Simon Watts—drawings by Sam Manning

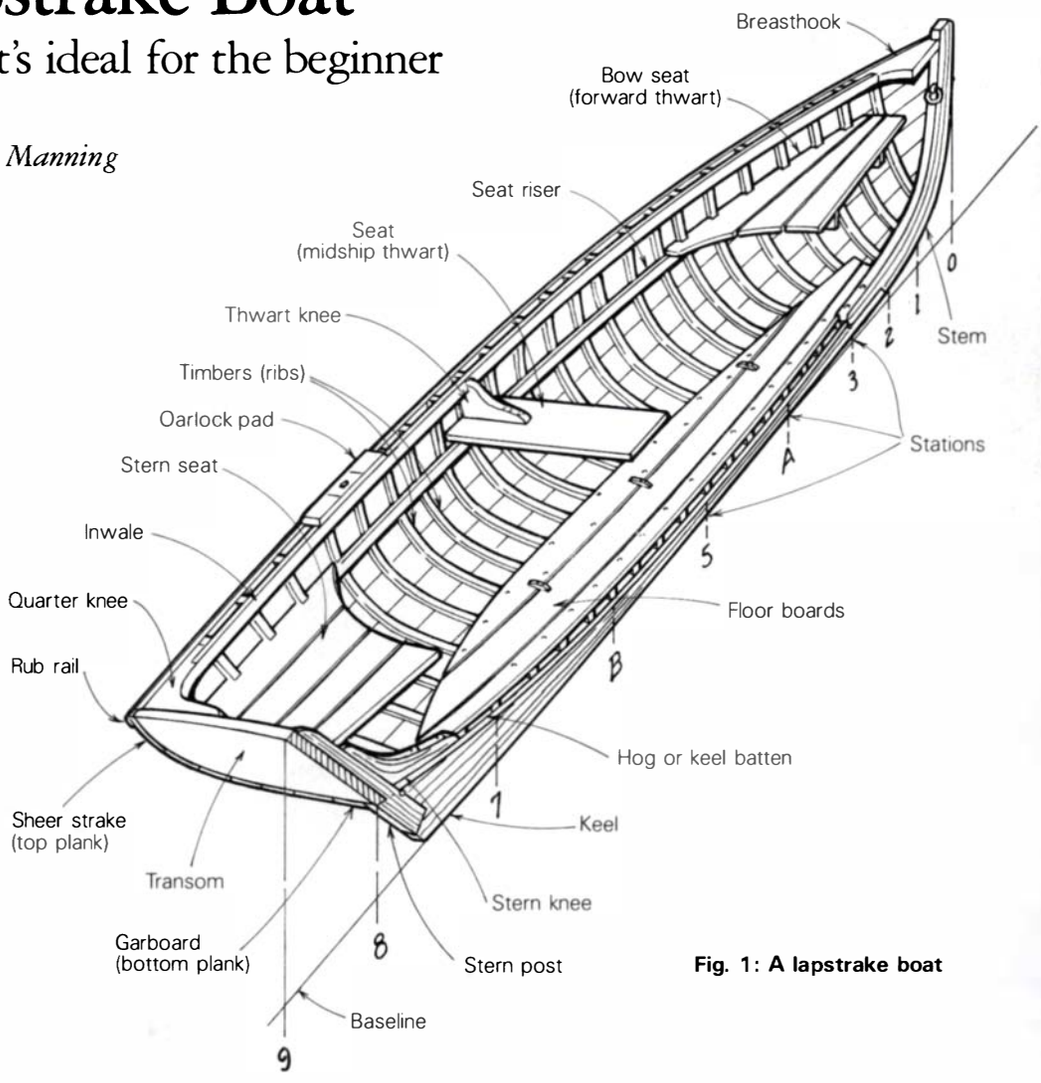


Fig. 1: A lapstrake boat

About 15 years ago, I bought a 10-ft. rowing boat secondhand from Jim Smith, a taciturn and rather crusty Nova Scotian. Smith was a traditional boatbuilder and not a conscious designer. He built boats out of his head and was impatient with paper plans. Yet he was proud of his work and swore he would never build a boat he wouldn't go to sea in himself.

Smith built this boat, christened Sea Urchin by my children, using a method called lapstrake. This construction, which I wrote about in a previous article (*FWW* #36, pp. 54-59), has a long history of producing strong, light hulls. Sea Urchin has been rowed in a variety of wind and weather—often inexpertly—and, like a well-mannered horse, has no vices. This gives me the confidence to offer plans and instructions for building a copy of the boat.

Like all workboats, Sea Urchin can be built of locally available materials using a surprisingly small complement of tools: a saber saw or bandsaw, an electric drill and the usual assortment of hand tools. Building this boat is within the reach of even a novice woodworker. In fact, an amateur woodworker friend of mine built one as part of this article's preparation.

Using the traditional lapstrake technique, the boat is constructed right side up, on a hefty frame called a strongback. Two molds, which act as guides in setting the boat's shape, are mounted on the strongback, and the planks or strakes are laid up around them. After the planks have been riveted or nailed together at the overlaps, reinforcing timbers (ribs) are added to stiffen the hull.

Materials—The original Sea Urchin is planked with relatively heavy, ½-in. white pine, to withstand hard use and Nova Scotia's winters. But for recreational use the boat can safely be planked with ⅜-in. white pine, Northern white cedar, red cedar, or cypress. The other parts—transom, thwarts, keel, knees and timbers—are all red oak. In the cold, salt waters of Nova Scotia this combination gives a reasonable lifespan—20 years or more. For warm, freshwater service I suggest the more durable white oak instead of red.

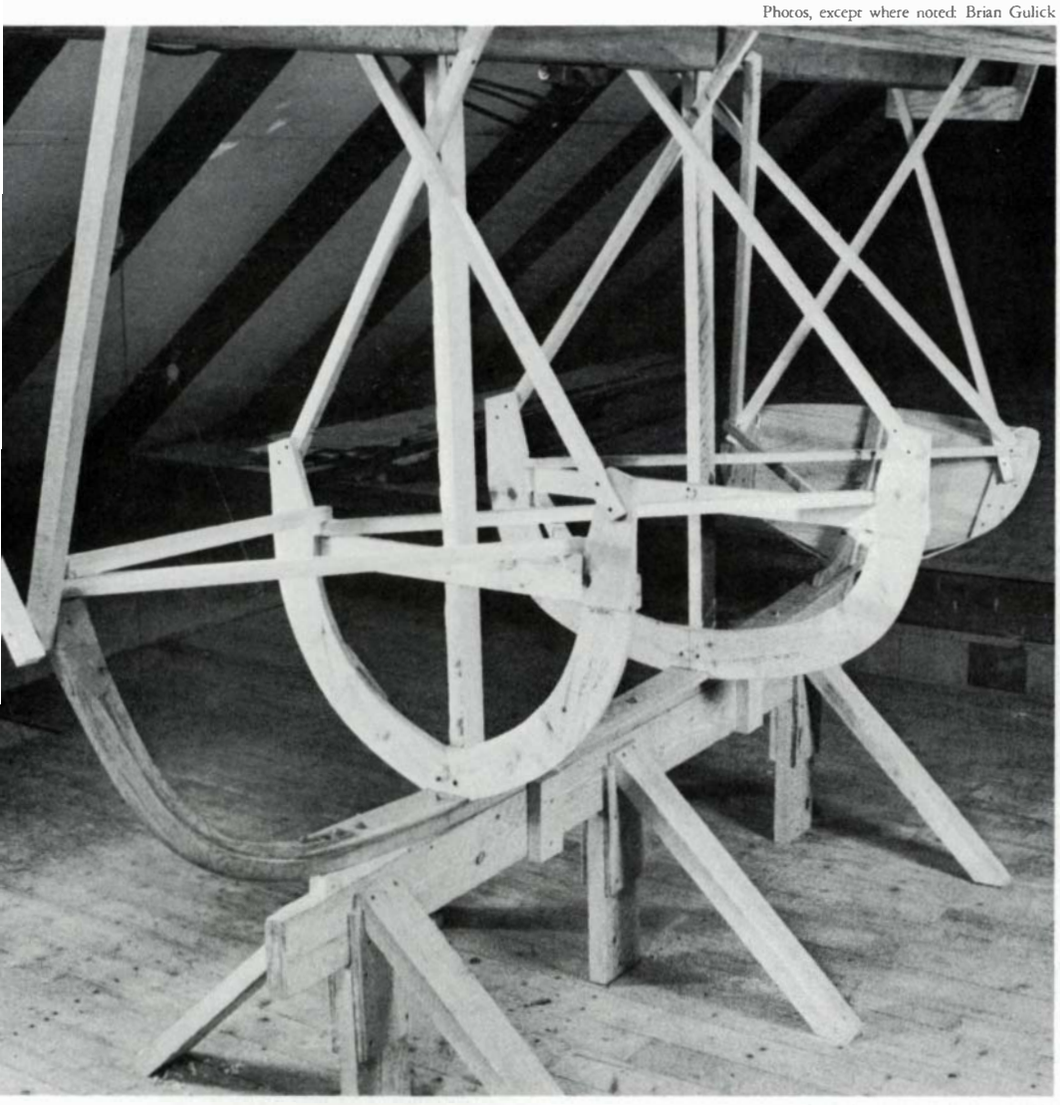
Kiln-dried wood is seldom used for boatbuilding. It is much harder to work than green wood and isn't as amenable to steaming. Once in the water, planks swell to seal any leaks, but kiln-dried stock can swell too much, straining the fastenings. Planking lumber can be barely air-dry, verging on green. It will continue to dry out on the boat, which helps to "set" the boat's shape. All the oak parts should be air-dry except the timbers, which steam best when green. If you can't buy green oak, soak the pieces in salt water for a week before steaming and installing them—the salt inhibits the formation of fungus.

Butt logs with a natural curve or sweep to the grain make ideal planking—there's less waste and they're stronger since the grain follows the curve of the planks.

Sea Urchin has six knees—wooden brackets that brace the transom, seats and other structures that meet at angles—and they are best cut from natural crooks, wood with curved grain which occurs where tree limbs and roots join the trunk. Sea Urchin has red oak knees, but applewood, tamarack, spruce and locust are often used. You can rough the knees out with a chainsaw right on the tree, well in advance, and coat them with linseed oil so they'll season without checking. Knees and stems can be steam-bent or form-laminated using a waterproof glue (*FWW* #17, p. 57) such as Aerolite. Hardware, fittings and paint can be mail-ordered from Duck Trap Woodworking (PO Box 88, Lincolnville, Maine 04849) or Wooden Boat Shop (1007 N.E. Boat St., Seattle, Wash. 98105), or bought locally from marine suppliers.

You should work in an environment that is cooler and more humid than is usual for a furniture workshop, as dry air will cause fresh-sawn oak to check.

Photos, except where noted: Brian Gulick



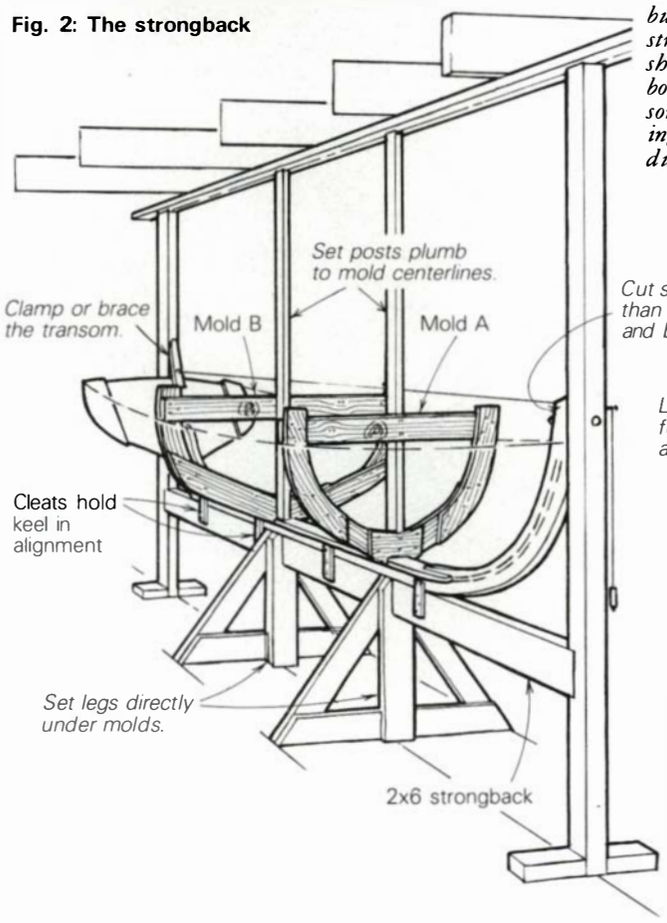
Lapstrake boats are usually built on a stout frame called a strongback. The photo above shows the strongback with the boat's backbone, molds and transom mounted. The diagonal bracing keeps the structure rigid during planking.

Strongback and molds—Lapstrake boats are best built right side up so each strake, or plank, can be fastened without the need of a helper underneath, and so you can see the evolving shape of the boat without standing on your head. Most boatmakers build these craft on a strongback frame like that shown in the photo at left and in figure 2. If you have a choice, place the strongback at right angles to and about 6 ft. from the workbench so you'll have access to the bench and both sides of the boat.

With the strongback built, construction of the boat begins with the molds, transom and backbone. These parts will form the basic shape of the boat, and the planks will be hung around them. Refer to p. 90 for an explanation of determining the mold and transom dimensions. I usually make full-size patterns on heavy paper folded in half, which assures symmetry when opened up. Make up the molds from ¾-in. dry pine, mark the centerlines and sheer lines, and leave "ears" projecting to attach bracing, as in figure 3.

Make the transom from two pieces of oak joined with cleats fastened with bronze screws. Don't

Fig. 2: The strongback



Strongback detail

To plumb and align molds, check centerlines against an offset tight line before fastening molds to post.

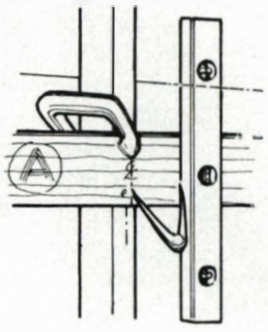
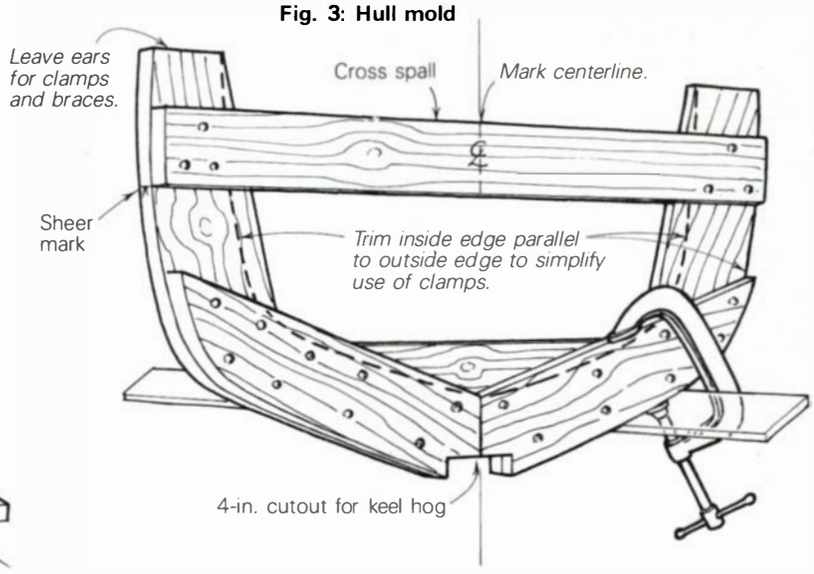


Fig. 3: Hull mold



leave these cleats off in favor of simply gluing-up the transom, or you'll have only end grain to nail into when fastening the planks at the stern. After you have assembled the transom, set your bandsaw or saber saw to 32° and cut the bevel as shown in figure 4. You'll need to adjust this angle with a spokeshave later, to give the planks a solid landing.

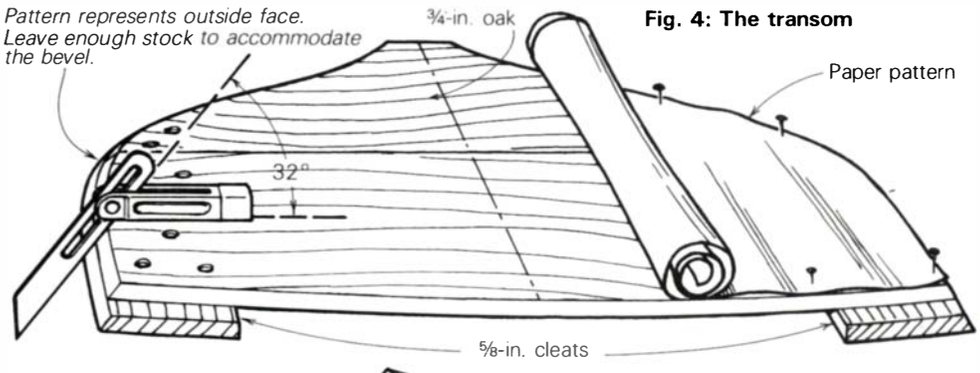


Fig. 4: The transom

Backbone—Before attaching the molds and transom to the strongback, you must make the boat's backbone. This consists of the keel, the stem, the stern post and its connecting knee, and the keel batten, or hog, to which the first plank will be attached. Refer to figures 5 and 6 for an explanation of these parts, and make a full-size pattern from the drawing and table on p. 90, which you can "loft" into templates to lay out the shapes directly on the stock.

The joints that connect these three pieces, intended to minimize end-grain exposure to water, are critical and must fit well. They can be cut with a bandsaw or handsaw, and then cleaned up with a plane or chisel. The stem joint, called a scarf, is fastened with two bronze carriage bolts and nuts. The stern post is fastened to the keel with a $\frac{5}{16}$-in. bronze carriage bolt (figure 5) countersunk at both ends and bunged outboard. This joint will be further strengthened with bolts when the transom and stern knee are mounted. Before assembling the joints, give them a thick coat of a commercial bedding compound such as Boatlife.

After you've bolted up these joints, drill $\frac{3}{8}$-in. holes through the joint lines. Drive a cylindrical plug of dry pine through the hole (see figures 5 and 6 for exact location), and cut it flush on both sides. This plug, called a stopwater, keeps water from seeping along the joint into the boat.

The next step is to make the hog and attach it to the keel with five through $\frac{5}{16}$-in. bronze carriage bolts, located so they won't interfere with the placement of timbers later. The top surface of the keel must be planed and squared so the hog, when sprung down to it, lies flat.

Now cut and fit the hog, then remove it so that you can lay out the stem rabbet—a V-shaped step in which the plank ends land at the bow (figure 6). Experienced builders cut this out on the bench before planking, but to avoid errors I advise novices to cut a ¼-in. deep, 90° groove initially, and then to deepen and enlarge it to fit each plank as it's hung. The rabbet must be stopped at the top edge of the last plank (the sheer strake), so don't take it too far up—leave the last inch to be cut later.

To mark the stem rabbet, draw a pencil line along both sides of the keel, $\frac{3}{8}$ in. (the planking thickness) down from the keel's top edge. This

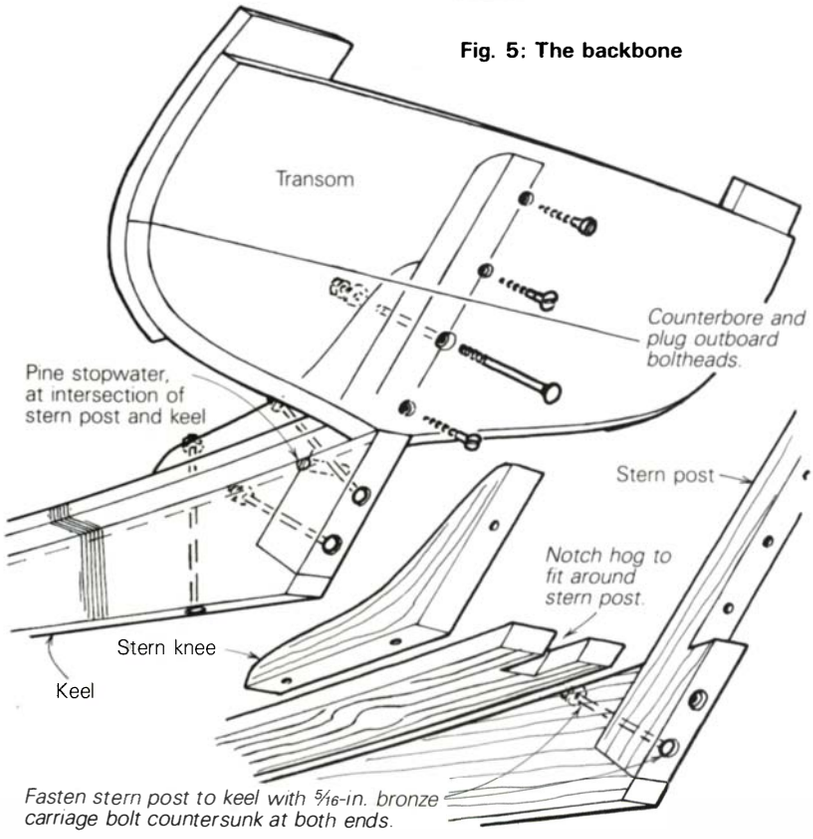
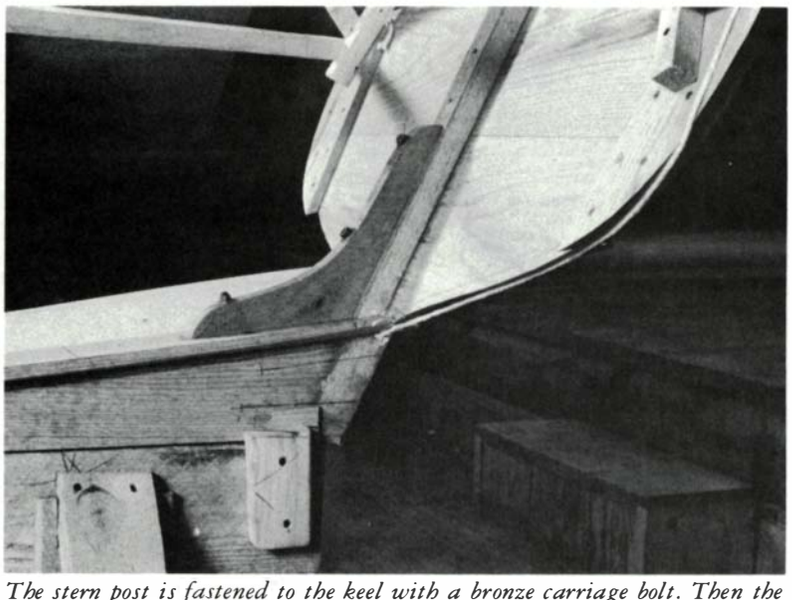


Fig. 5: The backbone



The stern post is fastened to the keel with a bronze carriage bolt. Then the transom is attached with bronze bolts through the stern post and keel and into the stern knee. The small round plug between the stern post and keel is called a stopwater, but it is misplaced in this boat. It should be higher, just where the keel, hog and stern post intersect. Caulking cotton seals planks where they land on the transom, but bedding compound could be used instead.

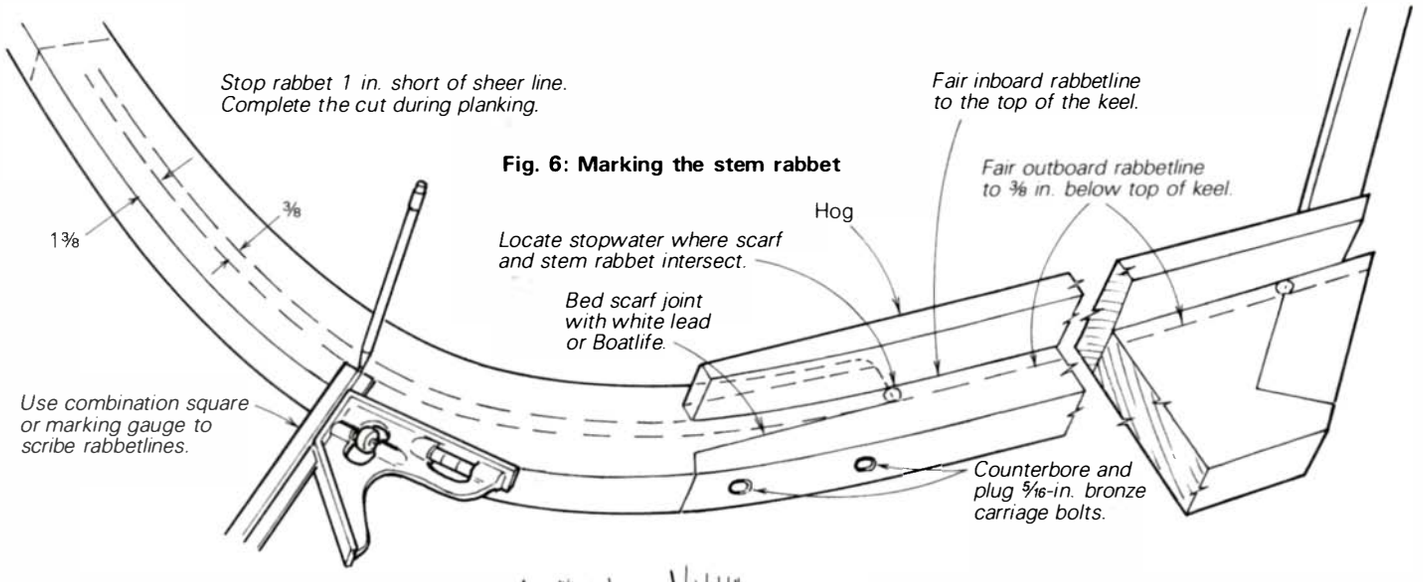


Fig. 6: Marking the stem rabbet

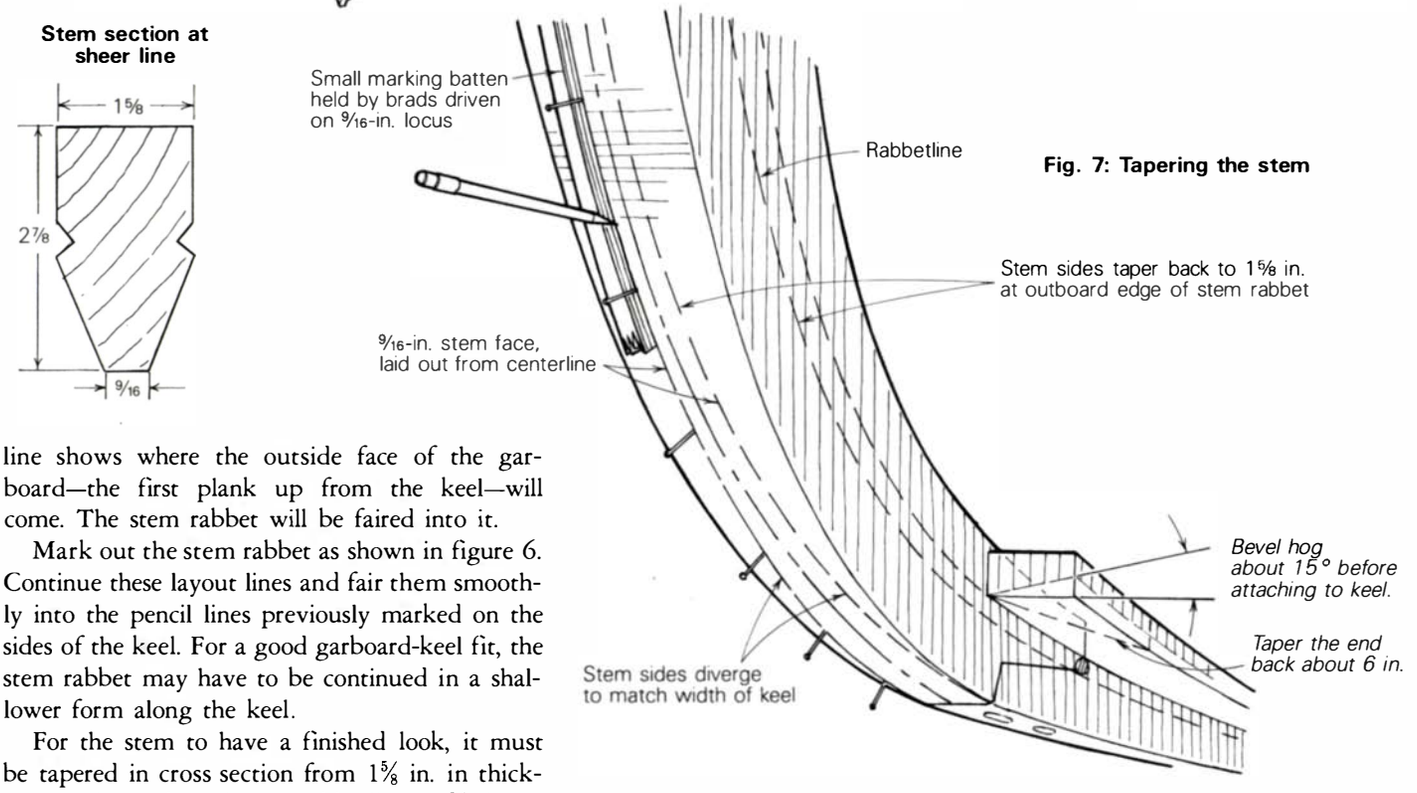


Fig. 7: Tapering the stem

line shows where the outside face of the garboard—the first plank up from the keel—will come. The stem rabbet will be faired into it.

Mark out the stem rabbet as shown in figure 6. Continue these layout lines and fair them smoothly into the pencil lines previously marked on the sides of the keel. For a good garboard-keel fit, the stem rabbet may have to be continued in a shallower form along the keel.

For the stem to have a finished look, it must be tapered in cross section from 1⅝ in. in thickness at the outboard stem rabbetline to 9/16 in. at its leading edge. Mark out the taper, using a thin batten (figure 7) to draw a fair transition as the stem thickness increases toward the scarf and into the keel, then plane the taper.

Before bolting the hog to the keel, saw or plane about a 15° bevel on its lower edges. This angle will be correct only at the center mold, and must increase toward stem and transom to accommodate the changing angle that the garboard makes with the keel. It can be adjusted with a rabbet plane when the garboard is hung.

Now place the completed backbone on the strongback, and secure it temporarily with clamps. Then install the hog and transom. Place the two molds in their proper position and attach them to the hog with diagonal screws. Plumb the stem and the stern post, brace them firmly and then align the mold centerlines, using the method shown in the detail of the strongback on p. 83. Everything must be securely braced so it cannot move during planking.

Planking—A lapstrake boat derives much of its strength from its planks, which are clench-nailed or riveted together lengthwise in overlapping joints. Jim Smith fastened the original Sea Urchin's pine planks with galvanized nails driven in from the outside and bent over (clenched) on the inside. This method is cheap and fast, but the nails can't easily be removed for repairs and they eventually rust. I used an alternative: copper nails with a copper washer called a rove, or burr, slipped over the point and forced down into the wood with a hollow punch. The pointed end of the nail is then clipped off close to the burr and riveted over with a ball-peen hammer. Bronze screws or bronze ring-barb nails fasten the planks at stem and transom.

Begin planking by making a full-size pattern of the garboard. Use a 10-in. to 12-in. wide piece of ¼-in. thick pine or ⅛-in. Masonite (the exact width will be determined later) to cut a rough pattern, and then twist it into place and clamp it lightly, using the method outlined in figure 8 to mark and trim the pattern. Once you've fitted the pattern well into the stem rabbet and along the keel, it's time to determine the widths of the garboard and the rest of the planks. Figure 9 shows a method of determining plank widths, which are then marked on the stem, transom and molds. (For another method,

Fig. 8: Fitting the garboard pattern

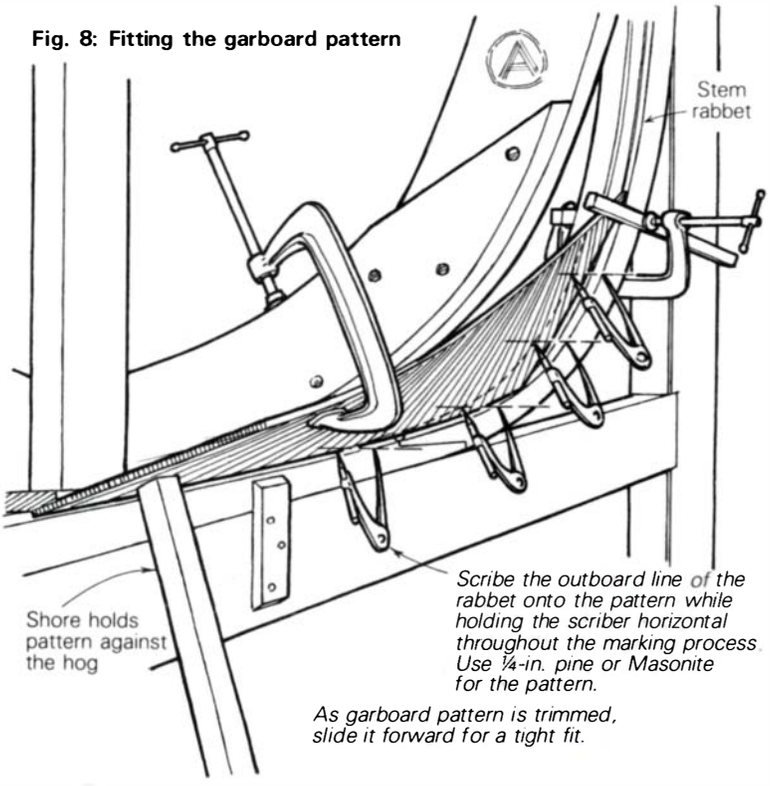
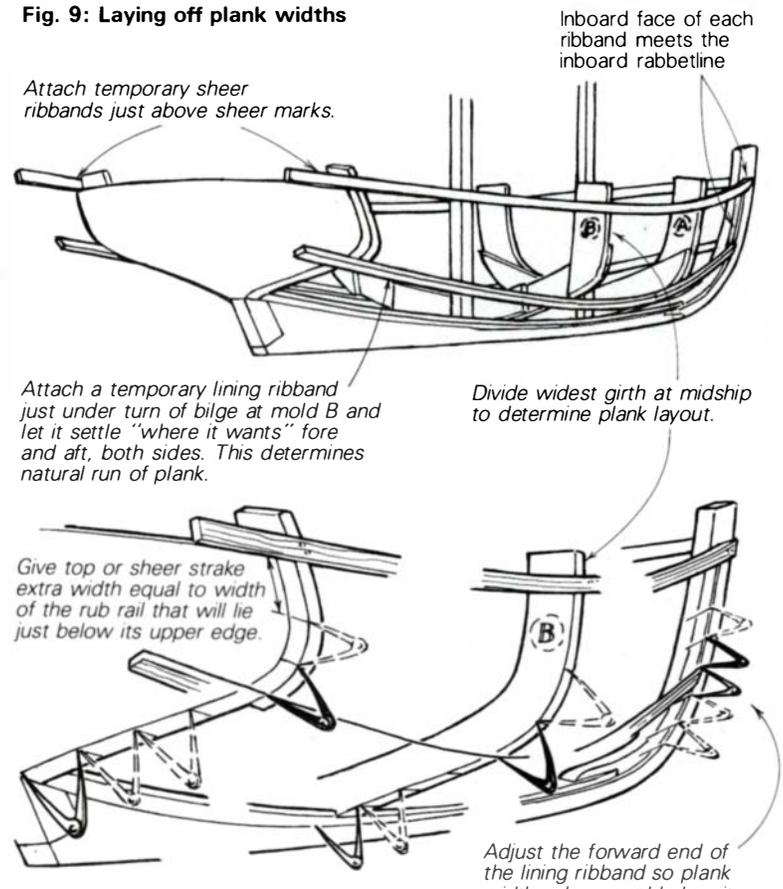


Fig. 9: Laying off plank widths



refer to John Gardiner's *Building Small Classic Craft*—an invaluable book for amateur boatbuilders—which is published by International Marine, Camden, Maine 04843.) Use a straight-grained batten to mark a fair curve between the four width marks on your pattern, then saw and plane down to this line. With the pattern cut and fitted, transfer its shape to your plank (figure 10) so as to avoid dead knots, and try to take advantage of any natural sweep in the board. Any loose knots in the planking should be knocked out, and the hole reamed and plugged with a tapered pine plug dipped in Aerolite or resorcinol glue. The garboard has a considerable amount of twist toward the stem, and it is easier to do the final fitting after this twist has been steamed into it. The easiest way is to wrap it in a towel and pour on boiling water. Clamp it in place and leave it overnight to cool, then cut out the rest of the stem rabbet so the hood (bow) end fits nicely. Take time to fit the garboards properly—they are the most difficult planks to hang, and you can expect to break or otherwise spoil at least one in the process. Don't be discouraged if it doesn't go right the first time.

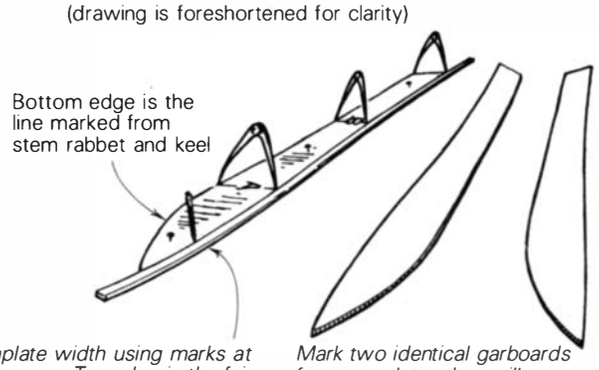
Before fastening the garboard, sand the inside surface, chamfer the inside corner and run a pencil line along the top outside edge of both garboards to mark the amount the next planks will overlap, ¾ in. Plane a 15° bevel away from this line. This can be done with a bench plane, but a rabbet plane with an adjustable fence is handier. To take the guesswork out of beveling laps, make a lap gauge (figure 12). Use the rabbet plane to cut the gains in the garboard and the other planks, which allow the strakes to lie flush at the stem and stern (figure 11).

Attach the garboard to the stem, hog and transom with 1-in. #10 bronze screws driven on 2-in. centers along the length of the keel and driven through the garboard into the hog. From now on, keep the boat balanced by planking evenly on both sides.

The planks on this boat are limber enough to be simply wrapped around the forms and marked directly from the edge of the plank already in place. Use slightly narrower planks where tight curves on the transom make splitting likely, or plane slight flats on the transom. Before committing planks to the saw, it's a good idea to line off one side of the boat with a batten for each intended plank-edge curve. This playing with battens until a curve "looks right" is a crucial part of lap-

Fig. 10: Marking the garboard template

(drawing is foreshortened for clarity)



strake construction. An unsightly line cannot be painted out later, whereas flat spots and "quick" turns are apparent at this stage and easily remedied by adjusting mold alignment or shimming flat spots.

Before continuing plank work, mark the centerlines of the timbers—the reinforcing ribs that fall every 6 in.—placing the first one on the centerline of the seat. Use a batten to carry these marks up from the hog to the sheer ribbands. Timbers in the middle two-thirds of the boat run straight up and down, but it is usual to lean them slightly forward as you approach the bow and slightly aft toward the stern.

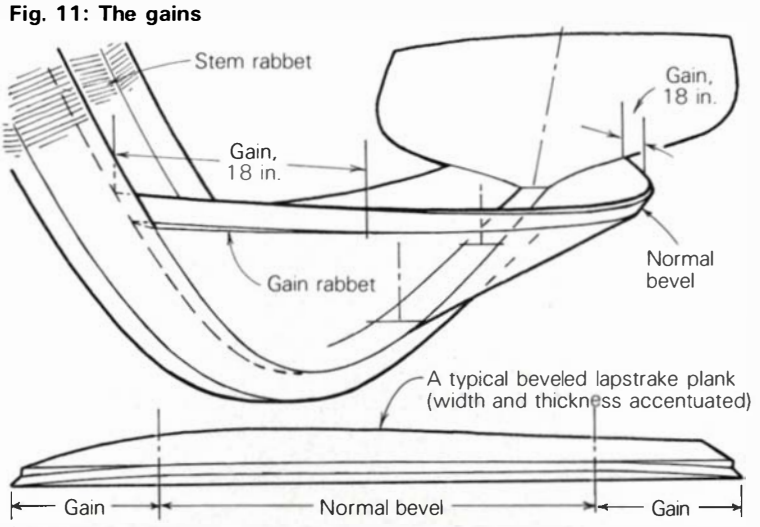
Wrap the first plank around the boat so its lower edge overlaps the upper edge of the garboard by at least ¾ in. Run a pencil along the top edge of the garboard inside the boat, and also mark the position of the transom, each mold and the stem. If a wide plank must take a severe twist, you may have to cut it roughly to shape and then put it back on the boat for a more accurate line. Use the method in figure 13 to mark the plank's width. Then, using the first strake as a pattern, mark out its mate on the opposite side of the boat. Make an identical pair by planing both edges with the planks clamped or tacked together. Then plane the bevels and the gains, making sure that the beveled surface is flat or even slightly hollow, not rounded.

When the second plank is fitted and clamped to the garboard, fasten it to the stem. Drill pilot holes for the copper lap nails roughly 2 in. apart, laid out from the center of each timber marked on the hog and ribband. Now rove and rivet the nails, leaving the nails out where the timbers will occur.

The remaining planks are marked, cut and fitted in the same way, except that the angle of bevel needed will increase as the curvature of the boat's side increases. Leave the top (sheer) strake about ½ in. wider than the marks indicate. Clamp it temporarily in place and tack a ¾-in. batten up to represent the upper edge of the sheer strake. Stand back and take a look. Starting at the transom, the curve should dip gracefully at the waist and rise jauntily toward the bow. Adjust it until the curve is pleasing, even if it misses the original pencil marks. Few things spoil the look of a boat more than a dead or an exaggerated sheer. A narrow strip called the rub rail will be attached to the outboard top edge of the sheer strake to strengthen and protect it, so this plank must be wider by an amount equal to the width of the rail.

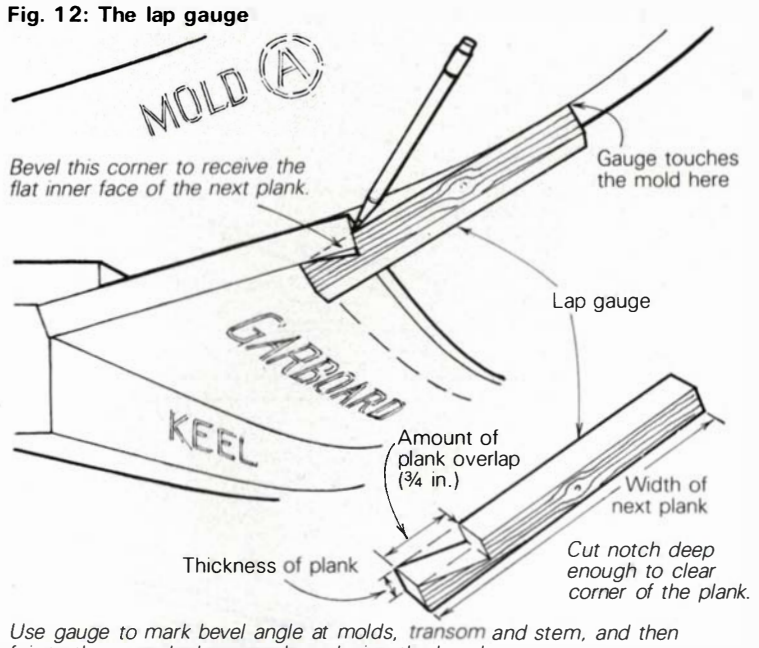
The boat's bottom plank, called the garboard, gets a considerable twist, which can be achieved only by soaking the end in boiling water, or steaming it, and clamping it in place to cool. This bow-on view shows how the stem is tapered back from its leading edge.

Fig. 11: The gains



Lapped plank must lie flush in the stem rabbet and at the transom. This is done by cutting the plank bevel inward in the form of a rabbet until it runs out to a knife edge at the plank end. Transition between full lap and flush knife edge is called the gain.

Fig. 12: The lap gauge



Use gauge to mark bevel angle at molds, transom and stem, and then fair to these marks by eye when planing the bevel.

Fig. 13: Marking and cutting planks

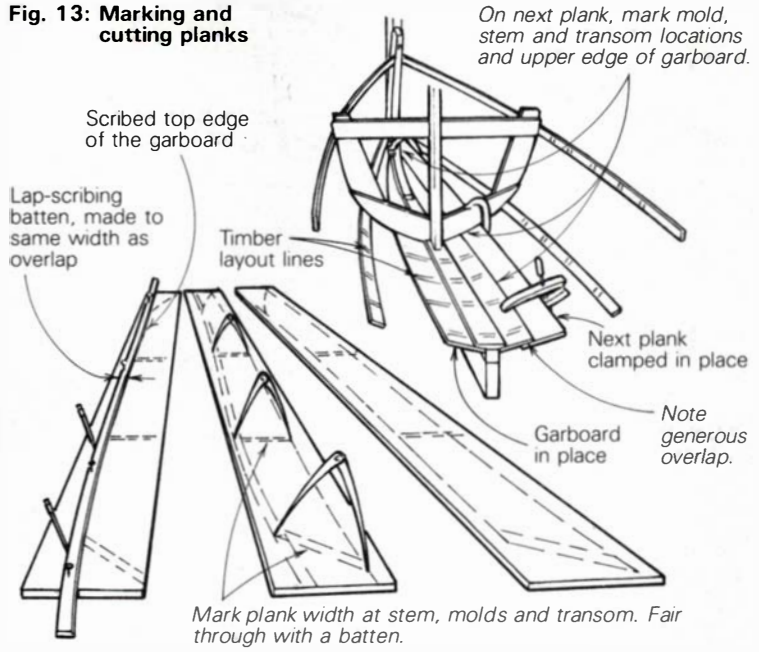
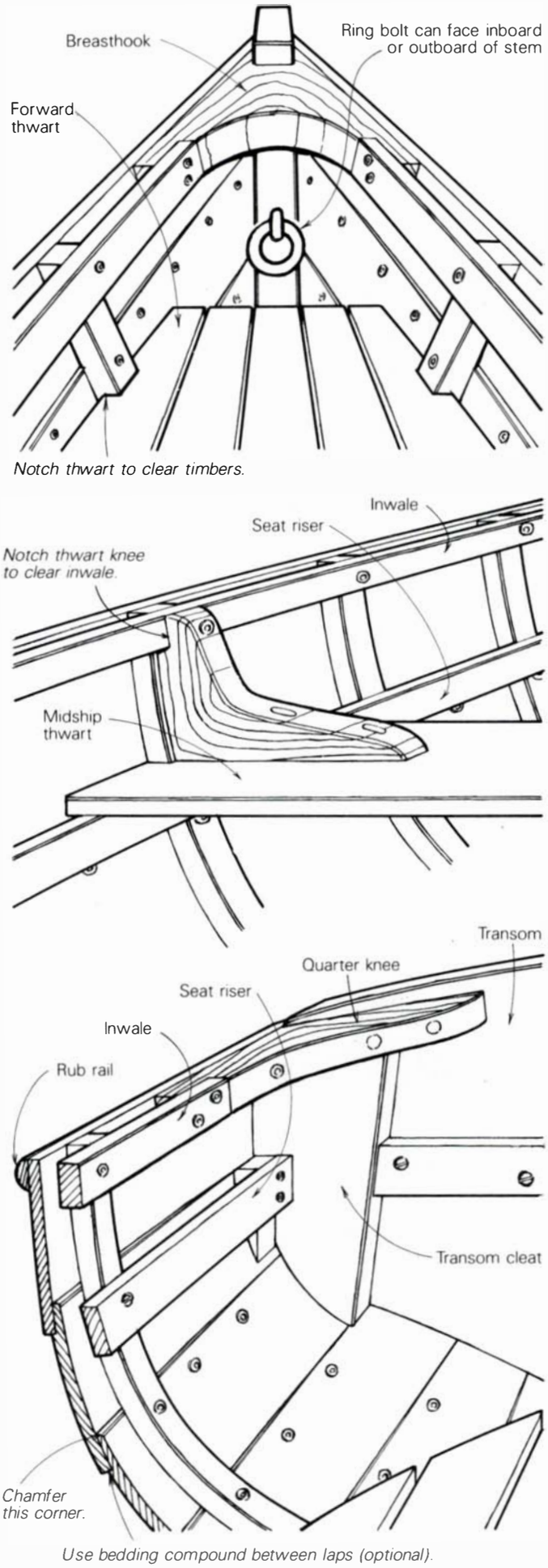


Fig. 14: Knees, breasthook and inwales



Timbering and knees—It's best to have three people for timbering, two to handle the hot timbers as they come from the steam box and one to drive in the nails from below. (For an article on steam boxes, refer to *FWW* #8, p. 40.) Choose straight-grained oak for timbers; it will be less likely to break, and a coat of raw linseed oil before steaming will make it bend better. Cut the timbers extra long to give you leverage while bending. Leave the molds in place for timbering, but remove the crossbracing. Then start nails in from the outside so they are held firmly but do not stick into the boat through the planking. As each timber comes from the steamer, force it down into the boat and overbend it slightly so it will fit tightly. Then nail it to the hog with a single 1¼-in. bronze nail. Clamp it loosely to the sheer strake and hit the top end smartly with a hammer; this helps to get it lying flush against the planking. Then, working from the keel up, one person holds a backing iron against the timbers inside while another drives the copper nails through from the outside, as in the photo below. Speed is essential. If one timber cracks or begins to split, replace it. Don't be afraid to twist the timbers with an adjustable wrench so they conform to the changing angle of the planking. When all the timbers are nailed in place, let them cool overnight and then rivet them.

Now cut and fit the two quarter-knees and the breasthook, notching them out to receive the two inwales, as shown in figure 14. Inwales, which reinforce and stiffen the top edges of the boat, should be installed slightly proud of the sheer strake so they can be beveled to match the camber of the transom. The inwales are fastened through every other timber and are roved and riveted on the inside. The alternate timbers will be drilled for fastening the rub rail later.

Next install the two seat supports, called risers, which run roughly parallel to the sheer line (figure 14). Nail them to each timber with two small ring-nails or screw them. Install the thwart and the thwart knees, using roved nails through the inwale and thwarts, or screws if the nails are too short.

Rub rails, which mount outboard along the top edge of the sheer strake, should be straight-grained oak shaped to a half-round with a router or molding plane. Nail them through every other timber and set the nail heads far enough

With the planks in place, the reinforcing timbers (ribs) are added. It's a three-person job to bend the hot timbers into place and nail them. In this photo, Simon Watts and Alexis Nason install the aftermost rib. Note that the last two ribs are two pieces so they will clear the transom knee.

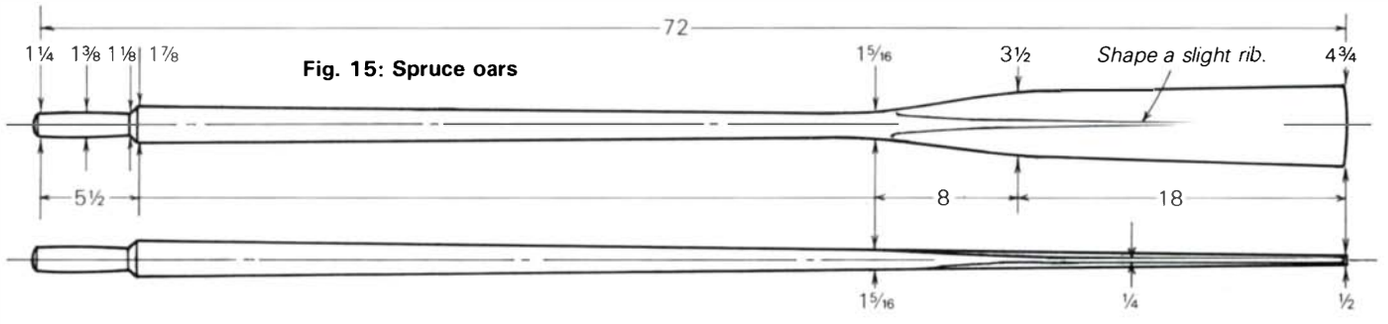
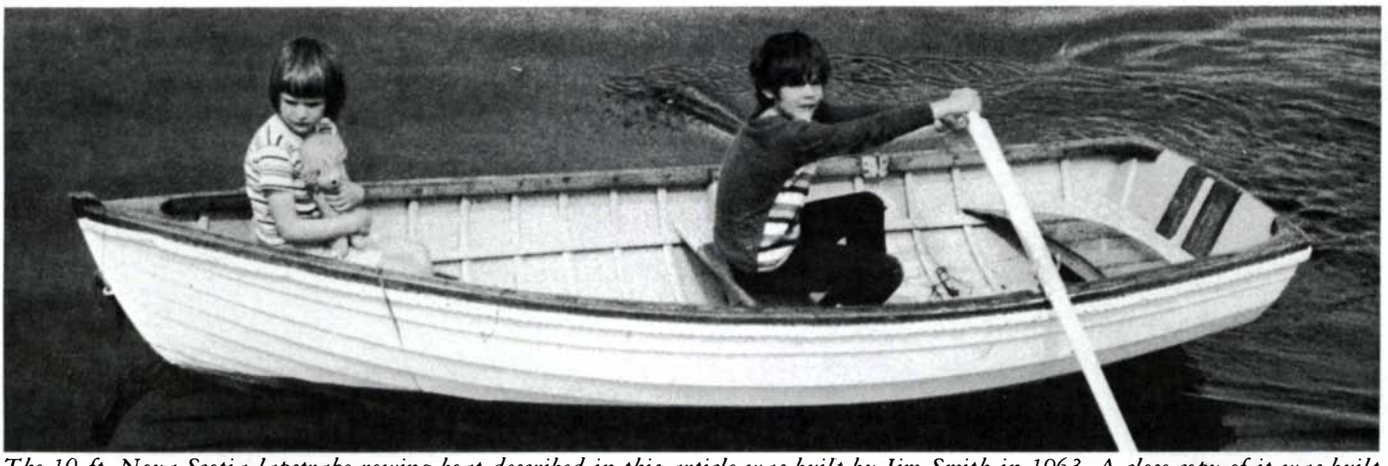


Fig. 15: Spruce oars



Simon Watts

The 10-ft. Nova Scotia lapstrake rowing boat described in this article was built by Jim Smith in 1963. A close copy of it was built by Alexis Nason of Brattleboro, Vt., as part of the preparation of this article. It took Nason about 160 hours to complete the job.

in so they can later be plugged with wooden bungs.

The floorboards are made of five pieces of ⅜-in. pine, as in figure 1. Cut the center floorboard 1 in. wider than the hog and nail it down. So you can bail the boat, make the floorboards to either side removable by fastening them with cross-grain cleats slipped under the center board and by hardwood turnbuttons screwed to the outer floorboards. Nail or screw the outer floorboards to the timbers.

Caulking and painting—This boat has only one seam to fill, the one that runs down the stem and along the keel. The other, running around the transom, has been sealed with bedding compound. Moisture-swollen planks will keep the laps tight. The traditional method of filling seams is to use caulking. This consists of one or more strands of unspun cotton driven into the seams with a wedge-shaped caulking iron. The seam is then filled up flush to the planking with putty or polysulfide. If the boat is going to be in and out of the water a lot, a bead of polysulfide run between the laps during planking will help keep it tight and will stay elastic through seasonal changes. Otherwise you can expect some leaking until the laps have swollen.

Some builders fill in the nail holes with putty. I prefer to sink them just enough to dimple the wood; they are a necessary part of lapstrake construction and nothing to be ashamed of. You can now bung all holes in keel, transom and rubbing strips. Sound knots can be shellacked to keep them from bleeding through the paint, or a shallow hole can be drilled with a centerless bit and bunged.

Before painting, it is a good idea to give the entire boat, inside and out, two applications of warm linseed oil, thinned half and half with turpentine. This helps keep the boat from getting waterlogged and heavy. The outside will need several coats of alkyd primer (give it plenty of time to dry and a thorough sanding between coats) before you put on the finish coat of marine gloss enamel. If you paint the inside, keep the number of coats to a minimum so you can get by each year with a light sanding instead of the considerable chore of removing the paint with torch or chemicals. If you want the inside finished clear, the oil finish Deks Olje, the marine equivalent of Watco oil, requires less maintenance than varnish, which tends to deteriorate rapidly in sunlight. This material is available from the suppliers mentioned on p. 82. Don't paint or varnish the floorboards—that would make for dangerous, slick footing. If left bare, the floorboards eventually turn an agreeable gray. I varnish the seats and pick out the edges in paint—a tradition in Nova Scotia. Spruce oars, 6 ft. to 6½ ft. long, are right for this boat—they're not difficult to make yourself. Dimensions are shown in figure 15.

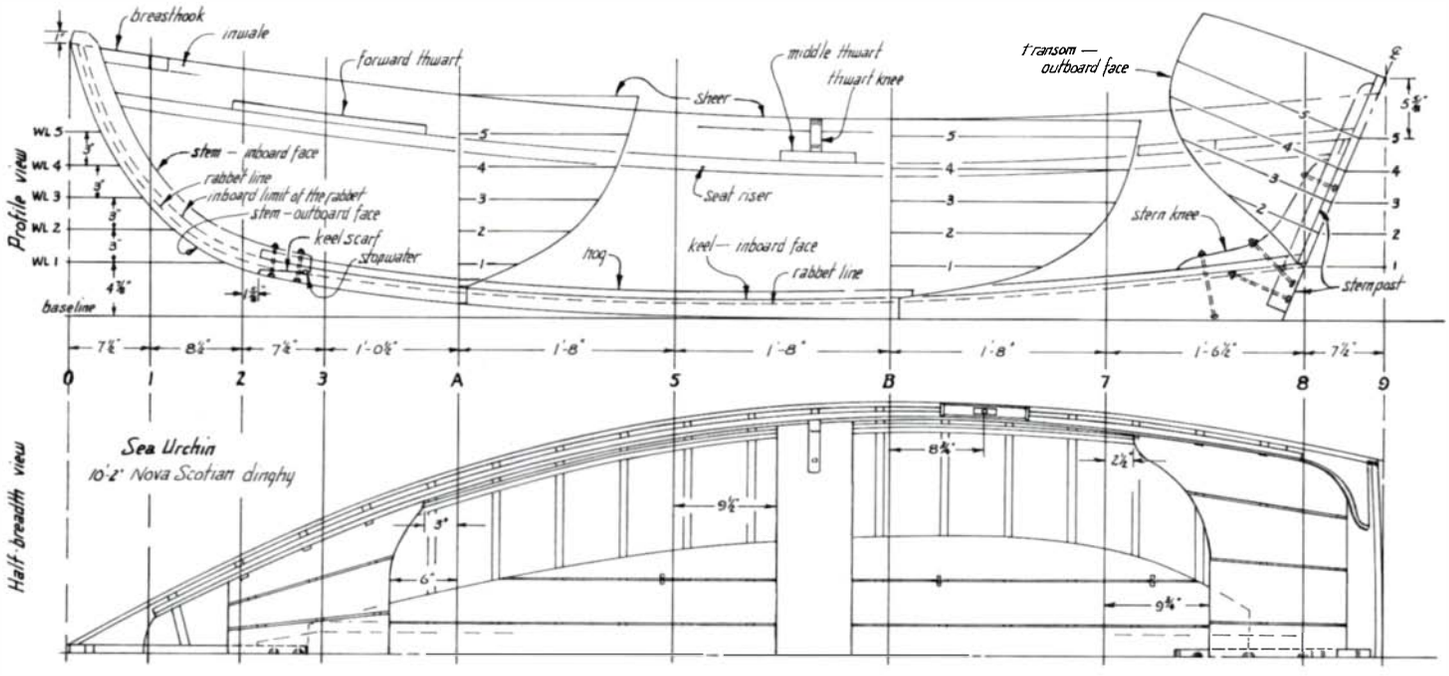
I use Davis-type oarlocks because it's impossible to lose them overboard. Mount them on pads nailed to the inwale and sheer strake so the oars won't scrape the rubbing strip. Before launching, attach a ring bolt or pad eye to the stem for securing a mooring and towing line.

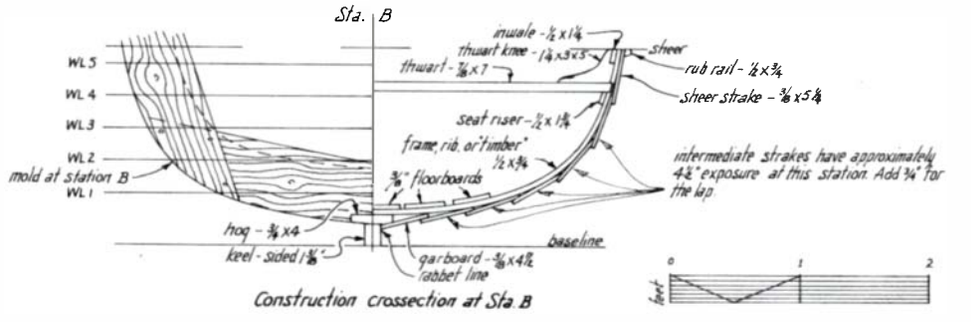
When your new boat goes into the water, expect some leaking until the planks swell and the laps close, a process which may take a day or so. Then she should stay tight and dry, and you'll have a craft with a pedigree that represents the accumulated experience of generations of boatbuilders.

Simon Watts is a cabinetmaker, an amateur boatbuilder and a writer. He lives in Putney, Vt. Sam Manning, a boat designer and builder, lives in Camden, Maine. For more on boatbuilding, refer to WoodenBoat *magazine, published by WoodenBoat Publications, PO Box 78, Brooklin, Maine 04616. Plans for wooden boats are available from the above, and also from Maine Maritime Museum's Apprenticeshop, 75 Front St., Bath, Maine 04530; Mystic Seaport, Mystic, Conn. 06355; and Bob Baker, 29 Drift Rd., Westport, Mass. 02790.*

Controlling shape: lofting Sea Urchin

by Sam Manning





Like all round-bottomed boats, Sea Urchin is made up from flat parts sprung and twisted into curves. Her overall shape is governed by two hull molds—A and B—spaced along the keel, and by the slant of the stem and transom. An experienced boatbuilder can set molds and end members by eye and come away with a functional, handsome boat.

I suggest, however, that the first-time builder of Sea Urchin follow the route used by professional boatbuilders who scale up, or loft, full-size the plans of a boat. If the plans of Sea Urchin shown here are lofted to full-size on heavy tracing paper, you will have a template from which to mark critical members directly on the building stock. Included here is a table of offsets (literally, distances set off from a measuring line) with dozens of perimeter dimensions that can be connected with a thin pine batten to form Sea Urchin's graceful curves.

Spread your paper on a large table or the long wall of a corridor. A boat's plan is laid out from station lines ruled perpendicular to a baseline shown in the profile (elevation) view and from the centerline shown in the plan view. Dimensions are shown for the two molds and the transom in half-breadth; the other half is identical. The offsets given are in traditional nautical nomenclature—feet, inches and eighths of inches—so 3 ft. 4¾ in. would appear as 3·4·6.

TABLE OF OFFSETS

STATION:	0	1	2	3	A	5	B	7	8	9
Heights above baseline (profile)										
Sheer line/top of rail	2·1·1	2·0·1	1·10·7	1·9·7	1·8·4	1·6·7	1·6·3	1·7·0	1·8·2	1·9·0
Inboard face of stem and hog		1·2·1	0·7·1	0·5·3&0	0·3·4	0·2·4	0·2·6	0·3·7	0·5·6	
Inboard face of keel				0·4·3	0·2·6	0·1·5	0·1·7	0·3·1	0·5·0	
Rabbet line		0·10·7	0·5·1	0·3·5	0·2·2	0·1·2	0·1·4	0·2·6	0·4·4	
Outboard face of stem and keel	2·1·0	0·10·0	0·4·2	0·2·6	0·1·2	0·0·2	0·0·0	0·0·0		
Distance out from centerline (half-breadth)										
Inside of plank at sheer	0·0·6	0·4·3	0·8·6	1·0·1	1·4·5	1·9·3	1·11·1	1·10·1	1·7·3	1·5·7

WATERLINE:	TOP OF KEEL	1	2	3	4	5	SHEER
Distance aft from station 0							
Stem - outboard face		1·2·3	0·9·5	0·6·6	0·4·4	0·2·7	0·0·0
- rabbet line		1·4·7	0·10·5	0·7·4	0·5·2	0·3·4	0·0·5
- inboard face			1·2·2	0·10·2	0·7·5	0·5·6	0·2·6
Distance aft from station A							
Mold (half-breadth) 'A'	0·0·6	0·5·4	0·10·3	1·0·7	1·2·5	1·3·5	1·4·5
Distance aft from station B							
Mold (half-breadth) 'B'	0·0·6	1·2·1	1·6·5	1·8·7	1·10·1	1·10·7	1·11·1
Distance out from C.L. of transom							
Aft face (half-breadth) of transom	0·0·6	0·0·6	0·9·3	1·3·1	1·5·5	1·6·3	1·5·7

Reading the table horizontally from the first to last station gives a series of points that are connected to form a particular line of the boat. The first line of the table, for example, describes the points which form the sweeping sheer line—the top edge of the top strake. Other parts of the table give point dimensions for the molds, transom, stem and keel. The drawings include other dimensions useful in building Sea Urchin. Take the time to be accurate; professionals strive for a tolerance of ⅛ in. over the length of a large hull. □

Turning Tips

Advice from a mill man

by R. Perry Mercurio

Are you trying to sharpen your turning tools on a bench grinder with a wheel so hard and fine that the slightest touch of steel burns a blue spot of drawn temper? You can't turn without sharp tools and you can't keep them sharp that way. Find a mill supply house (most cities have at least one in the phone book) and let them help you select a good sharpening wheel. I'd suggest a Norton #32A60-J5VBE or a Universal-Simonds #RA60-J-V8 in a size to fit your grinder. These are soft wheels and should never be used for anything except sharpening hard steels. Your good wheel will last longer if you put a harder, general-purpose wheel on the other end of the grinder, and use it for rough work.

You won't get a good edge if your tools bounce around, so it's important to keep grinding wheels round and true and free of vibration. This is easily done with a star wheel or a diamond-tipped truing tool, or even with a piece of broken grinding wheel. The star wheel will give you the best surface.

If you don't have a regular grinder, you can make one by rigging up a stand, either of wood or of angle iron, whose top is a comfortable elbow height. Mount pillow blocks on the stand, then fix the grinding stones to the shaft and power it with a separate motor and V-belt.

Honing: There are as many ways of honing as there are stars in the sky, but my 40 years of mill experience has shown that a $1.19 Crystolon pocket stone plus a couple of hard Arkansas slip stones will do a very acceptable job. The pocket stone bites off the required amount of metal, then the finer Arkansas stone smooths and polishes. For these fine stones I'd suggest a Norton #HS-3, which has a tapered cross section with round edges, and a Norton #HF-843, which is diamond-shaped in section with sharp edges. These three stones will also do nearly all of your carving tools.

To touch up gouges, make a socket of some sort for the butt end of the handle, to steady it while you hone. Hold the tool firmly between your left thumb and fingers so you can rotate the gouge easily while stoning with your right hand.

To keep stones clean and free-cutting, keep them moist at all times. Make a shallow tray from the bottom of a large tin can. Put a few layers of cloth in the bottom, saturated with a mixture of half kerosene and half motor oil. Stones can't absorb too much oil, and it makes metal particles picked up by the stone during honing loosen and shed. Hang an old towel nearby to wipe fingers and chisel.

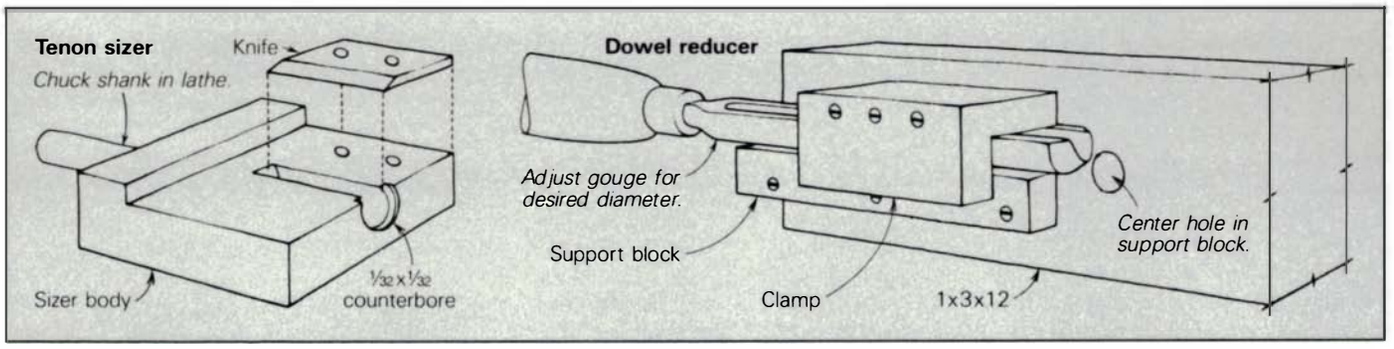
Some sizing tips: Duplicate turnings can be made faster by laying out their profile on a strip of masking tape along the tool rest, with parting-tool cuts indicated by double lines. Diameters for each cut can be noted right on the tape.

If you make duplicate turnings having a tenon on one or both ends and you have trouble keeping tenon size uniform, make a simple sizer. Choose a hard block of maple or hornbeam and turn a ½-in. shank on one end to hold in the lathe's chuck. Turning this block by its shank, bore a hole in the end that's a little larger than the desired tenon size, and a little deeper than the tenon is long. If you don't have a drill bit the correct size, you can grind a drill bit slightly off-center—then it will bore a slightly larger hole. Make a 1/32-in. by 1/32-in. counterbore at the front end of the bore to help start the tenon into the hole. Remove from the lathe and remove wood off one side until you break into the bore with a gap about ¼ in. wide. Using a piece of old scraper blade, plane iron or whatever, make a flat knife as shown in the sketch at the lower left and attach it to the sizer with its cutting edge just behind the center of the gap. If you rough out your tenons to within 1/32 in. of size, this tool will align and finish the job accurately. Mount the sizer in the lathe chuck, and set the lathe to about 500 RPM. Hold the work in your left hand, and advance it with the tailstock crank.

If you occasionally need a few dowels of an odd size that can be made by turning down a larger dowel, you can make a fixture to do just that. If you are starting with, say, a ½-in. dowel, bore an oversized ½-in. hole through the center of a 1-in. by 3-in. by 12-in. hardwood block. Next, to support a gouge, glue and screw a smaller strip of hardwood onto the first one, with its upper edge along the centerline of the ½-in. hole. Lay a ⅜-in. or ½-in. gouge on top of this second strip, with its cutting edge overhanging the edge of the hole. Fashion a wood clamp as shown in the sketch, below right, to hold the gouge in place. Mount a ½-in. dowel in your lathe chuck, and insert the free end in the fixture hole. Run the lathe at slow speed and gently push the fixture along until it reaches the headstock. You don't need the tailstock, just support the free end of the dowel with your hand to keep it from whipping around. You'll have to fiddle a bit to find the gouge setting that produces the dowel diameter you want.

Finishing: For a high gloss, the old shellac finish is still ex-

R. Perry Mercurio, of Kingfield, Maine, is a retired plant engineer in the commercial woodturning industry.



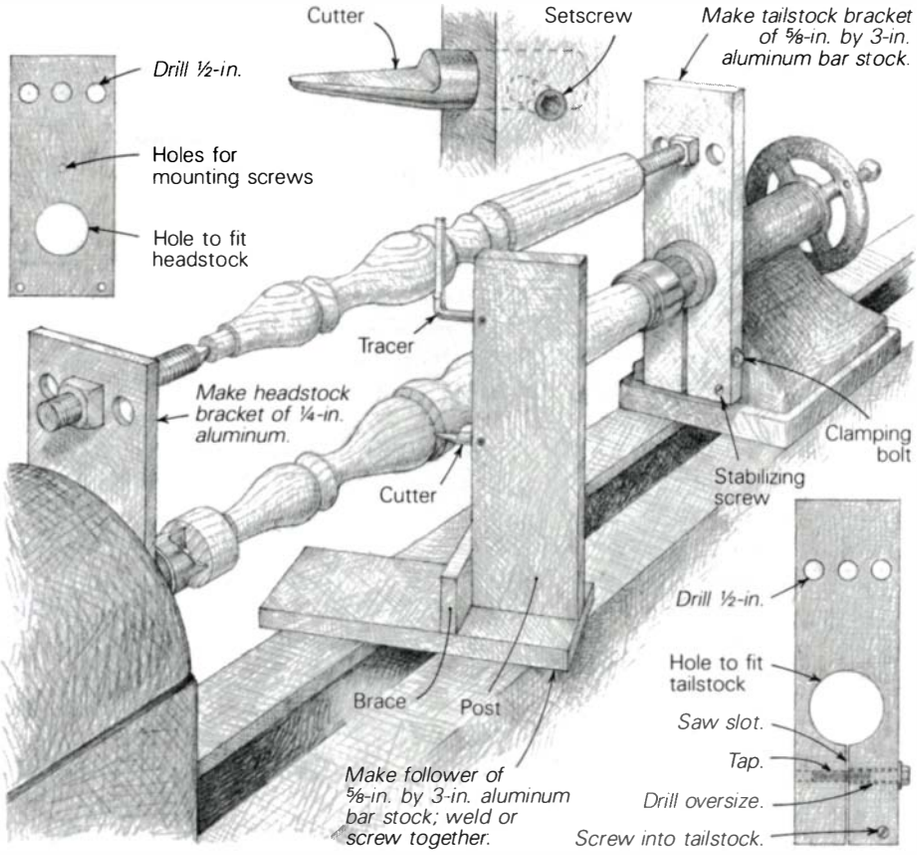
cellent. With the work turning on the lathe, brush on thinned shellac until the brush starts to drag. Let the piece spin a while and repeat, being careful not to let the finish build up too much. When the surface is evenly coated and not absorbing any more shellac, let it spin a few minutes to set up. Then remove the work from the lathe and give it at least five hours to dry—overnight is best—before you smooth it with fine steel wool. Then apply paste wax, letting it dry thoroughly, and polish it on the lathe with a soft cloth.

You can obtain a fairly good instant finish by applying shellac or oil with the lathe running at high speed, and rubbing hard enough to generate heat for drying the finish. At first the surface will look glossy hard. But this method will not dry the finish that has penetrated the surface, and the interaction between the dry outer layer and the damp inner layer will eventually leave a matte finish.

Dust: Most mills have elaborate dust-removal systems. Do your lungs a favor by hanging the suction hose of your shop-vac on the lathe bed while sanding. The noise may be annoying, but it could keep you around for a few more years. □

A shop-built lathe duplicator

by Lawrence Churchill



A considerable amount of my repair work requires replacing broken chair spindles and other such matching turned parts, so a duplicator is a valuable tool. In designing the one shown here, I wanted a jig that wouldn't interfere with normal lathe operation or require any elaborate setup. My duplicator isn't robust enough to trace a part from a square blank, but once the blank has been roughed to within ¼ in. of final size, this rig will finish the job nicely.

The duplicator consists of a pair of plates attached to the lathe's headstock and tailstock, and a follower that slides along the ways. The plates allow me to mount directly over the blank either a flat pattern or, by means of a pair of auxiliary spindles in the plates, the turning I want to duplicate. The follower is a post carrying a tracer that bears on the pattern or original turning. A cutter is mounted directly below the tracer.

First I replaced the headstock's original bearing cover plate with a piece of ¼-in. thick aluminum. This plate will hold the pattern about 4 in. above the turning axis. On some lathes you can use longer screws to attach the bracket over the original bearing cover. I made a similar bracket out of ⅝-in. by 3-in. aluminum bar to fit over the tailstock spindle housing. Aluminum bar can be jigsawn or bandsawn with ordinary woodcutting blades.

Drill the three ½-in. holes in the headstock plate as shown, then slide the tailstock and its plate up to it and use dowel centers to transfer the holes. To hold the part you want to duplicate, mount a pointed length of ½-in. threaded rod in the center hole of each plate, with a nut on both sides. A flat pattern can be copied by cutting two tenons on each end and wedging these in the plates' outer holes.

The follower consists of two lengths of ⅝-in. by 3-in. aluminum bar, joined at right angles and rigidly braced. These parts could be heliarc-welded, but I just screw them together. At the lathe-center height, drill a ¼-in. hole for the cutting tool, then cross-drill and tap for a setscrew. Do the same about 1 in. below the pattern centerline, for the tracer. A broken ¼-in. diameter tap or an old drill ground to a pencil-shaped cone and then ground flat on top makes a scraping-type cutter. Make the tracer by bending a 4-in. length of steel rod to a right angle and grinding its vertical profile to the shape of the cutter. Mount and adjust these parts so that when the edge of the tracer touches the pattern, the cutter cuts that diameter.

Most old turnings to be copied are out-of-round (egg-shaped) and bowed. If you position the original with the bow up or down, it won't affect the reproduction; that's why the tracer is so long. The variation in egg-shaped parts is usually not significant, except on tenons, which should be gauged for a close fit.

Start with the regular tool rest and rough out the new part in the normal manner. Most turners can get pretty close by eye, and having the pattern near the work makes it even easier—you can sight directly down from the pattern to check your work. When the new part is roughed out, remove the standard tool rest and move its base off to one side. Then just guide the follower to trim the new turning to final size. Polish and wax the follower base to keep it sliding smoothly. In my shop, this simple system has turned those duplicating jobs from red ink to black. □

Lawrence Churchill works wood in Mayville, Wis.

Lathe speeds

by R. Perry Mercurio

What is the right speed for a lathe, and what can you do about it? Assuming you have the usual set of carbon-steel tools, speeds for spindle turning should range between 750 RPM and 2500 RPM. Ultimately, we are concerned with the speed at which the surface of the work is turning, not merely the speed of the lathe. Thus, the larger the diameter of the work, the slower the lathe should turn.

But surface speed isn't the only consideration. Let's say you have a stair baluster about 1½ in. in diameter and 30 in. long. Even though the diameter is small, you can see right away that the length should limit the speed, unless you want to risk getting a faceful of wood—a speed of 800 RPM will be fast enough. If you have a workpiece only about 10 in. long and perhaps 2 in. in diameter, you can go to top speed, unless the species of wood comes into play. Harder woods create more friction, quickly heating the tool, which will then require more sharpening. Go slower. Some woods, teak for example, contain abrasive minerals, and require slower speed as well as more frequent sharpening.

Add a countershaft: If your lathe has only the usual three or four speed possibilities and you are beginning to get serious about turning, you will want to add more speed changes. An easy way is to put a countershaft between the motor and lathe headstock, with a step pulley at each end, as shown in the drawing below. Belt one end of the shaft to the motor and the other end to the headstock pulley. The countershaft frame should be hinged and should also have a locking device. This will ease belt changes and cut down vibration. The motor mount should be attached in the same manner. With this setup you can change speeds easily and quickly.

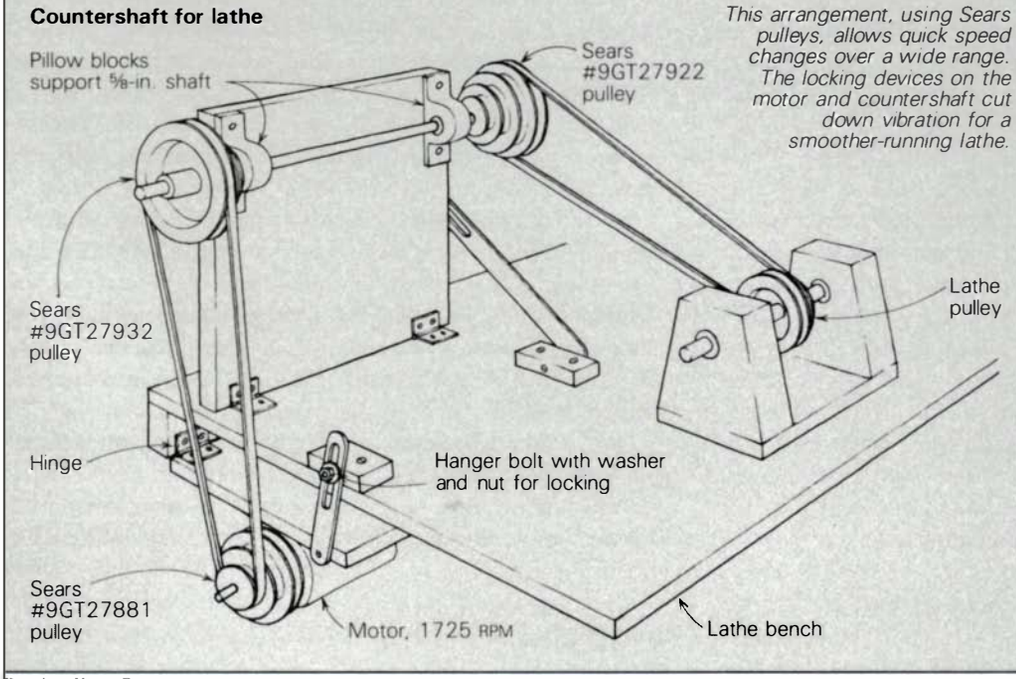
A word of caution: it's surprisingly easy when switching belts around to end up with the opposite of what you thought you were doing. A large bowl blank revving up to 2500 RPM can give you quite a start. So figure out the speeds at various belt positions and make a chart to hang on the wall behind the lathe. The formula is simple: merely multiply the driver speed by the diameter of its pulley and divide the product by the diameter of the driven pulley. With V-belts and pulleys this method is approximate, but close enough.

Bowlturning can get you into a really low range of speeds, especially for larger bowls. You might want to choose a set of pulleys that get down to 200 RPM, or even less. A lot will also depend upon the rigidity of your lathe and how well it is anchored to the floor (*FWW* #25, pp. 80-81).

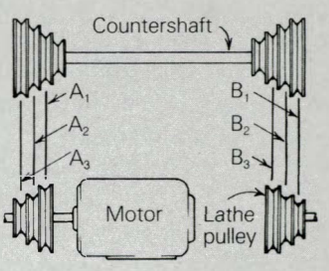
Reverse: It's a real help to be able to reverse the spindle rotation. Perhaps the most common benefit is being able to sand off laid-down fibers. But suppose you are making a dozen small bowls or bases that are being turned on a screw center. During the process of turning, sanding and finishing, you will have to mount and unmount each one several times. How easy it is to hit your switch either right or left to screw them on or off the headstock. When turning the interior of a bowl or dish, reverse allows you to work on the far side of the center, giving you improved vision and tool handling. Take care, however, that your work is securely fastened and that the faceplate is tight, else it might unscrew in the event of a dig.

Most motors can be reversed by swapping two wires in the junction box. Obtain a drum-type reversing switch from an electrical supplier and mount it over the lathe headstock. Connect it so that when the handle is pushed to the right, rotation is normal. Do not mount the switch where you could accidentally turn it on. Some professional turners like an on/off foot switch on the floor. This allows them to start or stop the lathe to inspect the work without losing hand position on the chisel. A foot switch and a drum-reversing switch can be wired so they work together. □

Countershaft for lathe



This arrangement, using Sears pulleys, allows quick speed changes over a wide range. The locking devices on the motor and countershaft cut down vibration for a smoother-running lathe.



Approximate spindle speeds at these belt positions

A_1 to B_1 = 2588 RPM
A_1 to B_2 = 1637 RPM
A_1 to B_3 = 1019 RPM
A_2 to B_1 = 1509 RPM
A_2 to B_2 = 955 RPM
A_2 to B_3 = 594 RPM
A_3 to B_1 = 920 RPM
A_3 to B_2 = 582 RPM
A_3 to B_3 = 362 RPM

Above figures based on a lathe pulley with steps of 5-in., 4-in. and 3-in. diameters.

Drawing: Karen Pease

Jeng Yee is among a handful of men in the world who practice Chinese woodworking skills taught in formal apprenticeships. He applied those skills to make this frame for a traditional Chinese chair.

A Chinese Woodworker

Looking over Jeng Yee's ancient shoulder

by Jason Beebe

For three weeks last summer, I perched myself on a window ledge at the Sweet Home Furnishing Factory in Bangkok, Thailand, and watched dozens of skilled woodworkers make things of astounding quality and variety. I had come to Bangkok in search of one of the three or four remaining masters of traditional Chinese woodworking. I had hoped to learn and to further my own skills—it was soon apparent that I had come to the right place. Everyone at Sweet Home was willing to answer my questions; some even went so far as to put their tools in my hands so I could attempt the work. They all knew what I was there for, and I was often beckoned to benches for a look at work in progress.

Sweet Home does only high-quality, custom woodworking. I saw everything imaginable being built, from traditional Asian styles to contemporary sculpted pieces, from tiny bowls to massive carved-teak chandeliers. All of the craftsmen there are highly skilled, but the work of Jeng Yee was by far the most brilliant. Jeng is a thin, unassuming man of 70 years who deviated from tradition by choosing the woodworker's craft instead of his father's profession, rice farming. Drawing on skills acquired over nearly six decades, Jeng is able to quickly and competently produce virtually any kind of furniture using the complex and hidden joinery—and no glue—that characterizes traditional Chinese woodworking. Jeng, who left China 22 years ago, believes that a woodworker can learn either hand- or power-tool techniques, but that hand tools are more efficient. This notion may seem anomalous to Westerners, but it proved true as I watched Jeng hand-cut joints that would have been all but impossible to make by machine.

Watching Jeng work, I realized that his skills transcend simple technique. He has developed an innate, sophisticated, aesthetic sense that I found infinitely subtle.

When I proudly showed him a photo of a desk I'd built of walnut and rosewood, he quizzed me about the two woods. "Are the woods equally hard? Do they have the same resin content? Will they expand and contract at the same rate?" I was embarrassed to admit that I had had a vain preoccupation with the external features of my work.

From conversations and observations, I came away from Sweet Home with a treasure trove of knowledge which I am still sifting through. I know I will never have the skill of Jeng Yee, nor can I even mimic his talents. Yet my perspective on my own woodworking has been dramatically altered; certainly for the better.

Photos, except where noted: Suthep Thiengthamcharoen

I found out about Sweet Home a few years ago while shopping at Siam West, a Portland store that sells the factory's furniture. The store is owned by the daughter of Koon Vilas, the man who runs Sweet Home and who in June 1981, after my persistent inquiries, granted my request for an extended visit to his factory.

Shortly after arriving in Bangkok, I was given a tour of the operation on a typical weekday, with work in full swing. Compared to an American furniture factory, Sweet Home is unusually quiet, since most of the work is done by hand, and is arranged with the needs and comfort of individual workers in mind. The factory is constructed around a courtyard. The furniture is built on the ground floor, where lumber is also stored. There is a kitchen here, where employees can eat at any time. The second floor is set aside for office and drafting space, as well as for furniture finishing.

Each worker has his own bench and ample work area. As most of the work is one-of-a-kind, each piece is built by only one craftsman, though the finish and carving are left to others. The workmen consider themselves carpenters not cabinetmakers, and most are Chinese. They are divided in the shop by the particular dialect they speak. Inexperienced workers are placed amongst the experts to foster learning.

Jeng Yee was hard at work when I first encountered him. He was wearing the loose-fitting clothing favored by the workers and smoking his ever-present cigarette. Although a septuagenarian, he displays the spirited energy of a younger man. His work area is between that of his youngest son, Pirom, and Beng Yow, a fellow Shanghainese.

Jeng is modest, but gregarious and outgoing. He works in a flurry of motion, inspecting what he has just done with the flash of a knowing glance before moving immediately to the next task. He works virtually nonstop, appearing always to know what to do next without giving it any thought. He's one of the oldest workers at Sweet Home, yet he is the fastest and the best craftsman there. He asks to do the most difficult work, the traditional Chinese pieces.

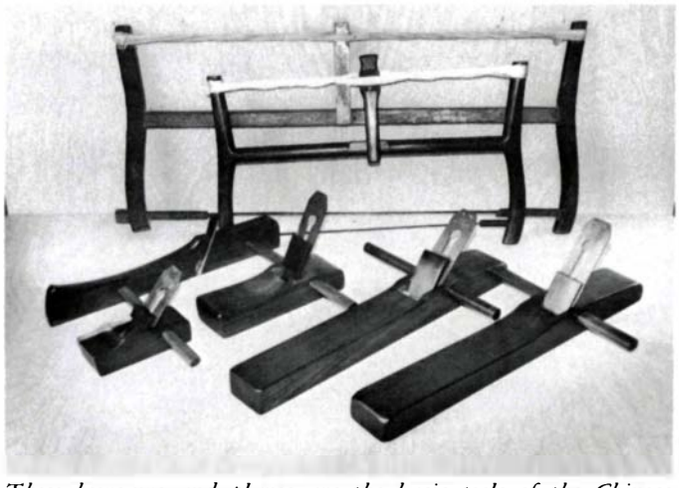
Jeng has developed an interesting routine for himself. He takes a break on occasion to climb out on a window ledge for a quick splash bath or to pause to rub some "fong-yow" medicated oil on himself. He sips often from his potent home-brewed alcoholic "youth potion." He eats his lunch around eleven, and when noon arrives he sweeps off his work surface, drags out a pillow and takes a nap right on the benchtop. He is quite the character, plugged in to local gossip and always eager to give his opinion, solicited or not.

Communicating with Jeng wasn't really a problem. I speak limited Chinese and Thai, but with the help and patience of other employees who served as interpreters and cryptographers, we were generally able to understand one another.

* * *

All of Sweet Home's workers make most of their own tools, including small items such as drill bits. Tool bodies are constructed out of *chingchan,* sometimes referred to as Thai rosewood, to conform to personal preferences. *Chingchan* is preferred because of its stiffness, weight, stability and resonance. Honduras rosewood has identical characteristics.

Jeng uses four essential planes. The first, a jointer plane, is about 20 in. long and very heavy. This is his roughing plane, to quickly waste excess material and smooth and straighten the working surface. He has a second plane, of the same length and weight as the jointer plane but with a more vertical blade angle and a narrower chip gap, which he uses as a sort of pre-smoothing plane. When the pieces are more or less assembled, Jeng planes them with his finish plane, whereas a Western woodworker might use sandpaper or a scraper. This plane, 10 in. long and having an increased vertical blade angle and a minute chip gap, works like magic. It can shave off curls of material the thickness of cellophane and it leaves a glass-like finish even when cutting cross-grain. Jeng's fourth plane is a narrow rabbet plane, a mere 1 in. thick yet 15 in. long. He uses it to bevel, cut, clean and smooth out grooves for delicate joining and gentle shaping. This particular plane is difficult to handle, and apparently it takes years of practice to master the fingertip control it requires. I was pleasantly surprised, however, with my first attempt to use Jeng's other planes. They have no front grip and are balanced in such a way that no downward pressure is needed for a smooth, accurate cut. Jeng has many planes in addition to these four, and when a new tool is needed he makes it.



These bowsaws and planes are the basic tools of the Chinese woodworkers at Sweet Home Factory in Bangkok. Tools are made by the workers to suit their individual preferences.

Jeng also has an assortment of flat and curved drawshaves, and instead of an electric router he keeps about 15 molding planes of various profiles. One I saw was shaped like a toy boat and was used like an inshave to gouge out a chair bottom. There are standard design criteria for these tools, but each worker shapes them to his own needs.

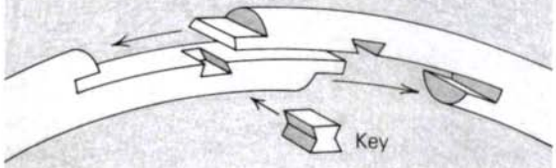
The only saw traditionally employed by Chinese woodworkers is the bowsaw. These saws, which vary in size, appear very heavy and clumsy, yet they are used for everything from a straight cut-off to minute joinery cuts. I had heard that such saws could perform faster than a bandsaw, and I found that to be true except for large-scale 90° production cuts. The bowsaw is particularly versatile in cutting compound curves, a critical element of Chinese woodworking and one that's most difficult with a bandsaw.

Sweet Home does have a machine room equipped with several planers, tablesaws, an overarm router and a bandsaw, but these machines are used primarily by the inexperienced workers who make the factory's few, simple production items. In comparison to Jeng, these workers are slow and inaccurate and are often injured by the machines. I saw one man lose part of a finger to the overarm router.

Artisans like Jeng feel that a worker can adopt either hand-tool techniques or machinery, but not both. The change of pace would be too dramatic. And inasmuch as the men at

The form of this hoop or yoke chair, right, made by Jeng is not foreign to Western eyes, but its construction is. The sweeping curve of the back and arms is not steam-bent but sawn from logs that have grown to the shape. The back is joined at the center with a hidden, wedged joint, illustrated in the drawing (above right). Jeng makes both contemporary furniture and traditional Chinese designs which he can build with or without glue, according to the customer's wishes. This cabinet, above, built in the Sung Dynasty style, was made by Jeng Yee five years ago. It's made of chingchan *wood and assembled without glue. The sparse floral carving is characteristic of this furniture and is added during construction by carvers at the factory. Furniture made by Sweet Home is sold by Siam West, a Portland, Ore., store.*

A wedged chair joint



To join the backs of a hoop chair (photo below), Jeng cuts this keyed joint with a bowsaw and chisels in less than 10 minutes. The key does not extend completely through the stock, so when assembled the joint is practically invisible from the front.

Jason Beebe

Sweet Home are paid by the piece, speed is important. I was impressed to discover that Jeng's ancient tools were faster, in most cases, than machines I would have used for the same operations. In a production run, my jointer would be faster than Jeng's planes, and a radial-arm saw would crosscut faster than his bowsaw. But since Jeng builds one-of-a-kind furniture and at least half of his time is spent cutting complicated joints, machinery that could be used would only slow him down. In one operation his hand tools finish a particular phase of his work without the need for further fitting. Part of the secret of his speed is the time saved by having all his tools close at hand on his bench. He isn't slowed by the jigs, setups and tooling changes that bog down the woodworker wedded to machines.

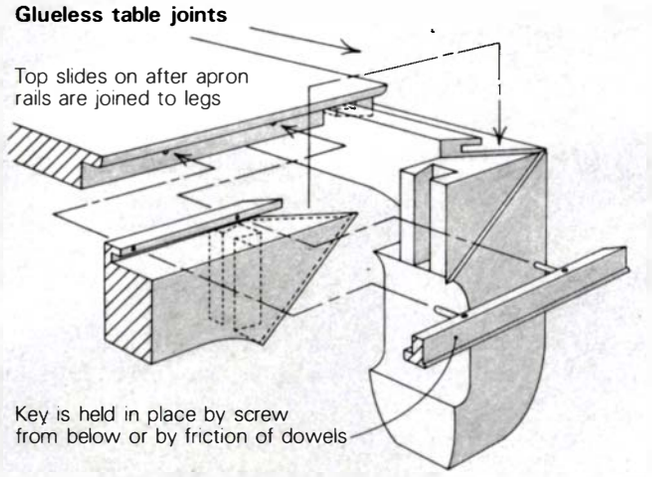
Sweet Home workers are quick to improvise when the need arises. This is most apparent by their use of any available part of their bodies to hold work steady. Workbenches are lower than in the West, to enable the craftsmen to utilize their bodies more readily. Open-toed sandals or bare feet are the norm, so artisans can quickly put their legs to use on the bench. I observed workers adopting a number of squatting positions for this purpose, the most remarkable of which was a carver steadying a small bowl with both big toes while nonchalantly crouching over his intricate work. This use of the body as a clamping device, though seemingly awkward, appears to be a logical extension of the Orient's arsenal of tools, saving time otherwise wasted in fashioning holding devices.

While many Western craftsmen will proudly expose a joint on the surface, Jeng Yee will not. To his mind, doing this would destroy design coherence, blemish the surface and weaken the joining function. This philosophy, learned early during his apprenticeship in Shanghai, shapes every stage of his work. He perceives a piece from the inside and then works his way to the outside. This internal perspective is what enables him to create a durable, structurally sound piece of furniture. Where Western traditional woodworkers tend to let appearance dictate structure and thus adapt their work around this visible feature or that, Jeng has learned to do just the opposite. Only after he is satisfied with the structural design will he begin to consider appearance.

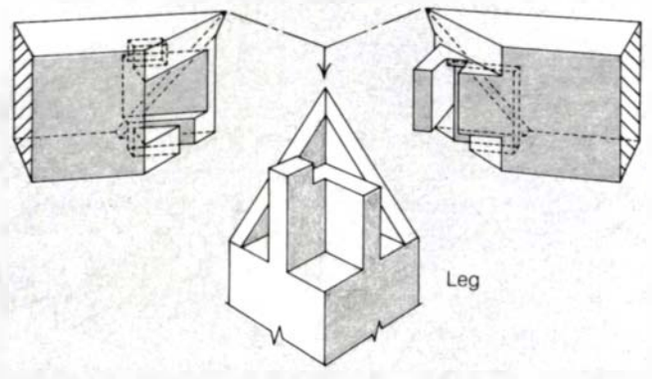
Through constant observation during my visit, I grew to understand Jeng's thought process in making joinery decisions. He initially considers the function of the piece he's building and decides where stress will be the greatest. In constructing furniture in the traditional way Jeng uses no glue, so he must devise a single key that will hold each joint in place, usually a dowel or screw. He must continually keep in mind the type of wood he is using so he can determine the appropriate size of each piece, thereby to properly effect the correct proportions for the entire structure.

In joining, Jeng thinks in terms of dry, physical strength rather than a good glue bond. His joints must do more than lock. They must be force-fit with equal resistance throughout the joint, without the wood distorting or splitting. He will not

Glueless table joints



This complex joint is one of several that are used to join table apron rails to legs. It's locked together by a doweled key on one end.



This is a typical Chinese leg-to-frame joint. It is self-locking and held together by downward pressure. The frame can be assembled only by first joining the rails, then adding the legs.

settle for anything less, and the joint on the finished piece will always be hidden beneath a surface miter.

To form joints, Jeng first marks them off with a scribe. All cuts are then made free-hand using a small bowsaw. For inside cuts he uses only chisels, without drilling out the waste. He makes sure all cuts are clean before pounding the joints together. Even after I had studied the construction of these joints, it still took me a full day's effort to produce a single miserable failure. Yet Jeng achieves this perfection in joinery in a matter of minutes. Because his glueless joinery depends on stable material, he chooses his air-dried lumber about a year before he actually builds the furniture. He alternately exposes the wood to the tropical sun and shaded, drafty areas. In Thailand the humidity is always quite high, so this drying process is slow and gentle.

The quality of the lumber that I saw in Thailand was exceptional. Carpenters there expect perfect stock and they get it. All of the lumber is of Asian origin and is milled locally. Price seems of secondary concern. Any size is available and color is often specified by a specific natural growth region in Asia. I saw a piece of *chingchan* about 15 in. square by 20 ft. long with no visible defects; I was told that this size and quality was not unusual.

The woods preferred by Jeng are the same as those coveted for centuries by the Chinese. The finest furniture is made of Chinese rosewood, called *phayung* in Thailand, or Thai ebony, which is called *makleua*. Today supplies of these woods are nearly depleted, so rosewood furniture is made of *chingchan* and an ebony alternative is called *sathorn*. Jeng favors teak for his more common projects, as it is easier to work. Unless a project is very exciting for him, he will complain loudly that he is too old to work any wood harder than teak.

In Bangkok I saw Ming Dynasty furniture and earlier pieces that had been built in the traditional way I have described. They seemed as solid today as when they were built, in some cases more than 800 years ago. This amazing durability must be attributed, I think, to the fine quality of the wood itself as well as to exceptional craftsmanship.

A traditional means of finishing many of these fine woods is with shellac, which is then lacquered to a flawless finish. Furniture made of *makleua* or *phayung* has a natural gloss, so the wood is simply burnished and left to be further polished by daily use. Nowadays much of the furniture is also given a natural oil finish.

* * *

There is no room for deviation for the orthodox Chinese woodworker. Jeng Yee's culture expects perfect traditional interpretations from him. The proportions and joinery must be exact, and conform to historical precedents. It is difficult for Western woodworkers to comprehend the degree to which tradition imbues the life of the Oriental craftsman—tradition dominated by a belief that opposites should be combined to create a pleasing whole. Often referred to as yin and yang, this concept is found in virtually every aspect of Chinese culture, and it permeates Jeng's work. In his furniture design it is the combination of hard and soft lines (straight and curved); one complements the other to achieve balance and grace. Planes and outlines, not mass, are stressed, to present a form of pleasing simplicity. This adroit blending makes the same traditional Chinese design seem to fit equally well in a peasant's dwelling or in a palace.

Even Jeng's fundamental attitude toward his work is colored by tradition. He works not just for pleasure or money. Rather, he feels a responsibility to continue traditions that transcend his own life. He thinks in terms of centuries in regard to durability, and that is perhaps the greatest difference between his tradition and ours. It's a difference that puts him in a class of his own, part of an elite group of survivors who served as apprentices to masters of the highest caliber.

Unfortunately, the number of artisans of Jeng Yee's skill is dwindling. Younger workers at the factory are usually not interested in devoting a large part of their lives to the old ways. They are employed to do a job they consider common labor, and frequently they don't think beyond their next paycheck. This problem constantly haunts factory owner Vilas, for he knows that it means a wonderful skill is slowly being lost, perhaps forever.

For me, the challenge now is to build furniture as structurally sound as it can be, to match the quality of the work I produce to the quality of the materials I use. I've gained a new understanding of the value of hand tools and the satisfaction that comes from their use. Having previously been concerned with building a reputation in the minds of others, I now feel a need to concentrate on my own growth. Failure no longer plagues me, as I believe that with enough persistence and patience, I will eventually succeed. □

Jason Beebe is a professional woodworker who lives in Medford, Ore.

Horizontal Boring Machine

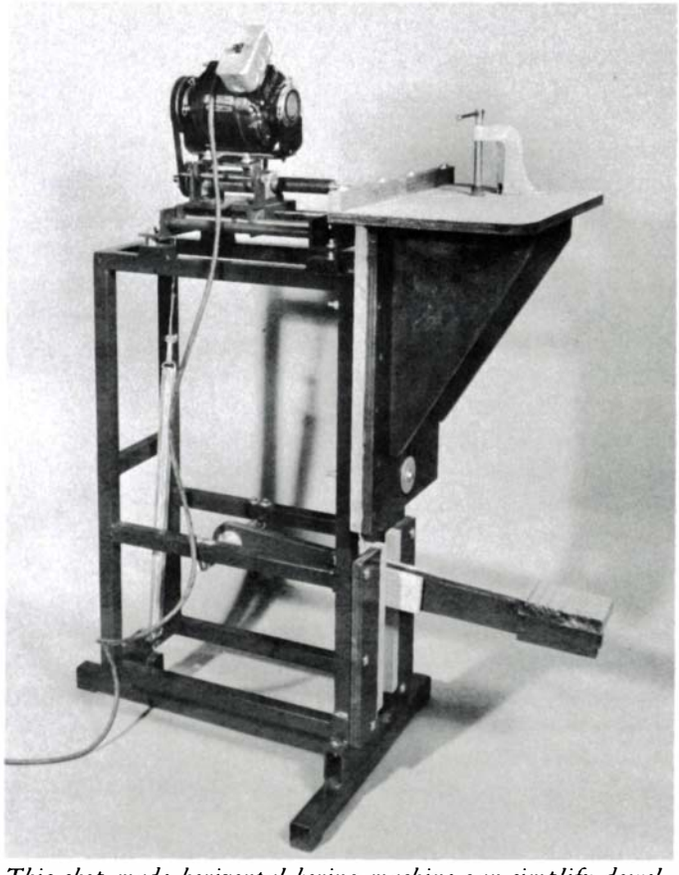
A translating mechanism with many uses

by Michael G. Rekoff, Jr.

A horizontal boring machine is really nothing more than a drill press on its side. But unlike the drill press, the boring machine can bore into the edges of boards of any length and width while the work is supported on its widest dimension. This makes the boring machine a good tool for fast, accurate doweling. The horizontal borer is often considered standard equipment only in high-volume shops, but the one I designed can be shop-built cheaply by anyone with moderate metalworking skills.

My boring machine uses a simple horizontal translating mechanism that smoothly moves the bit, spindle and motor, to bore work clamped to an adjustable table. This mechanism can be adapted to other uses: a router mounted horizontally or vertically, for example, could become a slot mortiser.

The translating mechanism consists of a mandrel mounted on a carriage that slides back and forth on a pair of steel rods. A steel cable connected to a foot pedal delivers the force to pull the bit into the work. I made a sleeve for attaching the bit to the mandrel, but a chuck could be substituted. Although most of the parts are readily available, some could be made by a machine shop. Since my machine isn't in constant use, I designed the motor mount so the motor can be easily removed for use on other machines. The dimensions given can be altered to suit your needs, and I suggest that you round up all the parts—particularly the mandrel—before you start.



This shop-made horizontal boring machine can simplify doweling and other drilling operations. It can be made from readily available materials with simple tools. You may need the services of a machine shop, however, to make some of the parts.

Making the base—Begin construction with the base, on which the spindle/motor carriage slides back and forth. It's made of two pieces of angle iron connected by two ¾-in. separator rods and spanned by two ⅝-in. guide rods, on which the channel-iron carriage slides. Make sure the holes in the base ends line up, or these rods won't be parallel and the carriage won't slide smoothly (detail A). After you've bored the holes, assemble the base on a flat surface, and test-fit the guide rods. Incidentally, separator rods can also be made with ⅜-in. ID gas pipe sleeves over a threaded rod.

Making the carriage—The guide-rod holes in the carriage will be fitted with Oilite bearings—oil-impregnated brass sleeves in which the guide rods run. Drill them to final size, and drill and tap holes for the tension bolts that connect the carriage flanges (detail B). These bolts keep the channel iron from distorting when the mandrel is snugged. I had to fiddle with their tightness to get the carriage to move smoothly.

Any mandrel should work, although it should have a collar to prevent longitudinal shaft motion in the bearings. Use a straight output shaft if you plan to use a sleeve to hold the drill, or a threaded shaft for a chuck. Make sure the mandrel axis is perpendicular to the edges of the carriage.

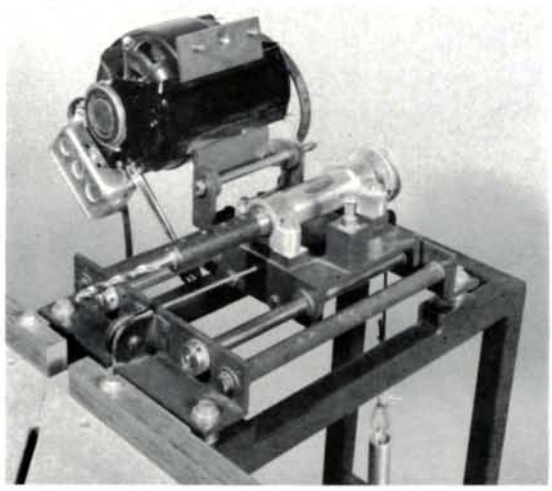
Next install the Oilite bearings, and assemble the carriage and base. Put a light coat of oil on the rods and, holding the bearings in place with your fingers, slide the carriage back and forth. It should move smoothly and freely through its entire travel. If it doesn't, you may have to ream out the bearing holes a little or dress the rods with emery cloth. This will relieve any binding in the guide rods and allow the bearings to self-align for the smoothest operation. Then fix the bearings in place with a slow-drying epoxy.

A ½-HP 1,750-RPM motor is adequate. I made up a motor-mounting system that pivots the motor so the drive belt can be installed and tensioned. The support brackets suit the motor I had on hand; you'll have to modify the dimensions to fit your motor. Before screwing the brackets to the carriage, make sure that the position you select will result in good alignment between the motor drive pulley and the mandrel pulley. Put an adjustable collar on one guide rod between the carriage and the front end of the base, to serve as a depth stop when boring. The belt tightener is a block of steel screwed to the carriage, with a bolt threaded into it so the head bears against a plate attached to the motor. Unscrewing the bolt tightens the belt.

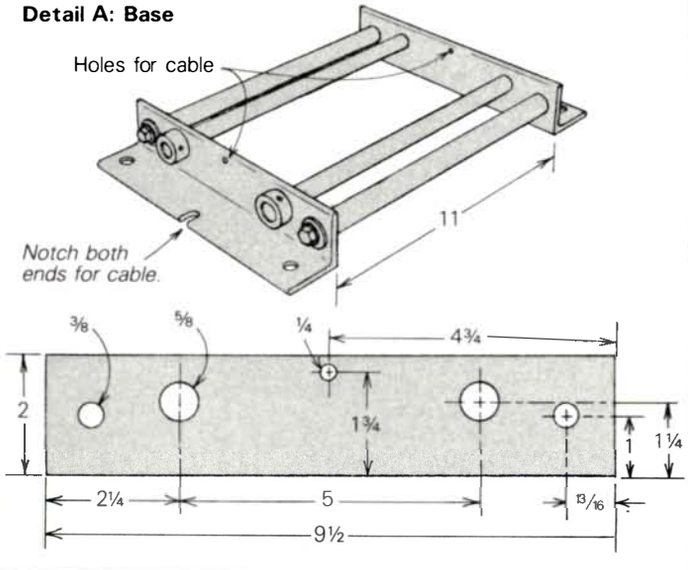
To complete the spindle, make the sleeve by boring

Horizontal boring mechanism

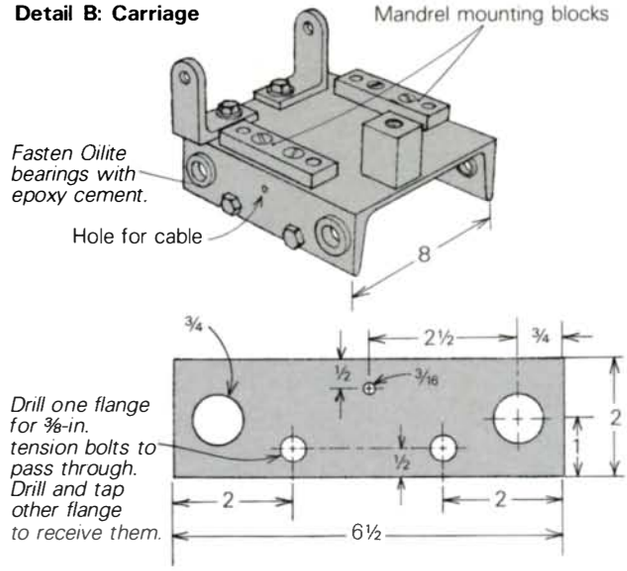
In the photo and drawing, the motor is swung back to show the spindle. Motor and spindle ride on a pair of steel guide rods, and the steel cable threaded through the pulley feeds the carriage for boring. The large spring returns the mechanism.

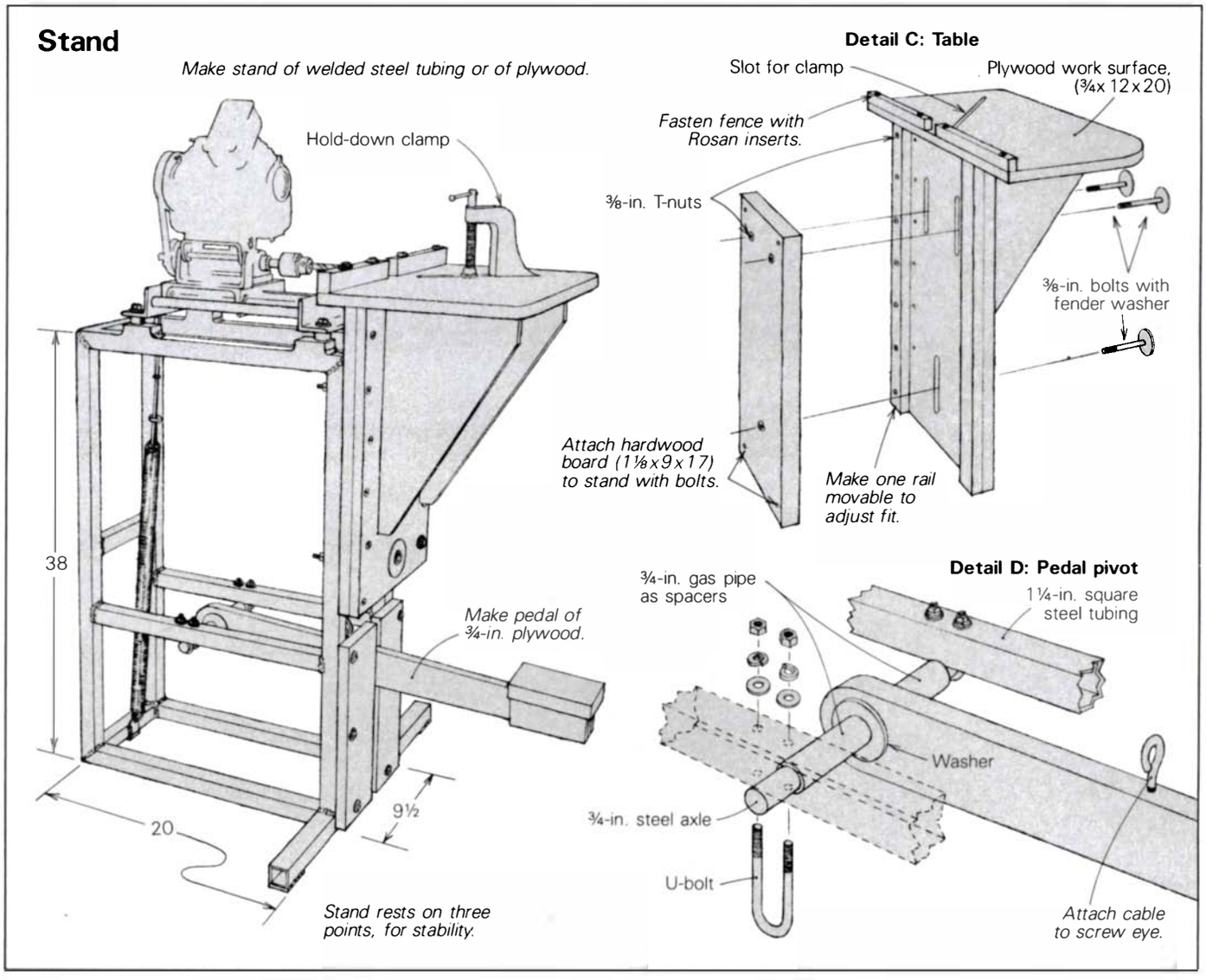


Detail A: Base



Detail B: Carriage





through a length of 1-in. rod stock and tapping for setscrews, or have it made by a machine shop. If you are using a chuck, thread it onto the mandrel.

Making the stand—I made my stand in two pieces—a frame and a platform—using square steel tubing welded together. The platform has three-point contact with the floor, making it easier to level the machine. The machine can be mounted on a bench top, in which case a feed lever could replace the pedal. The actual dimensions of the stand depend upon your particular needs. I made the machine's adjustable table and fence out of plywood, as in detail C. It slides up and down on the front uprights, aligned by a pair of hardwood rails, one of which is adjustable. I milled slots in the table and fitted them with bolts and T-nuts to lock the table in position. A clamp that also rides in a slot holds the stock down.

The critical requirement of the table is that it must hold the work parallel and at right angles to the travel of the drill bit, and this alignment must be adjustable. The table's maximum upward travel should go no higher than the lower edge of the drill bit, and its downward travel shouldn't be lower than the feed pedal in its released position.

Make and fit the feed pedal, install the steel feed cable and use a heavy-duty door spring to return the carriage. I ran the cable through thimbles before attaching it with cable clamps to the spring and the pedal eyebolt. Another cable clamp inside the carriage flange transfers cable movement to the carriage. Experiment with cable length and spring tension to achieve full carriage travel and comfortable pedal movement.

Aligning the machine—You'll need a dial indicator with clamping fixtures for this job. With the machine on a flat, level surface and drill rod in the chuck, clamp the indicator to one of the guide rods. Check vertical alignment first by placing the sensing tip on the top edge of the drill rod. Move the carriage back and forth to check runout, and correct it by putting shims under the mandrel mounting blocks. Then check horizontal alignment by putting the sensing tip against the side of the rod. Correct runout here by loosening the mandrel mounting bolts and repositioning the mandrel slightly. This is a trial-and-error process that should be continued until no runout is indicated. Mount the table and clamp the indicator to the drill rod to test the table for vertical alignment. Finally, install the fence so it's at right angles to the spindle's horizontal travel. □

Michael Rekoff is a professor of electrical engineering at the University of Tennessee at Chattanooga. He wrote about building a stroke sander in FWW *#3, p. 46. Photos by the author.*

Fine-Tuning Color Finishes

Get lustrous depth with transparent top coats

by Don Newell

Most woodworkers use a clear finish such as varnish or oil, particularly when working with fine, well-figured hardwoods. Many craftsmen probably have never considered using anything other than a clear finish. But there's a time and place for everything. When the wood you're working with is lacking in figure, or you're building a piece from undistinguished pine or mixed woods, or you want the piece to stand out in an otherwise monochromatic room, a color finish may be just the ticket.

A color finish—paint—is merely a clear finish with pigment mixed in. The familiar store-bought antiquing kits work, but they come in unimaginative colors with variations limited to wiping on different shades of toning inks. For your next project, why not select a color that sings, or at least hums a little? Orange or purple might be a bit much, but a small object such as a side table done in viridian green or alizarin crimson can add a dramatic touch to a room decorated mainly with the brown and sienna tones of traditional clear-finished furniture and cabinetry. Modern latex paints—the same ones you'd use on walls and trim—are a good choice and they're available everywhere. But whether you use oil-base or latex paint (semi-gloss or satin) is really not important.

A color finish requires as much surface preparation as a clear finish. Even though the color finish is opaque, imperfections in the surface of the wood will show through when the finish dries and shrinks. A color finish, however, hides sanding scratches somewhat. Where you might final-sand the wood with 240-grit paper for clear finishing, often you can get away with 180-grit under color.

Should you fill the grain under a color finish? Not necessarily, but you can. With close-pored woods such as pine or birch, you wouldn't use a filler anyway, even in clear finishing. On open-pored woods such as oak or mahogany, however, a filler is mandatory if you want to produce a smooth surface. This is a matter of personal preference, however. Since you're using color for its aesthetic value, there's nothing wrong with having the wood structure show. In fact, wood grain often lends interesting texture.

Use a tack rag on the surface and stir the paint thoroughly. Apply a moderately heavy coat as evenly as possible using a clean brush. Brush with the grain, particularly on unfilled, open-pored wood. Let the paint dry overnight.

Now for the step that makes the difference between a fine finish and just a finish. Run your hand over the dry finish and examine the surface in a strong sidelight. You'll see and feel brush marks and specks of dirt or lint. Those, plus the graininess of the suspended particles of flatting agent used to produce a satin surface, must be removed. Using 320-grit wet-or-dry sandpaper (coarser is too coarse and finer takes too long) and plain water, wet-sand the entire surface to remove irregularities without cutting through to the wood. Wet the surface well with water and, using a light touch, sand the surface in long, overlapping strokes. Use a pad of felt or rubber behind the paper to evenly distribute finger-pressure. And always keep the work area wet. The water acts as a lubricant and keeps the paper from loading up with paint particles.

Frequently dip the square of sandpaper in the water to wash off accumulated sanding residue and keep turning it to present a fresh abrasive surface to the paint. Remember, a light touch does it. Periodically wipe the sanded area dry with paper towels or clean rags and inspect it. If the brush marks and dirt particles have disappeared, you've gone far enough.

If you do cut through to the wood, don't panic. When the surface is completely dry, clean off all sanding dust. It's difficult to repair just one spot, so recoat the entire surface, then resand. The piece should now have a uniform, matte appearance and is ready to be given the final, lustrous touch.

For both protection and beauty, apply a high-quality, durable clear film over the color coat. Since your color coat will be either latex or alkyd (enamel) paint, a clear varnish is the material to use. You could rub in tung oil without damaging the color coat, but its ultimate appearance and film thickness are not nearly as satisfactory. I've tried both gloss and satin varnishes and found that the satin polishes more uniformly. Don't use polyurethane. It will not adhere well to any substrate containing a flatting agent, which most satin or semi-gloss paints contain.

Almost any good brand of standard interior varnish will work well, especially if the information on the label indicates it can be used for furniture, trim or the like. Look for the words "alkyd" or "modified alkyd" on the label. This type provides excellent adhesion, good wear characteristics, and good rubbing or polishing properties.

Wipe down the sanded color coat with a damp cloth to eliminate all traces of sanding dust. One medium-heavy coat of varnish (just as it comes from the can) is preferable to two thin, drier coats simply because a heavier coat will flow better, leaving fewer brush marks to correct when the varnish has dried. Since this coat of varnish is the final coat, let it dry a full 30 hours rather than merely overnight. You want to give the thinners in the varnish time to evaporate so that the film is hard clear through.

To brighten the luster of the clear coating and to polish out any airborne dust or dirt that may have settled onto the surface, fine steel wool works well. But lightly wet-sanding with 400-grit or 500-grit paper is even better. Follow this by hand-rubbing the surface with rottenstone or automotive polishing compound. Finally, polish the clear coating with a sheepskin buff chucked in an electric drill. This will impart a

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Don Newell, of Farmington, Mich., is a former paint and varnish chemist, an amateur furnituremaker and a frequent contributor to FWW. *He tackled general finishing in issues #16, #17 and #18.*

beautiful sheen, an appearance impossible to duplicate straight from the can. In fact, the luster will be close to that of a fine rubbed and polished clear lacquer.

Why not simply wet-sand, polish and buff the paint film itself? Two reasons: first, the paint film is much more susceptible to marking and scuffing than the tough clear coat of varnish, so it's less durable; and second, a clear coating over a color coat produces great depth and clarity.

Lacquer—While the paint-and-varnish system is the simplest to use because you can buy the materials at any paint outlet, lacquer produces equally beautiful, functional results. The basic technique—a color coat (over either filled or unfilled wood), followed by a clear protective film—is the same in either case, but the details vary.

Bare wood should be coated with lacquer sanding sealer for optimum adhesion. The sealer, color coat and final clear coat should be from a knowledgeable supplier. H. Behlen & Bros. (Rt. 30N, Amsterdam, N.Y. 12010), for example, sells brushing and spraying lacquers, both colored and clear, as well as sanding sealers, all of which are compatible.

Why not use a spray can? Simply because aerosol materials are heavily thinned to permit spraying under the very low spray-can pressure. The resulting film is extremely thin, so you have to apply many coats to build up a reasonably heavy layer. You can't rush it either: if you apply too many coats too soon, before the previous coats have had a chance to dry hard, the finish will remain soft for days. Stick with brushing lacquer if you don't have a good spray outfit.

Apply a sanding sealer and wet-sand it to a smooth, clean surface. Because lacquer shows coarse sanding scratches, all wet-sanding should be with wet-or-dry sandpaper of 360-grit or finer. Now put on several coats of color lacquer to build up a good film, lightly wet-sanding between coats to remove brush or spray marks. Then apply two coats of clear lacquer, allowing sufficient drying time in between for the thinner to evaporate. After the final coat of clear lacquer, let the finish dry for at least 72 hours before you polish it. Even though lacquer may appear hard on the surface, a substantial amount of solvent still remains in the film, and as this evaporates the film will continue to shrink.

To produce maximum sheen without gloss, rub the surface with fine-textured automobile rubbing/polishing compound, or with fine pumice or rottenstone. Then give the piece a final polishing with a dry sheepskin buff.

The result, whether you use varnish or lacquer, is superb. If you've ever seen a custom-finished car with coat after coat of semi-transparent paint hand-rubbed to a mirror gleam, you'll recognize the difference between merely finishing *with* color and clear-finishing *over* color. □

The aesthetics of clear finishes

Thinking of a finish only as a protective skin misses its aesthetic impact. The finish you apply becomes an inseparable part of the object and visually represents it. The right finish is a matter of function, appearance and historical precedent. All three must be considered if the finish is to complement the construction.

Consider a small rosewood music box inlaid with antique ivory and adorned by an heirloom cameo let into the lid. It will not be harshly handled, so the finish need not be extremely rugged. Moisture resistance in such a small piece is not a major consideration either. In fact, with this box, as with most small, cherishable objects, the meaningful consideration is aesthetic: does the finish help achieve, or amplify, the artisan's intended effect?

In this box, the maker used rosewood and ivory for their rich, nostalgic character. The finish should heighten this effect, and be one with the object. The grain and color of the rosewood should be allowed to show.

A drying oil such as boiled linseed or tung, hand-rubbed, will produce a dull surface. A gloss varnish will glare. And lacquer, rubbed and buffed, will give a high luster without shine.

Water-clear lacquer would be my choice. It can be wet-sanded between coats to eliminate brush or spray marks, and it yields not only a protective film that is completely transparent but also one that brings out color to the maximum. The final film can be rubbed and polished to a high luster.

Why not use varnish or drying oil? You could, but to me a drying oil's comparatively matte finish reduces the visual drama. A good rubbing-type varnish could probably serve as well as lacquer, but the clarity of lacquer is more jewel-like. It is compatible with the rest of the materials in the music box and their actual and subjective functions.

In contrast to the box, consider an oak desk—large, obtrusive and utilitarian. The wood, as beautiful and striking as its grain may be, was chosen to be used, and used hard. So it calls for a working finish. But the finish needn't look as though it was slapped on with a whiskbroom. Even a workhorse desk is entitled to face the world with a smooth coat. I'd use a sturdy satin varnish. Why varnish? Just as rubbed and polished lacquer expresses delicacy and refinement, so varnish projects a shirt-sleeves character. Historically, strong oak and durable varnish go together. A craftsman who makes or buys a desk of oak rather than of metal or laminate-covered particleboard is tying himself to a tradition. And for the same nostalgic reason, a mellow varnish is the logical choice. Gloss varnish would feel wrong. Its glinty, shiny surface begs attention, thereby embarrassing a working-class desk. Satin varnish, on the other hand, is comfortable on the desk and lets the wood come through, because there is no shine to interfere. The subdued luster also implies that the desk has been well used, its finish dulled by time and wear.

In another case of matching perception to function, consider a fine walnut gunstock. Historically, gunstocks have been finished with rubbed-in linseed oil, a material of countless shortcomings and only two possible virtues: it is easy to apply, and it is capable of producing a soft, pleasing luster if rubbed often and long enough. This soft sheen is generally believed to be a clue to a gun's quality, a perception that the gun is better made than one whose stock is not hand-rubbed. Ironically, for durability and moisture resistance, linseed oil is not a good finish for a gunstock. Tung oil, the popular Danish oils and certain penetrating varnishes can be made to look about the same as rubbed oil, and are far more durable. Yet even today, with these other materials available, a "genuine, hand-rubbed linseed oil finish" still sells guns. —*D.N.*

Woodworking With Kids

Making what *they* want introduces children to tools

by Richard Starr

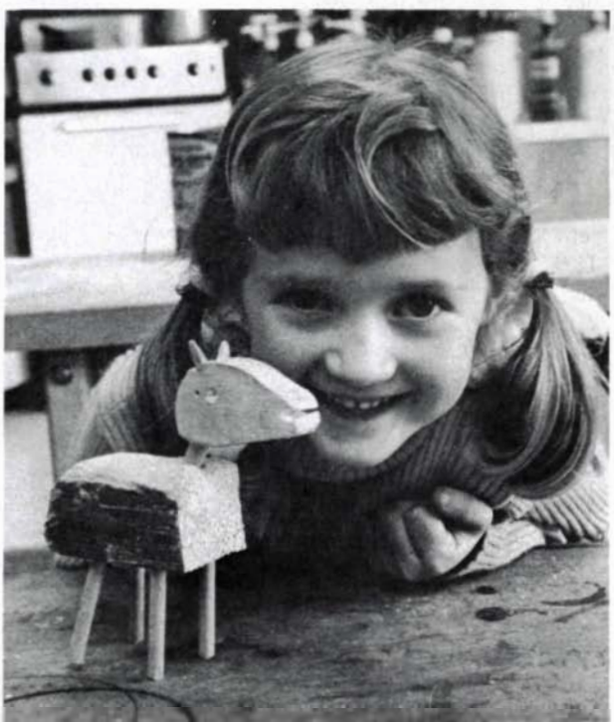
While some woodworkers make bowls or tables, my specialty is helping children make what *they* want from wood. I've been at it for 14 years, the last 10 at the Richmond Middle School in Hanover, N.H., where I teach woodworking to kids 11 to 14 years old. I've also taught in nursery and primary schools, and I've learned that children even 5 years old or younger enjoy using tools and wood to bring their ideas to life. For many children it's a natural step after crayons and finger paints.

Kids just starting woodworking need adult help at every step of a project. This sets the stage for a trusting collaboration between you and the child: he or she provides the ideas and energy, you supply the materials, techniques and a friendly helping hand when the going gets rough. Both of you will find the partnership rewarding and fun. And the child, who is learning physical coordination, patience and the ability to overcome frustration, is also finding that by creating real objects he or she can influence the world in a positive way—an important part of growing up.

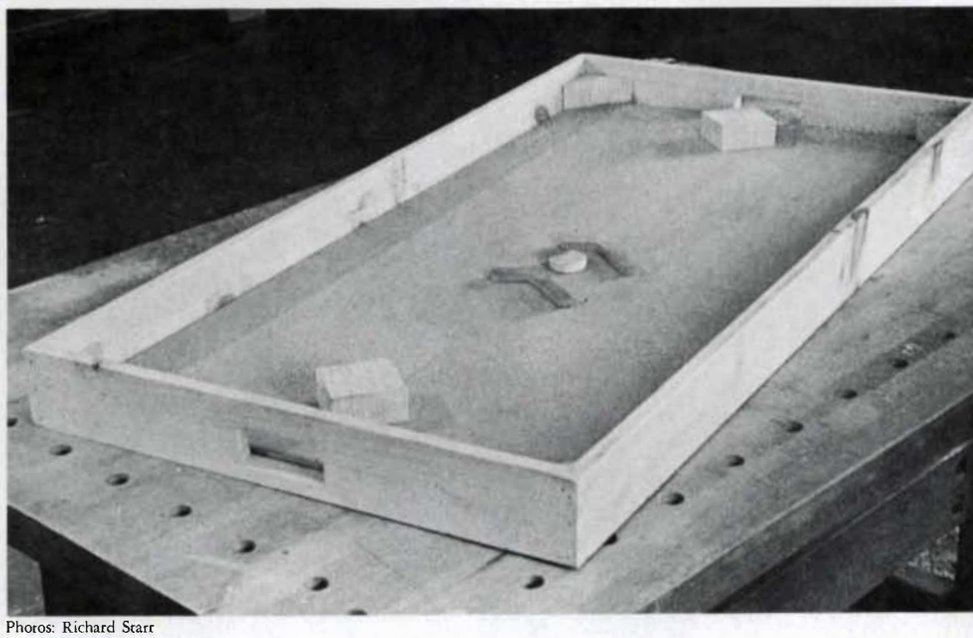
It's easy and inexpensive to set up a workspace or to equip

A Gallery of Projects

When you give kids tools, materials and instruction, don't be surprised at the results. This selection of projects built by Starr's students illustrates a few of the possibilities. Jay Sailor, left, an eighth-grader, took a full school year to build this drafting table, which has adjustable angle and height. Legs are held together by a removable wedge driven through tenons in the stretcher. Eighth-grader Emily Kucer, right, made this elegant music stand out of cherry. The height and angle of the stand are adjustable and are locked with wooden screws. Marble rolls demand both imagination and engineering skill; seventh-grader Peter Ghirardini, below left, used dowels as uprights and glued-up strips for ramps. Lisa Miles, below, a kindergartner, made this little horse out of pine and dowels.



After Starr rips the sides for the hockey board on his radial-arm saw, he has the kids nail and glue ledger strips to the bottom edges, left. Children should be reminded not to put nails too close to the ends of the boards, to avoid sawing through them when the sides are mitered. At first, mitering is confusing for children, so Starr hangs a mitered mirror frame on the wall as a teaching aid. Above, a fifth-grader saws a miter on one end of a board hockey frame.



Making a board hockey game gives children a chance to learn several basic skills: sawing, boring, chiseling and nailing. Above, a second-grader uses an auger to hog the waste out of one of the hockey board's goal openings. He'll finish the job with a chisel and a file. Above right, a student nails the plywood bottom into the hockey board. The completed board, right, will be given a coat of shellac, followed by wax for a fast-playing surface.

Photos: Richard Starr

your shop for teaching children. A few basic tools will do—a hammer, crosscut saw and coping saw, brace and bit and hand drill, a Surform tool, a couple of clamps and a vise. Older kids can use more sophisticated tools—bench planes, a miter box, chisels, carving gouges, spokeshaves and even a lathe. I use power saws to make basic rips and crosscuts for kids, but they do all the rest of the work by hand.

Workbenches for small children should be about 24 in. high. Middle-school-age children are comfortable at a 30-in. bench. You can cobble together a workable bench or cut down a sturdy old table. Kids can manage at an adult's bench (usually around 34 in.) by standing on a sturdy chair or a platform nailed together for the purpose.

Children come up with lots of original and surprising ideas on their own (I've included a gallery of interesting projects on p. 103). There are several popular projects the children choose again and again. The board hockey game I describe here is a good first project because it involves a variety of basic skills—nailing, mitering, drilling and chiseling. Kids can bash the puck around as soon as the last step is done, so gratification comes quickly.

To start this project, the children should make a rough sketch showing dimensions. The maximum size I recommend is 2 ft. by 4 ft., but smaller boards are fun too. From ¾-in. pine, you should rip four boards 3½ in. wide and about 5 in. longer than the sides and ends of the board. Also rip four ¾-in. by ¾-in. ledger strips equal in length to the four boards. Have the kids glue and nail the ledger strips flush with one edge of each side. They should be told not to nail within about 6 in. of the ends of the strips so there will be no danger of sawing through a nail when the ends are mitered. Children new to mitering find it confusing, so I illustrate the concept by pointing to an old oak mirror frame hung in the shop for this purpose. I explain that the miters point away from the center of the rectangle. Have the kids place one of the sides of the game on the miter box with the outer face against the fence and the ledger strip down. Show them how to clamp the piece in the box so it rests against both the fence and the base. They should saw only the left end of each piece, starting about 1 in. from the end.

When that's done, help the children mark the final length of each piece, equal to the full outside dimension of the board. Ask them which way the cut should go on that end, reminding them to imagine the piece as part of a complete frame. Draw an arrow to indicate the direction of each cut.

Cutting the goals is next. Show the kids how to lay them out by finding the center of each end piece along the upper inner edge and marking half the width of the goals to either side of that point. Project these points down the inner face of the end pieces using a combination square. To lay out the top of the goal, demonstrate how a square can be used as a marking gauge by holding a pencil against one end while sliding the square along an edge.

The children can use an auger bit of any convenient size to remove the bulk of wood from the goal opening. Protect the workbench top with a piece of scrap wood covered with colored paper. Fasten the end piece with two clamps set close to the goals. The children will enjoy drilling as many holes as can be fit within the layout lines. Be sure they stop drilling when shreds of colored paper come up among the shavings, a signal that each hole is finished.

Leave the piece clamped to the scrap wood as the kids chip out the rest of the wood with a ¾-in. chisel and mallet. Before giving a child a chisel (or any other tool for that matter), be sure to go over the safety rules: Always carry the chisel sharp-edge-down, work with both hands behind the sharp edge, and put the tool down when you're not using it, but don't lay it down with the edge hanging off the table. The kids should chop across the grain to sever fibers of wood before removing chunks with the grain. Show them how to take small shavings as they approach the line, and how to work from both faces in, to prevent tearout. When chiseling is done, file the inner edges smooth with the piece held in a vise.

When both goals are done, you can help the kids assemble the frame. Spread glue on the mitered ends and pull the frame together with a band clamp. After the glue has set, reinforce the joint with nails. If you don't have a band clamp, nail and glue each corner together in sequence around the frame, holding each one with a corner clamp as you nail. Cut a piece of smooth ¼-in. plywood to fit snugly inside the frame, run a bead of glue around the ledger strip, and nail the board down with ¾-in. wire brads. Set the heads of the brads so they won't interfere with the puck.

The children can use the miter box to cut the goal blocks and corner blocks. Glue the goal blocks in place—be sure they are centered in front of the opening and the same distance from each goal. One of the children can test for the best distance by holding a block in place while a friend tries some shots with the puck. Corner blocks will keep the puck from getting stuck in the corner of the board.

For a really fast-playing board, the kids can sand the plywood with 220-grit paper and apply a thin shellac wash. When that's dry, they should sand the surface with 400-grit paper and add a coat of paste wax.

I ask children to draw their hockey sticks full-size on paper so they can experiment with different shapes. The pattern is transferred to 1-in. thick hardwood. I bandsaw the shape, then resaw through the thickness to make two thin sticks. Have the kids use a pair of dividers to scribe pucks on the same thickness hardwood, but resaw the wood in half before cutting out the circle—it's safer. Sand the sharp edges off the stick, pucks and playing board. The faces of the puck can be waxed for extra speed.

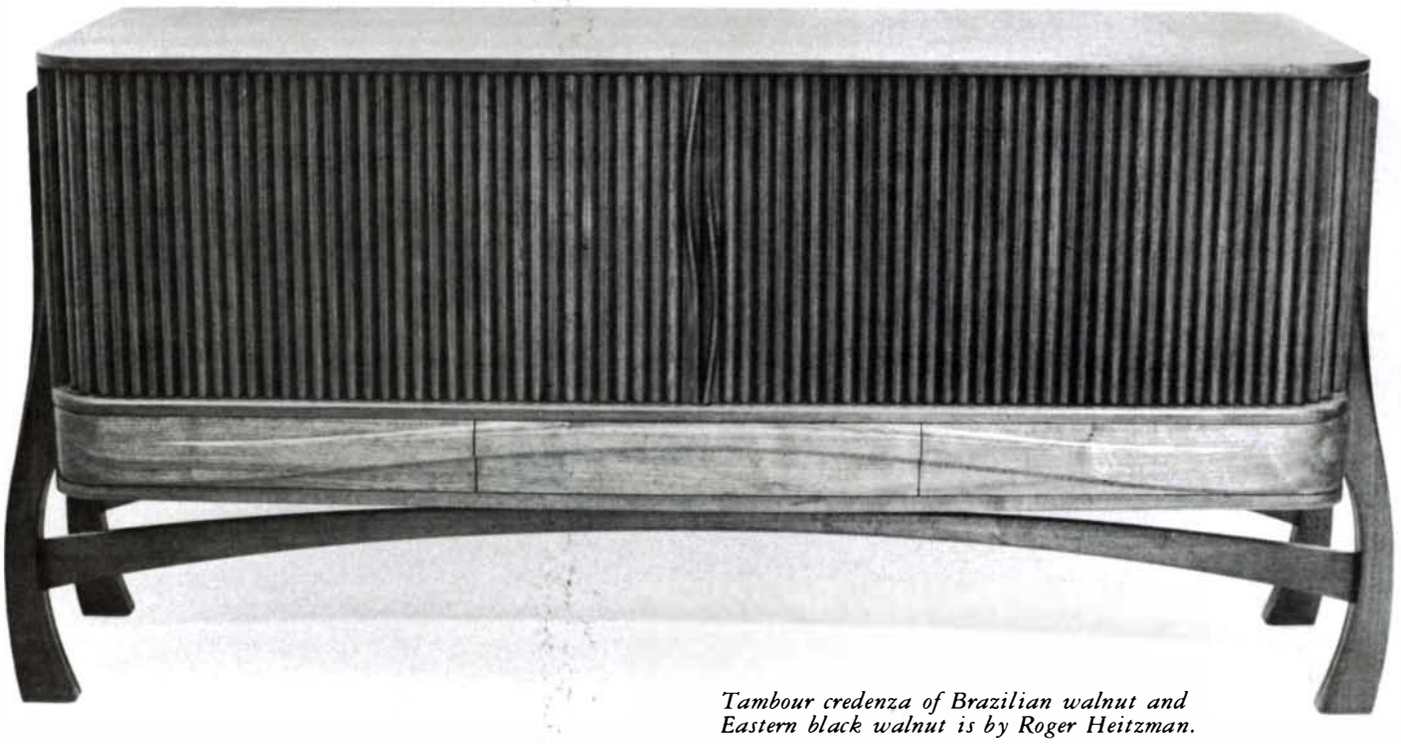
Most kids know the rules of this game. First the puck is centered on the board while the players tap their sticks over it and back on the board three times before trying to hit the puck to their own side of the board. Whoever gets the puck goes first. With the puck on top of a goal block, the player tries to ricochet it into the opponent's goal. Players alternate shots from wherever the puck lands. After a goal is scored, the opponent gets the next shot from atop his or her own goal block. Kids often come up with lively variations of these rules, as well as alternatives to the shape of the board. □

Besides teaching children how to work wood, Richard Starr contributes frequently to Fine Woodworking *magazine. He has written a book entitled* Woodworking with Kids, *which will be available this fall in hardcover for $19.00 from The Taunton Press. In this 216-page volume, Starr shows how adults can help children build all sorts of things out of wood, from simple boxes to tables and stools. In addition to describing projects, the book has a tools and techniques section that explains fundamental woodworking concepts to non-woodworking adults.*

Current Work

Seven groups show in Mendocino

by Michael Pearce



Tambour credenza of Brazilian walnut and Eastern black walnut is by Roger Heitzman.

One effect of the current renaissance in American crafts has been the proliferation of craft organizations, which provide a forum for artisans to exchange knowledge and to pool resources. An event last summer in Mendocino, Calif., carried the idea a step further: seven Northern California woodworking associations got together to put on a show of the best available work by their members. It was hosted by the Mendocino Woodworkers Association, and represented were the associations from Bolinas, Butte, Humboldt, Santa Cruz, Sonoma and West Marin. The week-long exhibition opened on Memorial Day weekend, so timed not only for maximum exposure to the buying public—Mendocino galleries rely on tourist trade—but also to give members of the American Craft Council, who were meeting in town that weekend, a proper sampling of our craft in Northern California.

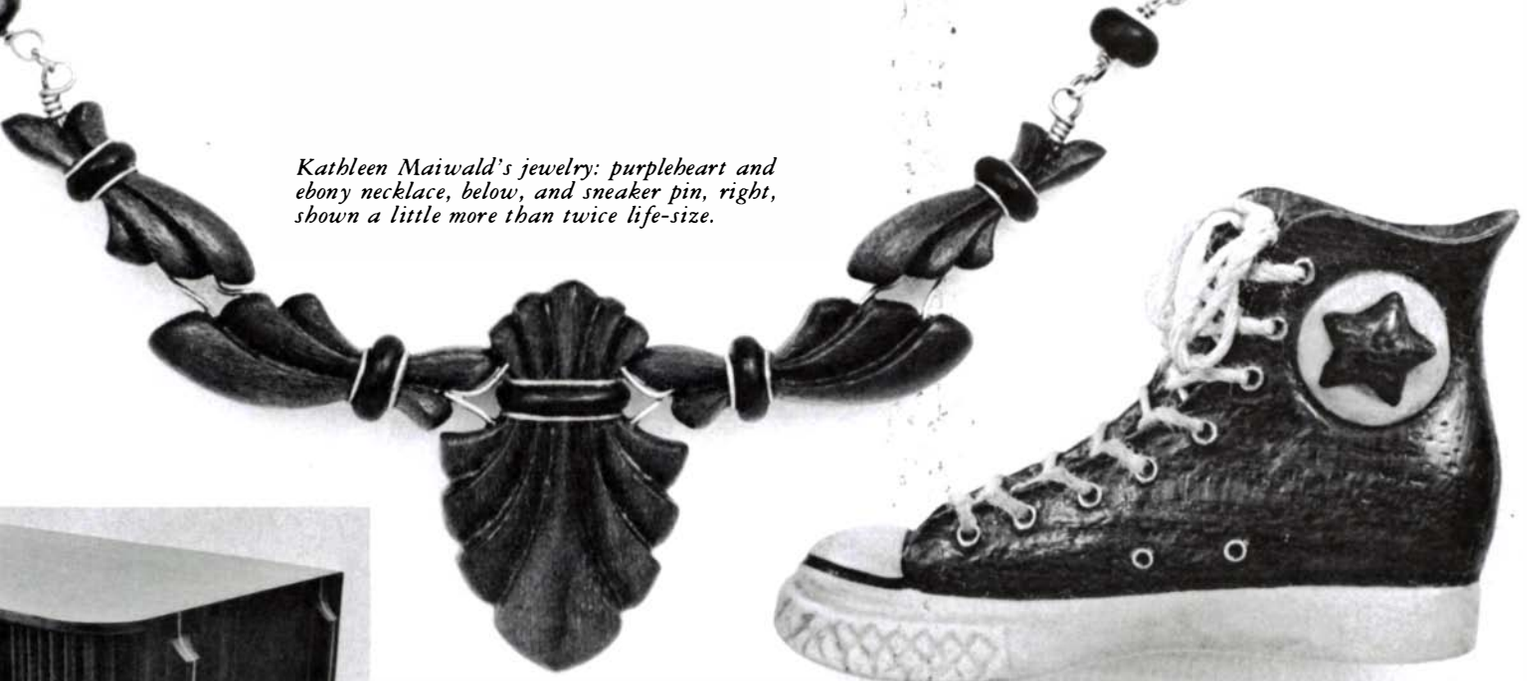
The show was impressive. Fifty-two woodworkers showed a total of 151 pieces—ranging in size from a turned goblet just ⅛ in. tall to a 10½-ft. canoe, and including furniture, bowls, boxes, jewelry and carvings. Unfortunately, the show had to be divided between two buildings a block and a half apart, making it difficult to take it in as an integral event.

The quality of workmanship was consistently high, with an emphasis on function and precise execution, rather than on strikingly unusual forms. Straightforward trestle-tables and traditional hand-worked chairs and cabinets were the norm; free-form sculpted shapes and bold combinations of contrasting woods were few. Although this might prompt speculation about a shift in style in California woodworking, it's my guess that this "new look" is explained by the organization and selection process of this particular show. It was put together and juried entirely by woodworkers, who generally have an eye for subtleties of technique and the refined use of materials. This attitude was reflected in the jury guidelines, which emphasized proper construction and finish, and practicality of design in accordance with the function of a piece.

Each piece was juried twice: first by the maker's local association, then by a panel composed of one member from each of the seven groups. This second jurying, which took place in Mendocino, was a closed affair. By all reports there was surprising agreement among jurors, and most of their decisions were unanimous. When there were differences, a lively discussion ensued, but in the end only 7 out of 158 works were rejected. Informal critiques of the rejected pieces were passed along to the craftsmen by their respective jurors.

Financially, the show was no great shakes. Total sales for the week came to $3000, most of that going for smaller gift-type items. That's not unusual for a woodworking show, so the Mendocino organizers—never expecting to recover their $2000 in expenses from their cut of sales—charged each exhibitor a stiff $35 entrance fee. Consequently the show was paid for from the outset, and the Mendocino Association could afford to budget a decent promotional effort and even came out a few hundred dollars ahead.

But most of the exhibitors I spoke with were willing to overlook the bottom line. They rated the show a success for its less tangible and less immediate rewards. A new network of communication has been established, and some of the groups have begun exchanging newsletters. The Mendocino and Sonoma associations are working on a plan to cut bulk-mailing costs by sharing expenses, and there has been talk of similar resource-pooling in the purchase of wood and tools. Tough times, some say, bring people together.



Kathleen Maiwald's jewelry: purpleheart and ebony necklace, below, and sneaker pin, right, shown a little more than twice life-size.

From Chico . . .

Kathleen Maiwald, 30, has been making jewelry since she was in high school. Four years ago she visited a Berkeley store that specializes in exotic hardwoods, and ever since, bits and chunks of ebony, purpleheart, rosewood, honey locust and brazilwood have been showing up in her work.

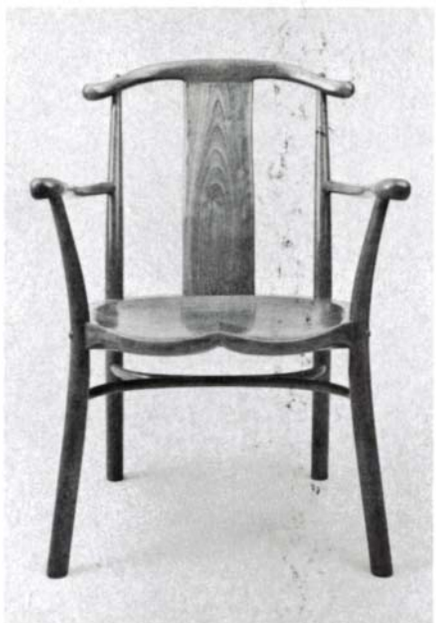
Maiwald does most of her carving using a dental engine and a selection of burrs that range from ⅛ in. down to the size of a pinpoint. After grinding out the shape of a piece, she cleans up the surfaces using sanding discs and dental stones, polishes with tripoli (which she rubs with a brush) and finishes with tung oil. "Fleur de Plume," above left, was priced at $375. It is carved of purpleheart, with ebony bands that are bordered with gold-filled wire. All of the carved parts are backed with ivory. "The Red Flapper," above right, a 1½-in. pin of brazilwood, boxwood, ebony and silver, has some of the character of a shoe that's been around the track a few times. Priced at $500, the pin was one of the more talked-about and enjoyed pieces in the show. Maiwald is a member of the Butte County Woodworkers Association, which was formed just 4 months before the show and now claims 54 dues-paying members.

From Los Gatos . . .

This tambour credenza (above and on the facing page) of Brazilian walnut and Eastern black walnut by Roger Heitzman of the Santa Cruz Woodworkers Association, would seem to have roots in the "classic" California style of Sam Maloof and Art Carpenter, but it displays a distinctive flourish in line and detail that is all its maker's. The repetition of two basic curves creates a satisfying rhythm: horizontally, there is the crown of the stretchers echoed by a parallel line sculpted in the drawer fronts; vertically, the curve of the legs extends all the way up the sides of the case and is repeated in the S-curve of the tambour pulls. Heitzman's fine sense of detail shows in the through mortises where the stretchers join the legs. Held by koa wedges, they punctuate the laminated koa stripes in the legs.

I doubt the practicality of placing the drawers under the cabinet, where they are more difficult to reach. But visually they make sense there, giving the piece a low center of gravity that supports its challenging stance. The piece is 32 in. high, 60 in. wide and 23 in. deep, and was priced at $4960.

From Petaluma . . .



Cherry chair shows the variety of design and technique that Jeffrey Dale employs.

Jeffrey Dale joined both the Sonoma and West Marin Woodworkers Associations, and this eagerness to gain skills and knowledge from every available source is reflected in his chair (left), made of cherry and priced at $950. Inspiration for the shape of the back and arms came from Gustav Ecke's *Chinese Domestic Furniture,* yet the overall look of the chair is contemporary. The legs were cut from timbers of appropriately curved grain, then shaped with a *nankin kana,* a Japanese spokeshave. The seat was dished with an adze and finished with Japanese planes.

The joinery is similarly eclectic: the splat is doweled at the top, mortised into the seat; the bent-laminated stretchers are mortised into the legs; the legs are bolted to the seat, then plugged; and the back legs have been set into the crest rail, then drawn snug with screws covered with plugs shaped like the ends of the legs. Its wide stance gives the chair stability and visual strength. Open arms invite you to sit. It was quite comfortable—37 in. high at the back, 18 in. high at the seat, 26 in. wide.

From Branscomb . . .

This sea chest by Robin Thompson is the unmistakable work of a boatbuilder. Made from local big-leaf maple that he milled himself, the chest employs a variation of the timbered-shell construction that Thompson uses in his dories. The panels in the lid are resawn to $\frac{3}{16}$ in. so that they bend easily to the compound curve of the top. They are secured to the sawn-curve frame with wood straps, held by a single copper nail at the center of each plank-end to allow for wood movement. Each of the curly maple corner caps is fastened with two 16d copper nails.

What appear to be molding strips on the front and sides, and double seams in the top panels, are actually rabbeted recesses that Thompson adds to underscore the lines of the chest and to give it a layered look. With its corner caps, exposed dovetails and nailheads, the piece may seem busy to some. But it worked for me—it looks heavy and strong, and the sense of security it gives is reinforced by the venerable tradition of marine craftsmanship that it represents. It wasn't for sale.

Thompson, a member of the Mendocino Woodworkers Association, made all the brass hardware himself. □

Michael Pearce makes furniture in San Francisco, Calif.

Current Work

West Virginia crosscurrents

by Paul Bertorelli

For the past three years, the Stifel Fine Arts Center in Wheeling, W. Va., has focused an annual show called "Crosscurrents" on a medium or materials used by the state's artists and craftsmen; this summer, the subject was wood. From the outset, Stifel director John Ellis sought a diverse show, so only two things were needed to enter: West Virginia residency and at least one object made of wood.

The juried exhibition featured more than fifty entries by twenty-seven West Virginia woodworkers. Two of the six prizes awarded went to makers of contemporary furniture, but the more traditional Appalachian crafts of basketweaving and woodcarving also garnered prizes. Jurors were Richard Kagan, a Philadelphia woodworker and gallery owner, Michael Monroe, curator of the Smithsonian's Renwick Gallery, and Robert Worth, head of the Philadelphia College of Art's woodworking department.

This bench is a bit of a departure for Bert Lustig, who is best known around West Virginia for his turned objects and wooden lamps. It's made of cherry with curly maple seat slats that suggest rolled and pleated upholstery. Lustig, of Berkeley Springs, calls this a governor's bench because it was made for showing at the National Governors Conference last year. It won a $500 second prize.

Baskets are a cooperative effort for Connie and Tom McColley of Chloe. After they break out the splints from green white oak, she weaves them into voluptuous shapes, and he provides the finely carved handles. The McColleys rely on vegetable dyes to impart delicate color gradations to the splints—oak bark for light brown, onion skins for yellow, and bloodroot for rich red. This basket, called 'Early Autumn,' is 16 in. high and was awarded a $375 prize.

Jude Binder had dancers in mind when she carved this mare out of a block of Mayan rosewood and then perched it on a base of padauk. Binder, of Five Forks, is a dancer herself, and she conceived and sculpted the 7-in. long piece while recovering from an injury. Her preoccupation with dancing figures is evident: when seen from various angles, the mare assumes subtly human anatomical proportions. It took a $375 prize.

David Barrett, of Kearneysville, won the $1,000 first prize in the Crosscurrents show for this Windsor-inspired bench made of cherry and curly maple. Barrett showed a local blacksmith a few woodworking tricks in exchange for lessons on how to forge the iron back spindles, which are friction-fitted into mortises in the 96-in. long seat. □

Phoros: Peter Marshall

Impressive show in San Diego

by Morris Sheppard

I was one of the jurors for this show, which took place at the Southern California Exposition in San Diego, and I was surprised by both the quality and the quantity of the work submitted. The large public that saw the show also seemed to be much impressed. The show was sponsored by the San Diego Fine Woodworkers Association, a new (8 months old) organization which already has about 170 members. Thirty-five of them entered more than 100 pieces, from which we chose 45 works for exhibition. A dozen years ago this would have been an impressive turnout for the entire West Coast. Now such quantity comes from a relatively small area, albeit one that enjoys a university with a respectable furniture design department. The show was organized by Chuck Masters, a local maker who manages a woodworking supply store, and Lynn Rebarczyk, president of the SDFWA. In general the work displayed solid design skills and professional levels of craftsmanship—indeed, many pieces were by artisans who work full-time making custom furniture. What a pleasure for those professionals who for years have often thought that they were members of a species about as common as the whooping crane!

Photos: © C. Quinton Kimball

Norm Ridenauer has built more than 100 chairs in the last couple of years. He measures clients with an adjustable plywood mock-up chair, so he can alter parts to fit. This chair is made of 1/16-in. veneers over 1/8-in. birch ply cores, squeezed by a compressed-air press. The parts are screwed and glued together. This design sells for $450. I found that it didn't suit my dimensions—the seat was too short—but it wasn't uncomfortable. I was more disturbed by the inward curve of the front legs, which seem to want to stand out farther.

Self-taught and in business now for five years, making his own designs mostly by commission, Ron Cunningham put about 300 hours into this 75-in. high walnut dressing mirror because he was attracted to the "elegance of that type of piece." The laminated supports trifurcate where they join the base, which contains a drawer. The mirror is priced at $4900.

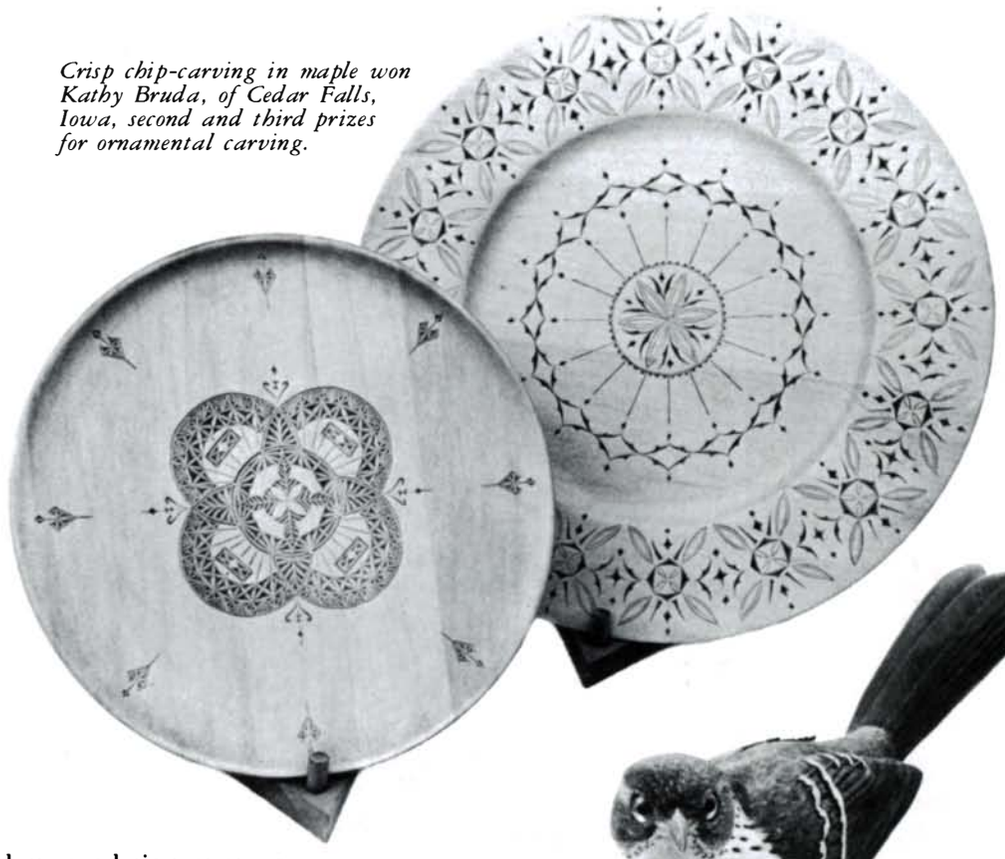
Charles Stromberg's coffee table of padauk and glass tries out an interesting concept with a nice sense of form, though his craftsmanship is uneven. The carving is fine, but the box joint at the corners is sloppily done—dovetails might have been nicer. The tabletop has the proportions of a sofa-back table, but at coffee table height it seems too narrow.

Tim Faner showed a dovetailed blanket chest of bubinga, with marquetry top made by Silas Kopf of Easthampton, Mass. Good draftsmanship and clean execution combine with a pleasing design that isn't overdone. Kopf's panel was glued to three pieces of ⅛-in. plywood and dry-bent over a form. Inside, a compartmented sliding tray maintains the high level of conception and detail.

Peter Tao's coffee table, 55 in. long and very well crafted, is a lively articulated structure which knocks down by removing wedges. Tao attached the top to the base by hand-chopping mortises in the ends of the top and in the crosspieces atop the legs. Tenons glued into the top and slot-screwed to the leg assembly allow the wood to move. □

Annual Woodcarving Show

Crisp chip-carving in maple won Kathy Bruda, of Cedar Falls, Iowa, second and third prizes for ornamental carving.



As usual, a dusty geodesic tent at the Great Mississippi Valley Fair in Davenport, Iowa, held the 16th annual International Wood Carvers Congress last August. The event attracted work from all over the country. More than 500 carvings—ranging from fishing lures to groups of human figures—competed for ribbons, purchase awards and tool prizes in 34 categories. The work, sampled here, reflects the vitality of the National Wood Carvers Association, which now has 20,000 members, united by their local chapters and their monthly magazine, ***Chip Chats.*** For more about the NWCA, write 7424 Miami Ave., Cincinnati, Ohio 45243.

Penny Miller, of Reston, Va., carves songbirds for a living. She took first prize in two categories, painted and unpainted realistic birds, with 'Chipping Sparrows' (above, foreground) and 'Brown Thrasher,' respectively. First prize for a realistic, unpainted aquatic creature went to Richard J. Landry for 'Large-Mouth Bass,' left, of walnut. Landry makes period furniture and carves game birds and fish in Auburn, Maine.