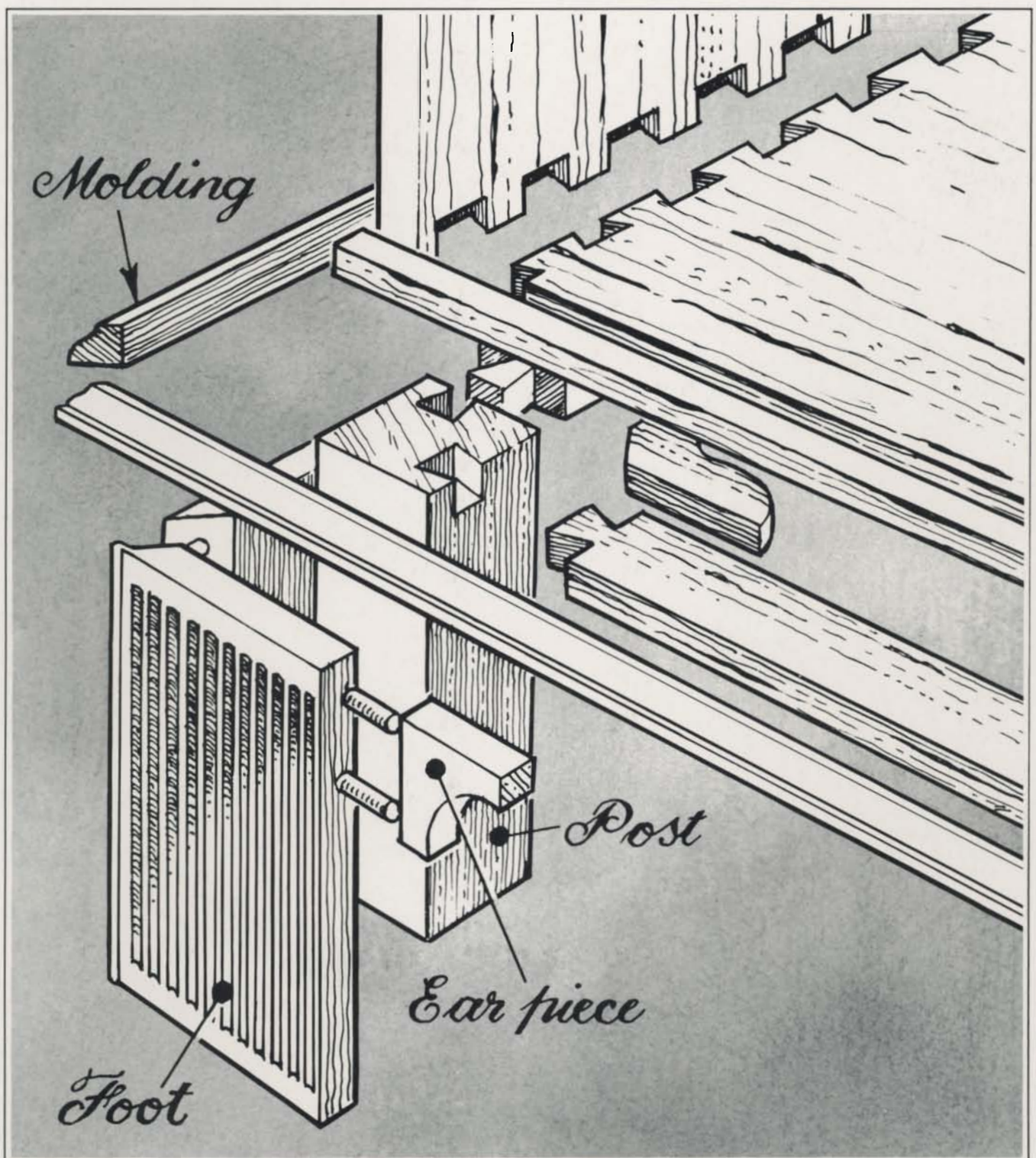
Fine WoodWorking

JANUARY/FEBRUARY 1983, NO. 38, $3.00



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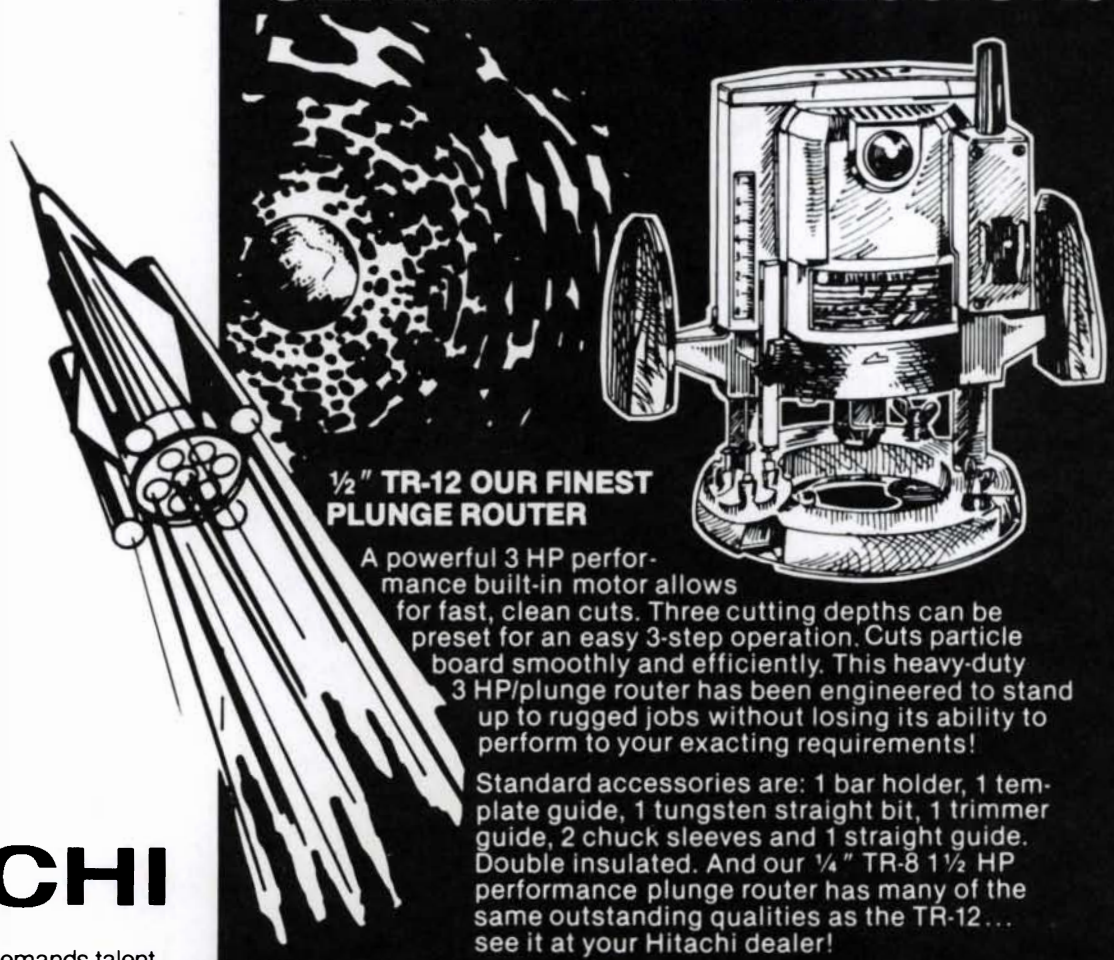

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Cover: The best way to understand period construction is to build a piece, second best is to take one apart. Furniture connoisseur V.J. Taylor of Bath, England, does both jobs, at least on paper, beginning on p. 54. In exploded drawings, he disassembles a secretaire-bookcase from the Georgian House museum, above. In the text he explains how it was made then, and how he'd reproduce it today.

Fine WoodWorking®

JANUARY/FEBRUARY 1983, NUMBER 38

DEPARTMENTS

ARTICLES

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Letters

In my 32 years of full-time woodworking I've seen many people do dangerous things with power tools. Art Carpenter, a fine craftsman I admit, is shown on the cover of *FWW* #37 (Nov. '82) making a cut on the bandsaw which, in my opinion, is dangerous. I hope none of your novice woodworking readers tries this one, it's scary.

—Bill Nolan, Munising, Mich.

ART CARPENTER REPLIES: To all woodworking students (and their shop teachers), I affirm that it is dangerous to do barrel-rolls before you can solo. And even then it is more dangerous than orthodox flying. I have as much distaste for blood on cold steel as anyone, particularly my own, and I do have all ten fingers. I found this cut to require the method shown, in the interest of accuracy and speed. The photograph does not make clear that the cut I am making is curved in plan (the stock could not be oriented alternately) and that the piece, though U-shaped, has a flat firmly resting on the table. After 30 years of daily life with the bandsaw, there are some things that can be done with confidence and competence and care which shouldn't be tried by a novice. One reader tells me he will hang the photo in his shop to illustrate horrendous practice. Excellent idea. No stunt-flying in the classroom.

As an industrial arts teacher of 24 years' experience, I found it difficult to believe what I saw on pp. 103-104 of your November '82 issue. How anyone in this day and age can allow children to work in an industrial arts shop without wearing safety glasses is beyond me.

I admire what Richard Starr has done with young children, but to allow this to happen and to write a book about it and for *you* to publish it sure makes me wonder in what age you are living. These are just the people we can teach the right way about safety from the start. . . .

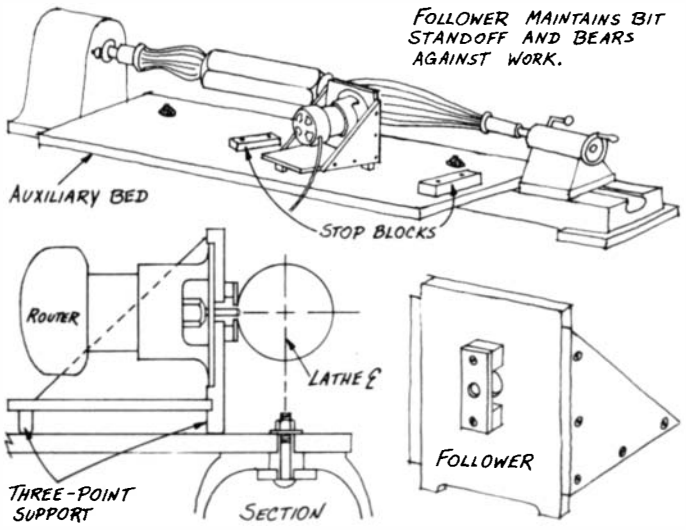
—Lawrence P. Jones, East Hampton, Ct.

RICHARD STARR REPLIES: I expect children to think about possible hazards in every job they do and to take the appropriate precautions. I believe that teaching an intelligent concern for safety is wiser and safer in the long run than devising blanket regulations. Since my students use hand tools exclusively, there are only a few operations where safety glasses are necessary. To require them where there is no reasonable risk—as when planing or boring with a brace-and-bit—would only encourage the kids to doubt the rules that do make sense.

Your article on hand injuries (Sept. '82) is very worthwhile. I have been carving and sculpting wood since I was eight years old—almost 30 years—and have developed several rules for myself to prevent injury. The worst lacerations I've suffered have been to my right index finger. I am left-handed and sustained them when the tool slipped off the work. The biggest and deepest was when I was very tired.

I never get equipment heavier than I can control physically. Bracing with vises, when possible, saves the right hand, and I wear a pliable leather glove on it when carving detail. On the motor tools, even the jigsaws, I put a foot-pedal speed control to turn the machine off instantly if it goes awry. When I use an electric rotary cutting tool with work braced in my lap, I always wear a heavy denim apron (I'd probably have several navels by now without it). Since my operation is non-commercial, I can pick times to carve when I'm relaxed—my youngest child just entered school and I foresee better opportunities ahead. Distraction by children can present a hazard for them as well as you. *—Nancy E. Hanel, Ijamsville, Md.*

In Q&A for November (*FWW* #37), I read with great interest the description of fluting and reeding turned posts with



a router, since I have had to face the same problem. Enclosed is a sketch and description of my scheme, which allows the router to directly follow the turned contour while allowing full visibility of the cutting process. The work is held stationary, using the lathe indexing mechanism, while the router is slowly fed into the work. *—Dennis Preston, Brookfield, Ct.*

In *FWW* #37, Don Carkhuff asks for advice on how to reed curved and tapered bedposts. Both repliers to his question suggest using a router but point out its limitations for this particular operation. Assuming Mr. Carkhuff is not into production work, you might care to tell him how I performed a similar operation on the reeded legs of a Sheraton-style dressing table.

I divided the legs into 12 segments, using a homemade indexing head on my 1950 Shopsmith, and did the rest of the work by hand, using three tools—a strong chip-carving knife and two gouges (#3 and #4, ⅜-in. and ½-in.). The lathe acted as a vise for the first part of the job.

With the work locked in the lathe in convenient positions, I made starting cuts with the knife along the pencil lines dividing the segments, the cuts directed toward the center of the spindle. I worked from the bead at each end toward the center. As I had left both ends of the leg square, I was able to transfer the work to the bench. The next step was to open up the cuts to right and left of the initial cut, thus starting the reeding operation. This was done by slicing with the same knife down each side, changing direction as the grain dictated, until reaching the bottoms of the reeds. The depth, of course, varied depending on the diameters of the turning along its length. Further opening up of cuts continued using the gouges instead of the knife.

The advantage of this hand method is that the increasing and diminishing diameters (and curvatures) of the reeds can be maintained, the gouging being adjusted to give a true shape the whole length of the reed. As an additional aid I scribed pencil lines around the turning at intervals. These lines tallied with sectional drawings of the completed leg, and gave the correct diameters at the bottoms of the vee between each reed pair. From thin sheet brass I cut actual-size gauges from the drawings, to check depth and roundness as the work progressed. *—Stephen R. Miller, Essex, Ct.*

It was certainly nice to see your mention of Adirondack guideboats in the lapstrake boatbuilding series by Simon Watts (Sept. '82 and Nov. '82).

Two points I beg to differ on. First, Watts states that early guideboats were made of white oak planks, beveled at the

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joints. The use of hardwoods on guideboats was reserved for the gunwales, faceplate and seats. The strakes were primarily quartersawn white pine and white cedar clear stock.

Guideboats today are very much in use and are presently being built by two masters, Carl Hathaway and Ralph Morrow, both of Saranac Lake. These two men, along with North Country Community College, have provided an excellent apprenticeship for the past two years in order to ensure the future of these magnificent craft. *—Robert Zatorski*

I must point out an editorial misstatement in my article about Chinese master craftsman Jeng Yee (Nov. '82). On p. 96 it says, ". . . Jeng uses no glue, so he must devise a single key that will hold each joint in place, usually a dowel or screw." Instead of a key in each joint, Jeng uses a single key to hold an entire construction (like a table or chair) together. Once the key to a piece has been located and removed, the whole piece can disassemble, and be assembled again.

The name of free-lance writer Joseph Grossman, of Davis, Calif., should have appeared along with my own byline.
—R. Jason Beebe, Medford, Ore.

I am having a great deal of trouble with one of your advertisers, a magazine titled *Contemporary Woodworker*. Seven months ago I sent them a $9 check for a subscription, for which I received notice that I would soon be receiving my first copy. I have heard nothing since. I have sent several letters, and I even resorted to a consumer complaint service in my local newspaper. The magazine refuses to acknowledge any contact. *—Bill Petersen, Spokane, Wash.*

EDITOR'S NOTE: *Contemporary Woodworker* magazine is published by Jerome P. Cigna, of 655 South St., Rochester, N.Y. 14620. Last winter, when Cigna printed his first issue, he obtained too few copies for the number of people who sent money in response to his advertisements. Even so, Cigna could not pay his printing bills, and thus was unable to print more magazines. Some of his customers received nothing.

Reader Petersen is among about 50 people who have written to *Fine Woodworking* wondering what's up. We spoke with Cigna on Nov. 2. When we asked why he had not answered his subscribers' inquiries, he explained that he was simply unable to keep up by himself. He said he had just persuaded his printer to release more copies of that first issue, which he planned to mail to "hopeful sources of capital" as well as to subscribers.

Cigna added that he has done the editorial work for a second issue, and is continuing his efforts to raise enough money to continue publishing. He asks his customers to be patient.

I read with considerable interest the information on veneering crotch mahogany as described in your Sept. '82 issue.

I have employed the following method successfully for many years. First, I lay up two plies of all crotches or burls or any other wild-figured wood. All this type of material contains cross-grain and grain in various combinations, and is basically unstable and subject to warping, cracking, buckling, etc. I use nothing but hot animal glue, except in rare circumstances I may use Titebond on small pieces. I shun contact cement like the plague. The powdered resin glues are too hard and brittle; also, most of them will not work with oily woods. You need a glue that will permit some movement, but a glue that will not bleed off moisture into the veneer being laid up. Apply the glue to the base material only—never apply to the veneer since this would cause it to expand,

which is what you don't want. The resin glues continue to bleed off moisture into the veneer, causing it to swell and eventually crack. Before usage, I treat all my crotch, burl or buckled veneers with a solution I make up, consisting of glue, alcohol, water, glycerin and flour. The base material for the two-ply can be any good flat, stable veneer. . . . All sliced veneers have a loose face and a tight face. When possible, lay the loose face down to the glueline. I have veneer work of this type 30 or 35 years old in perfect condition.

—Carl W. Kempf, Smyrna, Ga.

The island-workbench article (*FWW* #36, Sept. '82) includes a picture caption which reads: "Workers with limited shop space need to make use of every nook and cranny, and the island-style bench does just that." When I built my own shop in a space measuring 11 ft. by 22 ft., with a ceiling of 8 ft., I nooked-and-crannied one wall to death with floor-to-ceiling cupboards. I doubt if I comprehend fully even today just how this idea has discouraged the convenient locating of almost every stationary tool in my workshop. And I can't remember ever completing a project without at least once realizing that a badly needed plane or chisel or tack rag was securely stored behind a door completely blocked by the project or the jointer or something. Those cupboards have turned out to be a really bad idea. . . .

Most important, I swear to never again build a massive, unmovable workbench, either fixed to a wall or as an island. Thanks to mine—built to withstand the mightiest blows of your average village smithy—I have this great collection of sawhorses and other props which I use, to build everything beyond a modest jewelry box, out on the driveway or in the garage or wherever there is a little room. . . .

So despite the apparent wisdom of nook-and-cranny thinking, I am convinced it is a trap for the worker with limited shop space. Instead, the emphasis should be on portability and flexibility. Otherwise, every fixed item in the small shop can become not just inconveniently placed, but downright unsafe. Thus your companion article on Everett Traylor's portable carvers' bench is pure genius. In one reference to an adaptation of retractable lawnmower wheels, he has pointed out a heretofore unrecognized source of inexpensive retractors, and an idea for applying the lever principle to heavy-duty retractable casters. Believe me, there are entire books on workshop equipment that do not have that many good ideas between their covers. . . . I hope you can use these remarks to foster more discussion of workshop design. For the amateur and professional alike, productive time stolen for workshop improvements is too valuable to waste and too scarce to expend twice. *—Thomas H. Peer, Coracopolis, Pa.*

Every new woodworker should realize the importance of properly documenting the projects that are produced in his shop. Today's details that are seemingly incidental, such as sources of plans, sources of supplies and hardware, types of glue used and a good description of finishing techniques, as well as other pertinent information, may become invaluable ten years hence when you want to give details to a family member, duplicate a finish, etc. A rough sketch with basic dimensions should also be included. It is also interesting to look back over the resulting history of your hobby and review progress and note the various phases and areas of interest that have resulted. *—Wayne L. Draper, Houston, Tex.*

HAND INJURIES: BEWARE THE TABLESAW

The tablesaw set up to rip or fitted with a dado or molding head is the most dangerous machine in your shop. Preliminary results from the hand-injury survey we published in *FWW* #36 (about 800 people had responded by late October) show that 44% of all bad accidents occur at the tablesaw. Of the other machines involved in serious injuries, the jointer and the radial-arm saw came in a distant second and third.

Our survey asked readers to tell about the hand injuries they've suffered while woodworking, and to describe the tools and circumstances involved. In a future article, we plan to write in more detail about the results, in the hope that woodworkers can avoid some bloodshed if they know more about how and why injuries happen. Response to the survey has been greater than we had expected, with every day's mail bringing yet more horrible tales.

I spent a queasy day sorting the 800 responses, and I was appalled at the way we get chewed up by our tools, particularly by the tablesaw, which I had never considered really dangerous. Those whose reports I read obviously had learned otherwise, and their experiences are remarkably similar. Many were ripping or plunge-cutting small pieces of wood when the saw kicked the stock back, dragging a hand into the blade. Others tell of having a hand pulled into the blade by wood kicked back or lifted up when they tried to correct a skewed cut by sliding the wood back toward a gauge line. Dado and molding heads seem especially prone to kicking back when they strike a knot.

Jointers were responsible for 20% of the injuries reported. Typically, maimings occur when narrow or short boards are fed into the jointer without benefit of a push stick, allowing the knives to grab and kick the stock back, leaving nothing between finger and whirring cutterhead. A few woodworkers lost fingers to jointers or planers when they reached up the exhaust chutes to unclog chips—with the machine running.

As dangerous as it seems, the radial-arm saw was involved in only 8% of the injuries reported. When a user does make a mistake, however, the saw can quickly wreak frightful damage—of the five readers who reported amputation of all the fingers on one hand, three were using the radial-arm saw.

The bandsaw, router, portable circular saw, planer, drill press and shaper drew their share of blood, but none stood out as conspicuously as the three popular stationary power tools. And about 8% of the reported injuries involved hand tools; two-thirds of them were the result of a slip with a chisel. No doubt most hand-tool mishaps are band-aid injuries, but these weren't. The survey turned up cuts serious enough to require stitches, and half a dozen woodworkers reported nerve or tendon damage that left them with reduced motility.

If there is a common factor linking these accidents, it certainly must be carelessness. In survey after survey, woodworkers attempted an obviously hazardous operation, but many decided to chance it anyway, hoping for a time-saving shortcut. Reading the survey has fundamentally changed my attitude toward power tools. I used to think that blade guards created more trouble than they prevented, but when these questionnaires began to arrive we put the guard back on the tablesaw in our shop. I've come to see that it works, and I like it just fine.

—Paul Bertorelli

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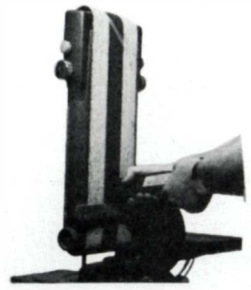

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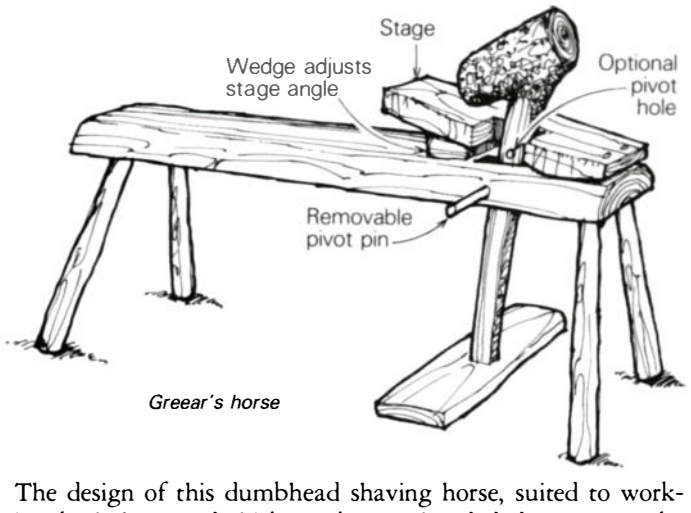
—Ray Elam, Los Gatos, Calif.

No. of spaces	Length of chord	No. of spaces	Length of chord	No. of spaces	Length of chord	No. of spaces	Length of chord
3	0.8660	28	0.1120	53	0.0592	78	0.0403
4	0.7071	29	0.1081	54	0.0581	79	0.0398
5	0.5878	30	0.1045	55	0.0571	80	0.0393
6	0.5000	31	0.1012	56	0.0561	81	0.0388
7	0.4339	32	0.0980	57	0.0551	82	0.0383
8	0.3827	33	0.0951	58	0.0541	83	0.0378
9	0.3420	34	0.0923	59	0.0532	84	0.0374
10	0.3090	35	0.0896	60	0.0523	85	0.0370
11	0.2818	36	0.0872	61	0.0515	86	0.0365
12	0.2588	37	0.0848	62	0.0507	87	0.0361
13	0.2393	38	0.0826	63	0.0499	88	0.0357
14	0.2224	39	0.0805	64	0.0491	89	0.0353
15	0.2079	40	0.0785	65	0.0483	90	0.0349
16	0.1951	41	0.0765	66	0.0476	91	0.0345
17	0.1837	42	0.0747	67	0.0469	92	0.0341
18	0.1736	43	0.0730	68	0.0462	93	0.0338
19	0.1645	44	0.0713	69	0.0455	94	0.0334
20	0.1564	45	0.0698	70	0.0449	95	0.0331
21	0.1490	46	0.0682	71	0.0442	96	0.0327
22	0.1423	47	0.0668	72	0.0436	97	0.0324
23	0.1362	48	0.0654	73	0.0430	98	0.0321
24	0.1305	49	0.0641	74	0.0424	99	0.0317
25	0.1253	50	0.0628	75	0.0419	100	0.0314
26	0.1205	51	0.0616	76	0.0413		
27	0.1161	52	0.0604	77	0.0408		

These figures are for a 1-in. diameter circle. For other sizes, multiply length of chord by diameter of circle desired.

Shaving horse #1



Greear's horse

The design of this dumbhead shaving horse, suited to working both long and thick stock, was handed down to me by some old-timers. It is made mostly from oak timbers and can be completed in a couple of days.

First split and hew a 5-ft. long, red oak log sap-side-up for the top of the bench. The heart side of a split log is harder to smooth and doesn't take the weather as well. Split the legs from an oak billet that is drier than the top, shape them with a hatchet, and mortise them into the bottom of the bench. For stability, cut or bore the mortises so the legs splay out, and use fox (blind) wedges for a tight fit. Hew the stage (the working platform) from a 3-ft. long, split oak log, and peg or bolt it to the bench at the far end. Taper the width of the stage toward the front (about 4 in.) so that the handles of the drawknife—and your fingers—have good clearance. Belly the underside of the stage in front of the pins and support its front edge with a wedge, so you can vary the working angle of the stage.

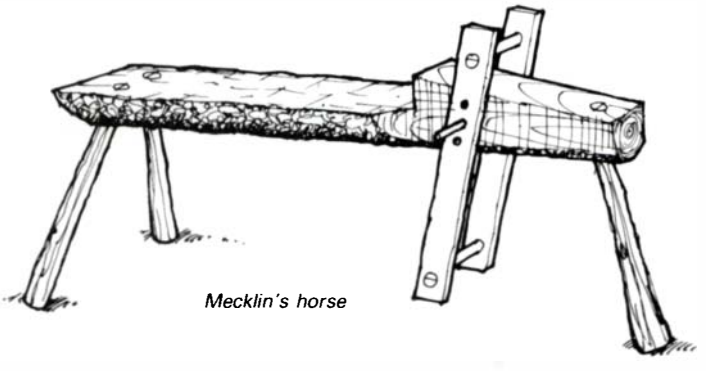
The "dumbhead" is a short section of hickory trunk with 3 ft. of limb left attached to act as a lever. Cut a mortise in the right side of the stage and hew the branch to fit it, being sure to flatten the limb at an angle so that the trunk section aligns over the stage. The fulcrum is a removable peg—you can make a series of pivot holes to adjust the horse for the thickness of your stock. Tusk-tenon a large pedal to the end of the limb.

This design is for right-handed people. Long pieces of wood, such as shovel handles, are positioned to the left of the dumbhead lever and pass comfortably under the shaver's right arm. A left-handed person would want to move the mortise for the dumbhead lever to the left side.

—Delbert Greear, Sautee, Ga.

Shaving horse #2

To make a shaving horse quickly with a chainsaw and broad ax, select a 6-ft. long hardwood log, 8 in. to 10 in. at the butt. Snap parallel lines down the log, halving the circumference. Saw kerfs down to the snap lines every 3 in. or 4 in., stopping 2 ft. from the butt end. Hew the chips out with the broad ax. Next hew out the remaining 2 ft. to act as a stage, angling it and tapering it as shown—the front of the work



Mecklin's horse

area should be less than 6 in. wide, to clear the drawknife handles. Make three 2-ft. long legs, and mortise them into the bench at an angle for stability. Now you have the basic work area shaped. It can be smoothed with adze or plane. Spend time on the work area to ensure that it is flat and true.

Traditionally, the head extends through a mortise in the work area. However, I prefer the "ladder-rung" head shown. With this setup you can work a long piece of wood unencumbered by the neck of the traditional head. Also, the ladder-rung head holds larger pieces of wood. Make the head out of two 2-ft. long 1x3s and two 1-in. dowels glued and wedged in the 1x3s. The head pivots on a ⅝-in. linchpin through the bench. Drill additional holes in the 1x3s as you experiment with the horse. If you wish, add a more elaborate pedal to the bottom of the head frame. Now you're ready to make excellent kindling. *—John Mecklin, Cherryfield, Me.*

Self-locking bench dog

Pendleton Tompkins' horizontal vise (*FWW* #28, p. 28) was an excellent suggestion. In fact, I made two vises and use them frequently to hold large pieces of plywood. However, I did not want to go to the expense and bother of installing a

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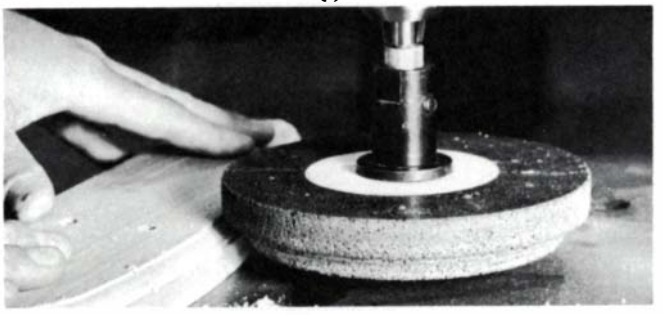
New Sanding Tool Sands Moulding



Great For Cabinet Shops!

For several years there have been a few products on the market similar to this wheel. When I evaluated these other products a few years ago, I found several shortcomings: burning of the workpiece; difficulty to shape; rapid wear; a $45.00 price tag; too coarse a finish; and, disproportionate wheel wear requiring constant re-dressing. I'm happy to report that Cratex has solved these problems and has developed a Silicon Carbide-impregnated wheel I can highly recommend.
You can sand just about any moulded edge with this wheel, simply dress the wheel to the shape of the moulding and run the moulding by the wheel. You can rough-dress the wheel by plunging the sharp edge of a cut-off piece of the moulding into the wheel. Fine detail dressing can be accomplished with a hard piece of steel (a sharpened file tang works well). Once you've dressed the wheel (check with a pencil mark across the detail), you can sand for hours without further dressing. We recommend 1750 RPM. Higher speeds will also work well. Wheels are stackable for thick mouldings. 6" dia. x 1" thick x 1" arbor hole with bushing to 5/8".

		Each	Each for 5 or more
225-001	*Fine 6" x 1" Cra-Pol Wheel*	$29.15	$24.15

Flat Head Tapered Plugs

Tapered plugs fit snugly into drilled holes. Head is oversize, bottom is undersize. Price per package of 100 plugs.

			Per Pkg.	Per Pkg. for 10 pkg. asst.
110-005	3/8"	Birch	$2.65	$2.15
110-006	1/2"	Birch	$2.65	$2.15
110-007	5/8"	Birch	$4.55	$3.65
110-008	3/4"	Birch	$6.75	$5.40
110-022	1"	Birch	$8.15	$6.55
110-023	3/8"	Oak	$3.65	$2.95
110-024	1/2"	Oak	$3.65	$2.95
110-025	3/8"	Cherry	$5.15	$4.15
110-026	1/2"	Cherry	$5.15	$4.15
110-027	3/8"	Walnut	$4.85	$3.90
110-028	1/2"	Walnut	$4.85	$3.90
110-029	3/8"	Mahogany	$5.15	$4.15
110-030	1/2"	Mahogany	$5.15	$4.15

Oval Head Buttons

Head is approx. 1/8" larger than tenon diameter. Tenon diameter listed below. Price per pkg. of 100 buttons.

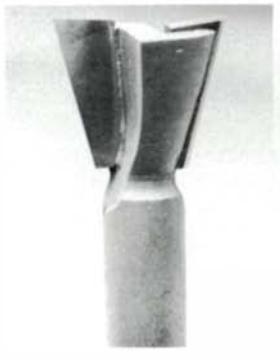
			Per Pkg.	Per Pkg. for 10 pkg. asst.
110-009	3/8"	Birch	$3.00	$2.40
110-010	1/2"	Birch	$3.00	$2.40
110-011	3/4"	Birch	$9.90	$7.95
110-012	1"	Birch	$12.90	$10.35
110-013	3/8"	Oak	$4.45	$3.60
110-014	1/2"	Oak	$4.45	$3.60
110-015	3/8"	Walnut	$5.65	$4.55
110-016	1/2"	Walnut	$5.65	$4.55
110-017	3/8"	Cherry	$5.65	$4.55
110-018	1/2"	Cherry	$5.90	$4.75
110-019	3/8"	Mahogany	$5.25	$4.55
110-020	1/2"	Mahogany	$5.65	$4.55

Cord Reel

Puts Power Where You Need It

Instead of dragging out 3 different extension cords, you can now unreel one power cord and plug in up to 6 different tools. And should you start to overload the 14 gauge cord, a resettable circuit breaker trips right at the job site. No more walking around to the fuse box. When you're done, simply roll the cord back into the reel, pick up the unit by the top handle and put it away.

177-001 *Cord Reel* $24.95



For Big Dovetails

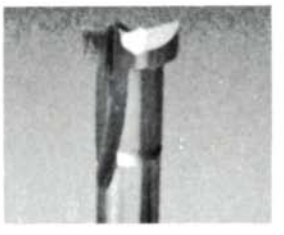
The classic dovetail joint is extremely strong and quite beautiful. This 1" carbide dovetail bit is unusual in that it cuts dovetails twice as big as the standard 1/2" cutters. 1/2" shank for extra strength.

132-052 $49.50

Use Splines Instead of Dowels

A 3-wing carbide-tipped cutter for cutting 1/4" wide x 1/2" deep grooves for splines. Splines are used extensively for aligning edge-glued hardwoods and will not cause splitting as dowels often will. Ball bearing pilot eliminates burning. 1/4" shank.

132-038 $29.90



Framer's Bit

This high speed steel keyhole bit is designed to cut the hanging keyhole on the back of a picture frame or plaque, eliminating screw eyes and picture frame wires. Plunge the bit in and it bores a 3/8" hole, push it forward and the bottom stays at 3/8" while the top of the slot is only 3/16" wide, forming a lip. 1/4" shank.

132-054 $15.50

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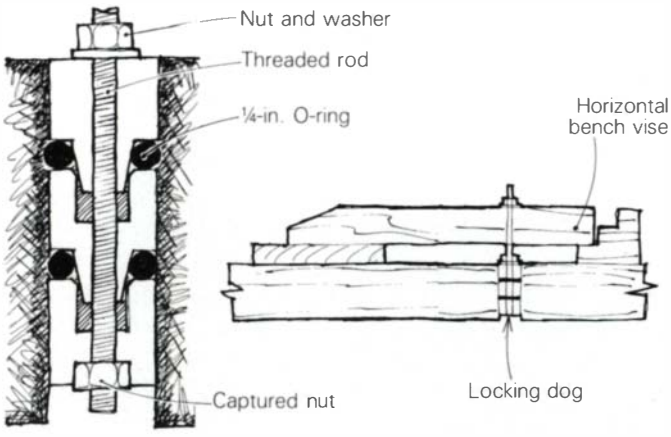
bench-screw nut to the bottom of every bench-dog hole. I solved my problem by making a pair of self-locking bench dogs as shown below.



To use the dog, I drop it into a dog hole and tighten the nut on top to compress the O-rings and make them bear against the side of the dog hole. Then I place a vise jaw over the threaded rod and tighten it in place with another hex nut. The O-rings provide enough friction so that the bench dog does not slip up as the vise is tightened.

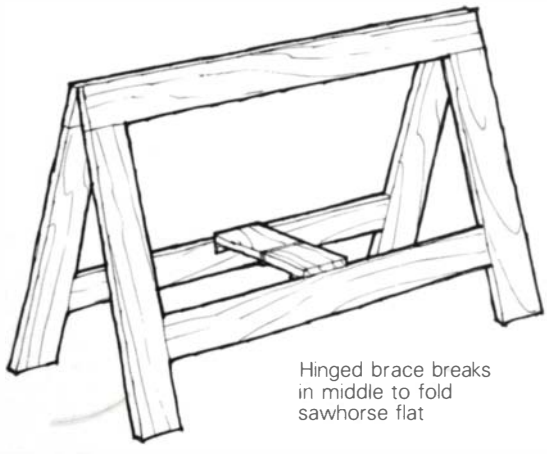
—William A. Rolke, Ft. Lauderdale, Fla.

Portable sawhorse

This sawhorse design doesn't look very strong, but it will stand up to all but the most demanding jobs. Because they are light and fold flat, the horses are perfect to take along to the job site. You'll wonder how you put up with those awkward 2x4 sawhorses for so long.

I used white pine for all parts, and doweled the joints. You could certainly make a stronger horse by using oak or maple and joining parts with mortise and tenon. After three years of service, however, my dowel joints are still tight. Make sure the hinges don't stick up above the top rail of the sawhorse, and be careful not to cut into the hinges when you work.

—Brad Schwartz, Huntington Beach, Calif.



Improved tusk-tenon joint for bed frame

The traditional tusk-tenon joint is well suited to joining bed side rails to headboard and footboard in all respects save one—the protruding parts are real shin-kickers. To overcome this problem, I designed an internally wedged joint which is no more difficult to make and works quite well. From the

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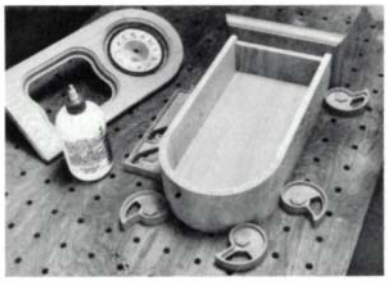
Clamps Any Shape Or Size

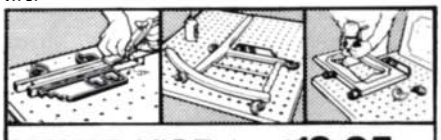


This ingenious patented clamping system solves holding problems for nearly every workbench operation. The vise clamps any size or shape workpiece firmly to your bench for planing, sawing, sabresawing, routing, drilling, jigging, dowelling, gluing and assembly.

Each vise contains four cams, a special fence with pins and a template. By drilling ⅜" holes 2" on centers a clamping bed of any size can be made on your work surface. It performs on any bench, sawhorse, or hobby board, and adds capability to portable benches. Requiring hand pressure only, and no bolts or screws, it can be mounted and removed in seconds.

This versatile tool functions 360° on your workbench eliminating "C"-clamps and nailing down. It clamps both workpiece and pattern for routing and is perfect for gang operations. Since components project less than ¾" above the bench surface ¾" stock can be worked with tool clearance.

For greater shop flexibility we suggest you order two.



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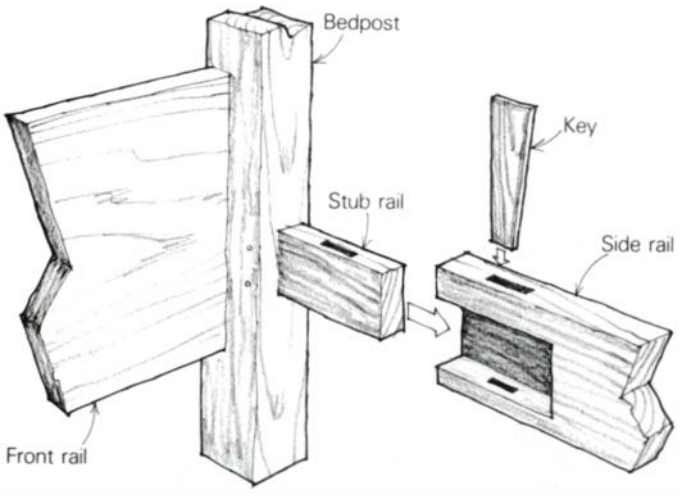


outside you see only the ends of the key. The secret of the joint is a stub rail mortised into the bedpost, pinned through the cheeks for strength. The stub rail fits into a short slot cut in the back of the bed's side rail. There it is locked in place by a key driven in from the top.

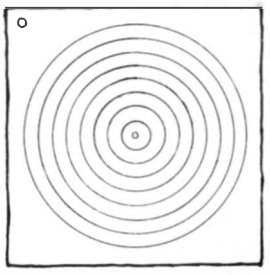
—Stefan During, Texel, Holland

Sharpening a wire wheel

If you use a wire wheel to remove rust from old tools, you know how soon the bristles bend over and lose effectiveness. Reversing the wheel helps, but just before you do this, run the wheel against a coarse grindstone. This puts a chisel edge on the wires that really cuts fast.

—Mark A. Latour, Saint John, N.B., Canada

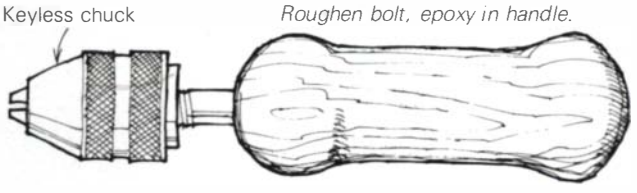
Centerfinder for woodturners



This Plexiglas centerfinder will be useful to woodturners who split odd-shaped workpieces from the log. To make the gauge, first mount a piece of scrap wood to the faceplate and trim it to a round disc. Now attach a piece of ⅛-in. thick clear Plexiglas to the scrap-wood disc and scribe a series of target-like circles into the face of the Plexiglas through its protective paper. Drill a center hole to fit your favorite scratch awl. To complete the gauge, spray the grooves with a colored enamel, drill a hang-up hole in one corner and remove the paper. To use the gauge, hold it on the end of irregular stock and adjust it until the largest possible circle falls completely over wood. Then mark the center.

—Nels Thogerson, Ames, Iowa

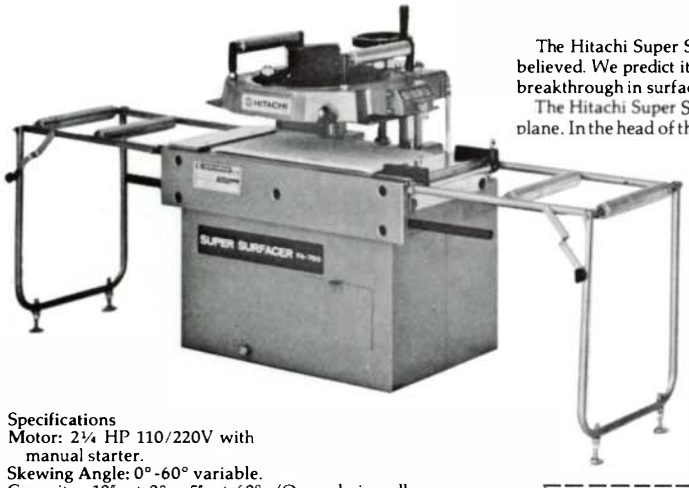
Hand drill



I made this tool ten years ago for holding cut-off Allen wrenches. Since then I've found several other uses for it and I use it often in my workshop. I haven't seen a hand drill this

The Hitachi Super Surfacing Machine

Finally a machine to relieve the drudgery, dust, and expense of sanding, exclusively sold and serviced by Conover Woodcraft



The Hitachi Super Surfacing Machine is absolutely incredible and really has to be seen to be believed. We predict it will take the woodworking world by storm because it offers an economic breakthrough in surfacing. It eliminates about 80% of all sanding.

The Hitachi Super Surfacer uses modern technology and a very old principle—that of a hand plane. In the head of the Super Surfacer there is a 10" wide carbide iron, bedded at 45°.

Unlike a plane, it is the wood that moves at the incredible rate of 213' per minute while the iron is fixed.

A big advantage of the Super Surfacer is that it takes such a light cut that there is no perceptible change in dimension of the stock. Frames and carcasses can be cleaned up, dry assembled, and then run through the Super Surfacer just before glue up. The only thing left to sand is end grain.

The maximum width of stock that the machine will handle is actually double the width of the iron because the head is open on one side. The Super Surfacer will cut against the wildest of grains with impunity, so the actual width of stock is 10" to 20" depending on the amount of skewing in the head. Roller tables at either end allow the machine to handle the longest of lumber, while very short pieces can be passed with ease. Four quarter pieces only 6" long are no problem.

Specifications
Motor: 2¼ HP 110/220V with manual starter.
Skewing Angle: 0°-60° variable.
Capacity: 10" at 0° - 5" at 60°. (Open design allows doubling of capacity.)
Feed: Endless rubber belt. 213 ft./min.
Dimensions: 74-1/2 long x 19-5/8 wide x 29-3/4 high
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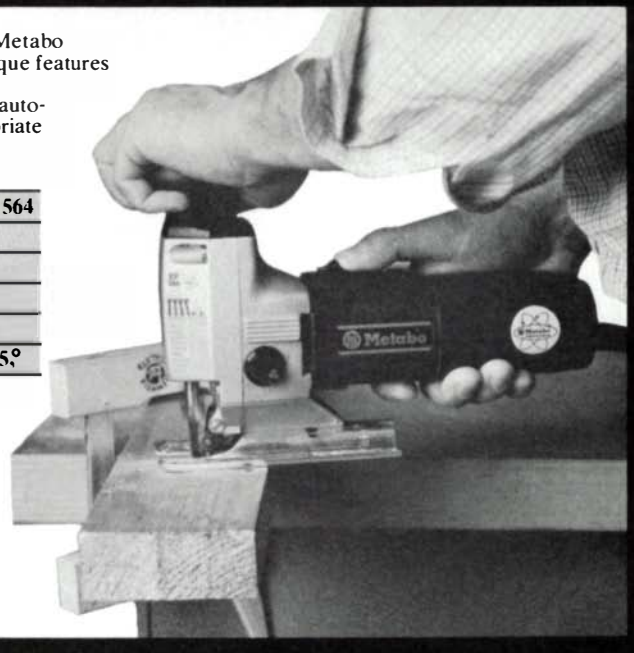
It's no puzzle. The jig saw to buy is Metabo.

The new Metabo jig saws are cutting their way through the competition. Metabo has combined the most useful elements all jig saws possess with several unique features of their own to build the best tool in the trade.

The Metabo EP 564, an electronically-controlled orbital jig saw, utilizes automatic electronic speed stabilization so you always cut at the speed appropriate to the material, and there's no need to adjust the speed while cutting.

Compare. The jig saw to buy, is by Metabo!

	BOSCH 1578	**METABO EP 564**
Input Wattage	320	**500**
Output Wattage	165	**310**
Efficiency	51.5	**62**
Stroke Strength	63.5 w/KG	**129 w/KG**
Click Locking Facility on Base Plate	NO	**0,° 15,° 30,° 45°**



Here are some other outstanding features of the Metabo jig saw:
● Grooved supporting roller prevents the saw blade from deviating sideways or backwards. ● Cooling fan air flow is diverted to dispense sawdust and keep your guidelines clear. ● Strokes are adjustable from 500 to 3000. ● Wood can be plunge cut, and no pilot holes are needed on pocket cuts. ● Cuts wood to depth of 2⅜," nonferrous metals to ¾," and steel to ¼." ● Ribbed clamping pads allow stationary use of the saw when it is clamped in a vice.

The Metabo EP 564 is equipped with dust proof and maintenance-free ball bearings, and the blades are interchangeable with AEG/Bosch. (D5-FW-EP564) Regularly $239.00. Special introductory price $220.95 ppd.

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Punkin Hollow WOOD and TOOL

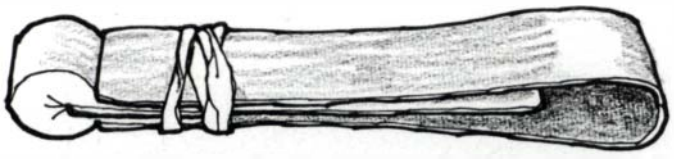
size, available commercially, but it is easy to make. Smaller versions are available as pin vises. Some uses are:

—a holder for sharpening small drill bits.
—a handle for needle files.
—a leather or scratch awl (chuck a sharpened nail).
—a handle for hex screwdriver bits.
—deburring wood or metal holes (chuck a countersink).

And, in its primary use as a hand drill, for a few shallow holes it is easier to use than a power drill.

—Robert J. Harrigan, Cincinnati, Ohio

Disposable foam brush



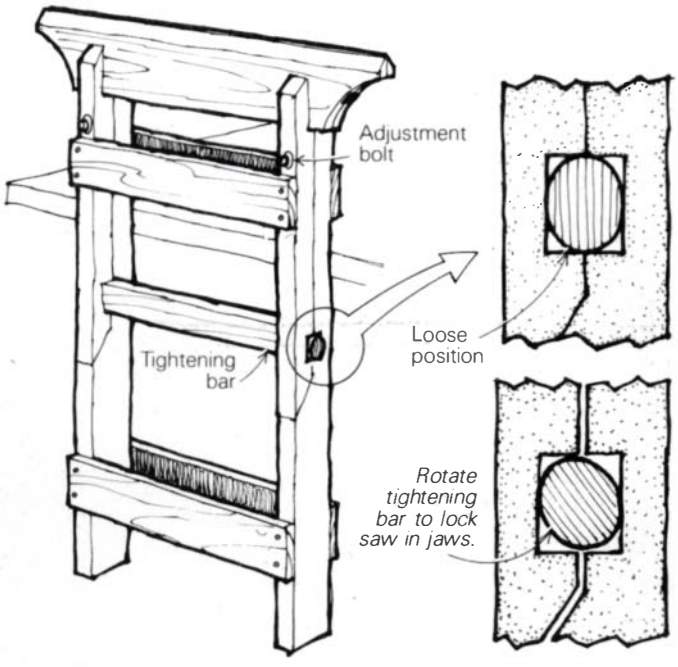
I use this homemade foam brush with its disposable insert on those little oil-finish or paint jobs where it is more work to clean a brush than to do the job.

I fold ½-in. thick foam carpet padding around the end of a 1/32-in. aluminum stiffening strip, and clamp it with a rubber band in an aluminum holder. After the job is done, you can throw away the foam and wipe off the aluminum.

—Harry M. McCully, Allegany, N.Y.

Saw-sharpening stand

For those who prefer to sharpen their own handsaws, this sharpening stand is a winner. A wooden tightening bar, worked to an oval at both ends, wedges the stand's jaws shut on the sawblade when turned. The two adjustment bolts near the saw holders act as pivots. They should be tight enough to hold the saw in place before the tightening bar is turned. I'm 5 ft. 8 in. tall and the 44-in. height is comfortable for me.



When you sharpen, you normally have to maintain two different angles: tilting the file up in the air a little, and also angling it toward the tip of the saw. Here's a trick: Instead of

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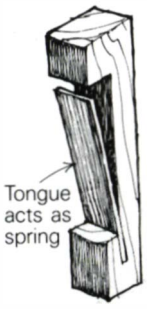
worrying about both angles, just tilt the saw stand so that it leans against the bench. Then you can concentrate on the angle toward the tip while you hold the file level.

—Brian Johnson, Sacramento, Calif.

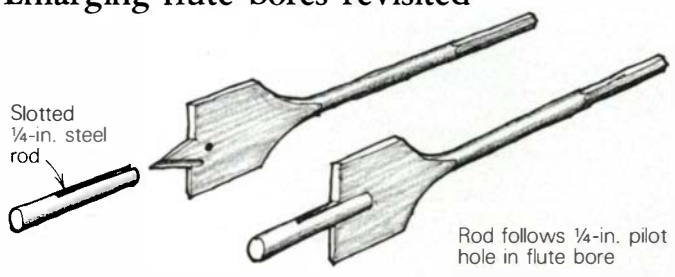


All-wood bench dogs

Here's a simple, inexpensive way to make bench dogs of wood, including the spring. First cut the dog to shape, as shown in the drawing at left. Then saw a kerf at the lower end of the dog and insert a wooden tongue of the same thickness as the sawcut. Simply press the tongue into place, don't glue it. When it breaks, it will be easy to replace.

—Michel Petrin, Ste-Marie Salome, Quebec

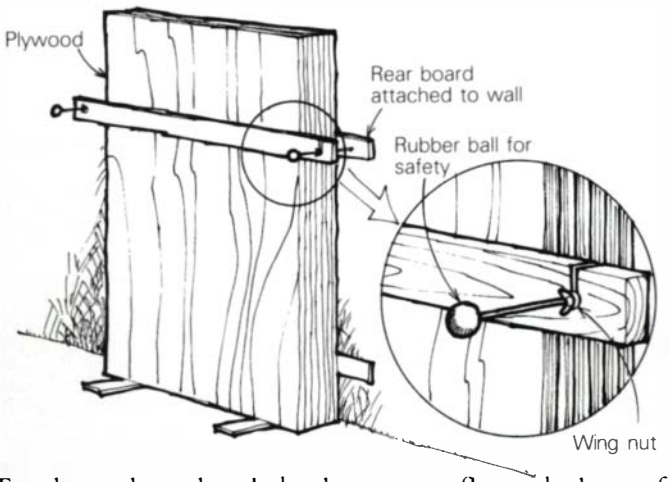
Enlarging flute bores revisited



Here's my variation on the method Vasco Pini uses to enlarge the bores of flutes (*FWW* #35, p. 16). First drill a pilot hole through the flute blank with a ¼-in. shell auger. Then construct a follower bit by cutting a slot in a short length of ¼-in. rod and slipping it over the tip of a spade bit. The rod will follow the pilot hole and the spade bit will self-center.

—Bob Vernon, Keuka Park, N.Y.

Plywood rack



For those whose shop lacks the space to flat-stack sheets of plywood, here's a vertical rack that will neatly contain the sheets and prevent the warping that results from merely leaning the sheets up against a wall.

—Bruce Bozman, Addison, N.Y.

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Quick Tips

Like short ends of wood, good woodworking tidbits pile up under the editorial workbench. We've opened this new department to be able to pass them along to you.

Before I strip the finish from a piece of old veneered furniture, I do any necessary veneer repairs. Then when I strip, color from the old finish stains the patch and blends it into the old wood. *—Don Teach, Shreveport, La.*

I dry green-wood bowls in my microwave oven, which heats the water clear through the wood and causes it to steam from the pores. I remove the metal faceplate and screws from the bowl, then set the oven on a low to medium setting, and run one minute on, one off, for about ten minutes, letting the moisture out of the oven from time to time. Bowls will change shape about as much as they would in air-drying, but I haven't had any crack yet. *—Robert Kick, Houston, Tex.*

Automobile engine valves make nearly indestructible rod stock for special punches or screwdrivers, or smooth burnishers for scraper edges. *—Robert Vaughan, Roanoke, Va.*

To make a really good disc sander, glue coarse and fine discs to an old flat-sided, fine-tooth sawblade and mount it on the tablesaw's arbor. For safety, use a bench grinder to remove the teeth, then true-up on the arbor.
—Stan Haywood, Sylvan Lake, Alta., Canada

I balanced my bandsaw's wheels the same way I balance motorcycle wheels, by wrapping solder around the spokes where needed. *—Jim Hassberger, Richland, Wash.*

To reproduce a large turning, I took a slide photo of the object with a rule laid out next to it. I projected the slide onto a piece of paper, and moved the projector back and forth until the rule was the right size, then traced the image. To minimize distortion, make sure that the camera is level with and at right angles to the object. Also, the longer the lens, the less distortion there is. *—Jeff Stubbs, New Ipswich, N.H.*

For an extra-long clamp, thread the ends of two pipe clamps and join them together with a pipe coupling.
—Murray Godfrey, Moncton, N.B., Canada

When repairing knot holes and the like, I use auto-body filler tinted with dry colors and oil colors. It sets up quick and hard, doesn't shrink, and can be shaped with woodworking tools—Surforms work particularly well, especially before the filler has cured completely. Be sure to use a filler with red catalyst, not blue. *—Pope A. Lawrence, Santa Fe, N.Mex.*

I had to edge-band some fancy-veneer plywood and didn't have veneer to match, but I managed to use the plywood veneer itself to do the job. I cut a strip of the plywood and glued its veneer side to the edge, then carefully removed the "waste" until I reached the back side of the veneer. Tricky work, but the job came out fine.
—George Ross, West Vancouver, B.C., Canada

We use playing cards for shims when making fine adjustments on setups and jigs. "Bicycle" brand cards are 0.011 in. thick—you can bet on it. *—Edward F. Groh, Napierville, and Charles E. Cohn, Clarendon Hills, Ill.*

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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	4½x9¼" Finish Sand., Dustless	160	110
3608B	1 H.P. Router	118	82
3601B	1 1/4 H.P. Router	196	130
3600B	2 3/4 H.P. Plunge Router	299	190
3700B	Trimmer 1/2 H.P.	124	85
6510LVR	3/8" Rev. Var. Speed Drill	109	68
DP4700	1/2" V.S.R. Drill 4.8 AMP	142	95
6010DWK	3/8" Cordless Drill w/case	142	84
6012HDW	3/8" Cordless 2-Sp. w/cl. Drill	164	115
4200N	4 3/8" Circular Saw	138	92
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#0	8"	4½"	15.97	10.50	56.70
#1	10"	6"	18.25	11.95	71.70
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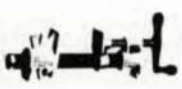
#6220	20'	62.32	40.95	221.13
#6225	25'	67.34	42.95	231.93
#6230	30'	72.39	45.95	248.13



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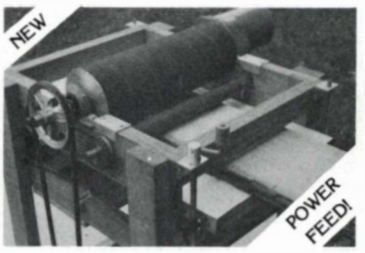

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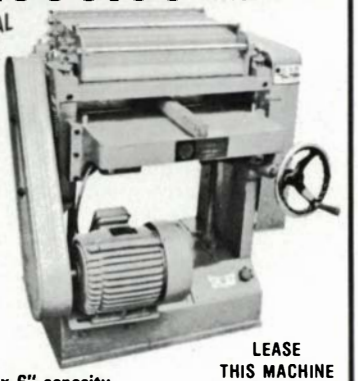

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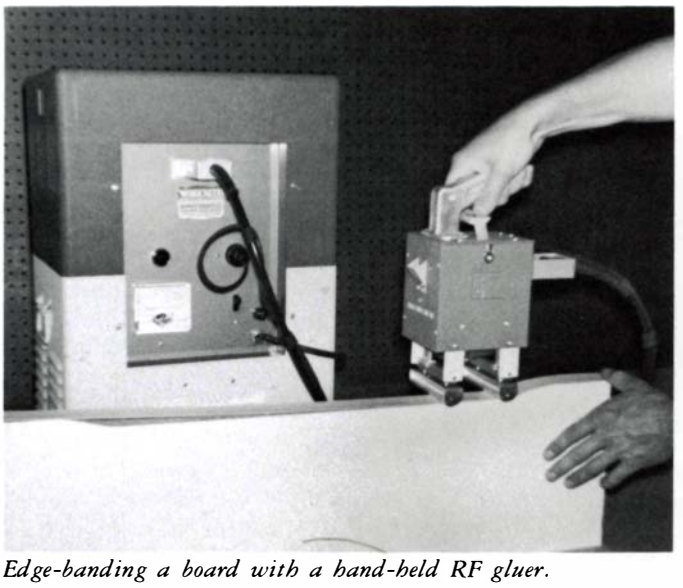
Radio-frequency gluing—*In an article on building a wooden stripper canoe (*FWW *#35, p. 76), the authors used a tool called a high-frequency wood welder to instantly cure glue without the use of clamps. What is this tool and how does it work? Are hand-held units manufactured for small-shop use?*

—James D. Francis, Belfair, Wash.



Edge-banding a board with a hand-held RF gluer.

The method you are referring to is called radio frequency or dielectric gluing. In principle, it works like a microwave oven: Glue is applied to the joint, and the joint is closed up in the normal way and then rapidly cured by exposing it to a concentrated field of radio-frequency energy. When the field strikes the moist glue, it causes the glue molecules to bounce around at great speed, generating friction and thus heat that cures the glue almost instantly.

Dielectric gluing has been used since about the end of World War II, mostly in furniture and millwork factories where the relatively high cost of the equipment is justified by faster glue-ups and the lack of need for space-consuming clamping rigs. Industrial dielectric gluers are large, stationary machines with conveyors that feed the glued-up stock in one side and out the other, fully cured in a few moments.

Small, hand-held units are available, but they aren't cheap. Workrite Products Co., 1315 S. Flower St., Burbank, Calif. 91502, manufactures three sizes of dielectric glue tools. The smallest, shown above, intended for cabinet shops, will cure glue in wood up to ¾ in. thick and costs $1,695. Two larger Workrite tools cost $1,895 and $2,229, and these will cure glue in wood 1½ in. and 2 in. thick, respectively. All three tools consist of handgun-mounted electrodes connected by a cable to a small cabinet housing the RF transmitter. To use a dielectric gluer, you apply glue to the parts and clamp them temporarily. Pressing the electrodes against the glueline at 6-in. intervals "spot welds" the glue so the clamps can be removed and the rest of the glue left to cure normally. Or, if the glueline isn't too long, it can be cured completely by exposing it to RF along its entire length.

Any water-based glue can be cured dielectrically, though urea-formaldehyde (powdered plastic resin) glues are most commonly used. White and yellow glues will work, but they are thermoplastic not thermosetting, so clamps must be left in place until the glueline has cooled and hardened.

Using water on oilstones—*I have been sharpening my tools with a Norton multi-oilstone and the standard oil bath. Will I encounter any problems if I use water instead of oil with these stones? Also, are these stones suitable for sharpening Japanese chisels and plane irons?*

—J. Crawford, San Diego, Calif.

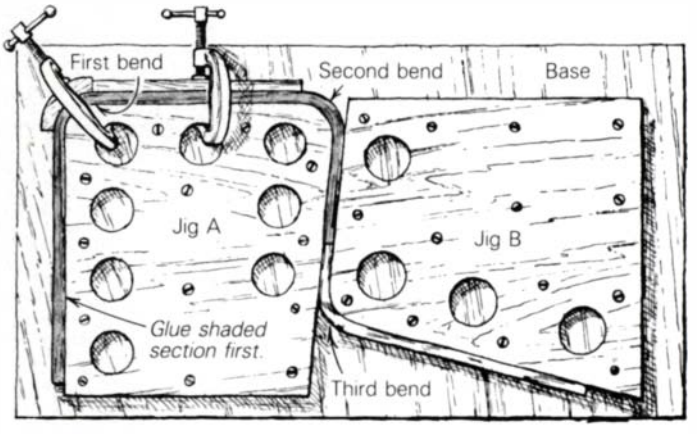
PATRICK CULLEN REPLIES: You can use water instead of oil with no initial lessening of sharpening efficiency. Eventually, though, your stones will glaze over because water is less effective than oil at keeping the small metal particles that are cut away by sharpening from clogging the stones' surface. Glazed stones can be restored by hand-dressing on a flat, cast-iron surface. Spread some 90-grit silicon-carbide abrasive on the cast iron and work the stones over the surface, taking care to keep them flat. Oil, however, is the recommended lubricant, and mineral oil is the best choice; motor oil will eventually gum up the surface of the stone. [Patrick Cullen is an industrial engineer with Norton.]

TOSHIO ODATE REPLIES: You should use Japanese waterstones to sharpen Japanese plane irons and chisels. I have tried to sharpen my tools on oilstones, but the steel used in Japanese tools is too brittle and the oilstones are too hard, making it difficult to achieve the sharpest possible edge. Waterstones are softer, so as the steel is honed, it wears away the stone's surface, forming an abrasive paste or slurry that is continually replenished as sharpening continues. The very fine particles in the slurry hone the brittle steel to a fine edge not possible with oilstones. [Toshio Odate is a sculptor and maker of traditional Japanese sliding doors called *shoji* (*FWW* #34, pp. 50-58).]

Form-laminating chair legs—*I am planning to make a chair with legs shaped roughly like a squared-off question mark. I want to laminate the legs, but I'm not sure how to make the forms or in what order I should make and glue the bends. How should I proceed?*

—Ettore Zuccarino, Deerfield, Ill.

TAGE FRID REPLIES: First, make up a two-piece jig to fit the shape you want to laminate, as in the drawing, and screw it



to a plywood or particleboard base. Make the space between the two jig parts exactly the thickness of the lamination and cut holes in the jigs for clamps. A few coats of wax on the jigs and the base will keep the laminae from sticking to them. I would use wood as thin as possible so you won't have to steam it, veneer 1/10 in. thick would be fine. You can get it from Chester Stem, 2710 Grant Line Rd., PO Box 69, New Albany, Ind. 47150.

To make the leg, remove jig **B** and apply glue to all the laminae shown in the shaded area of the drawing. For the time being, the rest of the lamination will be straight. Clamp the leg on the top of jig **A** first, make the first and second bends, and put clamps down each side of the jig. At the bends, make up a curved caul whose inside radius matches

the outside radius of the bend. Make the caul flat on the outside so the clamp will have a solid bearing surface. Use as many clamps as you can and make sure you have good, tight gluelines. After the first glue-up has cured, remove the leg from jig A and apply glue to the rest of the laminae, using compressed air or a vacuum cleaner, if necessary, to force it between the pieces. Then put the leg back around jig A, screw down jig B and make the third bend. Remove jig A and clamp the leg, starting at the point where you applied fresh glue. A clamp somewhere along the straight section of jig B will hold the leg in place temporarily while you remove jig A and set the rest of the clamps. I suggest you use a slow-curing glue such as urea-formaldehyde. [Tage Frid is a cabinetmaker, educator and author. For more on bending and jigs, see *FWW* #14, p. 48, and #30, p. 84.]

Formaldehyde in particleboard—*In an article that appeared in* FWW *#29 (p. 76), the problem of formaldehyde vapor being released from particleboard was mentioned. I plan to use particleboard for flooring in my home, and I want to know if there are any sealants that will stop vapor emissions. And if so, will they affect any subsequent finish I put on the floor such as wax, varnish or tile?*

—Christina Pierce, Hayfork, Calif.

GEORGE MYERS REPLIES: Some panel products, particleboard among them, do emit formaldehyde gas, and though there is debate about the long-term effects of exposure to this chemical, it is known to cause physical discomfort such as eye and throat irritation, headaches, skin problems and other distresses. At least two companies make sealants designed to keep the formaldehyde inside the particleboard, although neither is endorsed by the Forest Products Lab. Chemical Products Development Corp., PO Box 283, Oklahoma City, Okla. 73119, makes a polymer coating in clear and colored mixtures. Mortell Co., 550 North Hobie Ave., Kankakee, Ill. 60901, sells a clear latex varnish called Hyde-check. Both can be applied with brush or roller, and other finishes can be put over them.

Aging particleboard in a warm, humid place for weeks or months before it's used will drive off some formaldehyde. An attic or covered shed exposed to sunlight and with a high ventilation rate should work. Stack and sticker the boards or stand them against a wall so air can circulate freely. Ordinary household ammonia, which acts as a formaldehyde scavenger, can further reduce outgassing. Paint it on the boards and let it dry. Be sure to work in a well-ventilated area. If possible, coat the particleboard with sealant following the aging and ammonia treatments. Formaldehyde levels in the room can be further reduced if there is good ventilation both inside the room and, if possible, below the floor joists. Finally, you can avoid the problem almost entirely by using plywoods, most of which are glued with phenol-formaldehyde adhesives. This glue emits far less gas than the urea-formaldehyde adhesives used for most particleboards. [George Myers is a research chemist at the U.S. Forest Products Laboratory in Madison, Wis. For more information on the hazards of formaldehyde, write the Formaldehyde Institute, 1075 Central Park Ave., Scarsdale, N.Y. 10583, or the Center for Occupational Hazards, 5 Beekman St., New York, N.Y. 10038.]

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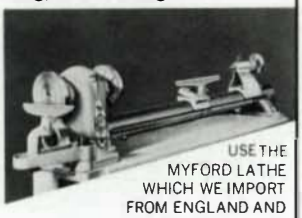

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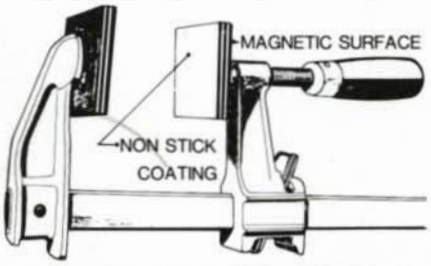

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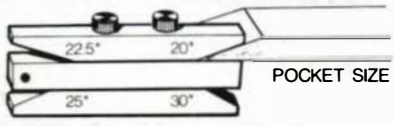

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and it looks beautiful for two or three hours but then gets tacky. Lacquer sanding sealer has given better results, but it too turned tacky. Any suggestions?

—William Bauernfeind, Downey, Calif.

I am making a small mat-cutting tool out of sandalwood. I know it's a very aromatic, oily wood. It looks good unfinished, but should I use any wax or oil to keep the wood from being stained when the tool is used?

—Tom Barnard, San Clemente, Calif.

DON NEWELL REPLIES: The tackiness is caused by the natural oils or resins in the wood itself. Dissolved by alcohol during French polishing or by lacquer thinners when you apply the sealer, these oils migrate into the finish and soften the surface film. Solution: remove the oil before you finish your turnings. I'd wash the wood thoroughly with lacquer thinner, leaving it sit wet for a few minutes. Dry the surface well with paper towels, which will actually pull the solvent away from the wood, bringing dissolved oils with it. Repeat the process and let the turning dry for an hour before you apply your finish. Be sure you have good ventilation and don't smoke—lacquer thinner is very flammable. [Don Newell is a former paint and varnish chemist.]

WAYNE JACINTHO REPLIES: I have two ways to keep sandalwood looking and smelling fresh. The first is to apply two thin washcoats of shellac (orange or white) diluted one part 3-lb. or 4-lb. cut shellac to five parts alcohol. This will protect the wood and yet still be permeable enough for that wonderful aroma to seep through. If the grain raises, cut the whiskers down with 220-grit sandpaper. I use shellac for the insides of drawers and for small boxes. For a tool, which will be handled frequently, you might be better off with the second method: no finish at all but periodic buffing with fine steel wool to remove dirt, skin oils and oxidized wood. [Wayne Jacintho works wood in Kauai, Hawaii. He wrote enthusiastically about sandalwood in *FWW* #37, p. 48.]

Aging cedar—*I'm making a picture frame out of new cedar, and I'd like it to have the silver-grey color this wood gets after aging in the weather. Is there any way I can speed up this process to get the color I want?*

—Lewis S. Farinholt, Kenner, La.

GEORGE FRANK REPLIES: To achieve the color you desire, begin by soaking the cedar in a concentrated solution of lye before you cut the frame parts to final size. This will wash out all the sap and chemical impurities in the wood; using a stiff brush with the lye will speed this up, but protect your hands with rubber gloves and wear eye protection. Wash off the lye with clear water and let the wood dry slowly. Then expose the wood to sunlight or even a suntan lamp for as long as possible, weeks or even months if you can.

Next coat the wood with freshly slaked lime and then remove all the lime you can with a soft brush. Bleach the wood several times (Chlorox is fine), drying it in between treatments. Before applying the final finish, neutralize any bleach that remains with a strong solution of vinegar. This process is long and tedious but worth the effort. [George Frank is a wood finisher and author.]

Joining a chair crest rail—*I'm making a Queen Anne dining chair and have run into a problem joining the crest rail to the back legs. It seems to me that running the grain in either direction will result in a weak, short-grain*

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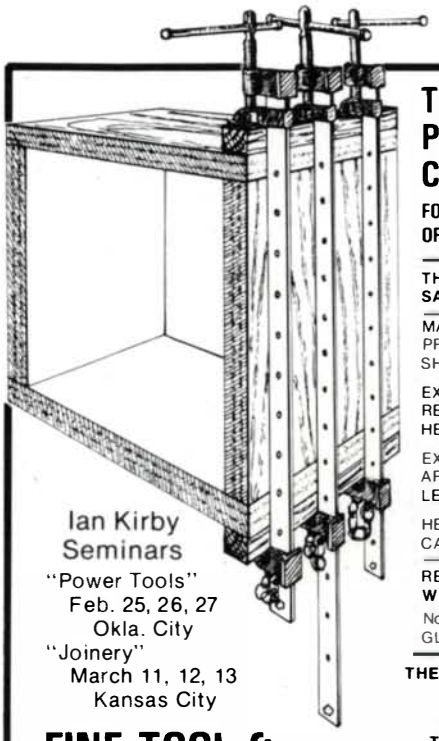

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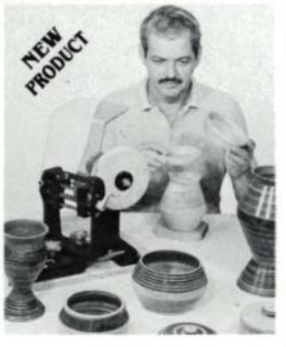

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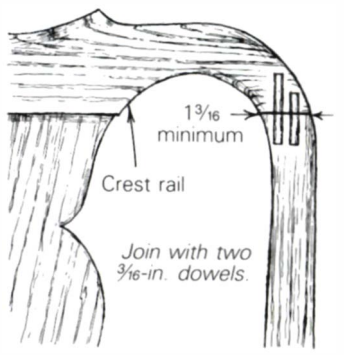
joint. Can you tell me the best way to make this joint?
—Michael O'Banion, Westminster, Md.

ANDY MARLOW REPLIES: The grain in the crest rail must run horizontally. At the point of joining, both the rear leg and crest rail shouldn't be less than $1\frac{3}{16}$ in. thick. This dimension will provide the most strength possible. If you start with 2-in. wide stock for the back leg and confine most of your shaping work to the crest rail side of the leg, you'll be able to include some of the radius in the strong vertical grain of the leg. Two $\frac{3}{16}$-in. dowels instead of one $\frac{3}{8}$-in. dowel would be better for this joint. For added strength, run the dowels as high up in the cross grain of the crest rail as you can. Also, don't make the radius where the crest rail joins the legs too small. I suggest looking through Vol. 2 of Wallace Nutting's *Furniture Treasury* for some examples of chairs with traditional lines. [Andy Marlow is a cabinetmaker and author.]



Follow-up:

Re building wooden strip canoes (*FWW* #35, p. 72). For obtaining a tight joint in areas of maximum hull curvature in this type of construction, we have been custom-manufacturing a set of matched-profile, carbide router bits. The ¼-in.-shank bits, when used in a shopmade router jig, cut matched beading and fluting on the strip edges for a tight, self-aligning joint. The bits cost $50 (U.S.) and are available from Furnima Industrial Carbide, Box 308, Barry's Bay, Ontario K0J 1B0.

Re Don Newell's reply for removing water rings on finishes (*FWW* #32, p. 26). My wife has a method she has been using for more than 25 years without fail. Apply a liberal coat of Vaseline over the water ring and let it stand for a day. The water ring will be gone and you merely have to wipe off the Vaseline. It even works on large areas, like the footboards of teenagers' beds after they go and leave wet towels on them. *—Robert J. Noeth, Arnold, Md.*

Readers can't find:

. . . a book or article with the procedure for cutting a dodecahedron from a solid block of wood.
—Douglas Raymond, Westbury, N.Y.

. . . a source for a brand of Australian ax called Hytest.
—Cecil Nickerson, North Vancouver, B.C.

. . . a source for chain-type corner clamps once made by the Handy Corp. of Chicago. *—Wilfred Gerlich, Maspeth, N.Y.*

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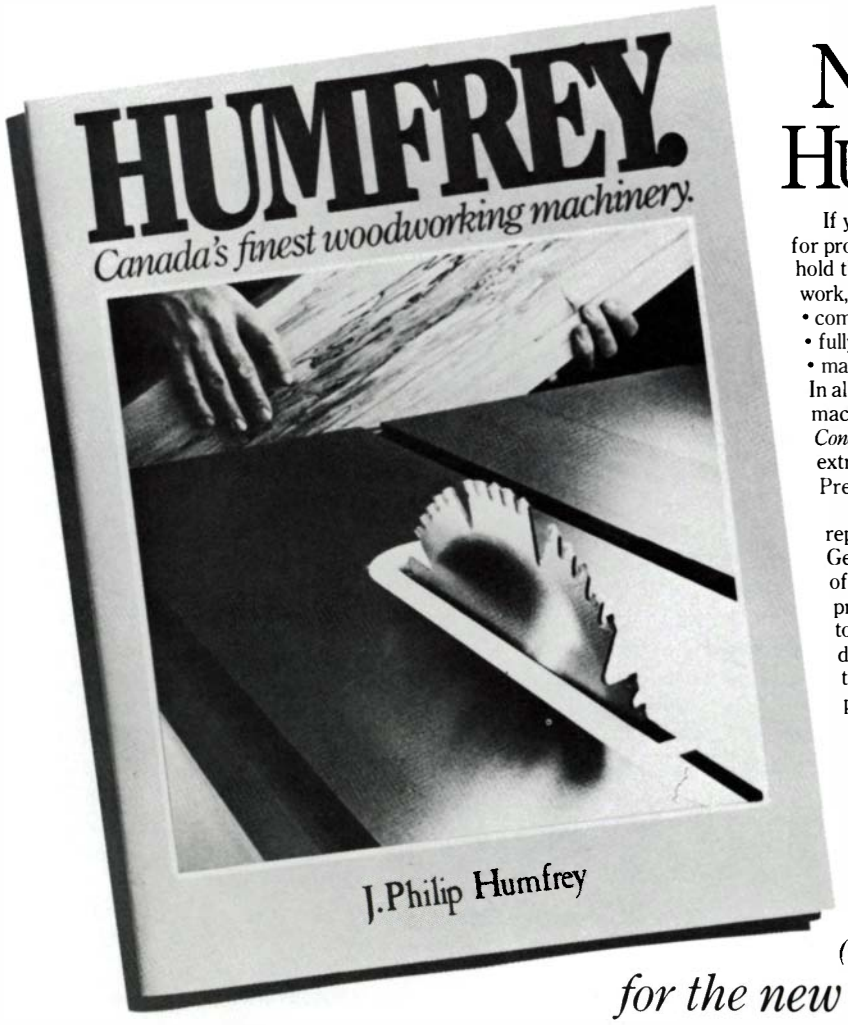
—Good-quality pepper-mill mechanisms are sold by Dudley Kebow, Inc., PO Box 2290, 2603 Industry St., Oceanside, Calif. 92054.

—Mobilcer-M, a wax emulsion designed to reduce checking in wood, is available in small quantities from Craft Supplies of Utah, 1644 S. State St., Provo, Utah 84601.

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



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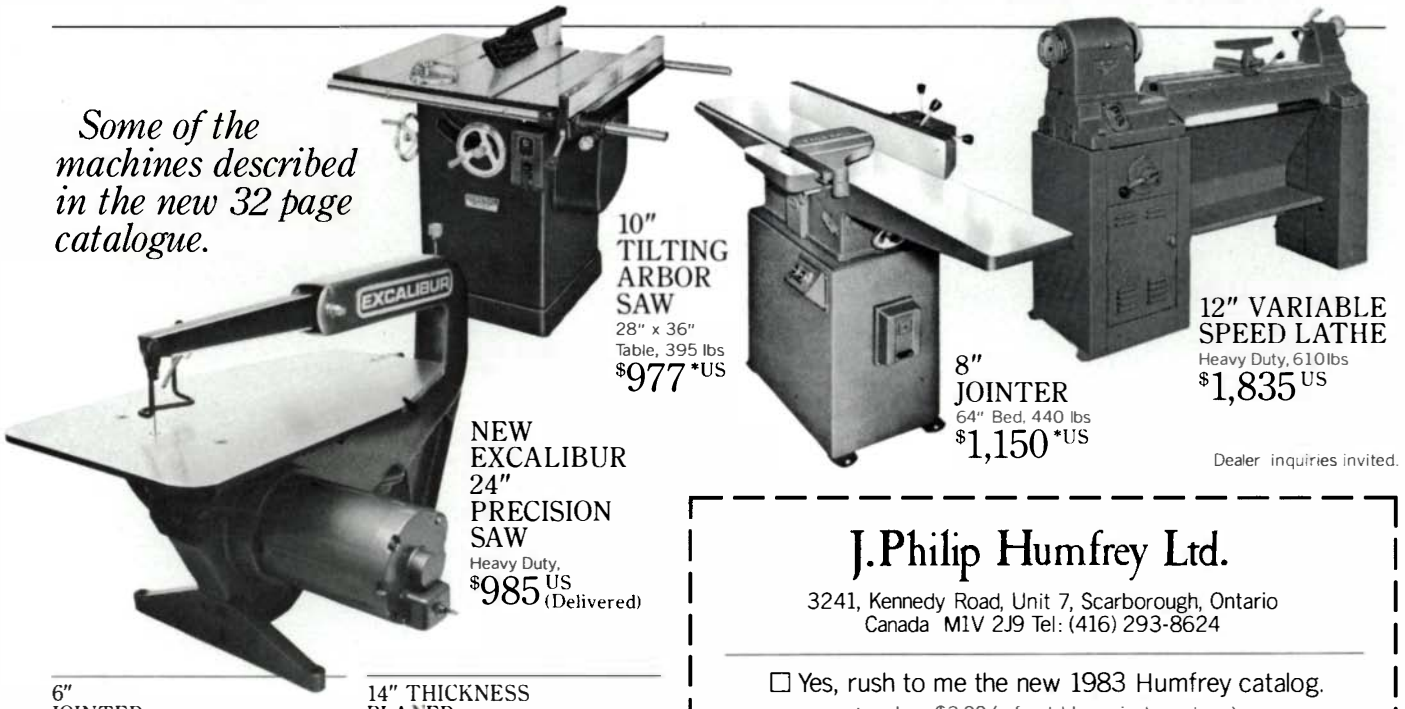

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AT THE TRADE SHOWS Cheaper plate-joinery, and flashing lights

Any new product is bound to spawn cheaper, and sometimes better, competition. That's what has happened with plate-joiners, those handy if expensive European machines that offer the woodworker a quick alternative to conventional joinery (*FWW* #34, p. 95). Virutex S.A., a Spanish tool company, has started exporting a plate-joiner that sells for $335, well below the cost of the $580 Swiss-made Lamello Minilo and less than the $355 Elu from Germany.

Two companies, Rudolph Bass, Inc. (45 Halladay St., Jersey City, N.J. 07304) and Woodworking Machinery Imports (2891 N.W. 75th St., Miami, Fla. 33147), sell the Virutex 0-81 plate-joiner. I looked one over at the Atlanta World Woodworking Expo last August, then borrowed one from Bass for a quick shop test. I found that the Virutex is made much like the Minilo and works just as well. Instead of the Minilo's pivoting front fence, though, the Virutex has a sliding, removable fence, which makes it a little slower to set up but more versatile for joining stock of different thicknesses. The only thing I didn't like is the Virutex's fence-locking, plastic wing nuts—they're awkward and seem certain to strip with much use.

For the money, the Virutex looks to be the best plate-joiner on the market, though I've never understood why these machines cost so much—they don't seem any more complicated than a portable circular saw or a router. Maybe the competition from Virutex will bring down prices on the other two machines.

• • •

My visits to the Atlanta and Louisville trade shows last summer convinced me that electronic technology is steadily finding its way into the small shop. At Atlanta, this sophistication took the form of a customized tablesaw fence that does all but feed the wood through the saw for you. Invented by John Harjung of Neshkoro, Wis., the fence has a couple of buttons in place of the stock fence's rack-and-pinion knob. I pushed one and watched in fascination as a tiny electric motor hummed, sliding the fence away from the blade. A digital read-out flashed, measuring the fence's movement in thousandths of an inch. At $2,000, this gadget costs more than the saw, but Harjung figures it could pay for itself in a busy shop. If you're interested, he'll custom-make one for any kind of machine equipped with a fence. His address is Dearborn Electronic Machinery, Route 2 Box 186, Neshkoro, Wis. 54960.

At Louisville's International Woodworking Machinery and Furniture Supply Show, I saw another device that's supposed to free the woodworker from the endless calculations needed to get maximum cutting yield out of a knotty board. The Compu-Gauge, made by Barr-Mullin, Inc. (109 Oberlin Rd., Raleigh, N.C. 27605), consists of a small computer that controls a panel of colored lights mounted on the cutoff saw's infeed side. The sawyer places the board in front of the light panel and punches in the grade of the lumber he is cutting, along with the lengths of the finished pieces wanted. Two or three seconds later, lights on the panel show a dozen or so ways the board can be cut for maximum yield. The operator picks the combination that gives the clearest lumber, eliminating knots and defects. At $8,900, the Compu-Gauge is best suited to production shops that use large volumes of common-grade lumber for their products. —*Paul Bertorelli*

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	60	.95 ea	.86 ea
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by Roger Holmes

Books About Wood (catalog), *RR 3, Owen Sound, Ont., Canada N4K 5N5; $1.00.*

R. Sorsky Bookseller (catalog), *3845 N. Blackstone, Fresno, Calif. 93726; $1.50.*

Woodworking Books (catalog), *Bark Service Co., Box 637, Troutman, N.C. 28166; free.*

Much as we might like to spend a couple of weekends or a couple of years in the workshop of a master craftsman, most of us have to settle for what we can learn from books and magazines. And it's not long before the supply of woodworking books at the local library or corner bookstore has been exhausted. Not all good books make it to the library, and a lot of them haven't seen the inside of a bookstore for years. Books don't stay in print forever. Many sink without a trace after they are published, whether that was last year or last century.

There are several mail-order book services in North America that cater specifically to the information-hungry woodworker. They handle both new and used books. If you can't lay your hands on a particular title, there's a good chance that these folks can. And they can usually recommend a book if you're interested in a subject but don't know any titles.

Maryann Hogbin lists around 400 titles in her catalog, *Books About Wood*. She specializes in books from outside the publishing mainstream, books published privately or by small houses. She buys books from five or six countries outside North America, including England, Australia and Japan, and sells to woodworkers in about ten countries. Hogbin also sells books on other subjects (including French children's books, weaving, papermaking and bookbinding), but woodworking books account for about three-quarters of her business.

Hogbin was a bookbinder and papermaker until about six years ago, when she discovered that it was easier to earn a living selling books than making them. Her first offer was ten books that "no woodworker should be without." It netted a single order—apparently only one woodworker on her mailing list was without. So Hogbin shifted her focus. She still offers the essentials, but prides herself on having books that people want but can't find, or the obscure book that they might want if they knew about it.

Hogbin's catalog includes a short précis of each title. Books considered for the catalog are critiqued by Hogbin, her woodsculptor husband Stephen, or woodworking friends. No commendation, no listing. Once a book has been deemed useful, it will stay in the catalog even if it isn't a big seller.

Hogbin also keeps her eyes open for remaindered books, poor sellers that have been abandoned by the publisher and sold to booksellers at bargain prices. Occasionally a woodworking gem will surface. At the moment, she is offering Edward Pinto's *Treen and Other Wooden Bygones,* a history of small woodenware and a great idea-book, for around half its original cover price.

Richard Sorsky, of R. Sorsky Bookseller, began selling woodworking books in 1977. His current catalog lists 429 titles, all but a handful about some aspect of woodworking. He buys mostly from other dealers, and a quarter of his books are purchased from overseas.

Books are grouped in the catalog by subject--cabinetmaking, carpentry, carriagemaking, carving and so on—and alphabetized by author under each heading. A blurb includes a

précis of the contents, the date of publication and often the condition of the book. Sorsky, himself a weekend woodworker, keeps in touch with craftsmen in his area to find out what they think of the books.

Sorsky says that most of his customers are looking for useful books, not collectors' items. Old books on machines and machining techniques are much requested, as are old woodturning titles. There's also a steady demand for books such as *The Wheelwright's Shop* and *The Village Carpenter,* firsthand accounts of now-vanished ways of life. With the exception of about a half-dozen rare books, Sorsky's books seldom cost more than $50, and many are less than $10.

Both Hogbin and Sorsky take requests for books not listed in their catalogs. If Hogbin can't locate a current edition, she will tap into a worldwide network of booksellers by advertising in the *Antiquarian Bookman's Weekly,* a trade publication. Sorsky will also place searches for books, or recommend private companies that specialize in book searches. The cost of the search is included in the price offered to the customer.

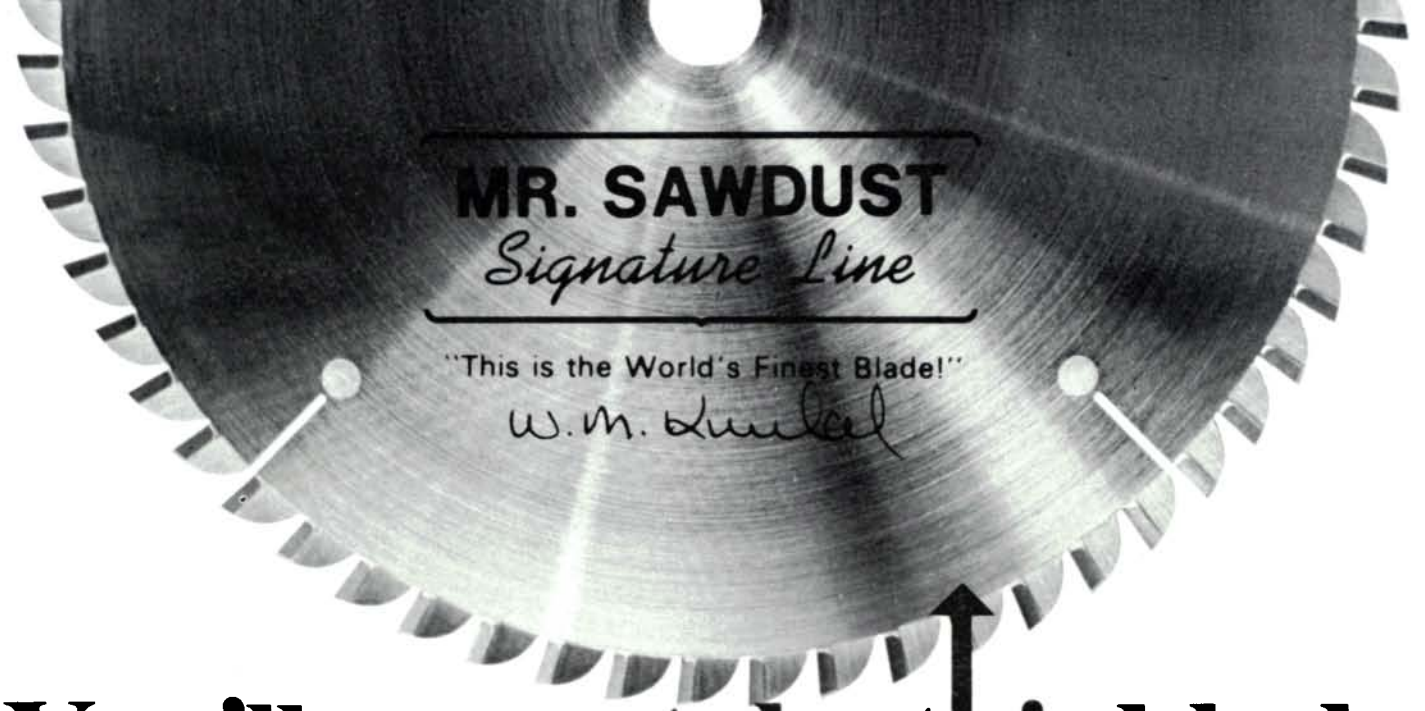
There's a mail-order business on the East Coast, too. Bark Service Co., in Troutman, N.C., lists over 300 titles in its catalog. Ric Ferrar, an engineering consultant and whenever-I-get-the-chance woodworker, set up Bark about four years ago, and now draws on more than 60 publishers for his books. (At present, he doesn't take requests for out-of-print books.) He reviews most of the titles himself and won't list ones that he thinks have little to offer. Ferrar gives discounts ranging from 5% to 15%, depending on the dollar amount of the order. If you're dissatisfied with one of his books, you can send it back within 10 days and he'll give you full credit.

Remember the Deltacraft Library? I made my first tenons with a dado head, a little Atlas tablesaw and *Getting the Most Out of Your Circular Saw and Jointer.* Delta manufactured small, sturdy woodworking machines in Milwaukee, and these books told how to use them. There were, I believe, six more machine books, covering abrasive tools, the drill press, shaper, bandsaw and scroll saw, radial-arm saw, and lathe. The books were written, starting in the mid-1930s, by Sam Brown, who also edited the company's bimonthly how-to publication, *Deltagram.*

Rockwell Manufacturing Company (now part of Rockwell International) bought Delta in the early 1950s and continued to publish and to revise the books. The latest revision was completed in 1978 by Robert Scharff & Associates. Scharff and his staff gave the books a complete overhaul, using new Rockwell machines to test the procedures. They added some new material and deleted some old, mostly because it ran afoul of today's safety regulations.

Unfortunately, several of the old books were discontinued. The shaper and lathe went, and the jointer and scroll saw disappeared from their pairings with the tablesaw and bandsaw. You can order the current titles (tablesaw, drill press, bandsaw, radial-arm saw, abrasive tools) from your local Rockwell distributor, or from Scharff (RD 1, Box 276, New Ringgold, Pa. 17960).

Rockwell has no plans to reprint the other titles. If you have a specific request for something from one of the old books (how to make screen molding on the shaper, for example), Scharff will photocopy the appropriate pages and send them to you, free of charge. As for the old books themselves: Sorsky lists four in his latest catalog. It pays to know a good bookseller. □



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In major shows across America, I make four points I learned the hard way: 1) Fine craftsmanship is never achieved with ordinary tools. 2) Beginning woodworkers should never be hampered by tools that cannot perform. 3) Professionals know: The Cut is *everything* -- cut after cut after cut. And 4) If a machine or a cutting-tool is not demonstrated to your complete satisfaction, don't buy it!

I also know you may be one of the thousands of woodworkers who never attend these shows. You've never seen the "perfect saw cut". Never watched what a great dado-head can *really* do. Don't know there's a Forrest-400 carbide that can actually outlast *you*. And you're confused by a lot of ridiculous claims.

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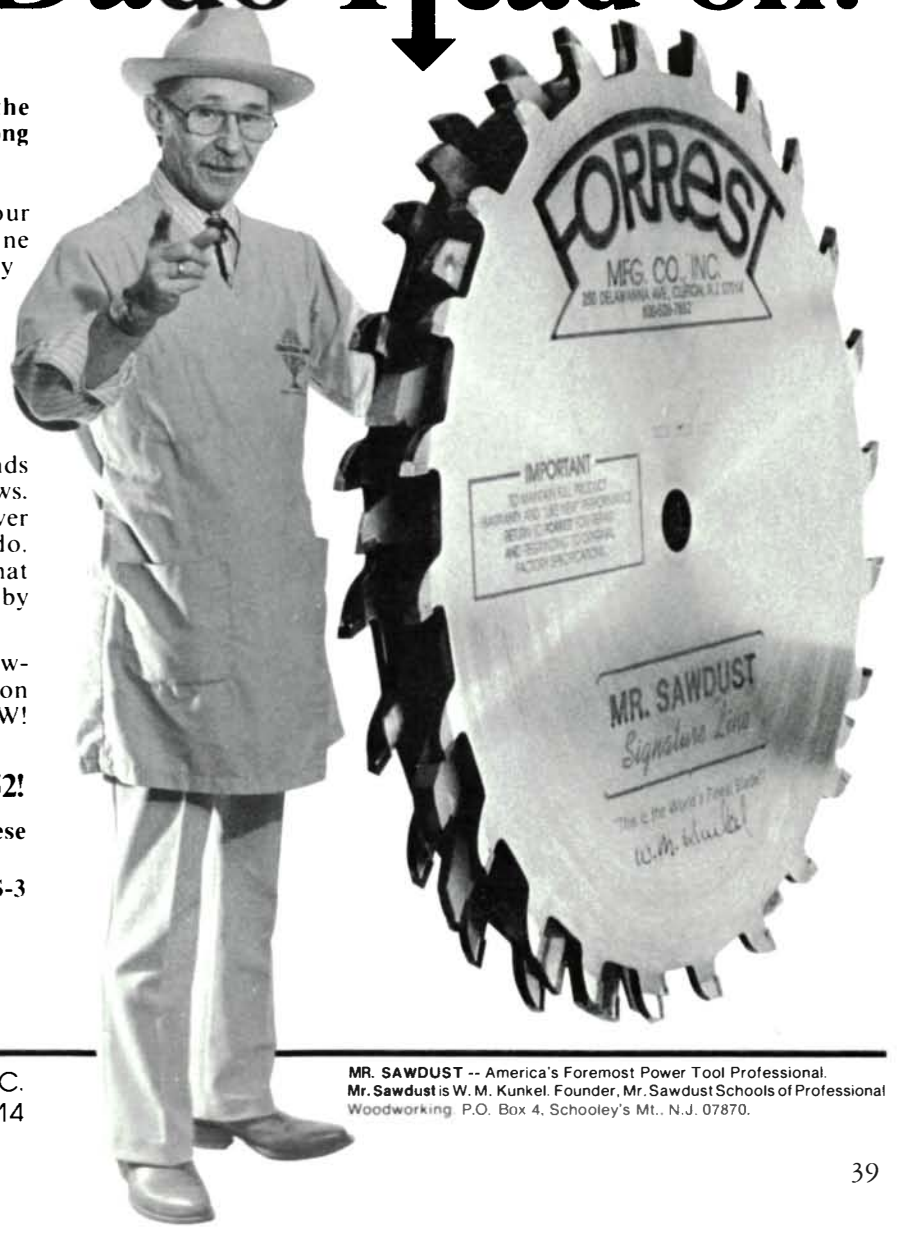

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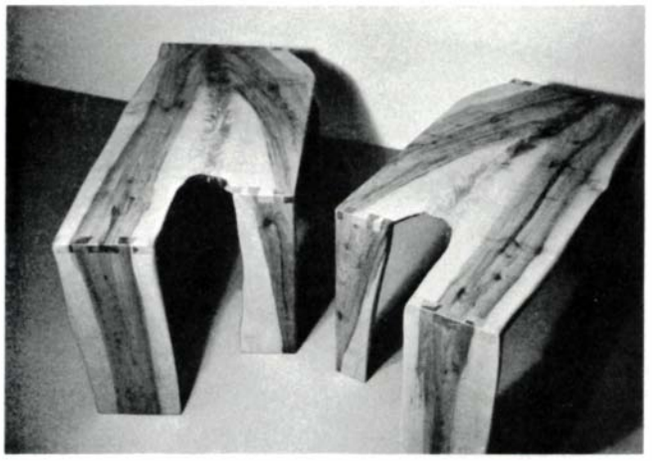
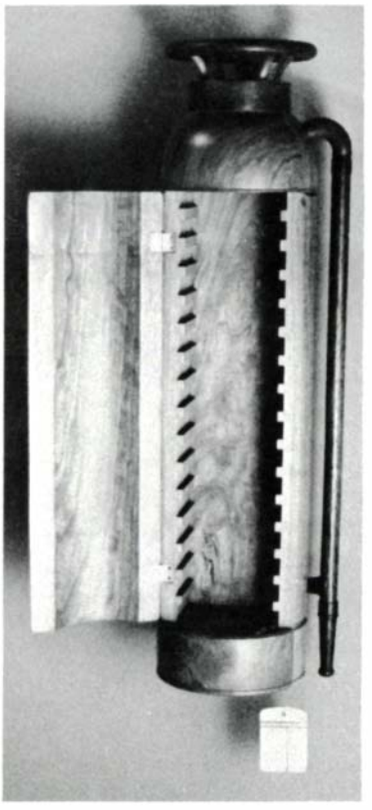
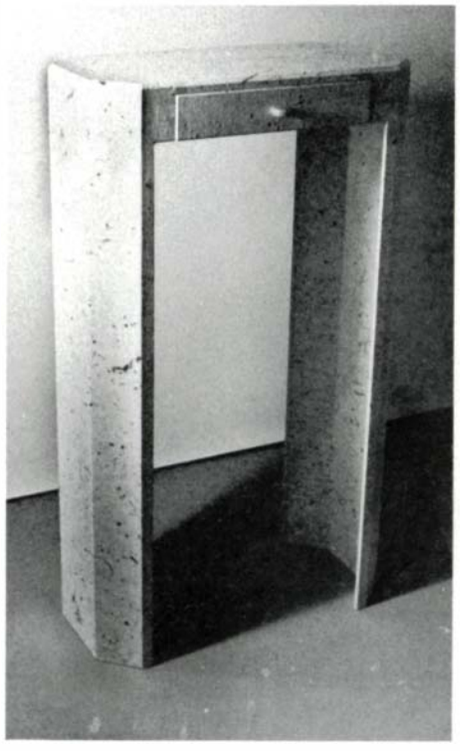
Last summer The Madison Arts Center in Madison, Wis., ventured from its usual gallery shows of fine art to feature "The Decorative Arts in Dane County." Judges surveyed the portfolios of some 90 craftspeople and invited 25 to show, six of them woodworkers. Their work, a sampling of which is shown here, ranged from traditional furniture to fool-the-eye art pieces. Many evidenced unusual techniques, especially in the rendering of surface.—*Richard Swanson, Madison, Wis.*



CHAINSAWN LUMBER FURNITURE—Steven Spiro, of Madison, used a bookmatched set of maple crotch planks to lend spidery symmetry to natural forms in the service of the common bench.



FALSE ALARM—C.R. "Skip" Johnson, art professor at the University of Wisconsin, kept gallery-goers doing double-takes with his cherry and walnut fire extinguisher, right. When opened, the extinguisher reveals its true function, holding tape cassettes. Not shown are his wooden radiator and urinal.



DECO SURFACES—The bird's-eye maple veneer of Dick Wickman's Art Deco occasional table, right, is finished in lacquer, which was popular in the 1920s and, if the number of lacquered pieces in this show is any measure, is regaining favor these days among small-shop professionals. Wickman, from Madison, also lacquered his "Paper-Covered Table," above—handmade Japanese paper laminated onto high-density particleboard. The visual effect is of antiqued wood, intriguing on a design so severely geometric.

Photos by the author

Makita BLADE SHARPENER Model 9820-2

Sharpens jointer and planer knives up to 16" long. With accessory jig, accurately sharpens plane irons and chisels. Medium grit Japanese waterstone rotates in gravity-fed water bath for safe work on your edge tools. One year limited warranty. Unit is modified by us to handle planer knives narrower than 1".

Model 9820-2 **$195.00** POSTPAID

ACCESSORY JIG for chisels and plane irons $10.00 Postpaid.

JAPANESE WATERSTONES

Japanese waterstones cut faster and produce a razor edge impossible to obtain with oil stones. Set of 3 stones consists of a 1200 grit coarse stone for establishing a sharp bevel, a 6000 grit finish stone for honing and polishing the edge, and an 8000 grit Gold finishing stone for producing a final edge of unsurpassed quality. Coarse stone is 2½" x 8" x 1⅜". Finish stones are 2½" x 7¼" x ½".

Set of 3 **$39.50** POSTPAID

LARGE JAPANESE WATERSTONES

New larger stones provide larger working surface, longer stone life, and greater stability while sharpening.

700 grit coarse	3" x 8¼" x 2¼"	$24.50 Postpaid
1000 grit coarse	4" x 9¼" x 3"	$29.50 Postpaid
6000 grit finish	2¼" x 8½" x 7/8"	$18.50 Postpaid
8000 grit Gold finish	2¾" x 8½" x 7/8"	$29.50 Postpaid
Set of all 4 large Waterstones		$89.00 Postpaid

Makita FINISHING SANDER Model BO4510

One-hand palm grip design. Flush sands into corners. Powerful 1.8 amps. 115 volts. 12,000 orbits per minute. One year limited warranty. 2.4 lbs. 4" x 4⅜".

$49.95 POSTPAID

Makita BELT SANDERS

Makita belt sanders are ruggedly built with powerful motors to perform well under constant industrial use. Dust bag included. 3 models.

9900B	3" x 21" $129.00 Postpaid
9924DB	3" x 24" $149.00 Postpaid
9401	4" x 24" $199.00 Postpaid

Makita PLUNGE ROUTER Model 3600BR

Like the well-known 3600B, this powerful 2¾ HP plunge router is designed for maximum ease of operation. It can be plunged to pre-set depths up to 2⅜". Has 2 adjustable depth stops. Holds ¼", ⅜", and ½" routerbits. The new model 3600BR has 6¾" diameter round base, which accepts optional guides.

$199.95 POSTPAID

MODEL 3600B (not pictured). Like the 3600BR except has 5¼" x 6 3/8" rectangular base. $209.00 Postpaid.

Set of optional router guides.....$23.50 Postpaid

LAMELLO Minilo Top

Swiss made jointing tool plunge cuts matching grooves for Lamello splines. Positions quickly for rapid assembly and maximum joint strength. 115 volts. 4.6 amps. 8000 RPM.

$580.00 POSTPAID

Makita BANDSAW Model 2116

ACCURATELY AND POWERFULLY RESAWS BOARDS UP TO 12⅜" WIDE. Depth of throat 13". Wheel size 16". Height of machine 52". Weight 297 lbs. Blade width ¼" up to 2⅜". Motor 2 HP. Industrial type machine priced for the small professonal shop or serious amateur.

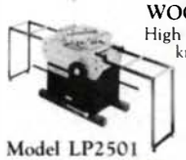
Makita THICKNESS PLANER Model 2040

15⅜" automatic feed thickness planer. 7⅜" maximum thickness capacity. 2 HP 115 volt motor. Weighs 254 lbs.

Makita PLANER-JOINTER Model 2030

12" automatic feed thickness planer, 6" jointer with 59" long bed. 2 HP 115 volt motor. Weighs 275 lbs.

Makita WOOD SURFACER



Model LP2501

High speed automatic feed stationary knife surfacer removes a thin shaving the width and length of a board leaving a superb smooth surface. Maximum width is 9¾". Feed rate is 180 feet per minute. Weighs 276 lbs.

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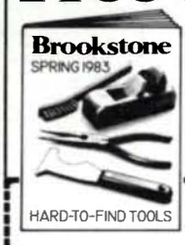

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Events

Listings are free but restricted to events of direct interest to woodworkers. The March issue will list Feb. 15–May 15; deadline Jan. 1; the May issue will list April 15–July 15; deadline March 1.

ARIZONA: Juried festival—Hayden's Ferry Old Town Tempe, Festival of the Arts, April 8–10. Original work only. Slides. For application, send SASE to MAMA, Box 3084, Old Town Tempe, 85281. (602) 967-4877.

ARKANSAS: Juried exhibitions—Toys designed by artists, Dec. 3–Jan. 2; Exhibition: painting and sculpture, through Jan. 9. Contact Townsend Wolfe, Arkansas Art Center, Box 2137, Little Rock, 72203.

CALIFORNIA: Lectures/seminars—A day with Sam Maloof at his workshop, Jan. 22 (Los Angeles), Feb. 26 (San Diego); Toshio Odate, Japanese woodworking, Feb. 4, Japanese hand tools, Feb. 5–6 (Berkeley); Ian Kirby, hand and power tools, Feb. 4, joinery, Feb. 5–6 (Los Angeles); Jerry Glaser, woodturning, Feb. 5 (San Diego); Joseph Bavaro, furniture of Gustav Stickley, Feb. 11 (San Diego); Grew-Sheridan, chairmaking, March 26–27 (Berkeley). Reservations. The Cutting Edge. Berkeley: (415) 548-6011; Los Angeles: (213) 390-9723; San Diego: (619) 695-3990.
Craft fair—Open to trade Aug. 11, public Aug. 12–14, Fort Mason Center, San Francisco. Deadline for slides, March 10. Contact American Craft Enterprises, Box 10, New Paltz, N.Y., 12561. (914) 255-0039.

CONNECTICUT: Juried exhibition/sale—Celebration of American crafts, through Dec. 23. Creative Arts Workshop, 80 Audubon St., New Haven, 06511. (203) 562-4927.

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

WASHINGTON, D.C.: Exhibition—Celebration: A World of Art and Ritual, through Feb. 21. Renwick Gallery, Smithsonian Institution, Pennsylvania Ave. at 17th St., Washington, 20560. (202) 357-2627.
Exhibition—The Fine Art of Private Commissions, Dec. 15–Jan. 28. Dimock Gallery, George Washington University.
Workshop—Bob Stocksdale, bowls, late April. Contact Ed Mark, Wash. Woodworkers Guild, 1565 Dunterry Pl., McLean, Va. 22101.

FLORIDA: Juried show—Boynton's Great American Love Affair, March 4–6. Slide deadline Feb. 15. Contact Eleanor Krusell, Box 232, Boynton Beach, 33435. (305) 734-8120.
Festival—Outdoor festival of the arts, Miami Beach Convention Center, Feb. 5–6.

GEORGIA: Workshop—Build a cabinetmaker's plane, March 4–6. Contact McGee's Woodworks, 218 S. Boulevard, Carrollton, 30117. (404) 834-7373, eves.

ILLINOIS: Juried exhibition—Contemporary musical instruments, "Music Makers," during the '83 holiday season. Slide/cassette deadline July 15. Send SASE to Ron Isaacson, Mindscape Gallery & Studio, 1521 Sherman Ave., Evanston, 60201. (312) 864-2660.

INDIANA: Juried fair—June 11–12, Talbot St. Art Fair. Entry deadline March 1. Contact Joan Kisner, 630 N. Washington St., Danville, 46122.

KENTUCKY: Workshop—Alphonse Mattia, Feb. 21–25. Contact Paul Sasso, Art Dept., Murray State Univ., Murray, 42071. (502) 762-6938.

LOUISIANA: Workshop—Woodworking skills, Ian Kirby, Feb. 19–20, Louisiana State Univ., Baton Rouge. Contact Rick Brummer, Louisiana Crafts Council, 7214 St. Charles Ave., #922, New Orleans, 70118.

MARYLAND: ACE Winter Market—Baltimore Convention Center, Feb. 10–13.

MASSACHUSETTS: Craft program—Hands-On Summer in the Arts for Teenagers. Wood, photography, ceramics, silkscreen/batik, weaving, July & Aug., Kents Hills School. Contact Jane Sinauer, 374 Old Montague Rd., Amherst, 01002. (413) 549-4841.
Workshop—Clavichord building, 10 wks. Begins Feb. 14. Museum of Fine Arts, Boston. Contact Clifford Boehmer, (617) 653-9584.
Exhibit—"A Showy Dance," whimsical wooden sculptures to entice all ages by designer/sculptor William Accorsi, through Jan. 10. Society of Arts and Crafts, 175 Newbury St., Boston; Mobilia Gallery, 348 Huron Ave., Cambridge. (617) 226-1810.
Student Exhibition—Boston Univ. Program in Artisanry, Feb. 9–28. B.U. Art Gallery, 885 Commonwealth Ave., Boston.

MISSOURI: Seminar—Ian Kirby, joinery, March 11–13, Kansas City. Contact Cheryl Hays, (800) 255-9800.

NEW HAMPSHIRE: Seminar—Woodgraining for Early American Decoration, Dorothy Hamblett, Jan. 11–15. One of six multimedia workshops for studio craftsmen. Contact Seminar '83, League of New Hampshire Craftsmen, 205 N. Main St., Concord, 03301.

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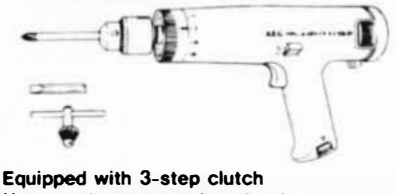

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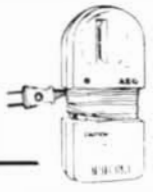

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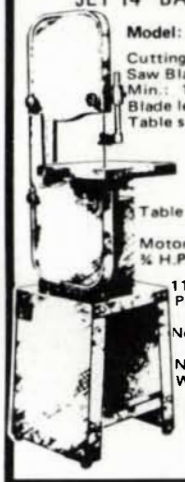

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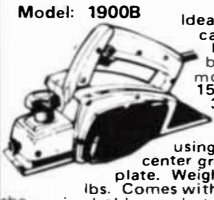
3 1/4" PLANER

Model: 1900B



Ideal for door and cabinet installations. 4 amp. ball bearing motor turns at 15,000 rpm. 3¼" blade capable of chamfer cuts using the unique center groove in sole plate. Weighs only 5.5 lbs. Comes with blade guage, sharpening holder, socket wrench, guide rule, blades. (Carbide blades add $37.)

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Model: 2030

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NEW YORK: **International competition**—New office furniture. Deadline for ideas, Dec. 29. Exhibition at the Musee des Arts Decoratifs in Paris, 1984. Write Cultural Competition, 972 Fifth Ave., New York, N.Y. 10021, or Concours Mobilier, Commissariat General du Concours, Pavillon de Marsan, 107 rue de Rivoli, 75001 Paris, France.
Exhibition—Woodturning, Feb. 11–June 3. American Craft Museum II, International Paper Plaza, 77 W. 45th St., New York, 10036. (212) 397-0605.
Exhibit—Marquetry: Images in Wood, through December. Pritam & Eames, 29 Race Lane, East Hampton, 11937.
Craft fair—Open to trade, June 21–22, public, June 24–26; Dutchess County Fairgrounds, Rhinebeck. Slide deadline 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. Neuberger Museum, Purchase College. (914) 253-5575.
Courses—Woodworking, spring session begins Jan. 10, all levels; demonstration—making the classic dovetail joint, Jan. 11, free. Contact instructor Maurice Frazer, Craft Students League of YWCA, 610 Lexington Ave. (at 53rd), N.Y.C., 10022. (212) 755-2700.
Exhibit—Women are Woodworking, through Dec. 24. Workbench Gallery, 470 Park Ave. S., N.Y.C., 10016.
Exhibition—Approaches to Collecting: Profiles of Recent Private and Corporate Collections, through Jan. 2. American Craft Museum I, 44 W. 53 St., N.Y.C.
Show—Whittling, relief, chip, decoy, folk and decorative carving, Feb. 27, free. Sculpture Associates, 114 E. 25 St., N.Y.C.
Exhibition—Syd Hap, marionettes of famous people, Jan. 15. Spectrum Gallery, 30 W. 57th St., N.Y.C.
Exhibition—Puzzle sculptures, Jan. 15. Katzen Gallery, 11 E. 57 St., N.Y.C.
Exhibition—Wood sculpted animals, Jan. 30. Payson-Weisberg, 822 Madison Ave., N.Y.C.
Exhibition—1,500 objects: wood, terracotta, stone, Feb. 3. Metropolitan Museum, 5th Ave. and 82nd, N.Y.C.

NORTH CAROLINA: **Workshop**—Woodworking skills and techniques, Ian Kirby, Feb. 11–13. Rutherford County Woodworkers, Box 589, Rutherfordton, 28139. (704) 287-3414.
Courses—woodworking, Dana Hatheway, white oak basketry, Marsha Waters, Jan. 16–29. John C. Campbell Folk School, Rt. 1, Brasstown, 28902. (704) 837-2775.

OKLAHOMA: **Seminar**—Ian Kirby, power tools, Feb. 25–27. Fine Tool and Wood Store, 7923 N. May Ave., Oklahoma City, 73120. (405) 842-6828.

PENNSYLVANIA: **Juried exhibition**—Delaware Valley Woodworkers. Port of History Museum, Penns Landing, Phila., May 20–July 4. Deadline for applications and slides, March 1. Society of Philadelphia Woodworkers, 4101 Lauriston St., Phila., 19128.
Show—Turned Objects, Feb. 20–March 12. Indiana State Univ., Kipp Gallery, IUP, Indiana, Pa. 15705.

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

SOUTH CAROLINA: **Exhibition**—Wood and fiber, Nov. 27–Jan. 2. Columbia Museums of Arts 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**—About fifty arts and crafts fairs (some local, some statewide) at various locations and times through Dec. For entry information contact Tennessee Arts Commission, 505 Deaderick, Suite 1700, Nashville, 37219. (615) 741-1701.

TEXAS: **Craft fair**—Open to trade March 24, public March 25–27. Market Hall, Dallas Market Center, 2100 Stemmons Freeway, Dallas. Contact American Craft Enterprises, Inc., Box 10, New Paltz, N.Y. 12561. (914) 255-0039.
Juried crafts fair—March 19–27, Houston Festival. Entry deadline Jan. 30. Contact Barbara Metkyo, 1950 W. Gray, Suite 2, Houston, 77019. (713) 521-9329.

VIRGINIA: **Exhibit**—Wood: Made in Va., featuring Va. Wood Craftsmen, Feb. 6–March 4. Staunton Fine Arts Assn., 1 Gypsy Hill Park, Staunton, 24401. (703) 885-2028.

WASHINGTON: **Workshops**—Lofting, Jan. 15; dinghy and lapstrake, Jan. 29; tools and tricks, Feb. 5. Northwest School of Boatbuilding, 330 10th St., Port Townsend, 98368. (206) 385-4948.

WEST VIRGINIA: **Workshops**—Traditional furniture, Ed Hillenbrand and Dave Kister, Feb. 21–25; production techniques, C. Bradford Smith, Feb. 28–March 4. Cedar Lakes Crafts Ctr., Ripley, 25271. (304) 372-6263.

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LM 72 10"	24	rip	62	43
Set of Above 3 blades			210	130

Model	Teeth	Use	List	Sale
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LU 82 10"	60	cut	82	51
6" Dado set	18	¼-13/16	133	99
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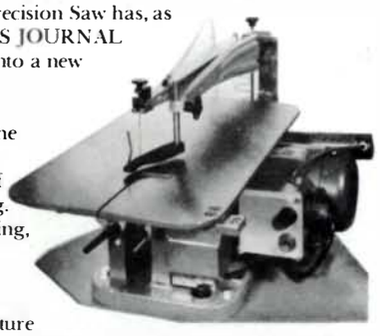
"The HEGNER saw is the best machine of it's type that I have ever had the pleasure of using."

Galen J. Winchip, Instructor of Woodworking

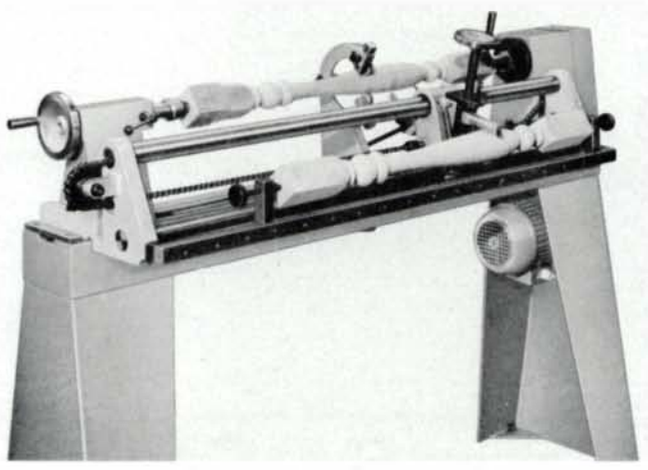


The HEGNER Universal Precision Saw has, as the editor of WOODWORKER'S JOURNAL wrote, "propelled (its owners) into a new world of scroll sawing."

Both the Polymax-3™ and Multimax-2™ will let you saw the most intricate patterns accurately, quickly, without any relief cuts and without major sanding.

When it comes to scroll sawing, there is only one name to look for—HEGNER.

And now, the excellence of HEGNER design and manufacture surfaces again—in the new 39" HEGNER DUPLICATING LATHE. Simplicity, quality and precision are combined in this woodturning lathe to give you the results you expect from HEGNER tools.



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Los Angeles, CA 90066
(213) 390-9723

The Cutting Edge
7626 Miramar Rd.
San Diego, CA 92126
(714) 695-3990

The Cutting Edge
1836 Fourth St.
Berkeley, CA 94710
(415) 548-6011

Wood Tool Center
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Mountain View, CA 94040
(415) 948-3844

W.S. Jenks & Son
738 Seventh St., NW
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Garrett Wade Company
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Connections

In Connections, we'll publish membership calls for guilds, letters from authors compiling directories in which craftsmen might like to be listed, and appeals from readers with special interests looking for others who share them.

Fake antique furniture: We are planning a show, with cash awards, that will allow the modern faker/cabinetmaker to exhibit his otherwise covert skills. All entries must be of new wood. For information, contact Lawrence P. McManus, 112 Gates St., Portsmouth, N.H. 03801. (603) 436-1630.

Southeast Florida professionals: Interested in getting together for a joint exhibition? Call Bob DeFrances, 3202 Karen Dr., Delray Beach, 33444. (305) 734-6770.

Kentucky Woodworkers' Guild: Amateurs and professionals. Bluegrass Woodworking, 1016 Rushwood Ct., Lexington.

Rescue the chestnut: If you know of a sound American chestnut tree, 37 in. to 40 in. in circumference, growing within the natural range (the eastern hardwood forests), take a minute to record its location on a postcard and mail it to: Dr. Franklin C. Cech, Professor of Forest Genetics, Dept. of Forestry (Section SHO), W.Va. Univ., Morgantown, W.Va. 26506.

International Furniture Competition: Sponsored by *Progressive Architecture* magazine. Functional furniture, not limited to production pieces. Deadline Jan. 26. Winners will be displayed at NEOCON 15, Chicago, in June. Write IFC, Progressive Architecture, 600 Summer St., Box 1361, Stamford, Conn. 06904. (203) 348-7531.

Orange County Woodworkers Assn: Andy Goldman, c/o OC Woodworkers, Box 2, Placentia, Calif. 92670. (714) 524-1946 (eves).

Reno Nevada Guild: Kevin Schroeder, 6200 Meadowood Cir., #1137, Reno, 89502.

Woodworkers' trip to China: Visit shops, factories, educational and research centers with George Frank and interpreters. Tentative departure Aug./Sept. 1983. Estimated cost: $3,000–4,000 for three weeks. Write Ms. Christine Frank, 511 E. 86th St., New York, N.Y. 10028, or call (212) 535-8591.

Tour England: Feb. 8–19. Organized by Excellence in Woodworking, 600 Talcott Rd., Park Ridge, Ill. 60068. (312) 823-2151.

Spokane: I'd like to establish a woodworkers' guild. Jim Freeman, 2129 E. Diamond, Spokane, Wash. 99207. (509) 489-5718.

California woodworkers from Bakersfield to Fresno. Let's organize our own guild to hold workshops and invite guest speakers. Mark R. Webster, 670 N. G St., Porrerville, Calif. 93257. (209) 781-4074.

I'd like to hear from anyone with experience in setting up a woodworking shop with no electric power and no usable river or wind options. Simon Watts, c/o The Taunton Press, Box 355, Newtown, Conn. 06470.

Coffin builders: I'd like to hear from anyone with plans, photos, ideas, comments and/or inquiries on building coffins, as I am inrerested in building one this spring. Tyrone D. Gormely, Mathematics Dept., Austin Community College, Box 2285, Austin, Tex. 78768. (512) 476-6381.

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION
(Required by 39 U.S.C. 3685)

1. Title: Fine Woodworking. 1a. Publication no. 105190. 2. Date of filing: October 1, 1982. 3. Frequency of issue: Bimonthly. 3a. No. of issues published annually: 6. 3b. Annual subscription price: $14.00. 4. Location of office of publication: 52 Church Hill Road, PO Box 355, Newtown, CT 06470. 5. Location of the headquarters of the publishers: 52 Church Hill Road, PO Box 355, Newtown, CT 06470. 6. Publisher: Paul Roman, 52 Church Hill Road, PO Box 355, Newtown, CT 06470; Editor: John Kelsey, 52 Church Hill Road, PO Box 355, Newtown, CT 06470. 7. Owner: The Taunton Press, Inc., 52 Church Hill Road, PO Box 355, Newtown, CT 06470. Stockholders owning or holding 1 percent or more of the total amount of stock: Paul Roman, 52 Church Hill Road, PO Box 355, Newtown, CT 06470; Janice A. Roman, 52 Church Hill Road, PO Box 355, Newtown, CT 06470. 8. Known bondholders, mortgagees and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages or other securities: None. 9. Not applicable. 10. Extent and nature of circulation:

	Average no. copies each issue during preceding 12 months	Actual no. copies of single issue published nearest to filing date Oct. 1, 1982
A. Total no. copies (net press run)	249,204	253,043
B. Paid circulation		
1. Sales through dealers and carriers, street vendors and counrer sales	32,391	32,999
2. Mail subscription	195,897	199,963
C. Total paid circulation	228,288	232,962
D. Free distribution by mail, carrier or other means, samples, complimentary, and other free copies	2,306	2,386
E. Total distribution	230,594	235,348
F. Copies not distributed		
1. Office use, left over, unaccounted, spoiled after printing	12,586	11,202
2. Return from news agents	6,024	6,493
G. Total (sum of E, F1 and 2)	249,204	253,043

11. I certify that the statements made by me above are correct and complete. Signature: Paul Roman, Publisher.

GOING FOR BROKE...ON MAIN STREET

BY IVAN HENTSCHEL

I had one of those all-too-typical shops. You know the kind, a small garage behind the house, business by word of mouth, too much time out to sharpen the lawn mower, too many odd jobs to keep the bank account solvent. Of course, there was always another tool to buy or another budget-breaking trip to the sawmill for some exotic wood or that special stash of bird's-eye maple. I built pieces here and there. I claimed I was in business, but I was really a weekend woodworker and I lost money every year, all the while accumulating more wood and more tools. At least the rent was low.

Eighteen months ago, my wife got a new job, 200 miles away, in the country. The shop had to move. I had to move. All those pieces of bird's-eye had to move. And all those tools. But where to? To do what? I was terrified.

I surveyed the new landscape for a new shop. Nothing. At least nothing I could afford. I looked for months. I was unemployed, turning dinner plates in the basement. I was reaching the end of my rope. I still had the bird's-eye.

I decided to look for work. In a recession bordering on disaster, my search was a disaster too. I could sell used cars or wait tables. I turned some more plates. I turned a few bowls. I turned down the chance to sell Datsuns.

I worked a lot on my hand tools. They became incredibly sharp. I spent a lot of time at the drafting table. I made blueprints of my blueprints. But I had no woodworking, save the dinner plates. So I ate from them and gained 10 lb., which made the bird's-eye seem heavier, until I realized that my muscles were deteriorating.

I found a solution. I started riding my bicycle, got exercise, saw the countryside and learned the back roads. I learned, too, that there weren't many woodworkers around.

I found an empty building, on Main Street in Hamilton, Va., a tiny town about eight miles away. The sign said "For Lease." So I made a phone call.

Keep in mind that I was not just broke but penniless. Not an odd job to be had. No resources. Undaunted (or foolish), I agreed to meet with the owner of the building. I didn't have the slightest idea of what I was getting into. But over the phone the guy sounded nice enough, though the rent seemed high. No, he didn't know about the zoning and what he really wanted was an antique dealer. I met with him anyway.

It was a lovely Sunday afternoon, and it was a lovely building, much bigger than I had thought. Big enough even for five of me. It was out of the question. He wanted me to rent the second floor. The basement was wet, and, except for four light bulbs hanging from the second-floor ceiling, there was no electrical service. But the flooring was wood, T&G fir, trimmed with nice baseboards, on white plaster walls. And the place had windows—big ones. I fell in love. Would I take half of the second floor, for $300 a month? And pay part of the electric bill? Could I build a wall? Could I wire the place? Yes, yes, yes and yes. I said I'd begin next week. He said he'd send me the lease. I went home to figure out how to pay for it. And how to move the bird's-eye up a flight of stairs.

I was elated—I finally had another shop. Or so I thought, because then the trouble started. Materials for the wall would cost $400. Fire insurance and liability would be another $400. The zoning was unclear. The county said I couldn't do my own wiring. Friends said the economy would never support the venture. I was broke. I worried about moving a 400-lb. lathe upstairs. There was no place to put the bird's-eye.

More time passed. I made more phone calls. The zoning was okay, the landlord would pay for the wall and he'd trade labor for rent. Since I wouldn't be doing any spraying, perhaps the fire insurance would come down. But I still needed a hundred bucks up front and $83 to install a phone. I needed two fire extinguishers. And an exhaust fan. And conduit. And an electrician. And another $300. I traded in the title on my truck for two grand and signed the lease. The landlord threw in a storefront window on Main Street.

I hate framing, 16d nails don't thrill me. Sheetrock is heavy and clumsy, taping is an art which I would cheerfully swap for finish-scraping any day. But I did it all without complaining, because it would get me my shop, my own place on Main Street.

I did it all with a Japanese ryoba saw and a few chisels because there was no power. I consoled myself in the evenings by designing stationery and newspaper ads. The electrician was tied up. Good thing. There was no one to help me move the equipment upstairs anyway. The bird's-eye I moved alone, plank by weighty plank.

After five weeks the money was gone but the income tax refund came, another two grand. My first ad came out in the newspaper that day, and I paid somebody $25 to help me pull my machinery up the stairs. Real fast, 750 sq. ft. got real small. I hung prints on the walls and got some potted plants. I went to the chiropractor and then went home and piled barbecued chicken on the dinner plates.

The electrician wired up the baseboards and put a timer on the exhaust fan (another forty bucks). The fire inspector came. I turned some walnut bowls, started a cherry drop-leaf and built a bookcase. I started working nine to five and resawed the bird's-eye.

Every week the woman from the newspaper comes and we run another ad for $59.42. I have feet to put on a grandfather clock, two old tables to refinish, and an order for two end tables and a coffee table. There is some oddball repair work, and today a lady brought in a printers' box to be modified for a wall hanging. It's not all that exciting, but it's work. The rent is paid. Others have moved into the building. Somebody brought in another small table to restore. The bird's-eye is glued up and clamped. The store window is full and somebody always seems to be looking at it.

I'm going for broke but going for Main Street, and it seems to be working. This may have begun as an act of desperation, but it's making an honest man of me. I still have part of the second two grand. And nobody owns the title to my motorcycle. . . yet. □

Ivan Hentschel is still on Main Street, and he says business is better than ever. 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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A Good "Bit" Better!

Almost unknown in America, Forstner bits are the most accurate and versatile of all woodbits.

With your Forstners you can drill flat bottom holes, or bore **clean** holes in thin stock or veneers. . . and even end grain. They easily enlarge existing holes.

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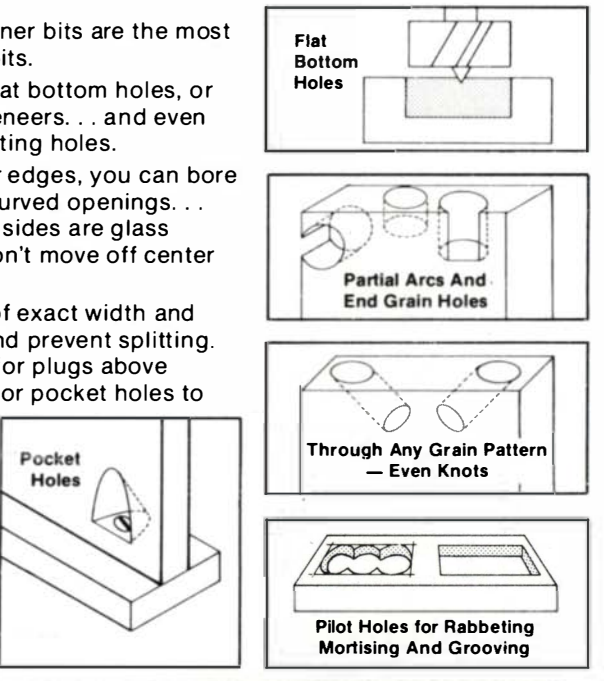

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You Can Order Tools By Phone:

Call TOLL FREE 800-321-6840
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FB100 -	1" Bit.....	**$16.95**
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F1000A 12⅛" Planer, 6⅝" Joiner, 3 hp, 15 amps, 110 volts, 10,400 rpm motor, ⅛" depth of cut, 3/16" thru 6⅝" cutting height, jointer bed 63", 4 column support, dust hood. Weight: 320 lbs. **Sale $1450 delivered.**

P-100 12⅛" Planer, 3 hp, 15 amps, 110 volts, 10,400 rpm motor, ⅛" depth of cut, 3/16" thru 6⅝" cutting height, 4 column support, dust hood. Weight: 265 lbs. **Sale $1150 delivered.**

SB-110 Dustless Belt Sander, 4" x 24", 2 speed, 8.7 amps, 115 volts, 25 belts, **$205 ppd.**

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Model	Diam.	Teeth	Arbor	Use	PPD. List/Sale
1030H	10"	30	⅝"	Ripping	$55/$34
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
1012H	10"	120	⅝"	Fine Mitering Precision Work	$145/$86

For 12" Diameter saw blades add 25% to the above prices

FREE: Sharpening with each saw blade purchased. Buy any four Saw Blades get one free. Call for details

Greenlee carbon steel, tempered for long life, designed for use in drill press or ⅜" portable drills. The set includes ⅛", 3/16", ¼", 5/16", ⅜", 7/16", ½" bits, all stop collars and protective pouch. **Sale $24**

Sizes 9/16", ⅝", ¾", ⅞" & 1" all have ⅜" shanks and are loose packed. cost **$44** both sets together **$55 PPD. WHILE SUPPLY LASTS! ***

Powermatic

10" Table Saw Model 66 complete with: 48" rails; single phase 2hp (115/230 volt) motor; push button switch. **Sale $1460**

Table Saw Accessories Biesemeyer T-square fence system with 72" rails & 32" extension table **$250.** 3 hp Motor & Controls 1 or 3 Ø add **$120 free C. T. sawblade**

8" Joiner Model 60 complete with: stand, 1½hp single phase or 3 phase motor, push button switch. **Sale $1299**

12" Planer Model 100: complete with 1 or 3 phase 3hp motor. safety over load switch. **Sale $2230 Free C.T. saw blade**

Shaper Model 26 complete: 2 hp, 115/230 volt, 1 or 3 phase, push button switch. ¾" + ½" spindles, free router bit adaptor and bits #'s 2, 8, 6, 16 and 17. **Sale $1660. C.T. saw blade**

14" Bandsaw Model 141 complete **$999**

ROUTER BITS CARBIDE TIPPED

—All Router Bits are top Industrial Quality with a money back guarantee *3 bit minimum

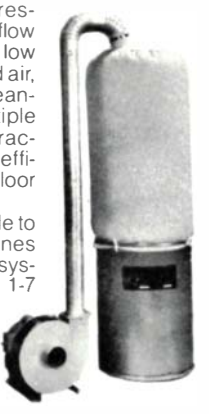
Shank Diam.	Cutting Diam.	Cutting Length	Overall Length	Bit #	Price Ppd	
¼"	¼"	¾"	2¼"	1	$ 6	
¼"	¼"	1"	2½"	2	$ 7	
½"	¼"	¾"	2⅜"	3	$ 7	
¼"	½"	¾"	1¾"	4	$ 7	
¼"	⅜"	1"	2"	5	$ 8	
½"	¾"	1¼"	3"	6	$ 9.50	
½"	⅜"	1"	2¾"	7	$ 7.50	
½"	½"	1¼"	2⅞"	8	$ 8	
½"	¾"	1"	2⅝"	9	$10.50	
¼"	½"	1"	2⅝"	10	$ 9	FLUSH TRIM BIT WITH 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.
½"	1¼" Diam.	⅜"	2¼"	18	$17	RABBETING BIT WITH B.B.

Dust Collection System

Keeping your shop environment healthy and hazard free is as easy as turning on your saw or planer, with our Dust Collection System.

We based our needs upon horsepower, high static pressure, large volume of free flow air, extra large filter area, low noise level, return of heated air, ease of installation and cleaning including single or multiple machines use. Using this practical approach our highly efficient system takes up less floor area too.

A complete 1 hp system able to handle from 1 to 3 machines starts at $560. The 2-5 hp systems able to handle from 1-7 machines simultaneously range in cost from $750 to $1250 and up. Please call for quotes on specific systems



Makita

15⅝" Planer 2040 2hp 115 volt 6500 rpm motor; full cutting range: ¼" thru 7⅝"; 2 quick set knives; speed reducing kit; dust collector hood. **Sale $1199**

12" Planer/6" Joiner 2030 2hp 115 volt motor; full cutting range; ¼"-6¼"; 2 quick set knives; speed reducing kit: dust collector hood. **Sale $1299**

Speed reducer kits:

Model 2030 & 2040. reduces feed rate by 40%, easy to install **$27 ppd,** Dust hood **$62 ppd.**

New Product: Our Four Ball Bearing Guide System now turns the 2116 resaw into a super scroll saw, able to accept blades from 2⅜" to as thin as ⅛" without further alteration. **$210 PPD.**

16" Band Saw 2116; 2 hp., (115/230 volt), 1 or 3 phase high torque 1150 rpm motor, 2" wide blade. Can accept down to ⅛" blades. List $1880. **Sale New $1299**

Router 3600B Plunge cutting, 2 hp, 22,000 rpm, 12 amps. FREE ROUTER BITS #'s 6, 7, 8. **Sale $200 ppd.**

Blade Sharpener 9820-2 Sharpens planer & jointer knives up to 15¾" wide, 7⅞" wheel, water cooled, 560 rpm. 1.6 amp., med. grit stone & wrenches & blade holder. **Sale $170 ppd.**

Finishing Sander B04510 Heavy duty; double insulated, 12,000. rpm, 4⅜" x 4" pad size. **Sale $50 ppd. Free router bit #1**

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Deep Penetrating Sealer

DPS penetrates deeply, seals, stabilizes and applies easily. It retards the movement of moisture from inside and outside by lining the cellular walls and sealing those cells.

DPS can be applied by rag, brush, spray or by dipping. It will enhance the wood's natural color and can be mixed with any oil based stain. Varnish, shellac, lacquer, enamels or urethanes may be applied over DPS. **Pint: $6 ppd.**

Catalog

The catalog contains the widest collection of professional tools, hardwood lumber, supplies and accessories ever printed between two covers. Valuable information, new products, special purpose tools, hard-to-find items, in all sizes; professional supplies, all industrially priced. **Send $3 for this valuable catalog.**

LEASING
STATIONARY POWER TOOLS

Time Payments now available for stationary tools, 2-5 year plans 20-25% down, personal or corporate, call for specifics

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Fine WoodWorking January/February 1983

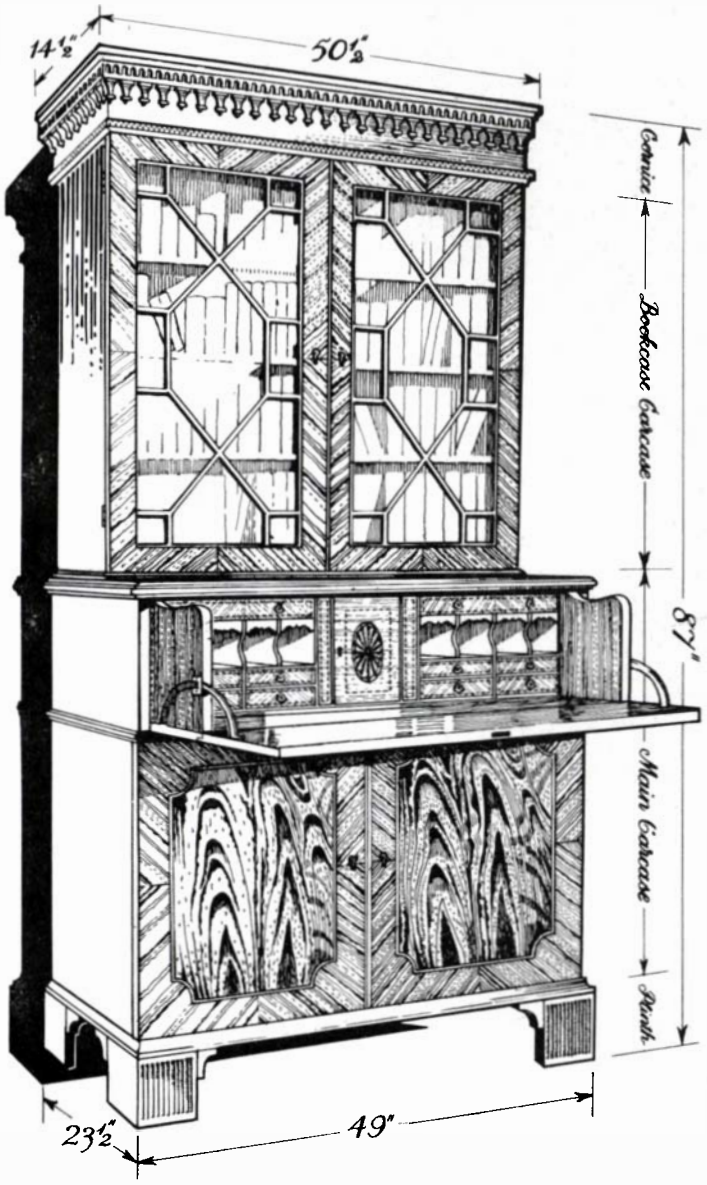
Building a Secretaire-Bookcase

Lots to learn from this 18th-century case study

text and drawings by Victor J. Taylor

It's not often that you come across a piece of English antique furniture that can be dated precisely, but glued to one of the drawer linings of this handsome secretaire-bookcase is the following receipt: "B. Milward [the purchaser]. Jan 25. 1787. Bought of Mr. Evans, Broadmead, Bristol. Price £15.15."

Today the piece stands in the Withdrawing Room of the Georgian House, Bristol, which is a real treasure store of late 18th-century household goods ranging from fine furniture and priceless paintings down to kitchen utensils. It is officially described as Hepplewhite style, but it seems to me that the date is too early for Hepplewhite, and that the piece is more likely late Adam. In drawing this complex piece, I was struck by how instructive it can be of various features common to much simpler furniture. Rather than follow a strict (and probably oppressive) how-to-do-it formula, I have attempted to present the piece as a tour of period construction practices, with side-trips into alternatives for the present-day craftsman.



As can be seen in the drawing on this page, the piece is composed of five sections: from the floor upwards these are the plinth, the cupboard (containing cutlery and linen drawers, and two butler's trays), the secretaire, the bookcase and the cornice. These sections were usually made as complete, separate units, then fitted together, although in this piece the bookcase and cornice are combined as one unit.

Often the sections merely rested on each other so that they could easily be dismantled if they had to be moved—indeed, quite often the main cupboard section had handles fitted to it to make lifting easier. Usually the weight of each section kept it in place, with various sorts of blocks and keys serving to keep things from shifting.

Mahogany is used for all show-wood parts, with oak and pine for the hidden parts and groundwork, normal practice for the time. The mahogany is almost certainly Cuban, and the superb "Spanish Feather" veneer is virtually unobtainable these days. All veneer is laid on without benefit of counter-veneer, which would be risky with today's central heating.

In the following drawings, each part of the secretaire-bookcase is illustrated and its construction explained, beginning with the plinth and working upwards, which is not necessarily the order in which it would be built. All pieces are numbered to correspond to the listing in the bill of materials on p. 60. In each figure, there is a small diagram of the full cabinet—the shaded part of the diagram is shown exploded in the drawing.

In drawing the piece, where it was impossible to see the joints, I have followed orthodox cabinetmaking practice. Doweling, incidentally, was a very common method in the old days. Craftsmen made their own dowels by trimming down a suitable piece of scrap wood, and then hammering it through a dowel plate, a piece of ⅛-in. thick metal in which holes of various sizes had been drilled—¼-in., ⅜-in. and ½-in. were usual. Dowels were often shaped from offcuts from the parts they were intended to join, minimizing uneven shrinkage. Willow was also used; its stems could be made into dowels with hardly any trimming.

At the time this piece was made, French polishing had not been invented (it did not become widespread in England until about 1820), so the piece was probably originally finished with linseed oil and wax, then French polished at a later date.

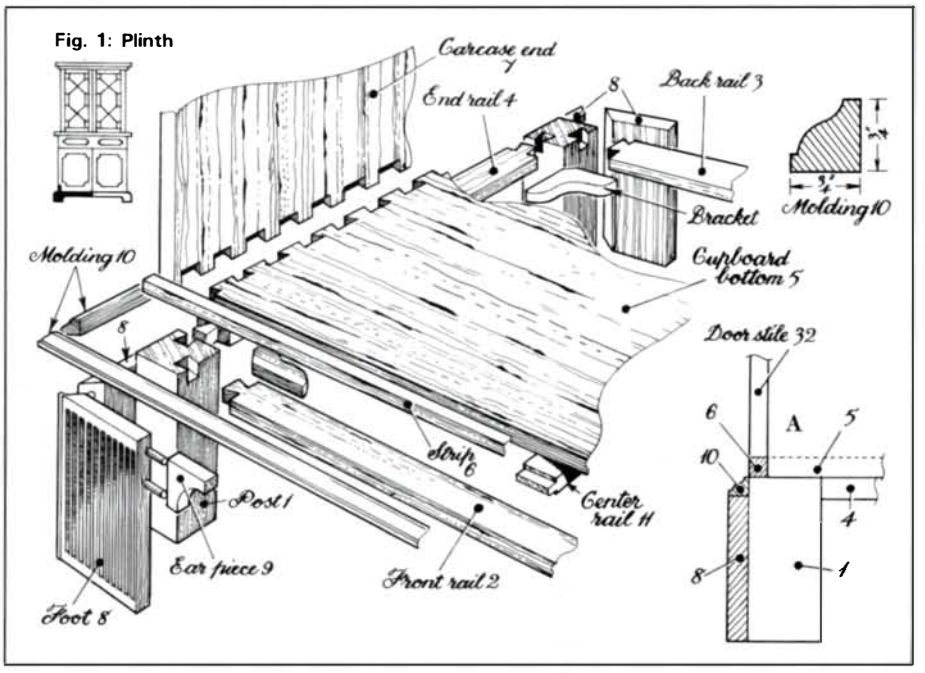
Victor Taylor, of Bath, England, spent many years in the furniture industry. He has written seven books, and was editor of the British magazine Woodworker.

Figure 1: Plinth. The basic members of this subassembly are the four corner posts *(1)*, which are connected at the front and back by rails *(2 & 3)*, and at each end by a rail *(4)*. The cupboard rests on this base and is almost certainly keyed to it with blocks screwed beneath the cupboard bottom *(5)*, though I couldn't see them.

The feet *(8)* are not weight-bearing, but are merely glued as decoration around the corner posts. The ear pieces *(9)* are glued and doweled to the feet, then the moldings *(10)* are pinned and glued on. Brackets are glued and screwed into each corner to strengthen the whole framework. Screws (hand-made) were first introduced in the late 17th century and by 1720 were common. Nails and pins (brads), of course, have been used for centuries, and there is even a reference from 1343 on using an adze to smooth "old timber" full of nails. On the arris of the foot there is a staff bead, whose profile makes any opening of the joint less obvious. A central frame rail *(11)* is mortised flush into the front and back rails. Following the usual practice of the time, the main carcase ends *(7)* are lap-dovetailed to the cupboard bottom *(5)*. There is a filler strip *(6)* beneath the cupboard doors, and this is shown in section at *A*.

Figure 2: Cupboard and drawer framing. The doors overlap the upright ends of the carcase, therefore the carcase ends have to be stepped back by ¾ in. below the point where the front secretaire separation rail *(15)* meets them.

The front and back drawer rails *(12)* are tenoned into the main carcase ends *(7)*, as are the top separation rails *15* and *38* (visible in figure 4, overleaf). Muntins *(14)*, drawer bearers *(13)* and a central bearer *(16)* connect these four rails. The two upper drawers are supported by this conventional framing, while the lower single drawers run on bearers *(30)* glued to the cabinet ends. This ignores wood movement, but the bearers are still secure. The drawer construction is orthodox, with lapped dovetails on the fronts and through dovetails on the backs. The bottoms are solid wood, grooved into the sides and fronts without being glued in, so that they can expand and contract. You could, of course, use plywood for the bottoms instead. The handles on the drawers are solid brass and match those on the fall front; they are shown at *A* in figure 10.



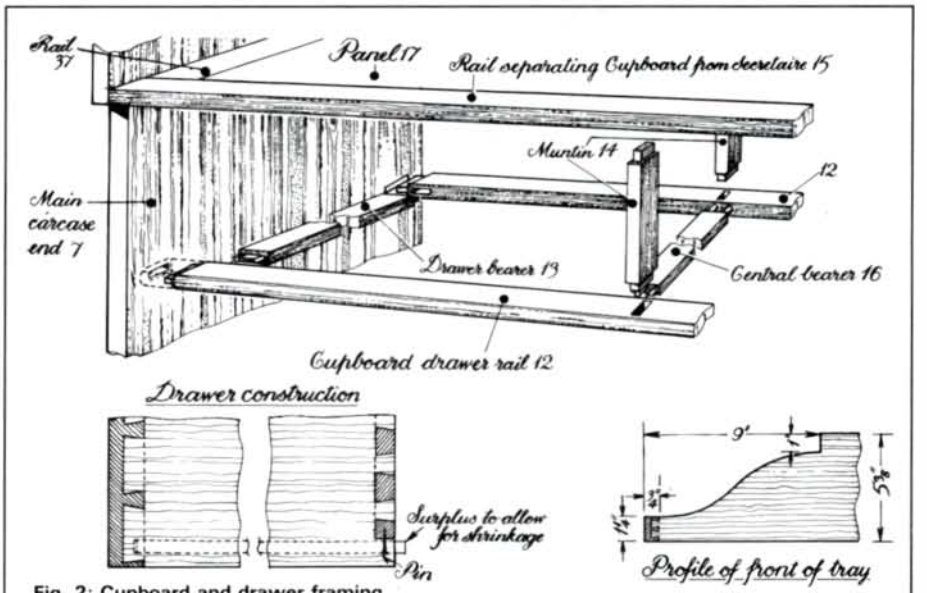
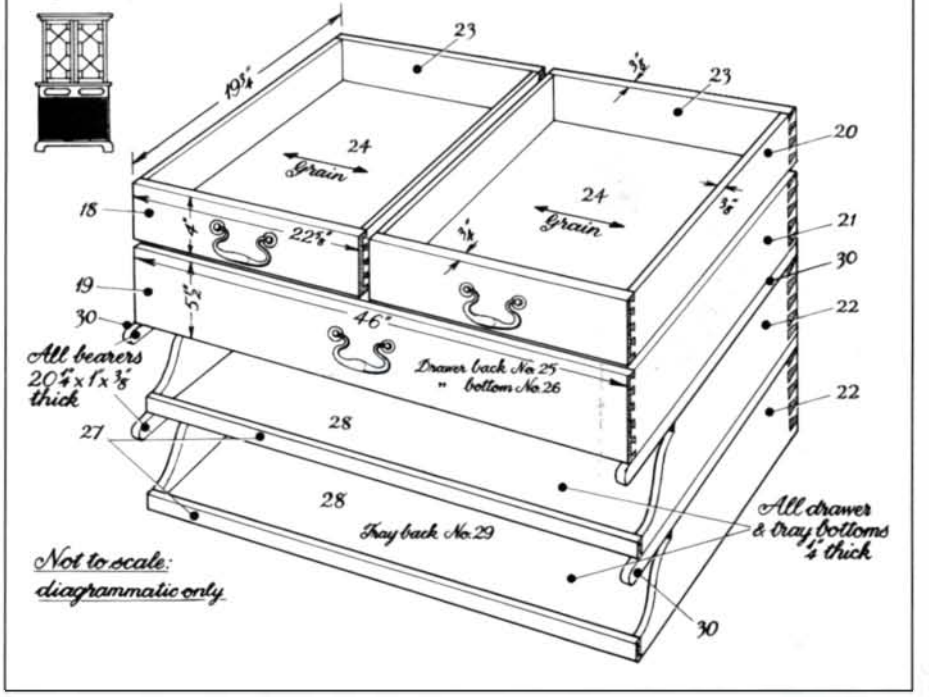
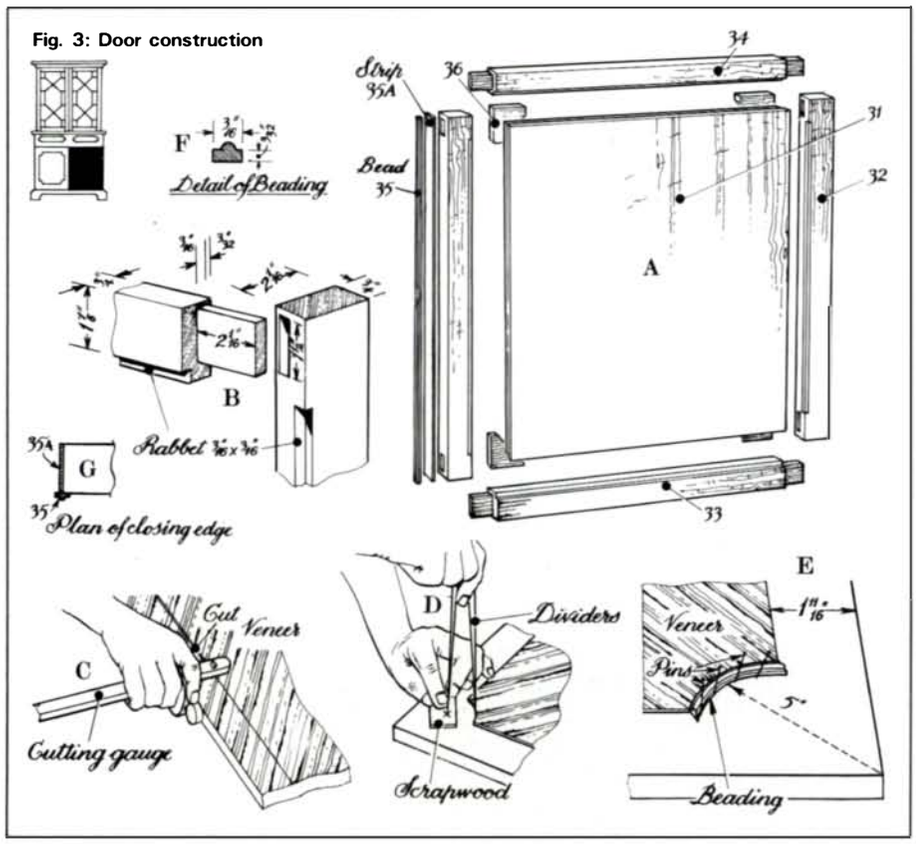
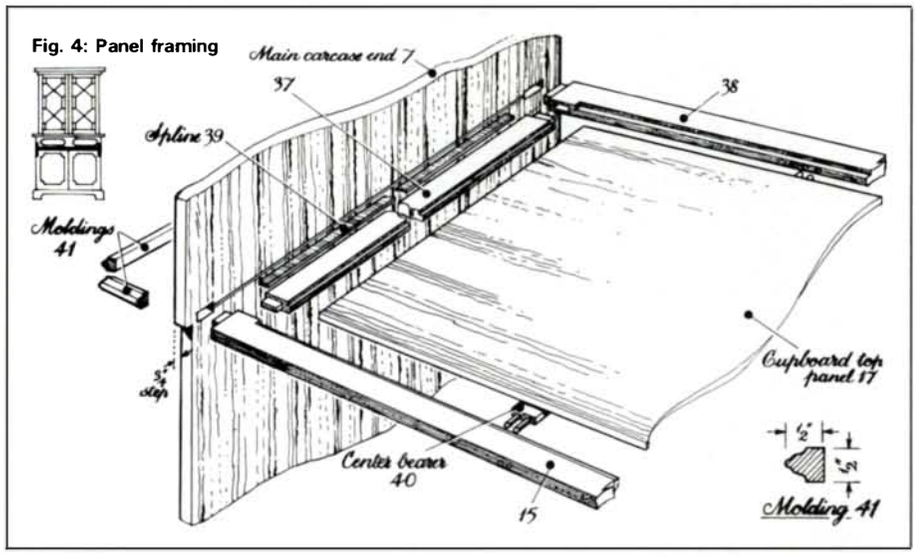


Fig. 2: Cupboard and drawer framing







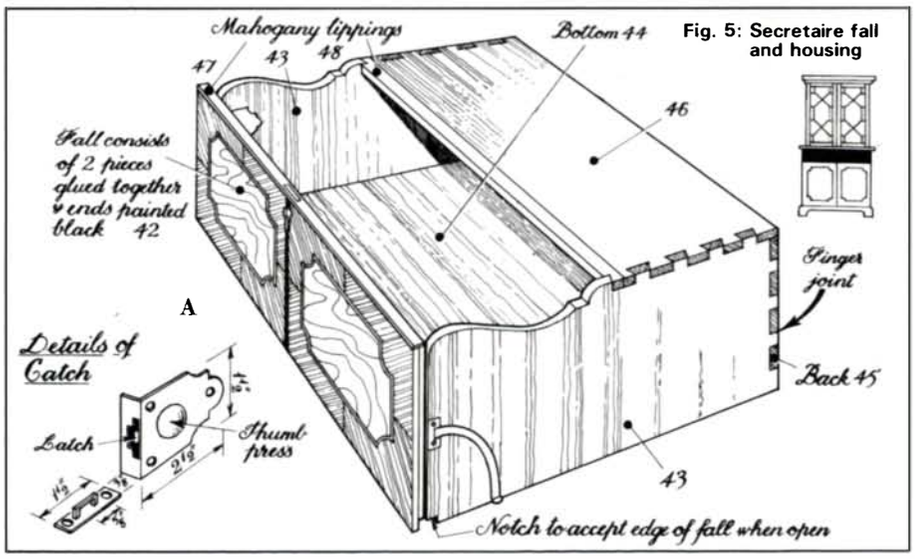


Figure 3: Door construction. The doors are hung by pairs of brass hinges. As you can see at *A*, the frame is a straightforward mortise-and-tenon job with a rabbet for the panel, which lies flush, glued and pinned. The rabbets on the rail run the full shoulder length, while those on the stiles are stopped, as at *B*. The tenons on rails *33* and *34* go right through the stiles, and their ends can be seen on the outside edges. On the closing edges, however, a thin strip *(35A)* has been glued to the edge to mask them. Blind tenons would do just as well here, and the cover strips could thus be omitted. A thin astragal beading *(35)* is fixed as shown at *G*.

The corner brackets *(36)* appear to have been glued behind the panel merely to add rigidity.

The doors were constructed entirely of oak, with no veneer on the inside. At the time the piece was made, veneers were sawn and consequently were much thicker than our present-day veneers. The central part of the veneered panel would have been laid in a press, while a veneering hammer would have been employed to put down the border. Workmen trimmed the edges of the veneer, after laying, with a cutting gauge *(C)*, simply a marking gauge with a small, sharp blade instead of the usual marking pin. A pair of dividers, with one point sharpened, was used to scribe the corners, as at *D*, and the cut was finished off with a knife.

Detail *E* shows the small ovolo beading being glued—almost certainly, it was steamed first. Both this and beading *(35)* are a blond color and could be birch, sycamore or holly. The left-hand door has brass bolts top and bottom, and a false escutcheon that matches the lock on the other door.

Figure 4: Panel framing. This panel *(17)* appears to be ⅜-in. thick pine, but I'd suggest birch plywood instead. It is pinned and glued into ⅜-in. by ⅜-in. rabbets worked on the edges of rails *15, 37* and *38*. Although the frame lines up at the front with the front edge of the carcase end *(7)*, it falls ¾ in. short of the back edge, to leave room for the back framing. The moldings *(41)* are glued and pinned on, corners mitered.

Figure 5: Secretaire fall and housing. The pigeon-hole section has a clever feature that I have not seen on other pieces from this period. It is contained

within a fall-front drawer, shown at right and at the bottom of the previous page, that pulls out to provide knee room for writing. The fall front *(42)* is made up of two pieces face-glued together to form a lip that fits into a notch cut into the side *(43)* when the fall is down (see *B* and *D*). The fall has three hinges, and is fitted with two brass handles, shown at *A* in figure 10. Two mahogany lippings *(47 & 48)* mask the drawer front's top edge and the exposed pine edge of the drawer top.

The quadrant stay was made from solid brass, with a small fixing flange brazed on. Cut out a $\frac{3}{16}$-in. channel in the drawer side for the stay to run in. You might wish to install a lock in the fall front and catches fitted into the sides (see *A* and *B*).

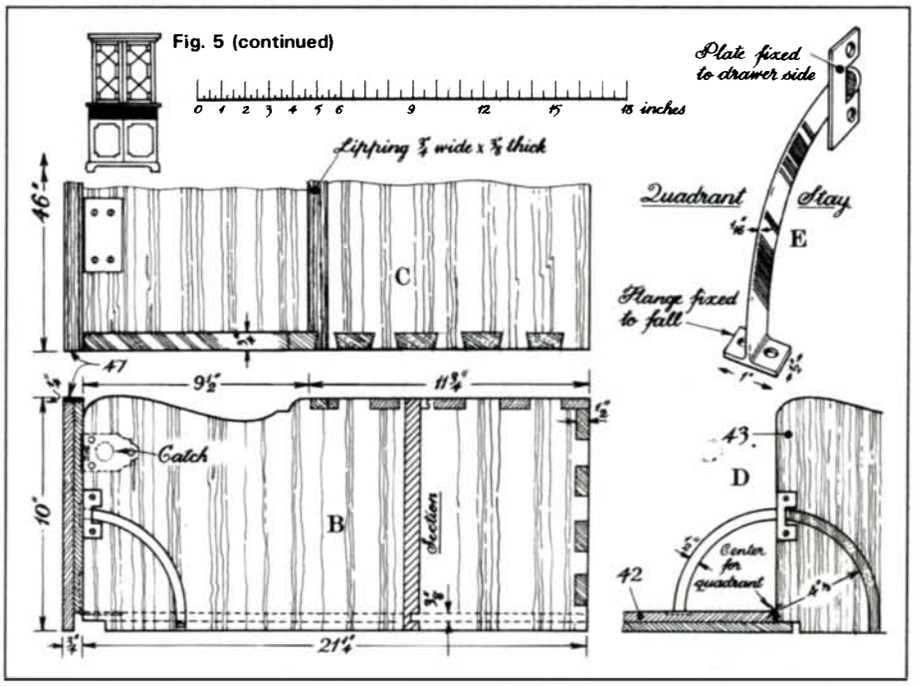
The fall front is veneered similarly to the cupboard doors, with the addition of a black inlaid line running from top to bottom in the center. Lippings are applied after veneering so that the top edge of the veneer is protected. The ends of the fall are painted black—not an attractive feature—and you may wish to substitute another thin lipping.

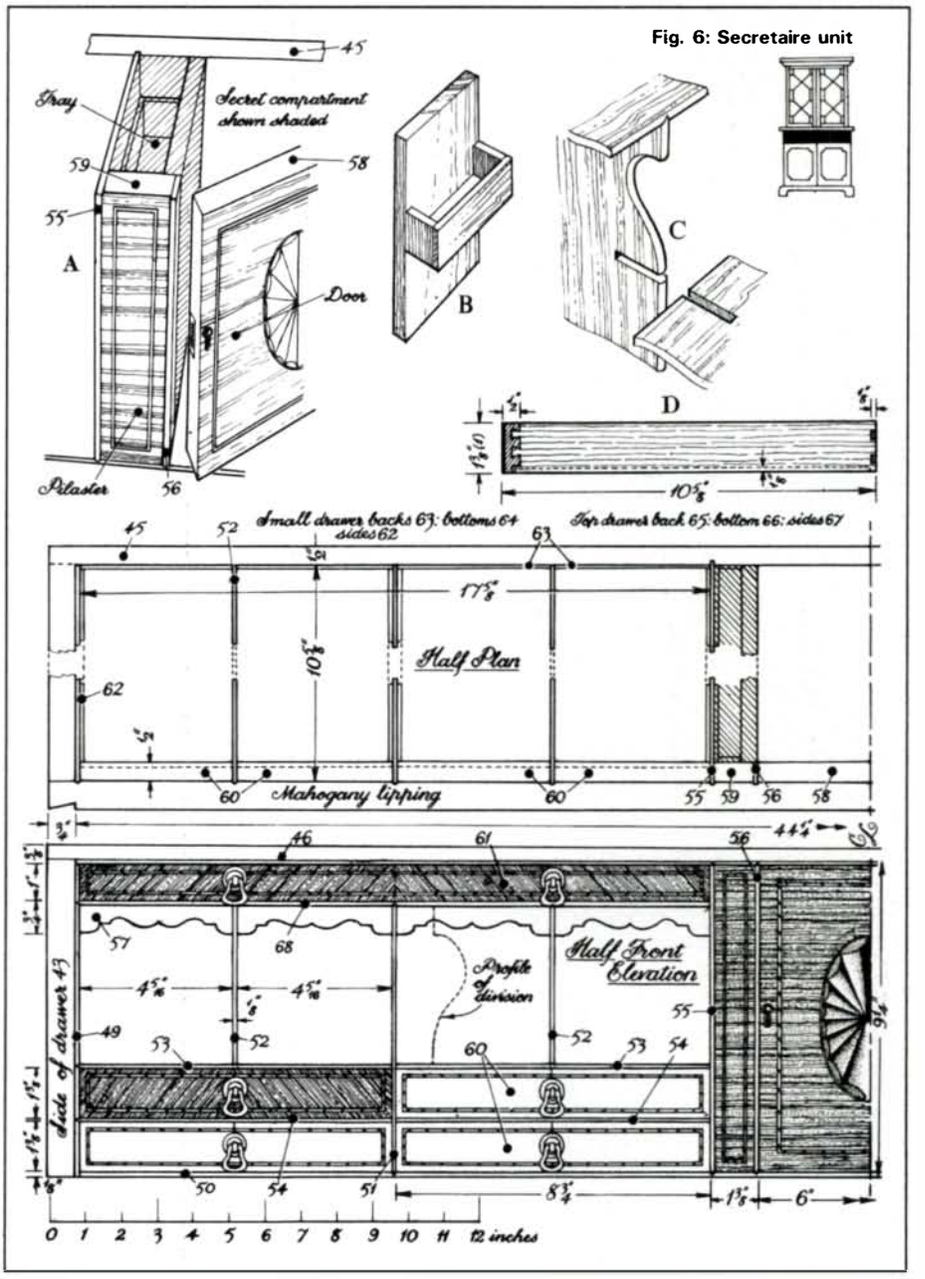
Figure 6: Secretaire unit. This is a real work of art, as all the parts are only $\frac{1}{8}$ in. thick, except for the drawer fronts, which are $\frac{1}{2}$ in. thick (including the veneer). All parts are mahogany. With such thin partitions, a practical joint is the interlocking joint shown at *C*.

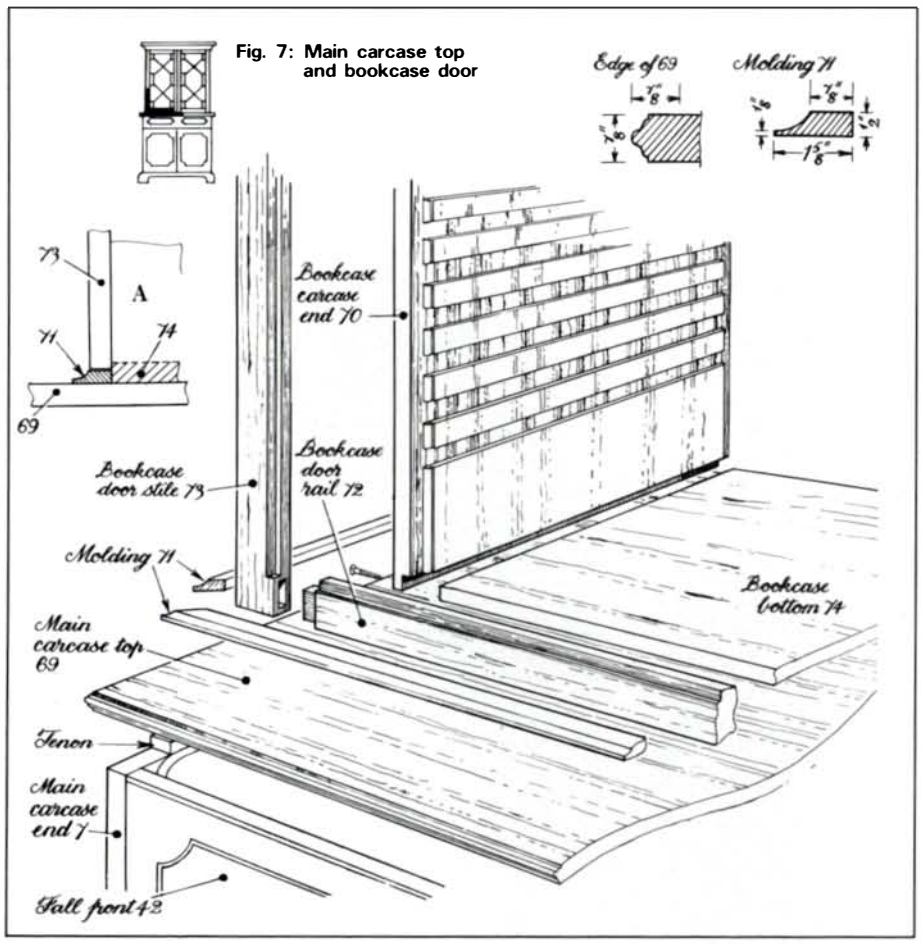
The main structure comprises the bottom *(50)* and the two ends *(49)*, which can be butted together and glued to the "drawer" side and bottom *(43 & 44)*. The remaining partitions *(51, 52, 53, 54, 55 & 68)* can be connected with interlocking joints. Construction of the drawers is shown at *D*.

The veneer is enlivened by black and white stringing about $\frac{3}{32}$ in. wide, and the cupboard door is further embellished with an inlaid fan.

Now we come to an intriguing item: the secret compartments *(B)*. Frankly, they are rather obvious and clumsy compared to some I have seen, and you may wish to elaborate upon them. They are built in behind the two pilasters (see *A*). Once you have opened the door, the two inner walls can be pulled inward and taken out completely. I had to pry them out with the point of a penknife, but probably a leaf spring had originally been fitted behind the tray to help push it out.







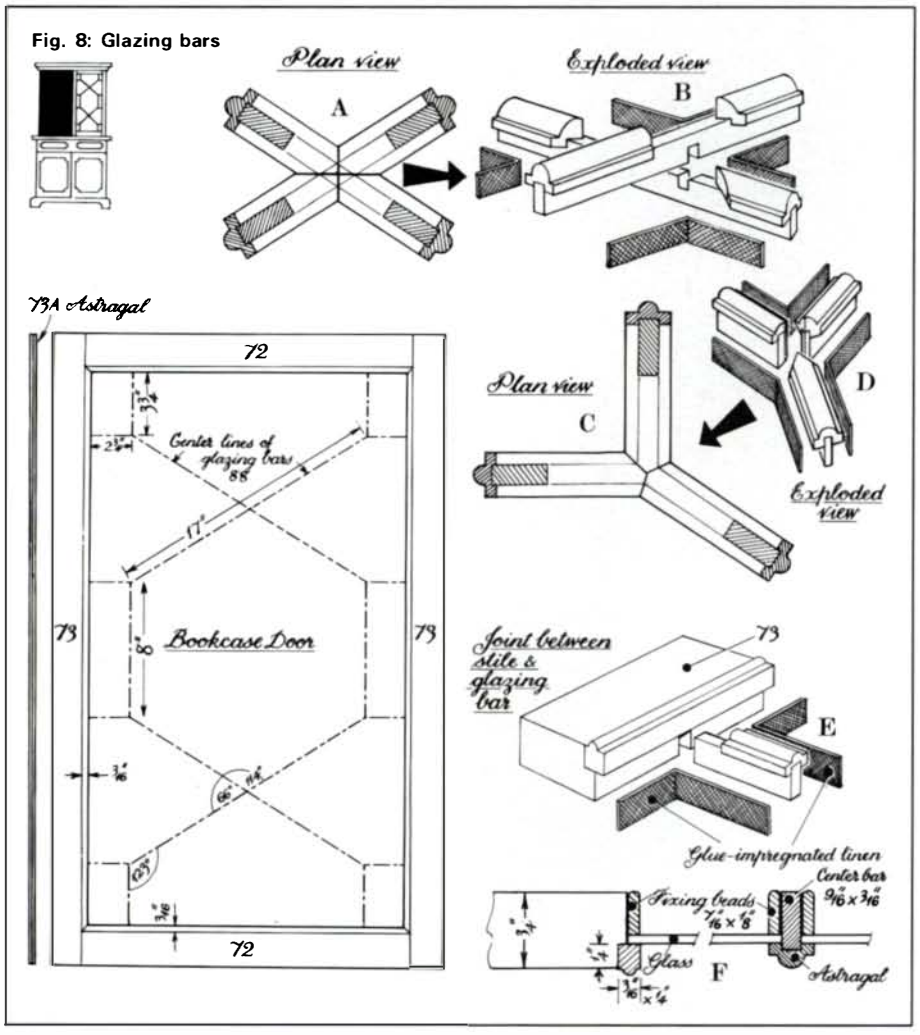


Figure 7: Main carcase top and bookcase door. The top of the main carcase *(69)* is fixed to the carcase ends by means of blind tenons on the main carcase end *(7)*. Moldings *(71)* are attached to the top (shown in section at *A*) so that the removable bookcase section does not shift. The bookcase is made up of the two ends *(70)*, the bottom *(74)*, and the top. The ends extend up to include the cornice, and we shall be dealing with the upper part, including the top *(76)*, in figure 9.

The bottom *(74)* is housed in a rabbet formed at the foot of the end. The joint is glued and then strengthened with wood screws driven in from the outside—the surrounding molding *(71)* will conceal the screw heads. The shelf supports *(70A)* are glued and pinned to the carcase end—these supports are made from a piece of $\frac{5}{16}$ in. stock which first has a small thumb molding worked on its front edge, and is then sawn into separate strips. Note that their back ends must stand $\frac{3}{4}$ in. away from the rear edge of the bookcase end to allow for the fitting of the back frame.

On the actual piece, the corners of the bookcase doors have through tenons, but I have drawn blind tenons, on the assumption that you will prefer them.

Figure 8: Glazing bars. Once the bookcase door frames are made, lay them on a flat board so that you can pencil the centerlines for the glazing bars on it, following the pattern and measurements shown. Leave off the astragal beadings until you have gotten the center bars fitted. Delicate joints such as these *(A–E)* can be reinforced with strips of linen soaked in glue.

In the original piece, the glass is fixed in place with putty instead of the fixing beads shown at *F*. I cannot recommend putty, as it has no resiliency, and consequently the glass will crack easily if the wood swells or shrinks—in fact, several of the panes have done so.

The last step is to hang the doors with three 2-in. hinges per door, and if you wish, you can fix a closing bead on to the right-hand door to match the one on the cupboard door. Door stops can be fitted beneath the top, where they will be out of the way.

As with the cupboard doors, the right-hand door has a lock and an escutcheon, while the left-hand door has just an escutcheon plus a brass bolt at top and bottom.

Figure 9: The cornice and top. The cornice *(75)* consists of a piece of mahogany lap-mitered to the top of the bookcase end *(70)*. It is rabbeted along its lower edge to house the bookcase top. Note the dado for the top in the bookcase end, as shown at *A*.

The carcase top *(77)* laps over the back framing (shown in figure 10), and it also laps over the bookcase ends *(70)* and the cornice *(75)*. In the original, it is screwed down all around, which does not allow for wood movement.

The piece will look best if you reproduce the original moldings instead of substituting lumberyard patterns.

The top molding *(78)* is quite straightforward, but the one below it *(79)*, which comprises the dentil motif with a cavetto beneath it, is not so easy. Probably the best way to tackle it is to run off the outline profile first on a spindle shaper, and then use a router to take out the slots for the dentils. Then you will need to chop out the rounded end of each slot with a small scribing (in-cannel) gouge.

Now for the bracket molding *(80)*. On many designs of the period this was a straight run of molding with the brackets joined together at the top. In our model, however, they will need to be sawn out separately with a fretsaw or jigsaw, and the small pieces of beading glued on beneath them. These small pieces were turned on a lathe as "split" turnings—two small blocks were glued together with a sheet of paper between them and then turned; it was easy to split them apart afterward.

Lastly, we have to deal with the Grecian key motif *(81)*, and the best way, again, is to use a router, squaring up with a chisel.

Once the brackets are glued on, it will be difficult to polish into all the nooks and crannies, so you can adopt the method employed by the old-timers. First they would have polished the cornice and the brackets as separate pieces, then they would lay the brackets on the cornice to scribe around them. When they removed the brackets, an outline was left and the polish was scraped away from this. Next they warmed up a metal plate (called a sticking board), so that the glue would not chill when it was spread on it. They would draw the backs of the brackets lightly across the sticking board so that each received a thin coat of glue, enabling them to be fixed with no fear of gummy crevices.

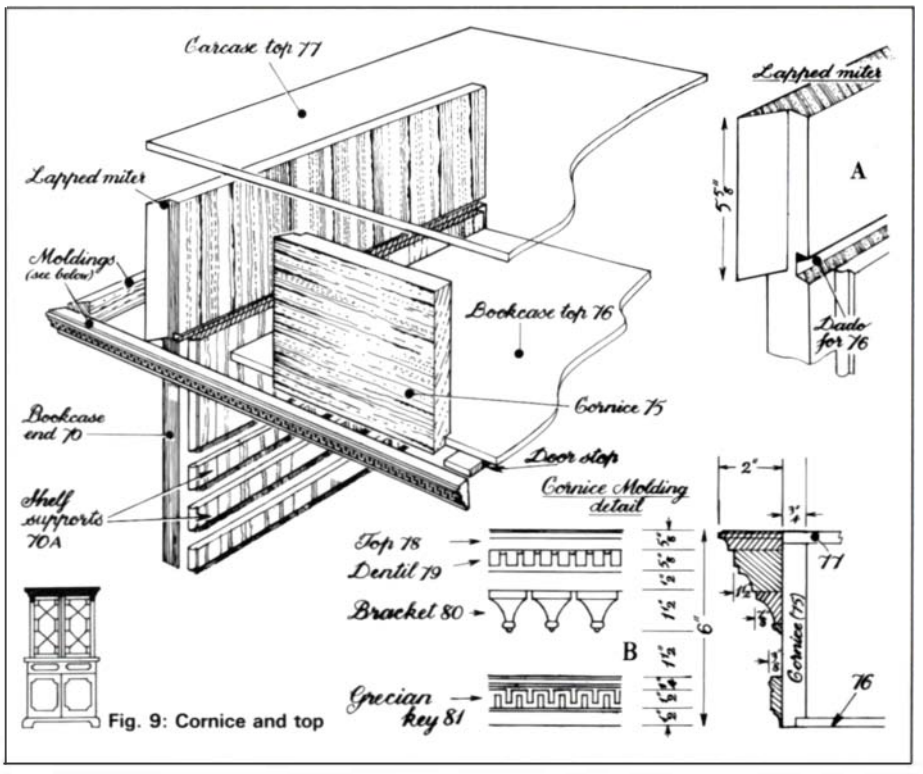


Fig. 9: Cornice and top

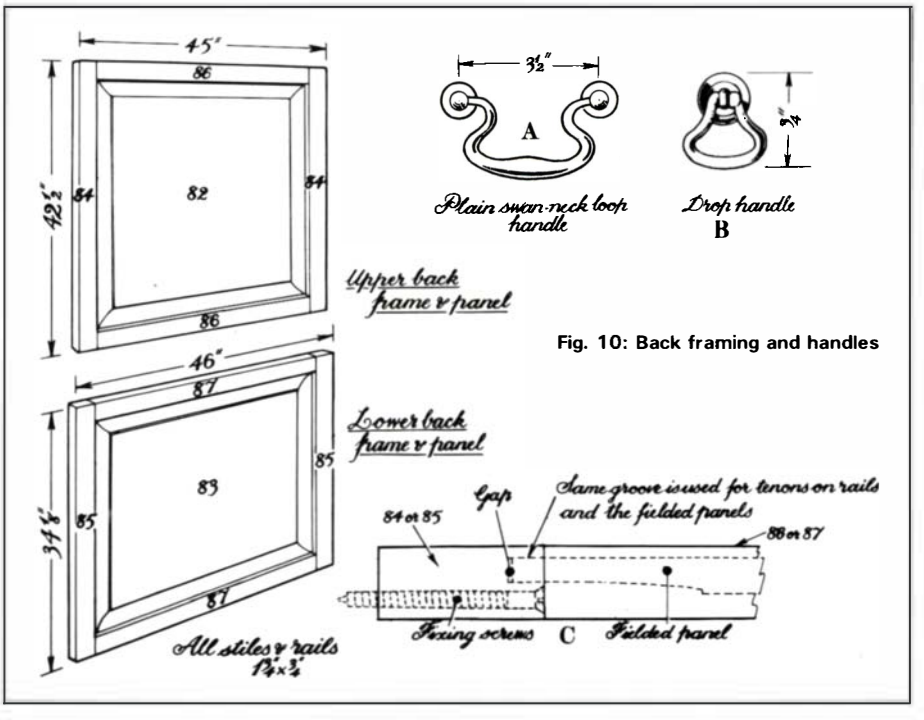


Fig. 10: Back framing and handles

Figure 10: Back framing and handles. Chances are that the framed panels in this piece were screwed into place, not glued. This would have allowed their removal, considerably lightening the piece if it had to be moved. It was difficult to see how the back frame was constructed, so I am giving details of typical framings that you can use. Those on the original were of solid oak, although you may wish to use pine. In any case, the frames are made up with conventional mortise and tenon joints. The fielded panels *(82 & 83)* are grooved in all around as shown at *C*—bear in mind that solid panels must not be pinned or glued in place but left loose to shrink or swell—leave some space, too, in the groove.

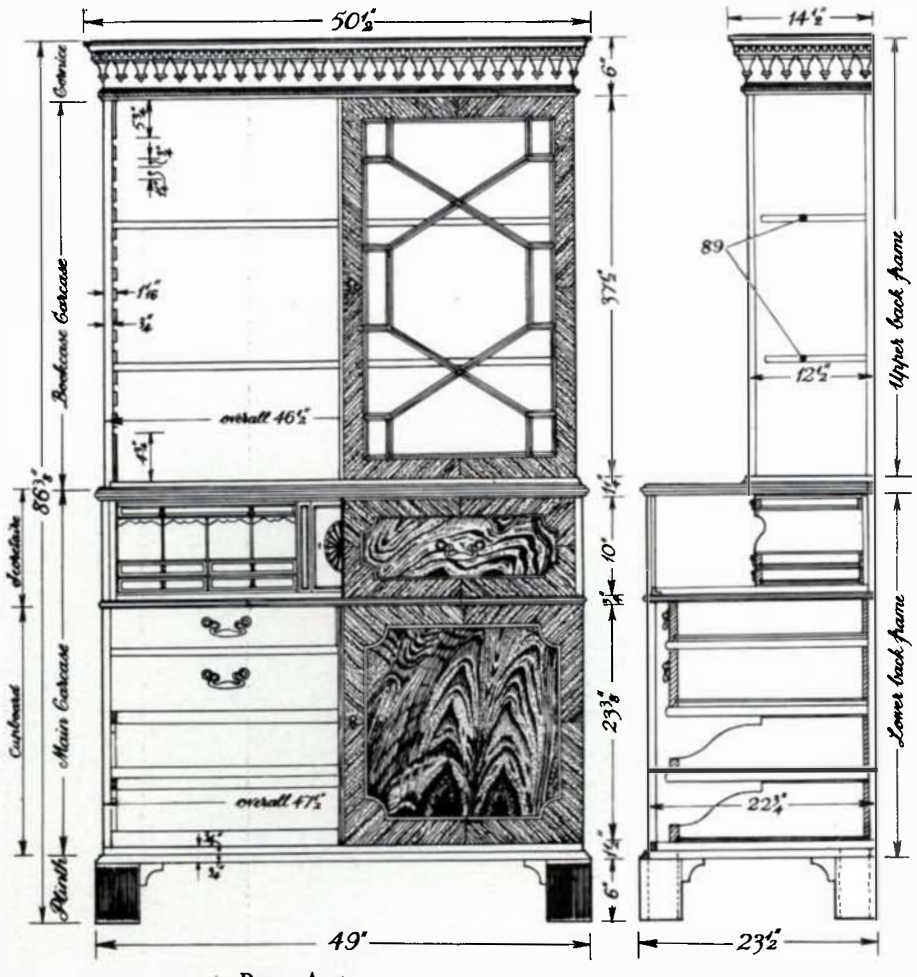
If you make the groove ¼ in. wide by ⅜ in. deep, you can then use it to accept the tenons as well as the panels. You may stop the grooves on the stiles *(84 & 85)* to avoid their running through the top and bottom edges when the frame is made up, although when everything is in its place, finally, these edges won't show. ◗

Bill of Materials

The dimensions given below are net, and you should allow extra for sawing, planing, etc., at the rate of about 1 in. in length, ¼ in. to ½ in. in width, and ⅛ in. in thickness. Where I have shown shoulder lengths you will need to add extra length for tenons. I have left the tenon dimensions mostly up to you, and you may, of course, use whatever joinery you prefer throughout the piece.

I have not included parts for the secret compartments, as no doubt you will wish to design more ingenious (and less publicized) ones of your own.

In measuring a complicated piece like this, one often finds that many of the parts were scribed from other parts or cut to fit, rather than laid out with a ruler. I found I had to adapt some of the measurements in order to get things to add up. Although I have made every effort to ensure accuracy, parts of the cabinet were inaccessible—cooperative as the folks at Georgian House were, no one was about to let me move it, let alone take it apart. I suggest that you temper haste with a bit of caution, and cut to fit as you go along. □



Part No.	Amt. Req.	Description	L	W	T
1	1	Posts	6¾	3	3
2	1	Front rail, shoulder length	41½	1⅞	¾
3	1	Back rail, shoulder length	41½	1⅞	¾
4	1	End rails, shoulder length	16	1⅞	¾
5	1	Cupboard bottom, shoulder length	46	22¾	¾
6	1	Strip	47½	¾	¾
7	1	Carcase ends, shoulder length	34⅞	22¾	¾
8	1	Plinth feet	6	4½	¾
9	1	Ear pieces	2	2	¾
10	1	Moldings from one piece	96	¾	¾
11	1	Center rail, shoulder length	18¼	1⅞	¾
12	1	Cupboard drawer rail, shoulder length	46	1⅞	¾
13	1	Drawer bearers, shoulder length	16½	1⅞	¾
14	1	Muntin, shoulder length	4	1⅞	¾
15	1	Separation rail, shoulder length	46	1⅞	¾
16	1	Central bearer	16½	1⅞	¾
17	1	Panel	42¾	18¾	⅜
18	1	Upper drawer fronts	22⅝	4	¾
19	1	Lower drawer front	46	5½	¾
20	1	Drawer sides	19½	4	⅜
21	1	Drawer sides	19½	5½	⅜
22	1	Tray sides	19½	5⅜	⅜
23	1	Drawer backs	22⅝	3½	⅜
24	1	Drawer bottoms	22¼	19½	¼
25	1	Drawer back	46	5	⅜
26	1	Drawer bottom	45⅝	19½	¼
27	1	Tray fronts	46	1¼	¾
28	1	Tray bottoms	45⅝	19½	¼
29	1	Tray backs	46	4⅞	⅜
30	1	Bearers	20¼	1	⅜
31	1	Door panels	19¹⁵⁄₁₆	19½	¼
32	1	Stiles	23¼	2¹⁄₁₆	¾
33	1	Door bottom rails, shoulder length	19⁹⁄₁₆	2¹⁄₁₆	¾
34	1	Door top rails, shoulder length	19⁹⁄₁₆	2¹⁄₁₆	¾
35	1	Closing bead	23¼	³⁄₁₆	³⁄₈₂
35A	1	Strips	23¼	¾	¹⁄₁₆
36	1	Corner pieces	2	2	⅜
37	1	End rails, shoulder length	18¼	1⅞	¾
38	1	Back separation rail, shoulder length	46	1⅞	¾
39	1	Splines	18	¾	⅝
40	1	Center bearer	18¼	1⅞	⅜
41	1	Moldings from one piece	96	¾	¾
42	1	Fall-front pieces	46	9¾	⅜
43	1	Drawer sides	21¼	10	¾
44	1	Drawer bottom	45¼	21¹⁄₁₆	⅜
45	1	Drawer back	46	10	¾

Part No.	Amt. Req.	Description	L	W	T
46	1	Drawer top	46	11	⅜
47	1	Fall-front lipping	46	¾	¼
48	1	Top front lipping	46	¾	⅜
49	1	Secretaire ends	8⅞	10⅝	⅛
50	1	Secretaire bottom	44½	10⅝	⅛
51	1	Secretaire partitions, long	7⅝	10⅝	⅛
52	1	Secretaire partitions, short	4½	10⅝	⅛
53	1	Secretaire partitions	17⅞	10⅝	⅛
54	1	Secretaire partitions	17⅞	10⅝	⅛
55	1	Secretaire pilaster sides	8¾	10⅝	⅛
56	1	Secretaire pilaster sides	8¾	½	⅛
57	1	Arcade fronts	4⁵⁄₁₆	¾	⅛
58	1	Secretaire cupboard door	8⅝	6	½
59	1	Secretaire pilaster fronts	8⅝	1⅛	½
60	1	Secretaire small drawer fronts	8¾	1⅜	½
61	1	Secretaire long drawer fronts	17⅝	1	½
62	16	Secretaire small drawer sides	10¼	1⅜	⅛
63	1	Secretaire small drawer backs	8¾	1⅜	⅛
64	1	Secretaire small drawer bottoms	10³⁄₁₆	8½	⅛
65	1	Secretaire long drawer backs	17⅝	1	⅛
66	1	Secretaire long drawer bottoms	17½	10³⁄₁₆	⅛
67	1	Secretaire long drawer sides	10¼	1	⅛
68	1	Secretaire partitions	17⅞	10⅝	⅛
69	1	Main carcase top	48½	23¼	¾
70	1	Bookcase carcase ends	43⅝	11¾	¾
70A	-	Shelf supports from one piece	28	10½	⁵⁄₁₆
71	1	Moldings from one piece	77	1⅝	½
72	1	Bookcase door rails, shoulder length	19½	1⅞	¾
73	1	Bookcase door stiles	37½	1⅞	¾
73A	1	Bookcase door closing bead (astragal)	37½	³⁄₁₆	³⁄₈₂
74	1	Bookcase bottom	45¾	11¾	¾
75	1	Cornice	46½	5⅝	¾
76	1	Bookcase top	45¾	11⅜	¾
77	1	Bookcase carcase top	46½	12½	¾
78	1	Top moldings from one piece	79½	2	⅝
79	1	Dentil moldings from one piece	77½	1⅛	1½
80	1	Bracket moldings from one piece	75	1½	⅞
81	1	Grecian key moldings from one piece	77	1¼	⅜
82	1	Upper back panel	39⅝	42⅛	⅜
83	1	Lower back panel	31⅛	43⅛	⅜
84	1	Upper back stiles	42½	1¾	¾
85	1	Lower back stiles	34⅛	1¾	¾
86	1	Upper back rails, shoulder length	41½	1¾	¾
87	1	Lower back rails, shoulder length	42½	1¾	¾
88	-	Glazing moldings, from total run of	242		
89	-	Shelves (number optional), each	44⅞	10¼	⅞

Marquetry pictures can add visual flourish to furniture of all kinds. For this walnut coffee table, Silas Kopf mounted an 18-in. by 46-in. floral picture with background of Australian laurel on a plywood base let into the table's top.

Marquetry on Furniture

Double-bevel sawing leaves no gaps

by Silas Kopf

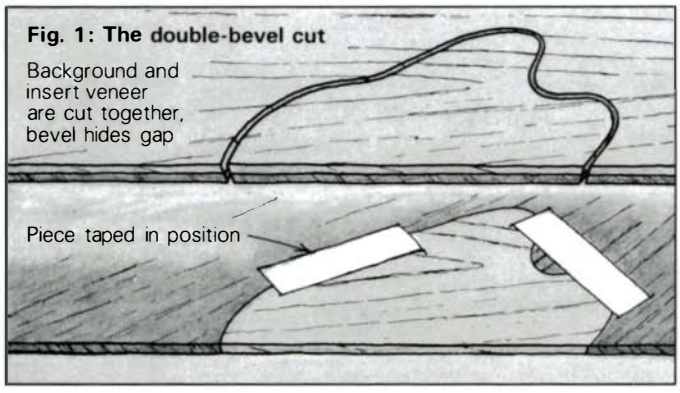
Although we really don't have a long tradition of using marquetry in American furniture, applying assemblages of colored veneers to add visual interest to a piece is gaining favor. Veneers, sold in hundreds of colors and textures, are quite workable for making rich designs and pictures. The techniques involved, though not simple, are easily learned; the real challenge is in creating patterns complementary to the furniture being decorated.

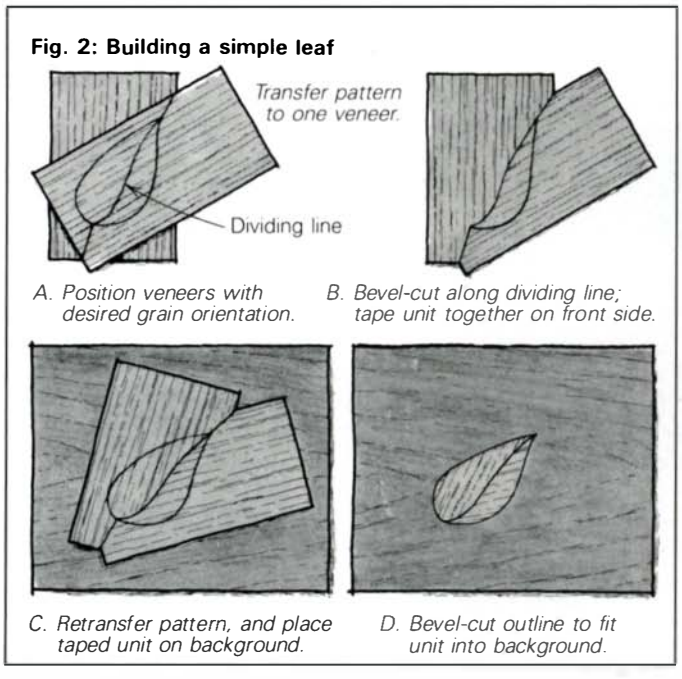
One of the beauties of marquetry is that it requires very little equipment. Perfectly satisfactory pictures can be made with a good hand-held fretsaw or a knife, although, as I'll explain later in this article, a power scroll saw has advantages. There are several methods for making a marquetry picture. I favor a technique called the double-bevel cut, as it offers both speed and precision when making just one or a few pictures. With relative ease, many pieces of veneer can be fitted together without gaps between the parts. I mount, or press, my marquetry work onto panels, which can then be applied to small boxes and furniture of all sizes. This double-bevel method is applicable to about 95% of the work I do.

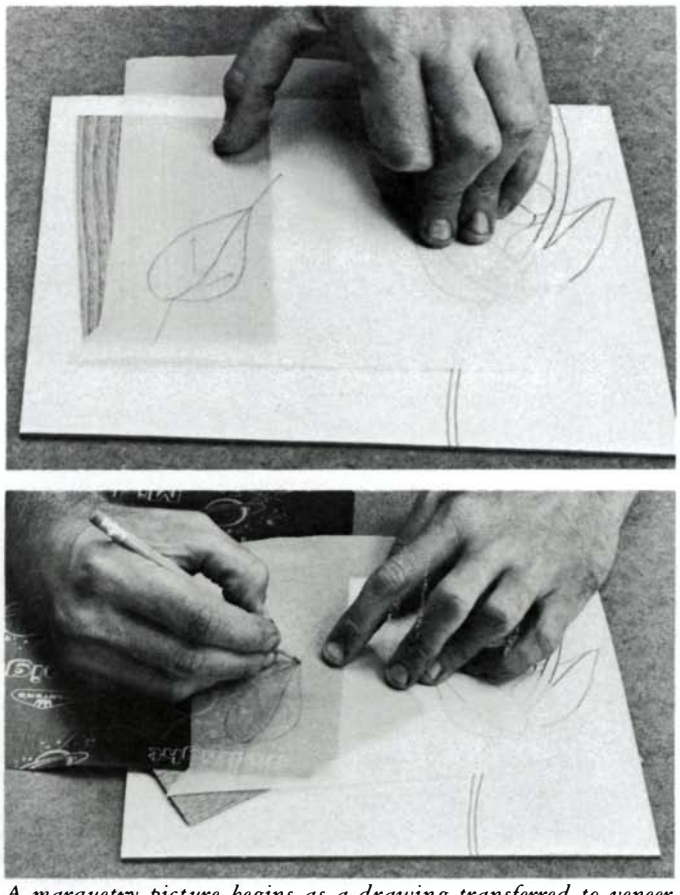
Double-bevel cutting is an additive process. You start with two pieces of veneer, one of which will fit into the other, and you build up the picture around them part by part, taping each piece into position until the picture is complete and ready for mounting. One piece is set on top of the piece it will fit into, and the saw, angled to cut a bevel, cuts through both at once. The waste is set aside and the two pieces are placed together. The gap that is created by the sawblade is taken up by the bevel, so when the piece on top "falls into" the lower one, it will wedge in place with no space or an invisibly small space between, as in figure 1 (p. 62). The angle of the bevel is a function of the thickness of the sawblade and the thickness of the veneer. Using $\frac{1}{28}$-in. thick veneer and 2/0 jewelers' blades, the gap will be filled if you cut a bevel of around 13°.

Designing and making a picture—I try to make the picture the focus of my work and then design the furniture to best display it. This rules out mounting pictures close to the floor; eye-level application on cabinet doors or on tables seems ideal. Surfaces subjected to a lot of abrasion and wear aren't good locations for marquetry, but tabletops will hold up fine if they are protected with a hard surface finish such as polyurethane. Keep in mind that tabletops are horizontal surfaces that are frequently cluttered, so your efforts may be invisible much of the time.

Using marquetry on furniture calls for relatively large pictures that fit the human scale of pieces being decorated. A tiny, detailed rendering, for instance, goes better on a small box than in a tabletop. Attention should be paid to grain texture and figure as well, since this has a great deal to do with the size and scale of a picture. Marquetry pictures of any size are possible, and with a little planning the throat opening of the saw needn't restrict picture size—you can make







A marquetry picture begins as a drawing transferred to veneer with tracing and carbon paper. In the top photo, Kopf has traced the leaf and positioned it on the veneer for a pleasing grain orientation. Next, to transfer the pattern, he slips carbon paper between the tracing paper and the veneer. He often skips the transfer, preferring to just draw his picture directly on the veneer. This allows more spontaneity—the successful picture relies as heavily on the wood's figure as it does on a preconceived plan.

several small pictures in sections and put them together later on the finished piece.

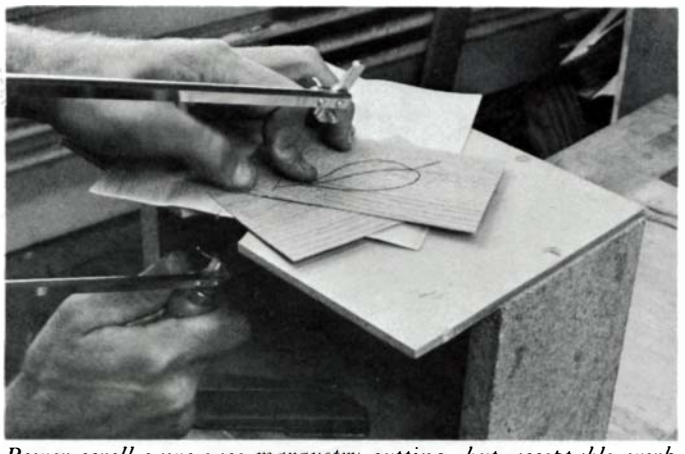
Making the picture itself with the double-bevel technique can best be explained by using a leaf pattern consisting of two pieces of the same kind of veneer joined at the middle in the process shown in figure 2. This leaf "unit" is then placed in a background of another color of veneer. When you double-bevel cut two pieces of veneer, you may find it helpful to put a little rubber cement between the pieces to keep them from slipping during cutting. The rubber cement will have to be cleaned off before pressing, so to avoid that step, you can rely on finger pressure to keep the veneer aligned. Transfer the leaf pattern using the method described in the photos above.

To set the leaf into the picture, place it on the background and then drill a $\frac{1}{16}$-in. hole through the taped unit and the background. The hole can go anywhere on the outline of the leaf, although it's more practical to drill where another part, such as a stem, can ultimately cover the hole. Insert the sawblade through the hole and saw around the perimeter of the leaf, again on a bevel. After sawing, the leaf should fit into the background with tight joints.

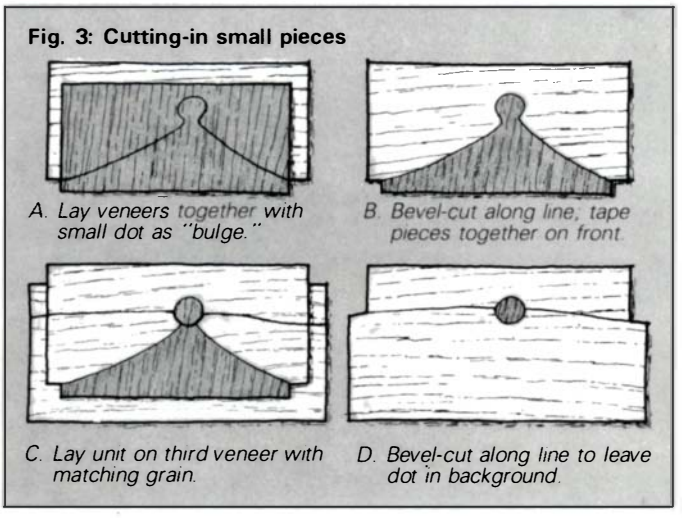
As you build the picture, hold it together with veneer tape applied to what will eventually be the front or exposed part of the picture. The tape will obscure the face side, so you'll have to transfer your patterns to the back as the work progresses. This will make it possible to see the joints and align your tracings with parts that are already in place. You can make more complex patterns by transferring then sawing more and more pieces into the package. It is always the same additive process. Occasionally multi-piece units will be added to one another, a flower for example. The individual petals each have three or four parts, which are made up separately. Then they are all added together to make the more complex flower. Experience will show where to make these divisions. Parts that are structural units, such as petals, a face or a tree, work well as single marquetry units.

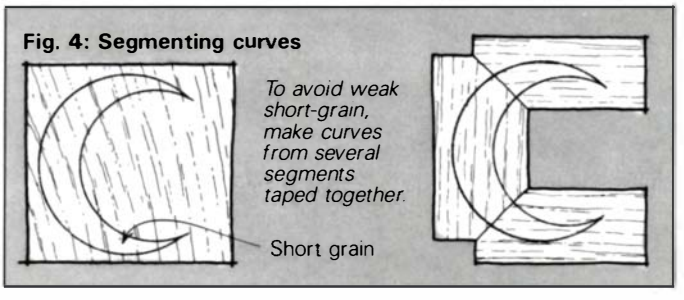
The actual cutting can be done by hand or with a power scroll saw. If you do it by hand, use a deep-throat fretsaw and a V-notch bird's-mouth saw table made from scrap. With a little practice, you'll be able to hold the saw at the correct angle while manipulating the work over the bird's mouth. When cutting by hand, you should back the veneer with a waste piece to keep work from being splintered by the downward pressure of the saw. Poplar works well as a waste veneer because it saws easily and is inexpensive.

Sawing with a power scroll saw has several distinct advantages over hand-sawing. First, the bevel is maintained at a constant angle by tilting the table of the saw. Second, both hands are free to steer the wood through the sawblade. Third, the work gets better backup support from the narrow opening in the saw table, so no waste veneer is necessary for most cuts. Finally, the throat opening of the stationary saw is often larger, allowing a bigger picture to be made more conveniently. My saw has a 24-in. throat, versus the 12-in. of a deep-



Power scroll saws ease marquetry cutting, but acceptable work can be done with a fretsaw and a bird's-mouth jig, here made of plywood nailed to a box clamped to the bench. Kopf is cutting a leaf pattern, and he is using a waste sheet of veneer as a backing to keep the saw from splintering the back side of the cut.





throat fretsaw (see *FWW* #27, p. 53, for an article on a marquetry-cutting jigsaw).

I have removed the hold-down device from my saw so I can better see the saw line. The blade can easily bind in the narrow kerf, so I have to hold my fingers close to the sawblade to keep the veneer from jumping on the upstroke. This sounds dangerous but really isn't, since the saw's short strokes make it unlikely that your fingers could be dragged into the blade. Even if they are, the blade is so fine that it doesn't cause much more than a nick.

The most difficult maneuver in the double-bevel cut is the nearly complete turn around to make a pointed part. When you reach that stage in the cut, the veneers are pivoted with the saw running. While pivoting, pull back slightly so there is pressure on the rounded back of the blade and you can hear that it is not cutting. When the pieces are swung around to the proper orientation, continue cutting on the line. This will make the parts pointed and not rounded over, giving the whole picture a crisper look.

Breaking sawblades is a constant and annoying problem for the marquetarian. The choice of sawblades is a compromise between a thin sawkerf and strength. With double-bevel cutting, 2/0 blades work well. Standard jewelers' sawblades have teeth spaced closely together for cutting metal. These cause problems with certain woods, particularly when powersawing. Resinous woods, such as rosewood, clog the teeth, overheating the blades and causing them to snap. Double-tooth (skip-tooth) blades are better for marquetry because they adequately clear away the sawdust.

When a blade does break in the middle of a perimeter cut, I return to the original drill hole to restart the cut because it is difficult to insert a new blade in the kerf. When you change the blade the unit may move, so realign it and the background veneer. Retracing a cut in the kerf is also difficult; it's best to saw the perimeter in the other direction, tilting the saw table the opposite way so the bevel will match where they meet.

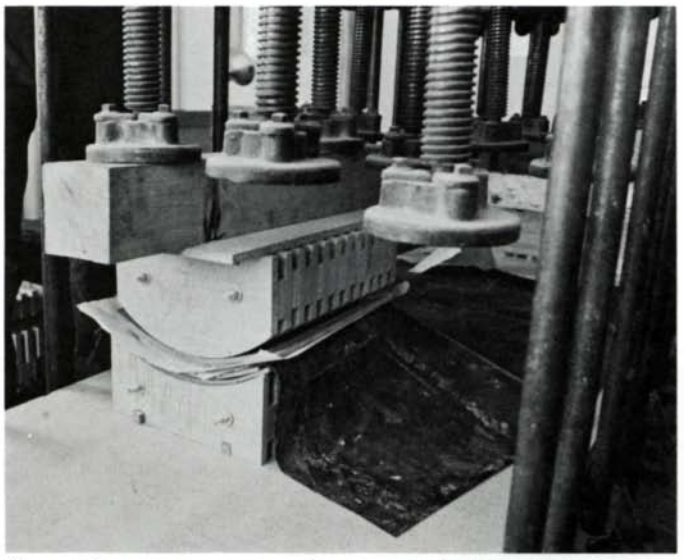
It is difficult to double-bevel small pieces, but one way is to start larger and cut back. For instance, to make a ⅛-in. dot of walnut in a maple background, scribe the walnut as a "bulge," as in figure 3. Double-bevel along this line and place the completed unit on a second sheet of maple, taking care to match the grain. The next cut will bevel the two maple veneers together along the grain for an almost invisible joint, while at the same time leaving the dot in place.

Sometimes it's better to knife-in small parts, using the window method. With this method a hole is cut into the background and the piece to be let in is set underneath. You don't need a double bevel here, because the knife takes no kerf. The hole's outline is scribed with a knife, the piece removed and the cut finished. The piece is then ready to be taped in place. In cutting with the knife, only one piece is cut at a time. When you use the window method, the piece to be let in can be slid around until the grain is oriented to best tell the marquetry story.

Selecting veneer—Certain species of wood work beautifully and look good in a marquetry picture. As a general rule the softer or more closely grained the veneer, the easier it is to saw. An open-grained wood, such as oak, takes a little extra care, as it tends to splinter away, particularly in short-grain situations. A single layer of tape covering these spots before the veneer is cut will often hold the wood fibers together. I occasionally rub a little yellow glue on the surface and let it dry before cutting to help hold the wood together. Backing troublesome parts on the power saw with waste veneer also helps. Experience and a few shattered parts will, in time, identify the problem woods. Parts that do shatter can sometimes be salvaged by gluing or taping them together until they go into the picture and are eventually pressed.

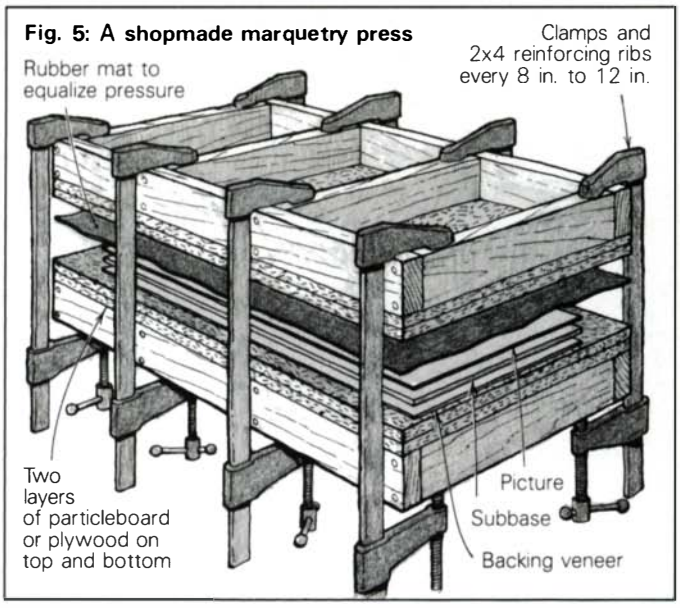
As with all woodworking, you want wherever possible to avoid short grain and its inherent weakness. Thin parts will cut better if the grain is aligned with the long axis. It is often advisable to segment the pieces when forming a thin curve, as with the crescent in figure 4. Tape the segmented pieces together as you go.

At this point a word about veneer tape might be helpful. Every new piece that is cut means the addition of another



Marquetry panels are pressed onto curved tops in this particleboard jig Kopf mounts in his veneer press. The picture is laminated to a subbase of three ⅛-in. lauan plywood sheets. Scrap Masonite and a rubber sheet put between the form and the work spread clamping pressure, and bridge the jig's irregularities.

Fig. 5: A shopmade marquetry press



layer of tape. When there are a number of small pieces in a small area, the thickness of the tape can be a factor when the picture is pressed. The thinnest tape I have found is a 30-gram paper tape manufactured by the Ubro company in West Germany and available from Woodcraft and from Welco Machines, PO Box 18877, Memphis, Tenn. 38118. Even using the thinner tape, the buildup may be so heavy that it's best to remove all the built-up tape and then retape, so that one even layer holds all the little pieces together.

It is important to realize that the colors and contrasts you see when you choose veneer will not necessarily be there in the end. Finishing generally changes the wood color, and it is not always an even change in tone from wood to wood. Time will also alter the picture considerably. Light woods tend to darken and dark woods get lighter, giving the marquetry picture a progressively monochromatic look as time passes. This is why old work often seems faded: it is faded. These color changes are unpredictable, so I usually don't try to compensate for them in my designs.

There are tricks for manipulating color. A traditional way of attaining a three-dimensional illusion in marquetry is to scorch the wood in hot sand to darken it, simulating a shadow. I have a hot plate with a cast-iron skillet heating sand whenever I'm working on a picture. The depth of the sand is about 1½ in. The deeper the veneer is shoved into the sand, the darker the scorching, because the temperature is hottest at the bottom. This yields a gradation of color that is particularly fitting for shadows. Various woods react differently to the treatment. Soft woods scorch more quickly than harder species. Pointed parts have more surface area exposed to the hot sand and therefore burn faster. Dip the piece in and out until the desired shade is reached. Sand-shaded parts should be slightly darker than you would ultimately like, as there is some surface charring that will be scraped and abraded away after the picture is pressed.

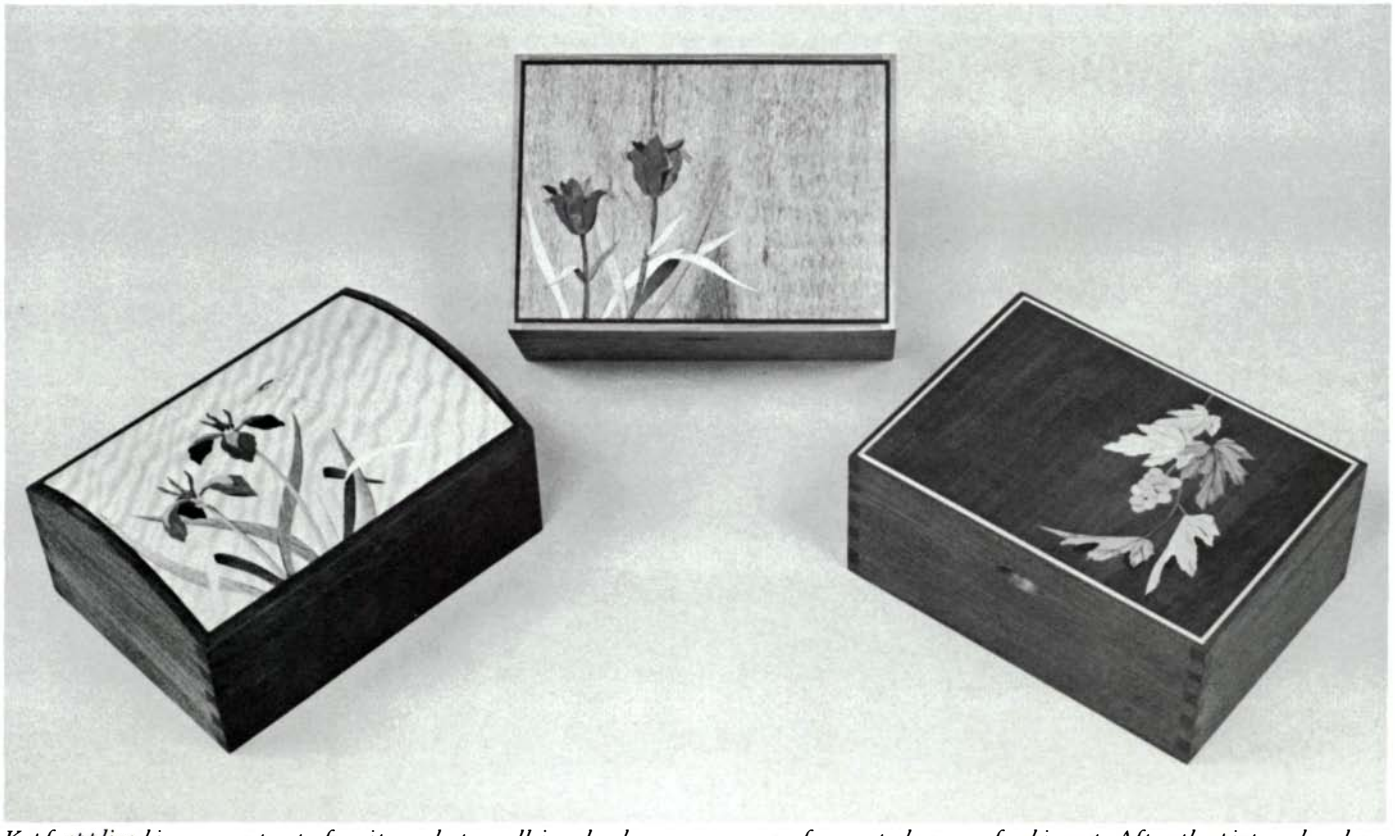
Instead of plunging the piece of veneer into the sand, it is sometimes easier to scoop the hottest sand from the bottom of the frying pan and run the wood through it. I use an old gouge for a scoop. By pulling a curved piece, such as the crescent in figure 4, through the hot sand in the scoop I can char the veneer evenly. In the skillet, the thin ends would burn before the center of the arc became dark enough. You can also stain marquetry parts before or after they are assembled, and dyed veneers of various colors and species are sold by marquetry suppliers.

Mounting or pressing—After the parts have been cut, the picture should be checked over to see if all the parts are present and accounted for. Any missing pieces can be knife-cut in. The finished picture can then be mounted to the panel or subbase that will hold it together after the tape is removed. This panel can become a decorative element in a piece of furniture or it can be put in a frame for display. In any case, a marquetry picture should have solid wood around its edges to protect the veneer from damage.

I prefer lauan plywood as a subbase. It's cheap and available and usually free of voids. I apply many of my marquetry pictures to small boxes with curved tops. For these, I use three layers of ⅛-in. plywood laid up in a curved form (see *FWW* #6, p. 35, for an explanation of this method). Other types and thicknesses of plywood and particleboard work fine as marquetry bases, but solid wood panels should be avoided. They move too much during seasonal moisture changes, and this can pop loose small veneer pieces or cause serious cracks. Subbases should get a backing veneer on the side opposite the picture to keep the panel balanced and prevent warping.

Pressing the picture onto the surface is essentially like any other veneering operation. The key in marquetry is to equalize the pressure over the entire surface. With the slight differences in thicknesses of veneers and the buildup of veneer tape in concentrated areas, the potential for uneven pressure is ever present. A veneer press is the best way to ensure even pressure. But it's a bulky and expensive piece of equipment for the occasional maker of marquetry panels. Not owning one needn't stop you from trying marquetry. Thick pieces of particleboard and quick-action clamps can make a suitable press (figure 5). To spread the pressure evenly, I use a hard rubber mat 1/16 in. thick between the picture and the press. The mat, which I bought at a rubber supply house, is similar to tire inner-tube rubber.

A variety of adhesives can be used, but I generally choose urea-formaldehyde glue. It has several advantages: it spreads



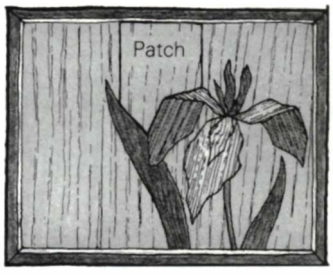
Kopf applies his marquetry to furniture, but small jewelry boxes are a more frequent showcase for his art. After the picture has been mounted and let into the tops of these boxes, Kopf trims the joint between frame and picture with a contrasting wood.

easily, allows a long open time, and also fills gaps by curing to a neutral tan color (of course *you* won't have any gaps to worry about). I don't use contact cements at all because they seem to be unreliable for veneer work.

The marquetry picture should be oriented with the grain direction of the majority of its pieces running at 90° to the grain of the subbase. Run the grain of the backing veneer in the same direction as the picture. Spread glue evenly on the subbase, picture and backing veneer, and then press or clamp it up and let the assembly cure in the press for 12 hours.

The pressed picture emerges from the press covered with veneer tape and isn't much to look at. I remove most of the tape with a hand scraper, working with the grain as much as possible. Then I finish the job with sandpaper. Sometimes it's safer to forgo the scraper and sand the tape off, as pieces that are cross-grain to one another have a way of being torn out by the scraper. I use a hard cork block with 80-grit paper for the initial sanding. The flat block keeps the softer woods from abrading away faster than their harder neighbors, thus keeping the picture from becoming wavy. Because the felt bottom of an orbital sander is particularly prone to leaving a wavy surface, use one only for a final cleanup of cross-grain scratches, using 220-grit paper.

There are two repair problems that will probably occur at some time or other in your marquetry experience. The first is a "blister" in the veneer caused by improper adhesion. The blister is evidenced by a hollow sound when you rub your finger over the work. If an individual marquetry piece has not adhered, raise it with a knife, inject glue under the wood and reclamp, using cauls to localize the pressure over the repair. If the problem is in the middle of a larger expanse of background, slice the blister open along the grain with a knife, again inject glue beneath it and then reclamp the piece.



The second problem you may encounter is scraping or sanding through the veneer. The repair is made by inlaying a patch into the marquetry panel. Let's assume you have gone through at a particular spot. Select a piece of veneer, preferably from the same flitch, which has grain characteristics similar to the piece being replaced. The borders of the inlay patch should parallel the grain of the background and run from marquetry pieces inside the picture to the picture's outer edge, as above. This leaves you with a patch without end-grain butt joints, and it should be less visible. Make a tracing of the area to be recut and use the tracing as a pattern to mark and cut the patch. Bevel the cut so the piece will wedge into the panel when clamped. Set the patch on the panel and scribe around it with a knife. Use a router to cut the panel to the depth of veneer thickness, coming within about $\frac{1}{16}$ in. or $\frac{1}{8}$ in. of the knife line. Use a chisel to remove the rest of the waste material, occasionally checking the patch for a good fit. Glue and clamp, and hopefully your picture will be like new. This method can also be used to inlay veneer into a solid piece of wood, such as a tabletop. If you do inlay, try to avoid cross-grain constructions that will later loosen during seasonal movement. □

Silas Kopf does marquetry and makes furniture in Northampton, Mass. For more on this subject, see FWW *#1, p. 33; #5, p. 38; #9, p. 70; #16, p. 67; and #25, p. 90. The Marquetry Society of America, PO Box 224, Lindenhurst, N.Y. 11757, publishes a monthly newsletter with technical information on the craft.*

Photos, except where noted: ©Jeffrey Nintzel

Portfolio: Walker Weed

A retrospective of quiet woodworking

"We are overwhelmed these days by people trying to do something different just to make a splash," observes Walker Weed. "I have always objected to the emphasis on doing a striking or new design instead of concentrating on good established things. It would be better to teach a student to make a good wheelbarrow than a very fancy highboy."

The furniture on these pages, with Weed's accompanying comments, exemplifies this philosophy. These pieces were picked from 50 on display last year at Dartmouth College's Hopkins Center in Hanover, N.H. The retrospective exhibition encompassed Weed's 30 years of professional woodworking, and was a tribute to Weed upon his retirement as director of the college's crafts program.

Walker Weed's furniture would be better known if fame depended on quality rather than on showmanship. His craft reflects his character: quiet but articulate, modest, humorous and entirely likable. His furniture is rooted in tradition, but not firmly anchored to it. He made New England pine furniture in his first full-time workshop, in Gilford, N.H., in 1948. But he was soon captivated by the simple elegance of Shaker furniture. In the early 1950s he discovered George Nakashima's furniture as well as modern Scandinavian design. So strong was his attraction to the latter that Weed took his family to Norway in 1960, visiting the foremost furniture designers there as well as in Sweden and Denmark.

All these influences are evident in Weed's furniture, but his love of woodworking goes back much further. "My Yankee grandmother got me started," he says. "She communicated to me her enthusiasm for her collection of good antique furniture and her knowledge about its construction. She was also very handy with tools." Weed's formal training went no further than sixth- and seventh-grade shop classes. Based on the Swedish "sloyd" method, these classes were, he says, "a colossal experience," and he has had a shop ever since, learning the trade by observation and inquiry, and by doing.

Weed ran his shop in Gilford for 17 years, until 1964. "It was really a one-family operation," he recalls, "with my wife Hazel hanging tough in the lean years, always supplying moral support, keeping the accounts, talking with customers, collaborating on some pieces with her weaving, and doing all the upholstery. The children piled lumber and swept the shop."

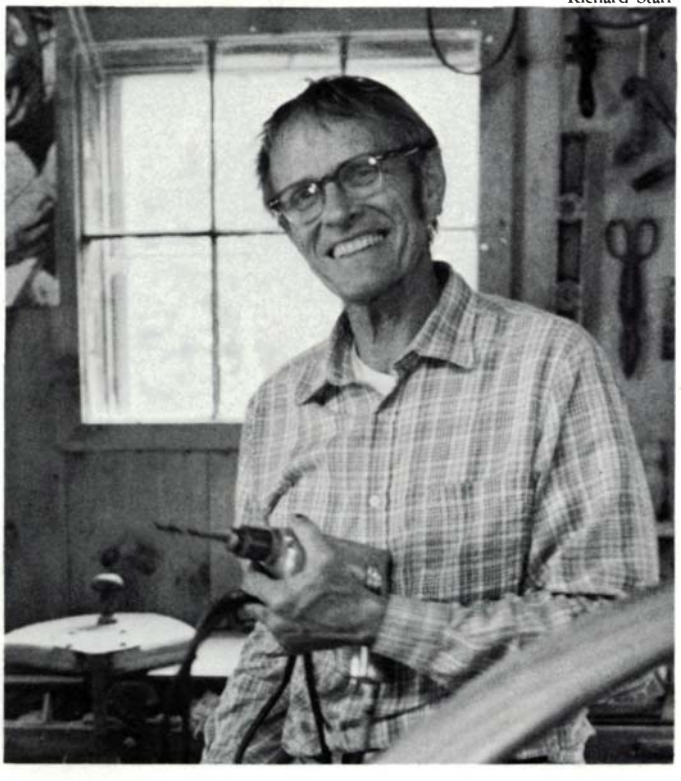
In 1962, Weed was appointed woodworking instructor at Dartmouth, his alma mater, and two years later he took over the crafts program. He has given a great deal of thought to the education of hands and mind. "There are considerable advantages to getting rigorous training in a craft," he says. "Our informal program, though, touches so many people who sample the craft to find out if they're interested. It's an extracurricular, walk-in-off-the-street shop for students and faculty, a sort of survival program. Some go on to crafts careers, but many develop a lifelong avocation."

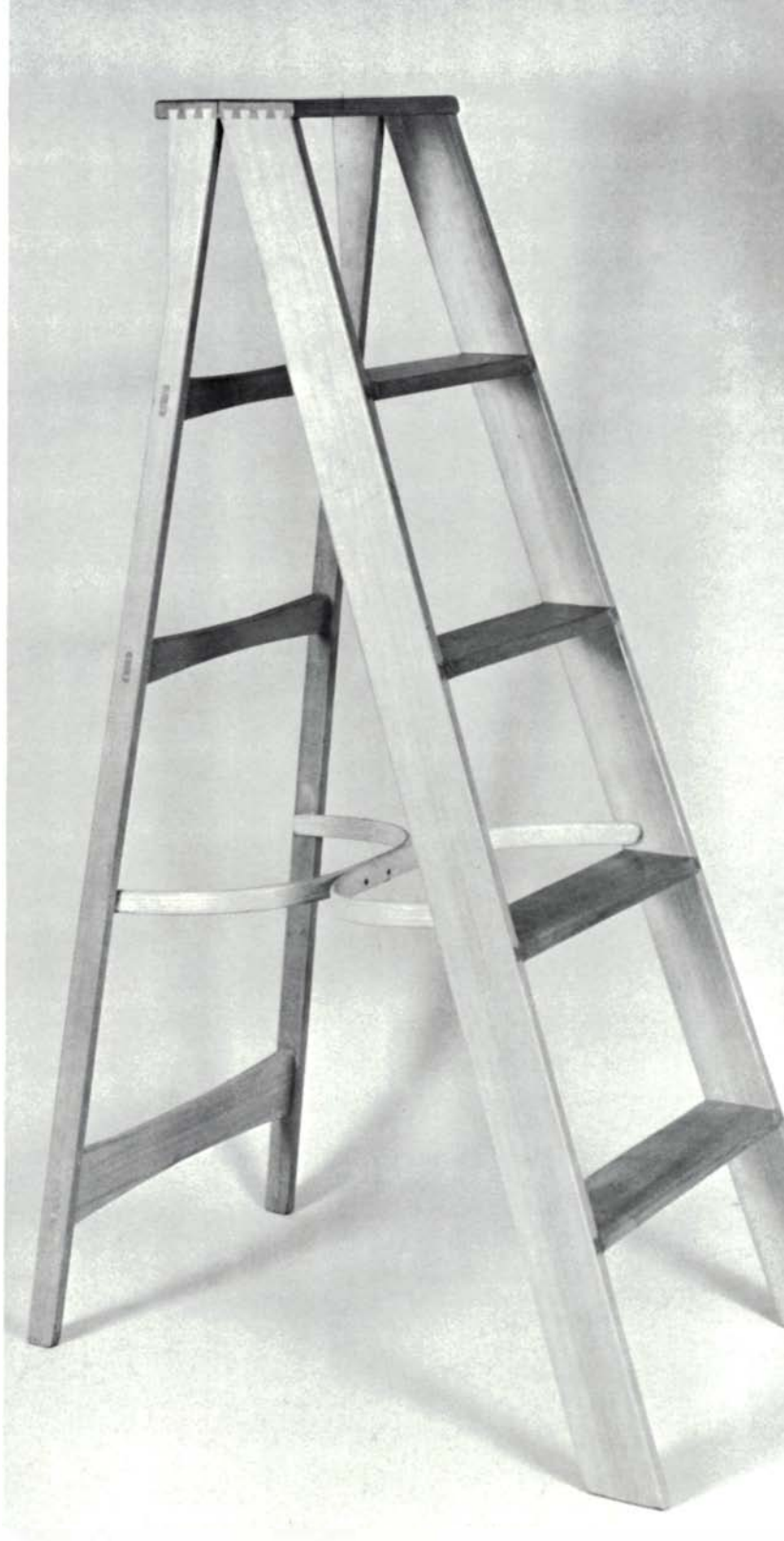
Peter Smith, director of the Hopkins Center, summarized Weed's contribution in the exhibition catalog: "Walker is the embodiment of respect for craft, and he knows from within what respect for craft can teach . . . how to work well and how to live well."

—Richard Starr

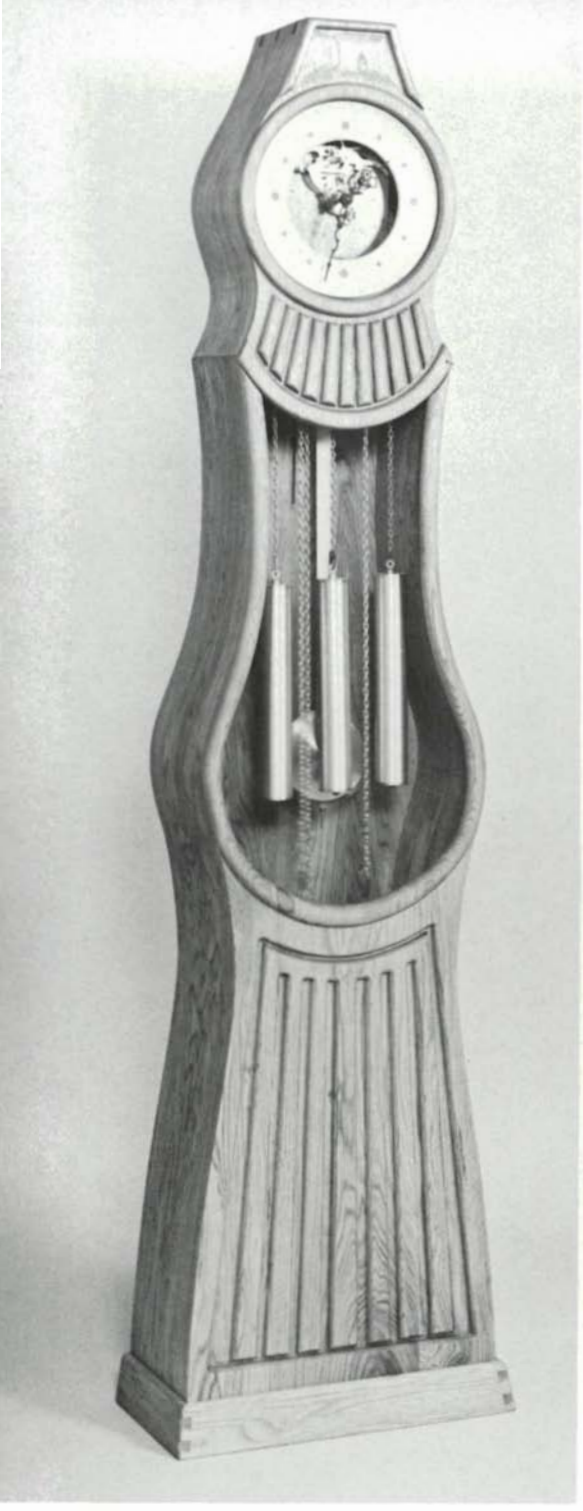
Settee, 1956, black walnut, 94½ in. by 30¼ in. by 18 in. My instructions were just to make a bench of that particular length with some Shaker feeling to it. It was derived from the so-called "deacon's bench" and somewhat from the chairs I'd been doing at the time. There are minor variations that show my tendency to not change a piece a whole lot but to take what is good and restate it in a different way: more splay to the legs, a little more grace and a little more humor than the Shakers would have allowed. To me there's a kind of suppressed smile there somewhere. It's a happy piece. The base is a frame with lengthwise stretchers directly beneath the seat and between the legs. The base is screwed to the seat.

Richard Starr





Step ladder, 1978, Sitka spruce and white ash, 56 in. by 32½ in. by 20½ in. The things you have around the house to use every day ought to be as attractive as possible. . . just one little way of making life nicer. It seemed to me that the commercial design was pretty good, so I just changed the things that could be improved: the material, joinery and hardware. I laminated the white ash bows and fastened them together with a short piece of piano hinge secured with rivets. The top is sawn in half along the grain and piano-hinged together. The bows fold upward, nestling between the risers as the top folds in the center. The treads are let into the risers with housed dovetails, the stretchers are through-tenoned into the rear risers, and the split top is machine-dovetailed to the sides. The finish is urethane varnish. This is the only step-ladder we have.



Clock, 1980. I let myself go on this one. It's much more decorated than a lot of things I do. I did it for myself, with no intention of showing it, so I just played around until I had something I liked. I had seen an old clock with this same shape in a book of Scandinavian furniture, but it was painted and solid, with no open work. Mine has an open front and face, no glass. I had the mechanism hanging on a shelf, working, for seven years while I thought about what I was going to do. I mocked it up in plywood and pine, full-size, to see how it would look. After changing it several times I made forms of solid pine boards for laminating. The sides are 8 in. wide with four layers of ⅛-in. laminations. It's butternut, except for the face buttons and mock dovetails of walnut.

Folding screen, 1960, teak and black walnut, four panels, each 72 in. by 18 in. The walnut frames are mortised and tenoned. The curves at top and bottom relieve the squareness of the whole thing. The slats are of teak and the warp pieces are ½-in. square pieces of walnut. The slats drop into slots in the frame. The two-way hinges are leather fastened with escutcheon pins. I've also done these screens in willow and walnut, and some in cherry too.

Storage cabinet, 1978, butternut, apple pulls, 79 in. by 45 in. by 19¾ in. This is not an exact reproduction of a Shaker cabinet, but it's pretty close. I like being able to introduce a little asymmetry without exaggerating it—a nice touch and perhaps a little more useful. I used butternut, a pleasant wood, but soft. The interior parts are pine and the back is raised panels of pine. There are dust panels between the drawers.

End table with drawer, 1954, black walnut, copper enamel pull, 24 in. by 22¾ in. by 18 in. Well, this really is an old piece. I did a lot of tables like this back then. The construction is very straightforward. The legs are tapered on the inside; the outside corners of the legs are perpendicular to the top and to the floor, so the dimensions of the frame are the same top and bottom.

Block-back side chair, 1956, cherry, 31¼ in. by 17½ in. by 17½ in. I made a great many of these when I was at my Gilford shop. The backrest is concave but otherwise square, its ends are cut to parallel the side spindles. I had curved the back on both faces, but I found the single curve was interesting and different. The legs are secured to the seat with round tenons, split and wedged. I never did any of these chairs with stretchers underneath, but they've held up extremely well, except that some of the early ones with pine seats have come loose over the years. The legs are square in section with edges rounded over. Sam Maloof was paralyzed to find out that I used to sell these for about $35, but that was back in the 1950s.

Richard Starr

Living room, Weed home, Etna, N.H. The things that you do for yourself or to give away are the best things that you do. The hanging chair is designed as an occasional chair and hangs about 15½ in. from the floor. It was inspired, no doubt, by Scandinavian basket chairs, but they are completely enclosed; I was trying to do this in the simplest way. The design evolved quickly, just by playing with it. The chair is made of ⅛-in. thick strips of laminated white ash glued up with Titebond. Each curved piece is glued on a different form because each is a compound curve, some more than others. The small bows are ½ in. thick and are joined to the others with a half-lap joint and an iron rivet and washers. The top is joined with an open lap joint and hung on a chain by a round hook bolt with a round nut in the back. I've made about 20 of these chairs.

I live in a timber frame house about 200 years old, made with no flimflam. I built most of what you see in this picture—we surround ourselves with extensions of our own personalities, we probably feel more at home in this cocoon. The door is butternut with hand-blown bull's-eye glass. The loom is a traditional Scandinavian counterbalanced type that I built in Norway in 1960. The dining table is walnut, 6 ft. long with curved-edged drop-leafs on the long sides. The lamp is made of African walnut. The couch with linen upholstery was originally built as a daybed but I shortened it. —*Walker Weed*

Turning a Matched Set of Bowls

Patternmakers' tricks for consistent shapes

by Arthur F. Sherry

Getting the most from an outstanding piece of wood by making a one-of-a-kind bowl is part of the woodturner's art. But turning a good matched set of bowls can be an equal challenge, calling for careful planning and execution. A matched set, to me, means consistent shape more than anything else. Bowls can be made of different woods, or be inlaid with elaborate designs. Yet if their shapes are the same, we instinctively know they belong together. Here are some patternmakers' tricks and templates that will help you turn a series of bowls, or almost anything else, exactly alike.

Wood never stops moving as its moisture content changes, of course. Plan to use dry wood, or your bowls will become oval after they have been turned. I frequently rough-turn bowls, then let them dry for a few days to stabilize before I finish turning. I've found species such as mahogany and walnut to be particularly stable, but you can apply these techniques to more highly figured species, too.

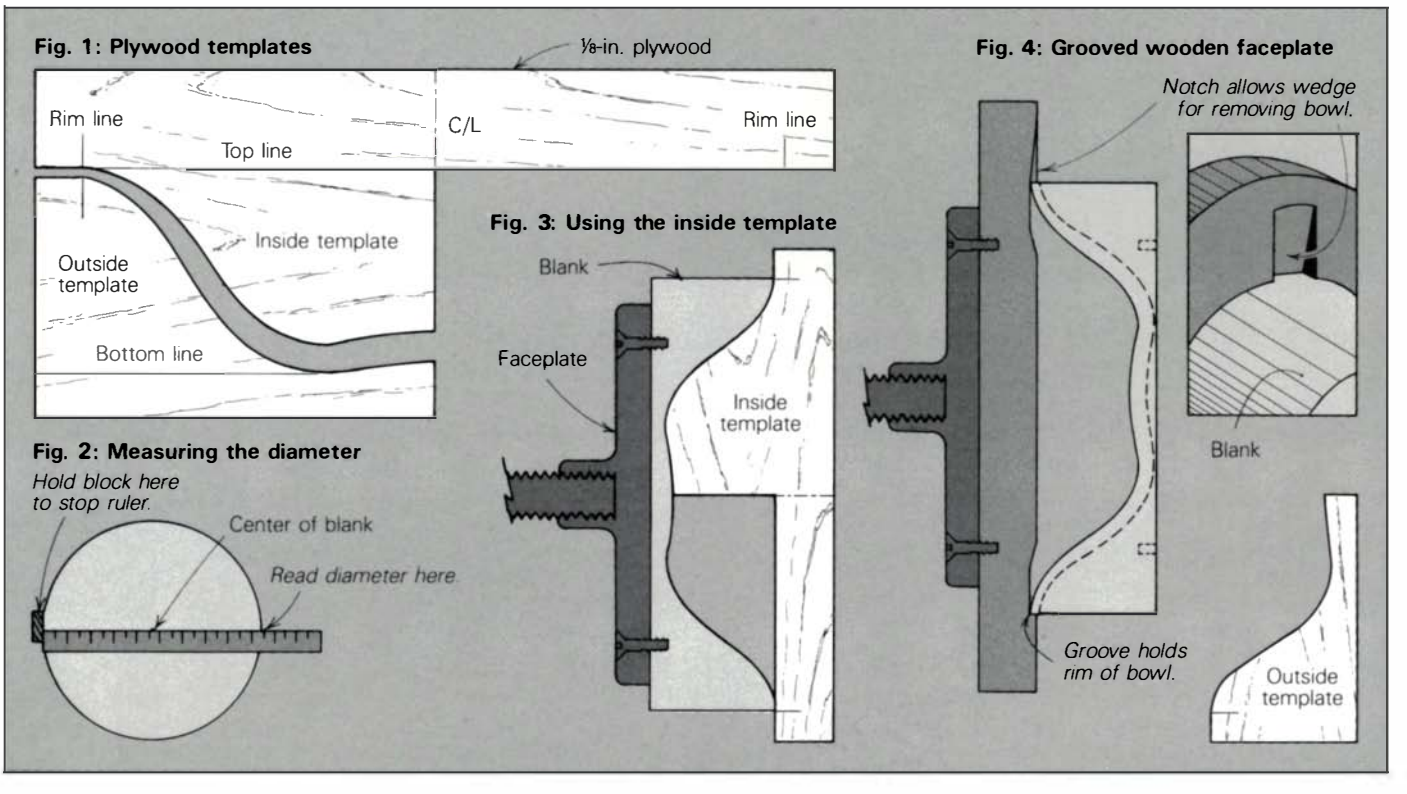
Start by designing the shape on paper. Then transfer the layout to a squared piece of ⅛-in. plywood (figure 1). Lay out the centerline of the bowl, marked C/L. Then, with a knife, scribe lines for the top and for the bottom of the bowl, perpendicular to the centerline. Draw the cross section of one half of the bowl on the template, and scribe rim lines (parallel to the centerline) to mark the outside diameter of the bowl. Notice that the side of the rim should be left at least ⅛ in. thick, so that after the inside has been turned you can mount the bowl as shown in figure 4, for turning the outside.

Cut out, file and sand the template to shape. If I am making more than a few bowls, I copy this template onto another piece of plywood and use the master only for the final fit. I never touch the master to the spinning bowl.

To turn the inside of the bowl, screw the blank (bandsawn round) to a faceplate and mount it on the lathe. Turn the block to the final height of the bowl, plus 1/64 in. for final sanding. Next turn the diameter, and stop to check it with both a square (so that the side is perpendicular to the face) and a ruler. I measure with a ruler, as shown in figure 2, instead of using calipers, because calipers have a tendency to give a little—a ruler is more accurate. First, mark the center of the blank while the bowl is turning, then stop the lathe and hold the ruler so it crosses the center point. If you stop the end of the ruler against a small wooden block held against the side of the bowl, the ruler will line up exactly with the edge of the rim.

You can hollow the inside of the bowl quickly at first, checking your progress with a template copy held against the spinning work. But stop the work often to check the fit as you approach the final form, as shown in figure 3. Keep in mind that the centerline of the template must end up at the center of the bowl, and that both rim lines on the template must line up with the rim of the bowl.

Stop turning when the inside of the bowl is about 1/16 in.



full of these final marks, then switch to the master template. Rub the edge of the template with a little chalk or a crayon. Stop the lathe and rock the master back and forth in the bowl, gently transferring chalk to the high spots. Carefully turn away the marks, stopping and checking after every cut, until the master deposits an even spread of chalk along the profile of the bowl, but still about 1/64 in. full of the reference points. Sand down to the line, using from 180-grit to 360-grit sandpaper, but leave the outside rim square so it can be mounted in the next step. Take every bowl in the set to this stage before proceeding.

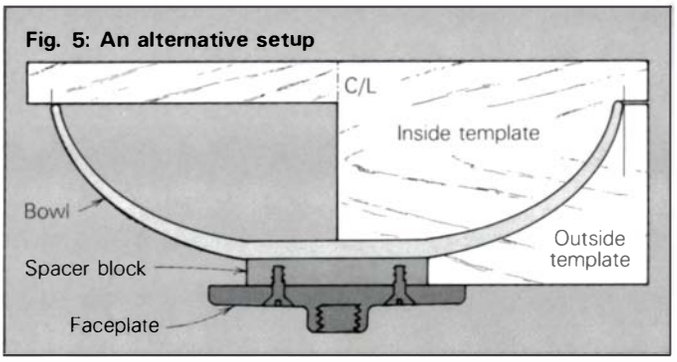
To turn the outsides, begin by scribing a line that shows the location of the bottom of the rim. This will be the reference line for the outside template. Then check the diameters of all the bowls. There's always some slight difference, sometimes due to wood movement, sometimes to that last pass with the sandpaper. Select the smallest and turn a shallow groove in a wooden faceplate so that the rim of this bowl fits tightly (figure 4). There is no room for error here. Cut the opening with a skew chisel until its outside is slightly smaller than the rim of the bowl. Then turn the chisel over and rub, rather than cut, the last few thousandths away, until the bowl fits tightly and is difficult to remove.

We will hold the bowl in with a few tiny spots of glue, then use little softwood wedges or give it a light rap with a hammer to pop it out of the groove after the turning is done. Make some shallow notches in the faceplate before you glue the bowl in, so you will be able to get the wedges beneath the bowl's rim.

Mark a circle on the blank, approximately the size of the bottom of the bowl. Then turn the underside of the bowl using the center and rim line as guides, testing as before, until the chalk shows no more high spots. Switch to the master template and finish the bowl. Remove it with the wedges.

Enlarge the groove in the faceplate if necessary, to fit the next larger bowl, then repeat the process. When all the bowls have been turned, I use files and a piece of sandpaper glued firmly to a block to shape the rims, and I check the curve of the outside edge with radius gauges (standard sheet-metal templates). Because matched bowls are usually used for food, I finish them with a non-toxic finish such as Constantine's Wood Bowl Seal, or a vegetable oil.

Fig. 5: An alternative setup



Once you understand how templates work, you can vary their use. A single-mounting setup that lets you work on the rim more easily is shown in figure 5. Its drawback is that the bottom cannot be as easily shaped. You have to glue uniform spacer blocks to the blanks and allow for their thickness in laying out the design on the template.

You can also take the guesswork out of long turnings. Just use several smaller templates along the length of the turning, each with its own set of reference points on the straight sections. If your lathe allows you to remove and replace your turnings accurately, do each step on all the turnings before proceeding to the next; if it doesn't, make a list of the steps so you can repeat them exactly in order.

As in all woodworking, accuracy on the lathe is as much a state of mind as it is a procedure. Templates will show you when you have gone far enough, but only your skill as a turner will prevent you from going too far. □

Arthur F. Sherry, of New York City, has completed four years as an apprentice patternmaker, and is now a partner in South Family Furniture, making custom furnishings.

Walnut-oil finish is safe for food

by Antoine Capet

A few hundred years ago, rubbed oil made do as a finish for everything from the cogs in wooden clocks to the gear on old sailing ships. When we think of rubbed oil, most of us probably think first of linseed oil, which is the most prevalent of the traditional oils, at least for outdoor items such as gateways and for seafaring. Yet many of us shy away from using it on bowls or other receptacles for holding food because modern, fast-drying linseed oils usually have poisonous chemical additives. The odor of linseed oil, also, while pleasant on a tool handle or in an artist's studio, quickly takes away one's appetite.

There are several other oils that can be used instead. A classic book on finishing, *Lexique du Peintre en Batiment,* by Le Moniteur de la Peinture (Paris-Liège, 1935-36), lists other natural oils and their drying capabilities:

Oils, high drying capability—linseed, poppy, tung, walnut, hemp, sunflower.

Oils, moderate drying capability—colza, soya.

Oils, no drying capability—olive, peanut, almond, castor, grape pips.

Some of these rule themselves out. Tung oil is not edible, poppy oil (from artists' supply stores) is exorbitantly priced, and hemp oil is unobtainable these days. I've left the moderate-drying oils alone, because they seem to have no advantages. Olive oil, often mentioned as a salad bowl finish, has the drawback of never drying.

Walnut oil, though, the traditional French furniture polishing oil, deserves a closer look. It is not only edible, it is delicious. And it can be bought in health food stores and specialty food shops at a price that compares favorably with modern finishing oils.

Walnut oil's pleasant odor and nontoxic qualities are in sharp contrast to some other finishes I've tried. One commercial salad-bowl finish, though certified safe for bowls, has a strong smell of petroleum distillate that persists for a long time. Another "certified safe" finish requires that you wait 30 days before actually using the object.

There are additional advantages to using walnut oil on functional objects. Quick and soft finishes, waxes for instance, poorly resist spilled coffee, wet hands and damp fruit. Walnut oil takes these things in stride. Many hard-film finishes can chip, crack or peel away,

but walnut oil penetrates deeply, and will conform to a dent without losing its ability to protect against moisture.

What then is wrong with it? Walnut oil requires time to build into a decent finish, ruling it out in a cabinetmaking shop that seeks a quick, high gloss. But for many of us, making things for our own pleasure, this is not so important.

I use walnut oil without a sealer, because it accentuates the figure best when allowed to penetrate deeply into the wood. I made some tests on fenceposts and found little difference in its drying time (about the same as raw linseed) whether I added small quantities of drier or not. But I found a pronounced acceleration when the oil was applied hot. It can be heated for a few minutes in a saucepan, about one-quarter full, until fumes begin to thicken. There's always a danger of fire, of course, but people safely fry with hot oil every day.

The smoother the surface texture, the less oil the object will absorb, and the faster it will shine. You can use a paintbrush to apply the oil, but it's better if you dip the wood, because the end grain will gulp up vast quantities, ensuring protection against future checking. Work the oil into the wood, rubbing surplus from the sides around into the end grain. After a day or so, polish it at high speed on the lathe.

I usually wait two weeks before giving the wood a second application, then two or three months, then a year or more between further treatments. □

Antoine Capet teaches contemporary British social history at the University of Rouen, in France.

Turning goblets

by J.H. Habermann

Turning a goblet presents a few problems, but once you see your way around them, the job becomes easy.

Design: Some turners have enough confidence to let the shape evolve as they work, but I generally pick a shape I like—a favorite wineglass, for instance—and trace it with a device similar to those in *FWW* #18 (p. 83), a pencil mounted on a base that follows the profile of the glass to make an outside pattern.

Once you have traced the outline and allowed ¼ in. for the walls, you can plan to drill out most of the inside with Forstner or multi-spur bits chucked in the tailstock. This will save wear and tear on your turning tools as you remove the difficult end grain. Determine from your own pattern which size bits to use and how deep to drill, as shown in figure 1. Use calipers to measure the diameter of the glass at several points, then mark these dimensions on a template made from hardboard.

Wood: You can make almost anything into a goblet. Even native "weed trees" such as sumac work well. Goblets don't require scarce, chunky turning blocks; offcuts from furniture wood can be used. You can laminate thin stock either vertically or horizontally to get enough mass—just don't try to glue end grain. And leave some extra length. This allows you to turn a stub tenon for mounting the work in a wooden faceplate. You wouldn't want to waste this precious depth on a bowlturning blank, but here it doesn't matter.

Turning: Glue the stub tenon into the faceplate, aligning and clamping it with your tailstock, as in figure 2. When it is dry, rough-turn the outside of the top of the goblet, referring to the caliper sizes on the template, but do not turn the narrow stem yet. Chuck the appropriate drill bits in the tailstock, and drill out as much of the inside as you can.

Fig. 1: Hardboard template, drilling guide

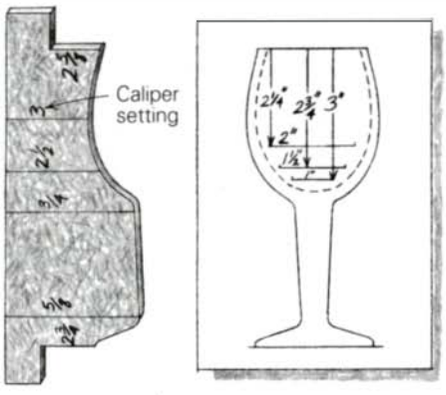


Fig. 2: Stub-tenon mounting

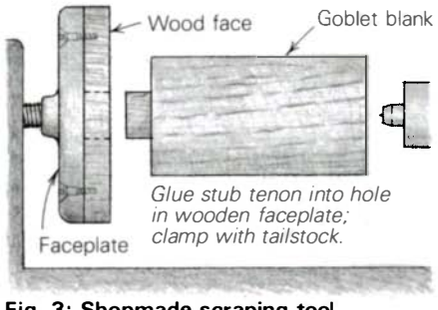


Fig. 3: Shopmade scraping tool

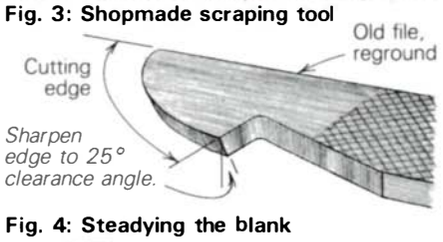
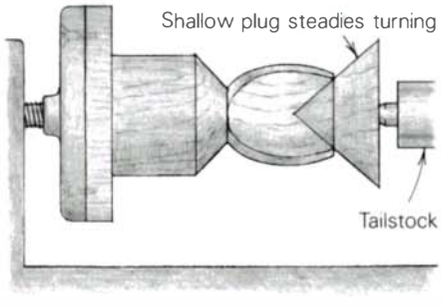


Fig. 4: Steadying the blank



True the inside by hand. Turners generally look down on scraping tools, but there's a lot of end grain in a goblet, and this is where scrapers excel. Commercial side-cutting scrapers such as Sorby's work well, but you can make your own by grinding old files, as shown in figure 3. I use my thumb and fingers as a thickness gauge.

When the inside of the goblet is true, insert a shallow plug (figure 4) and draw up the tailstock for stability. This will save you a lot of blown-up goblets as you turn the stem.

Using a combination of calipers and the template, turn the stem and clean up the shape. When I am duplicating a series, I make a full template that slips over the entire goblet while the lathe is stopped. This solves the problem of registering a half-template.

Before final-sanding, partially part off the base. Point the parting tool slightly toward the tailstock. This will give you a concave bottom that will be more stable.

Sanding and finishing: You will get far fewer circular scratches if you use an orbital sander to sand the work while it is turning. Work down to 280-grit, reversing the lathe once in a while if you can, and finish up with steel wool and a final polish with a handful of chips.

You will need to seal the goblet if you plan to use it. I have had great success with John Harra's DPS (deep penetrating sealer), which plasticizes in about a week. If you want a higher gloss, you can finish over this with a natural drying oil, or you can use commercial salad-bowl finishes. □

J.H. Habermann lives in Joplin, Mo.

Repouring Babbitt Bearings

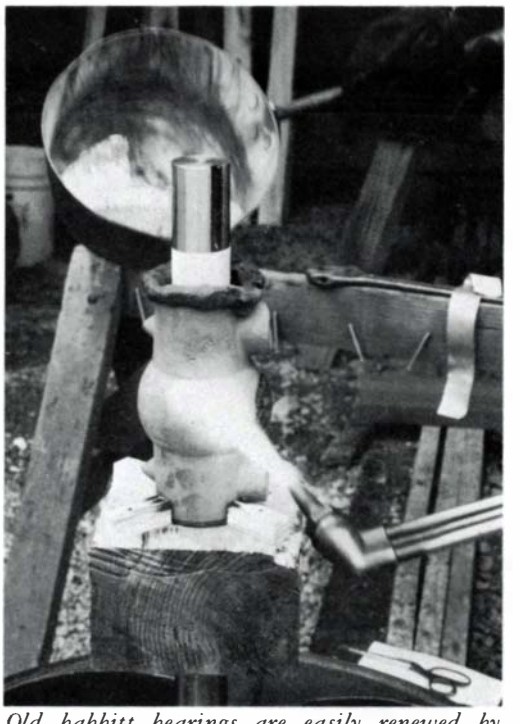
A low-tech way to rescue old machines

by Bob Johnson

What woodworker hasn't dreamt of having a 36-in. or 42-in. bandsaw in the shop, a machine that can saw the thinnest stock one minute and then slab a 12-in. log the next? Most of us recoil from the price tags on such new machines. For the craftsman who would like industrial-quality machinery without paying new-machine prices, one answer is to seek the machinery of the 1880-1930 era.

Machines of that era are generally massive and well-made, and since most of them were built with babbitt bearings, industrial buyers are scared off, making such used machines available for surprisingly low prices. Aside from cleaning and painting, very often the only work required to put such machinery back into practical service is the rebabbitting of its bearings.

Modern ball and roller bearings have ended the age of babbitt in woodworking machines, but its heydey is still recent enough for there to be thousands of babbitt-bearing woodworking machines still in use and many more that are out of service and in used-machinery emporiums which can be restored. Babbitt bearings last a long time and will continue to function even when worn. But best of all, when they do need replacement, the job can be done cheaply with a minimum of tools.



Old babbitt bearings are easily renewed by pouring molten babbitt, above, into the mold formed by the bearing shell and shaft. A torch warms the shell, keeping the metal from hardening prematurely. Babbitt, replaced by ball and roller bearings in new machines, still does its job in restorable, older machinery.

The principles of rebabbitting bearings are the same whether for a toy engine or a submarine propeller shaft. The metal is melted and poured, using the machine's bearing shells and shaft as a mold. When the assembly cools, the shaft is removed, if required, and the bearing surface is dressed with hand tools for a good running fit. Holes and grooves to supply and hold oil are cut in the finished babbitt.

Why babbitt?—Throughout the 19th century and well into the 20th, machine bearings were cast in a variety of alloys that have all come to be called babbitt. The name itself comes from Isaac Babbitt, who invented the recessed bearing box and lined it with metal alloy. Today, babbitt refers generally to a low-melting-point alloy made from some mixture of lead, copper, tin, zinc, antimony and/or nickel—a blend soft enough not to wear shafts and easy to renew when worn.

Most of the babbitt bearings in woodworking machinery are made with two-piece cast-iron housings that have a considerably larger inside diameter than the shaft they will support. The molten babbitt is poured into the space between the shaft and housing to form the bearing. The hot metal runs into holes, slots or lips drilled partway into the housing, and this locks the bearing in place.

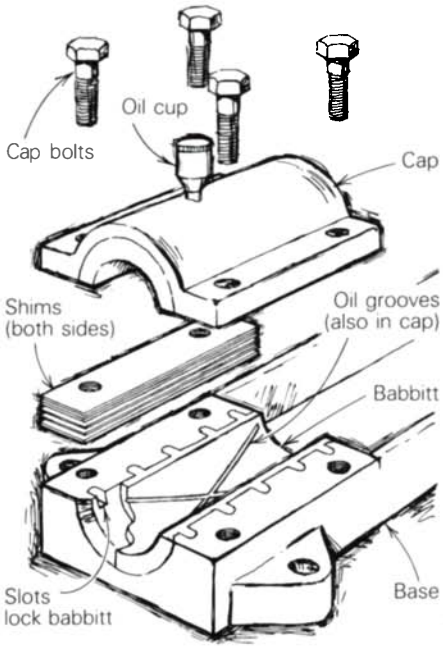
Some bearings, particularly those for vertical shafts, are one-piece and so are a bit more troublesome to pour. Machinery designers often did not allow much space for the babbitt, or for pouring it in between shaft and bearing shell.

One-piece bearings are not adjustable for taking up play, but a two-piece bearing can be adjusted by adding or removing shims until the cap is tight against the base (figure 1, p. 74), while still allowing the shaft to rotate freely. Many people try to adjust by tightening or loosening the bearing cap nuts until the shaft rotates freely, instead of by removing or adding shims. This is a poor practice, as it allows the cap to move, and usually causes the bearing to heat and wear rapidly.

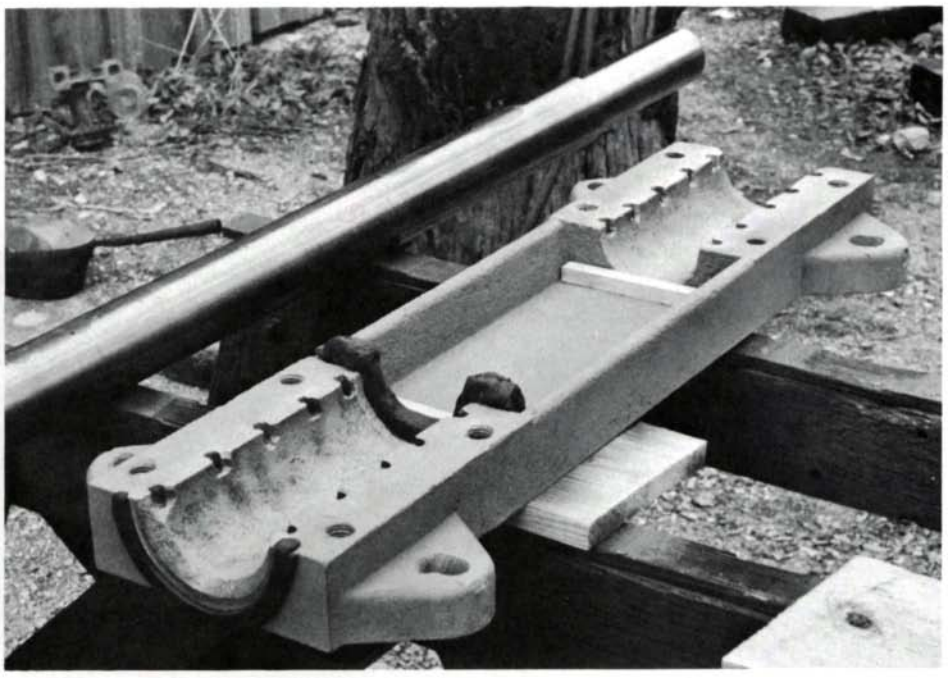
How do you know when to rebabbitt? A quick inspection should tell. With two-piece bearings, tighten the cap bolts until the shaft won't turn, then back them off until it can be spun freely. Grab the shaft and give it a shake. There shouldn't be play in any direction. If the machine can be run, examine the end of the shaft while it's turning. If it wobbles instead of just rotating in place, new bearings are probably needed. Before you decide to rebabbitt, try eliminating the play by removing any shims left in the bearing.

Materials—In addition to standard shop tools such as wrenches, screwdrivers and hammers, you'll need some other tools and supplies for rebabbitting. First, you'll need a way to melt the babbitt and to heat the bearing castings, both for removing old babbitt and for pouring new. An oxyacetylene rig is best for both jobs, although a propane or MAAP gas torch can do small jobs. An ordinary household gas or electric stove gets hot enough to melt babbitt. Be sure to use an old heavy iron or steel pot—a 2-qt. saucepan is ideal. If you have a big bearing to pour, a plumbers' pot—a stove and crucible for melting lead—will save time and is more convenient. Hardware stores sell cast-iron plumbers' ladles in several sizes. These ladles have long handles and pouring lips. Each bearing

Fig. 1: Typical two-piece babbitt bearing



Restoring the bearings in an old machine takes but a few tools. You'll need a torch (propane will work, but oxyacetylene is better), a container to melt the babbitt in and a ladle to pour it. Babbitrite or other damming material contains the metal while it hardens in the bearing shell, light machine oil keeps the babbitt from sticking to the shaft, and the popsicle sticks are used to test the temperature of the babbitt before the pour.



After disassembling the bearings, Johnson's assistant melts out the old babbitt with a torch, above left, making sure he gets it out of all of the recesses, slots and holes in the bearing shells. The old babbitt is saved. With the addition of some fresh metal, it can be reused. Setting up a bearing for the pour calls for some artful placement of supports and damming materials. Above right, Johnson has placed wood blocks that will level and support this sawmill arbor exactly in the center of its bearing shells; Babbitrite, a damming material, has been placed at both ends of the bearing to contain the molten metal until it has cooled. With the bearing shell braced on a level surface and the shaft firmly supported and centered in it, below, the molten babbitt is poured until it slightly overfills the shell. The shell is kept warm during the pour with an acetylene torch. Johnson pours two-piece bearings, such as the one shown here, in two separate operations—one for the bearing base and one for its cap.

must be made in a single pour, so make sure the ladle is large enough to do the job.

In 24 years of pouring bearings, I've never found that I couldn't reuse the old babbitt melted out of a machine simply by adding a little bit of new babbitt to make up the quantity required. If you're a perfectionist, you may decide not to take chances with an unknown old babbitt mix and to use all new. Babbitt is locally available from hardware stores or industrial supply houses and most sell two types, a high-lead alloy for slow-speed bearings and a high-nickel mix for high-speed ones. For most woodworking machinery, the high-nickel babbitt, or high-speed babbitt, is worth the cost—about $9 a pound from my supplier. We always use it on machine shafts that run at several thousand RPM, such as jointer and planer heads and tablesaw arbor bearings. We save money by using the old melted-out babbitt of unknown alloy only for slow-speed bearings, such as the drive gear and feed roll bearings on planers or bandsaw wheel shafts.

Babbitt is sold by weight in bar form, and some dealers will break a bar for you. Be sure you have enough. Nothing is more frustrating than to almost finish a perfect pour and run out of babbitt—you have to do the whole job again.

You'll need to seal the bottom, ends and oil holes of the bearing shell to stop the molten babbitt from running out. The handiest material is fireproof clay made for babbitting, which can be worked like modeling clay. There are various proprietary names—Babbitrite and Dambabbitt are two. The stuff is reusable and a can seems to last forever. Wood, cardboard, sheet metal, cloth, rope, string and other materials can supplement the damming material.

Preparation—Some machines have non-removable bearing shells cast right into their frames, others are made with a removable cap which bolts to a base that's cast into the machine, and others have both removable bases and caps. Whichever the case, before rebabbitting, all the old babbitt must be removed, and the bearing shell and the shaft must be clean and dry, free of all traces of loose rust, grease and oil.

If the bearings are removable, tip the bearing up and support it so that the old babbitt can run into your ladle or melting pot. Play the torch on the babbitt, starting at the bottom, allowing the babbitt to flow out. When the shell cools, inspect the surface to be sure that you've melted out all the corners, slots, and keyways provided to lock the babbitt in.

Machines with cast-in bearing shells are harder to clean. These will often have the babbitt-locking holes at the bottom of the bearing; if so, the holes can be used as drains for emptying the old babbitt as you melt it out. If there are no holes, you can sometimes drill one. Failing this, you'll have to chip the old babbitt out with a chisel, a task made easier by playing the torch on the metal so it flows and accumulates in a lump at the bottom, where it can be removed.

Machinery that has been out in the weather often has rust under the original babbitt. This should be removed by sandblasting, wirebrushing, or scraping and sanding after the old babbitt is out.

The shaft that will ride in the bearing must be clean, straight and polished to a bright, smooth finish. Flaws in the shaft will be reproduced in the bearing. Check the roundness of the shaft with a micrometer; it may require remachining if it is worn out-of-round or deeply pitted. We put old, worn shafts in a lathe and take a very light skim cut, and then polish them with fine sandpaper followed by crocus cloth. This is especially important in finely-fitted high-speed bearings. If you are dealing with a very long shaft or one that you can't prop into position for the pour, you'll need to make a babbitting mandrel—a piece of shafting the same size and finish as the original and long enough to extend beyond the bearing to some means of support at both ends.

Setting up—If there's an art in rebabbitting bearings, it's in the setup, wherein the shaft is secured in the exact position it will occupy in the finished bearing. You need room to pour the hot metal around the shaft, and it must not move during the pour and while the babbitt is hardening. Each machine requires its own special setup, so you have to be resourceful. Pour two-piece bearings in two steps, one for the cap and one for the base. Single-piece bearings are done in one pour. Here are some general guidelines for setting up:

With two-piece bearings, start by making up the shims that go between the bearing halves. I make brass shims of assorted thicknesses for each bearing, so play can be adjusted in variable increments. The shims can range in thickness from 0.1 in. to 0.001 in. Hard-finish paper will work for the thinnest shims. Use as many shims as you can, in equal numbers and thicknesses on each side, so your bearing will be thick and will last a long time before rebabbitting is required.

If the bearing shells are removable, place the bearing bases on a level surface; if they can't be removed, wedge and brace the machine so the bearing base is level in both horizontal planes. This will keep the babbitt from running to one side or one end when poured. When you're satisfied that the bearing is level, locate the shaft precisely in the center of the bearing, and in the final position it will be in the machine. Use dividers, sheet-metal guides, wooden wedges or whatever to measure and mark the location of the shaft. There are various methods for securing it there. You can sometimes support the shaft with small wooden blocks beyond each end of the bearing, or you might have to build a jig or cradle. Each situation is different. Use common sense, and remember that the shaft and shell must be in the relationship you ultimately want them, which usually means that the shaft is centered inside and parallel to the bearing base. Small, light shafts and mandrels can sometimes be supported by Babbitrite alone, but it is better to use a solid support.

There will be space between the shaft and the ends of the bearing shells, and this is where Babbitrite comes into play. Wrap it around the shaft and press it against the bearing shells to prevent the escape of molten metal. Holes in the bearing castings can be filled with Babbitrite, or with small dowels. Plugging oil holes with dowels saves drilling them out after the bearing is poured. Make certain that there is no unwanted egress for the molten babbitt.

Sometimes bearings are made in pairs or sets, such as on some jointer head assemblies. You must set up all the bearings at once, though the actual pour can be done a bearing at a time, without moving anything between pours.

One-piece or sleeve bearings are likely to be more successfully poured vertically. Brace your shaft or mandrel and make sure it is plumb—check on two sides 90° apart with your level, and secure it in position. If you have a large pulley that fits the shaft, it can be used as a base with small wedges under the rim to plumb the shaft. Slide the bearing housing over the shaft and support it at the point where the bearing

will actually be. I find that the easiest way to support such a bearing is to bore a shaft-sized hole in a block of wood, split the block and then snug it to the shaft with a C-clamp. Put a layer of Babbitrite between the block and the bearing, and nail small pieces of wood to the block to center the bearing.

As it cools, the babbitt will pinch the shaft if you don't provide running clearance. Hard-finish letter paper is just thick enough to create enough clearance. Apply a light coat of oil to the shaft so the paper will stick to it, or use tape beyond the ends of the bearing. Instead of using paper, you can scrape the running clearance by hand after the pour. But be sure to oil the shaft in either case so the babbitt doesn't stick to it.

Check over your setup. Make sure the shaft is accurately positioned and braced, and that you've dammed every place where the babbitt could run out. You are now ready to melt the babbitt.

Bearings that are not adjustable, or that have a limited range of adjustment on the machine, should be set up together with their shaft in place, and then poured. Pouring the bearings individually off the machine allows less margin for error, so that when they are replaced they may pinch the shaft. If misalignment is not severe, scraping can often cure it.

The pour—Babbitt alloys contain metals that rapidly oxidize when heated, so it's unwise to leave the babbitt on the burner for long periods while you adjust the setup. We shorten the melt time even more by playing an acetylene torch flame directly on the lumps of babbitt in the melting pot. Impurities rise to the top of the molten babbitt and must be removed. Old-timers and old books sometimes suggest that you skim off the dross with a wooden stick, and this will work. However, the clean surface is an unstable composition that will quickly skin over again. It's better to leave the impurities floating on the top until you are ready to pour, then push them to one side and dip your pouring ladle in. Some old texts suggest putting powdered charcoal on the surface of the molten babbitt to help retard oxidation. Such things as pumice powder, fine sand, plaster or even shop dust can also be used. Each will retard oxidation and will float, making it easier to sweep aside with a stick before pouring.

Before you pour, you must heat the bearing shells. If you omit this step the babbitt coming in contact with cold metal is liable to chill and start to harden, giving rise to all manner of problems, from bearings of uneven, spongy texture to bearings with cavities, or those not filled by the pour. More babbitting problems arise from failure to perform this step than from all others combined, and those words—*heat the bearing shells*—should be branded on the brow of anyone pouring babbitt.

While your babbitt is melting, play your torch gently and evenly over all the bearing's exterior. You want it much too hot to touch, but nowhere near red-hot. The less space you have between shell and shaft, the hotter the shell should be, to ensure that babbitt will flow into all corners. This is especially true when you are pouring one-piece bearings. If the shaft is large, warming it with the torch will help. If you are pouring a bearing without the paper wrap, then you definitely should heat the shaft as well as the bearing shell, though take care—overheating can cause warping.

The time-tested way to check temperature is to insert a stick of soft wood (we use a popsicle stick) into the melted babbitt. If you can feel the stick wiggling, the babbitt is too hot. After three or four seconds in the molten babbitt, the stick should char on the end, but not burst into flame.

Put on heavy gloves and eye protection (molten babbitt splashing about causes nasty burns) and quickly dip up a ladleful, pushing the dross and impurities out of your way with your testing stick. Pour the babbitt into the bearing. Move quickly. Ideally, your pouring ladle should hold enough babbitt to fill the bearing shell in one go, but if you must pour another ladle, do so as rapidly as possible. With a helper and two ladles, you can pour from diagonally opposite corners of a horizontal bearing. Watch for overflows and especially for babbitt running out of openings you failed to plug. If babbitt is running out where it shouldn't, stop pouring, fix the leak and start over. Pour until there is a slight excess on the top. When you see the poured babbitt begin to harden, however, do not pour any more.

The pour is done. Now leave the assembly alone until it cools—when you can hold your hand on it, you can disassemble the setup and learn the degree of your success.

Finishing the bearing—If all's well, when you remove the shaft you will be greeted by a uniform, smooth, shiny, silvery babbitt surface. It will have no specks, streaks, blowholes or other irregularities. Some of these, if present, can be removed in finishing up, or ignored, depending on the size of the bearing and the degree of precision required. In most woodworking machinery bearings, you can ignore slight irregularities, especially those at the ends of the bearings, or those where oil grooves will be cut. Glaring irregularities will require a repour. How to decide? Check for the following problems.

Frosty patches: Usually in the center of a bearing, frosty patches can be caused by babbitt trapping air that didn't escape fast enough, or by impurities that got into the metal. If these don't cover more than a third of the bearing, you can still use it. Some small pockets in the center will act as oil reservoirs. If you feel grit on the babbitt surface, the babbitt must be removed, skimmed more carefully and repoured. If the babbitt is frosty all over, the metal was too cool when poured or the casting was not hot enough. Sometimes, uniform frostiness can result from impurities that did not rise to the top. The bearing will be spongy and weak, and should be repoured, with careful skimming after the melt.

Streaks or layers: This means the babbitt was not hot enough when poured, or more likely the casting was too cool and the babbitt began to chill. Light streaks may be removed by scraping and the bearing used; if they are deep, repour.

Looseness: If the babbitt is loose in the bearing shell when it cools, you probably left some oil in the bearing shell or housing, or some got in the babbitt itself, or some other contamination was present. You can repour, but you might be able to tighten the babbitt in the bearing shell by peening it gently with a ball-peen hammer, expanding the babbitt slightly. Peen from the center outward to the edges. This will leave dents in the bearing that you will have to scrape out.

Incomplete babbitt: Voids usually occur at the ends, and in most cases impair only the bearing's appearance. You can use the bearing anyway, or repour it. Sometimes there is a cavity in the bearing center—not a hole but a gentle depression, often not visible until you test the bearing. The cause could be a shaft that was too hot, or trapped air. Leave a small cavity to act as an oil reservoir, but one large enough to reduce the

shaft/bearing contact by a third or more should be repoured.

Clean up the bearing by paring away excess babbitt with a chisel. Pare away the surplus babbitt protruding above the top and beyond the ends, drill out any oil holes and cut oil grooves. Though old books carry a bewildering variety of designs for oil grooves in babbitted bearings, you can use the originals, if they were visible, or cut a V-groove from the oil holes along the length of the bearing, stopping ¼ in. short of the ends so that oil will not run out.

Special tools are made for cutting oil grooves, but as these are hard to find nowadays, you can make one from a piece of ⅜-in. iron rod, as shown in figure 2. The corner of an old flat file will cut oil grooves; small chisels and even pocketknives can also be used. The edges of these grooves and the points where drill bits have emerged through the babbitt are usually a little ragged, so smooth them off or chamfer them.

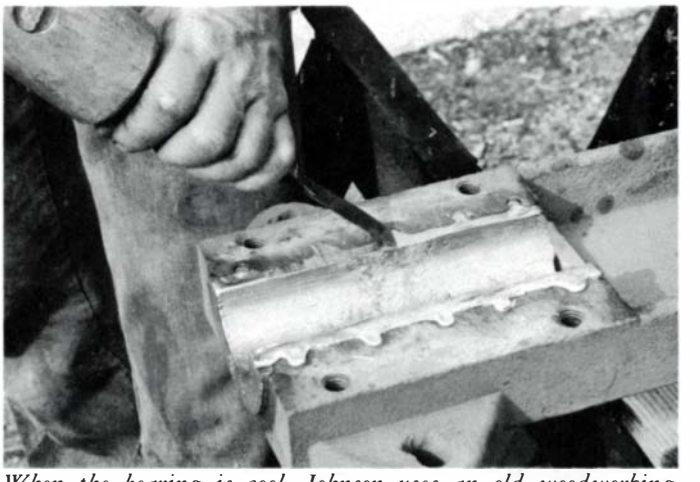
Final fitting of the bearing is done by scraping, the aspect of babbitting that many beginners fear most. It does take time and some judgment, but there is nothing mysterious or difficult about it. The amount and method of scraping depend on the speed of the shaft, the load on the bearing, and the degree of precision desired. Ideally, all bearings should be hand-scraped (or machined) to a perfect running fit. In practice, many bearings will fit their shafts well enough right after the pour, needing little or no scraping. Our rule of thumb is that woodworking machine heads that turn at high speeds, and parts requiring a perfect fit, such as a lathe headstock or the cutterhead of a large planer, should be scraped. However, the wisdom of taking the time to scrape rough, large or slow-speed bearings is questionable.

If you decide scraping is required, you'll need bearing scrapers and a small bottle of Prussian blue (machinists' layout dye), available from industrial supply houses. Lacking Prussian blue, ink or shoe polish could be used. Bearing scrapers can be purchased or made—they look like a 3-cornered file with the teeth ground off. Homemade scrapers of other shapes are often more useful than the store-bought kind. A flat file with the teeth ground off one face and one edge makes a fine scraper for large bearings. Babbitt cannot be sanded or filed. Not only will it gum, but abrasive sandpaper particles will become embedded in it.

Begin by coating the shaft with layout blue. Lay it carefully in the bearing, rotate it a couple of turns without sliding it lengthwise, then remove it. If the shaft is a perfect fit, the bluing will evenly cover the surface of the babbitt. More likely, though, you'll see blue spots where the shaft is making contact and the rest of the bearing will be shiny babbitt. Scrape gently at the blue spots, and try the shaft again. Shave gently rather than digging at the babbitt. Each time you try the shaft you should see more blued babbitt, meaning that the bearing is making better contact with the shaft. Continue in this fashion to any desired degree of finish.

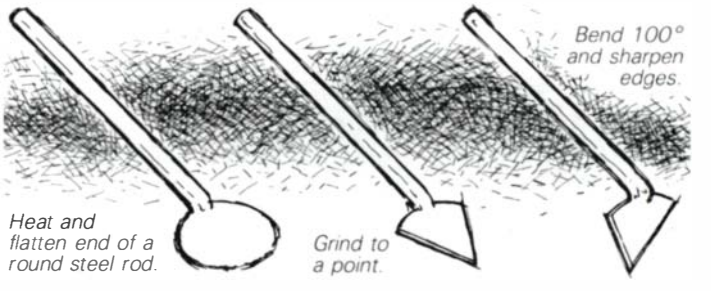
A perfect fit is not impossible but requires much patience, and is not, in most cases, worth expending much time over. If a bearing must be that perfect, better to machine it with a reamer, a hone or a rotary cutter in a lathe or drill press—a job best done by a machine shop. Since babbitt is soft, it is somewhat forgiving, and after a period of time shafts will run in and wear the babbitt to a running fit. With or without scraping, however, if your bearing makes at least 50% contact with the shaft, pat yourself on the back and say well done.

Most woodworking machinery will have bearings constructed as I've decribed, but occasionally you may see an insert bearing—similar to car-engine connecting-rod bearings. These are often made of bronze or iron. Rather than making a new bearing of these metals, it's cheaper and easier to bore out the old shell to a diameter larger than the old insert, and pour a babbitt bearing in its place. For flat rubbing or sliding bearings, follow the steps—clean, set up, level up, heat and pour. Use an old plane to level off such a flat surface—grind a steep bevel on the iron as you would for very hard wood, and take light cuts. Or make a jig to hold a long scraper made from an old file.



When the bearing is cool, Johnson uses an old woodworking chisel to trim the babbitt flush with the mating surface of the shell. Next he'll check shaft/bearing contact with machinists' layout dye and scrape out the high spots for a good running fit. He'll finish by scraping an oil groove along the bearing's length.

Fig. 2: A homemade oil-groove cutter



Newly babbitted bearings require running-in. High-speed shafts will often heat new babbitt bearings until they have worn the bearing in. During this period, they should be oiled liberally with any kind of motor oil, and the caps kept snug against the shaft. But watch for overheating. In woodworking machinery, no babbitt bearing housing should get too hot to touch. If a bearing heats excessively, it will melt some of the babbitt at the running surface, and some of the components in the alloy may separate out and scratch or mark the shaft. If this happens, clean the shaft, lightly scrape the bearing, and check the fit of the cap.

If you take the time to restore, adjust and lubricate the babbitt bearings in machinery, you'll be amazed at how long the bearings will last. Being able to repair them easily and cheaply when they do wear out only adds to the enjoyment of owning and using these fine old machines. □

Bob Johnson restores vintage woodworking machinery and sells exotic hardwoods. He lives in Rossville, Ga. Photos by the author. For more on woodworking machinery, see FWW *#30, p. 68.*

Dockside at Hamburg, a jumble of cranes, rigging and sheds, is one of many stops for exotic woods on their way to market.

The Trade in Exotic Hardwoods

How wood gets from the tropics to your shop

by Irving Sloane

History records that the demand for exotic hardwoods has always been brisk and, occasionally, voracious. The ebony forests of Mauritius were cut down by the Dutch in the 17th century, and West Indian mahogany (*Swietenia mahagoni*) was so heavily cut for Spanish shipbuilders and 18th-century furnituremakers that by the mid-19th century it had disappeared from commerce. A measure of the ancient esteem for rare woods is the name Brazil, taken from brazilwood (*Caesalpinia echinata*), an important item in the European trade of the Middle Ages, centuries before Brazil was discovered. Originally, brazilwood came from Sri Lanka, but it also grows in Brazil. It was used for dye extraction before being sought for violin bow making. It is more commonly known today as pernambuco.

Working with exotic woods—rosewood, ebony, boxwood—is one of the great pleasures of being a musical instrument maker. My search for such woods has led me and many other musical instrument makers to Theodor Nagel & Co., of Hamburg, West Germany. A family-owned firm established in 1837, Nagel is the world's foremost timber trader specializing in exotic hardwoods. An order for 200,000 ebony fretboards is not unusual, but neither is an order for just one.

Home base for Nagel is a ten-acre tract in the industrial Billbrook section of Hamburg. The firm's timber-sawing and grading operations, dry-kilns and storage sheds spread along both sides of the Billstrasse, the district's main road. Here trucks deposit logs and square-edged timbers from all over the world, brought from dockside at the ports of Hamburg and Bremen. The wood is resawn into boards, and custom-sized billets or scantlings for grading, the ends are waxed to retard checking, and finally it is shipped. Nagel employs almost 100 people here in Hamburg and another 500 worldwide, with sawmills in Brazil, Indonesia, India, Sri Lanka, Africa, Mexico, the United States and Austria. Their Indian sawmills in Kerala and Mysore cut and shape rosewood and ebony into parts for violins and guitars. The firm's customers include the world's major manufacturers of guitars, pianos, organs, harpsichords, violins and woodwinds. Nagel also supplies furniture manufacturers in Europe and Scandinavia.

The export manager in charge of sales to the musical in-

strument trade is Peter Wiese, a wiry, intense native of Hamburg with almost 30 years of experience in the timber business. Buying and selling rare woods in the international market requires shrewd judgments about world supply and demand, a profound knowledge of these woods and large amounts of capital. Wiese works hard at his job—buying wood and seeing customers—all the while preoccupied with shipping costs, fluctuating exchange rates, and customers trying to preserve liquidity by shrinking their wood inventories. His sales domain is the world except for France, Scandinavia and the Iron Curtain countries. At 7:15 each morning he is in his office, reading telexes from distant places. He is a born trader, forthright and voluble.

"It's tough today, and very competitive," Wiese says. "We're buying and selling a product which is gradually growing scarcer in a world market where economic conditions are changing every day." He explains that dealers used to ship logs to Europe for sawing, but in recent years many developing countries have embargoed the shipment of logs. In such countries as India, Sri Lanka and Brazil, logs must be sawn into dimensioned lumber before export, the idea being to create local jobs. This trend has changed the import business. "Some of our big saws here are closed down," Wiese says, "although we still handle many logs from Africa, Burma and North America. But today you cannot export a board from Brazil thicker than three inches."

This saddens Wiese; cutting open a log felled in some wilderness outpost and freighted halfway around the world is part of the romance of the timber trade.

The stiffest competition Nagel faces these days comes from the ubiquitous Japanese. Their buyers will spend as long as three months in one area buying wood. Nagel, though, requires buyers to return home after a maximum of three weeks—by which time a buyer's aggressiveness, sharpness and resistance to bad deals will start wearing down. Life at the company's tropical sawmills is difficult, Wiese says. "Often we send a person out, and after a few months he starts going bush. His attitudes change, he sleeps late, he drinks, and when he comes home to report we can see that he is changed. It's definitely not for people who are upset by insects and lizards. I myself have been sick twice with malaria."

Still, Wiese declares, "I am a timber man. Timber is a business you have to have a certain feeling for—a gift, you might say. I wouldn't trade my job for any other."

Wiese joined Nagel in 1960. His first overseas assignment was to comb the backwoods of Florida, Georgia and the Carolinas to hickory logs for European ski makers. It was a hard lesson in how money can be lost in the timber business: "Finally I had accumulated a load dockside in Jacksonville for shipment to Hamburg. That same day the Teamsters went on strike and nobody would move my logs. Day by day I watched them split under that baking sun, and I had to get rid of them for half their value."

He chuckles over the memory while leading me into the yard, a complex of sheds dominated by a large kiln. A corner of one shed is used as a sales display for offcuts of a variety of rare woods. These are stacked on shelves and sold by weight to craftspeople for a nominal price.

We pause in front of one of many big storage sheds piled high with logs: "That balsa lumber from Ecuador and Venezuela will go to the model-making trade. The teak will go mainly for furniture and flooring. This is lignum vitae from Mexico and Central America, one of the heaviest woods." Lignum (*Guaiacum spp.*) contains a natural lubricating oil, guyacan, which makes it suitable for lining ship propeller shaft tubes and for other mechanical applications. The lignum logs are short, 3 ft. to 4 ft., with yellow sapwood and greenish heart. I suggest that this species is also used for the soles of fine wooden planes, but Wiese says no, that's vera wood (*Bulnesia arborea*) from South America. It's not as oily as lignum and a bit lighter in color, but it has the same hardness and weight.

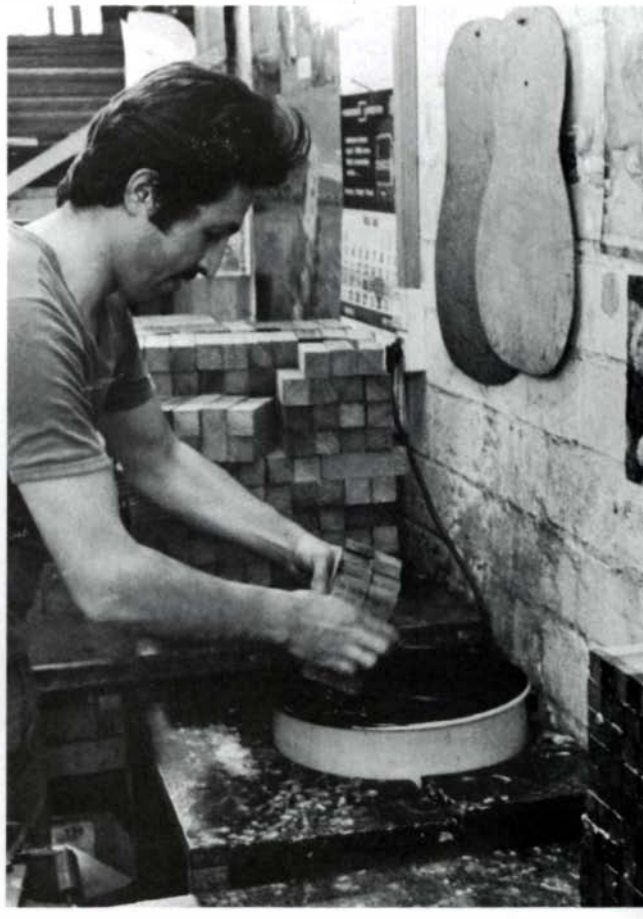
Wiese feels strongly that woods should be sold by their correct names so people know exactly what they are buying. "There are many close substitutes for different woods. Take mahogany—even experts are at a loss sometimes to explain what can be considered a genuine—*Swietenia*—mahogany. Another example is rosewood. The Brazilians call rosewood—*Dalbergia nigra*—jacaranda. The English cutlery makers call it Bahia wood. In India, rosewood—*Dalbergia latifolia*—is called palisander. In Germany it is known by both names regardless of where it comes from, and some Germans have translated the English word rosewood into *rosenholz*. But this is wrong because *rosenholz* is actually tulipwood—*Dalbergia variabilis*." Wiese has a diploma from Hamburg University's School of Forestry and Wood Research; botanical Latin comes easily to him.

Brazilian rosewood is a favorite of mine, so I pursue discussion of its availability with Wiese and his associate, Belsemeyer, who has just returned from Brazil. "All gone," Wiese says, explaining that only veneer cutters can afford to buy the few logs still reaching market. I wonder whether undiscovered rosewood might grow deep in the jungle, but Belsemeyer replies, "Rosewood doesn't grow in the jungle, it grows in the central coastal regions," where it's often planted as shade for cocoa trees. Unfortunately, fertilizer for cocoa spoils the wood. So does prolonged storage of the logs. Unwilling to give up, I ask if logs are ever smuggled out in defiance of the government embargo. Belsemeyer doubts it: "The customs people wouldn't jeopardize their jobs for one log or even for a large bribe. It just wouldn't be worth it to them."

In some countries, India for example, logs are gathered at government depots, then auctioned in parcels of up to fifteen logs each. Half the annual supply of East Indian rosewood is auctioned during September in Mysore, with bidding conducted through native go-betweens. Wiese himself usually attends. "You have to go there many days in advance to study the parcels, make notes, and decide how much you will be willing to pay. Bidding is done in Hindi, but you quickly learn what is one, two, three and so on."

Burmese teak (*Tectona grandis*) is also sold at central depots, but at prices fixed by the government. The Burmese, like the Indians, use elephants for dragging logs because they can work in narrow places where tractors won't fit. In inaccessible areas, teak trees are girdled and left to dry for a couple of years before felling. Then they can be floated downstream; green teak is so heavy it sinks.

We are walking through the yard and a big zebrano log from Africa catches Wiese's eye. He's brought along his timberman's gouge, with which he takes a short, glancing swipe at the end grain, leaving a shallow groove. "When logs stand in storage they get covered over with a coating that hides the true color and grain," Wiese explains. "Here where I've made the cut you can see the color and grain, which look very good



Peter Wiese, above, uses a timber gouge to inspect a bubinga log. Scooping into the log's end grain reveals the wood's color and texture. Behind him is lumber 'sawn in the boule.' Wood is more commonly sawn in this manner in Europe and is stacked in the order it comes from the log, thus preserving the relationship of color and figure from board to board. Theodor Nagel & Co. is a principal supplier of musical instrument woods and provides its customers with custom-sized blanks and billets. At right, a worker dips the end grain of billets in wax to guard against checking during drying and shipping.

on this log. When I go to buy logs, I take the gouge so I can see what I'm buying." Near the edge of the log he points to a dark stain, a resinous suffusion which probably goes right through the wood and will have to be cut away.

Nearby a stack of bubinga logs have just come in, 109 tons Wiese recently bought. On one of them he shows me another defect that can diminish the lumber yield: a large, circular split in the annual rings. "This is bad, a ring shake that may run through the entire log." He hurries to the other end of the log to check. "No, it doesn't show on this end. We can determine approximately where the shake ends by tapping the log with a hammer. You go along tapping, with your ear close to the log, listening carefully to the sound. It will change when you reach the shake. We have to know so that we can cut the log in the right place."

We pass to another shed where a 10-ft. log provokes a cry of pleasure: "This is the finest grenadilla log I have ever seen—East African blackwood. In the size, the grain, the color, an incredible log. It's in the rosewood family, *Dalbergia melanoxylon,* and will be used for making woodwinds and bagpipes. I wish they were all like this one—on some logs we're lucky to get out 20% of usable wood."

Wiese interrupts our yard tour to chew out a man for improperly stickering a log sawn through-and-through. "It really gets me to see that sort of thing," he says. "You bring a log 5,000 miles and then they sticker it the wrong way. Nobody does it, but ideally the end sticks should protrude a bit so they shade the end grain of the board underneath."

There are many woods of great beauty that never find their way to the sawmill. "It's the old story of supply and demand. We sometimes try to introduce new woods, but people who buy wood are very conservative, especially musical instrument makers, who don't like to experiment." As substitutes for Brazilian rosewood, Nagel now sells amazonas and Santos palisander (*Machaerium scleroxylum*), "a beautiful wood but with the same drawback that cocobolo has, it may cause skin irritation in some people. Gaining acceptance for these woods is going to take time."

Another problem with introducing rare species, says Wiese, is that "they have to have a certain diameter or else there is no profit in it. Many are too small, and others—the top-quality logs of large diameter—will be bought by veneer cutters who will pay big prices." Then there is ocean freight: "I could buy woods in South America for very little, but the freight will cost $200 a ton. I can bring logs into Europe from Africa for $150 a ton including the price of the logs."

Some woods are disappearing from the market not because they no longer can be found in the forest, but because demand is just too low. Satinwood (*Chloroxylon swietenia*), for example, once was sought for making hairbrush handles, but now they're made of plastic. Cocus (*Brya ebenus*) from Jamaica is a beautiful brown wood, but likewise in limited demand and difficult to get out, so there's no incentive to go after it. Pernambuco, the Brazilian wood used for violin bows, is also increasingly hard to find. Snakewood or letterwood (*Piratinera guianensis*), a hard South American wood used for canes, umbrella handles and flutes, has almost disappeared from the market—Wiese estimates the entire annual demand at not more than three tons. "Even if you were willing to pay $3,000 a ton for it you would still buy only $10,000 or $15,000 worth, small stuff for an established timber trader. Labor is expensive today. When people were hunting for bucks, you found men who would go into the forest, cut the trees and carry them out. Nobody seems

interested in doing this kind of work today."

On the other hand, boxwood (*Buxus sempervirens*), a favorite of wind instrument makers, is still valuable enough for Nagel to send men into the mountains of France or Turkey to cut it from the high, rocky places where it grows. Ebony is another species that normally grows as isolated trees, the best of it (*Diospyros ebenum*) coming from Sri Lanka. The wood is so heavy that it's usually cut into manageable chunks on the spot, then packed out.

The world's finest ebony was supposed to have come from Mauritius, but Wiese says he has seen a small piece only recently, for the first time. "The best African ebony (*Diospyros crassiflora*) is from Gaboon but very difficult to get. Cameroon is where most African ebony comes from. Gaboon is harder and blacker. Quality can vary greatly in ebony even within a two-mile area, depending on soil conditions. The best stuff grows in the mountains."

We pass a man loading the trunk of a Mercedes with bags of wood. "Those are offcuts of grenadilla," Wiese says. "We bag and sell it for firewood. It makes a fine fire, long-burning, good heat, and slight, pleasant smell. Lignum vitae is even better—it burns with a green flame." As if sensing some concern of mine for the depletion of the earth's forests, he notes that "90% of world wood consumption is for firewood and burning down forests to clear land for agriculture."

In the future, it's clear that technological advances, labor and freight costs, and political upheaval will have more to do with the availability of rare hardwoods than the extinction of individual species. Timber traders are drawn to countries where conditions favor investment: political stability, abundant supply of desirable species, a minimum of red tape. Volatile politics in South and Central America, parts of Africa and the West Indies have wiped out some traders.

If the price of a rare hardwood rises above what buyers are willing to pay, they will turn to substitutes—cheaper woods, plywood or plastics. And as demand dwindles, timber traders will drop those species in favor of the ones that sell well. Many manufacturers have switched to plastics for their labor-saving benefits, or to improve product performance. Composition bowling balls, for example, are far superior to their forerunners which were turned from lignum vitae. Woods from which dyes were extracted have been supplanted by chemical dyestuffs.

For the professional woodworker using rare hardwoods, the future looks expensive rather than bleak. Amateurs may have to switch to domestic hardwoods unless they can afford the escalating prices due to rising labor and shipping costs. For Americans, some of these costs are offset by the dollar's current high exchange rate. Shops using large quantities of rare woods might even find it worthwhile to import their own wood, rather than buying it on the domestic market. □

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Whither Rosewood?

A supply outlook for exotics

by Paul McClure

As conditions in the world market shift, woodworkers who enjoy exotic hardwoods need to know the current status of the different species. Why are some, such as teak and rosewood, becoming difficult to obtain? Are these shortages temporary, or are they harbingers of disappearance? Are available substitutes worth considering? Are new woods emerging in attractive supply?

Some woodworkers feel that we should not import wood from Third World countries, in order to protect our own economy and to not participate in the depletion of the tropical rain forests. But I feel that these are isolationist views which ignore the interdependence of the world economy, and which forget the fact that most land clearing has been done for agriculture, not timber. In fact, increased demand for wood is likely to lead to sound forestry policies in developing countries that don't yet know the value of their forests.

These days, the supply of exotic woods is primarily influenced by political decisions in Third World countries. For instance, most of the teak (*Tectonia grandis*) that is sold on the export market originates in Thailand, India, Sri Lanka, Indonesia, Burma and China. Only the last three are presently exporting teak in log form. Thailand, India and Sri Lanka have banned the export of logs and roughsawn lumber. Their economists believe that the teak stands have been overcut, and that there's more money in milling and exporting small pieces of dimensioned lumber. Consequently, teak exports from these countries have fallen off, because such pieces are of less value to the average cabinetmaker and boatbuilder. Burma, China and Indonesia have picked up supplying the world's demand for larger pieces. The export of ebony (*Diospyros spp.*) and satinwood (*Chloroxylon swietenia*) is similarly constrained because these woods also originate in India and Sri Lanka.

Shortages are not new in the business of importing and exporting wood. They are cyclical and have recurred for as long as records have been kept. Most woods whose availability is now restricted politically, geographically or economically will probably return to the marketplace in two or three years. At present, most woods reaching the American market come from Central and South America. Wood export from the Orient has dramatically decreased and the supply from Africa has become unpredictable.

Brazilian rosewood (*Dalbergia nigra*), however, a prize South American wood, is liable to remain scarce. The tree is peculiar in that it has to be quite old (around 200 years) to be of value. The wood's beautiful figure and fragrance are the result of the tree's gradual deterioration from the center out. Young trees have drab brown heartwood and no scent. There are few saleable rosewood trees left, hence the Brazilian government no longer allows rosewood to be cut and exported in log or lumber form.

Cocobolo (*Dalbergia retusa*), which is yellow, red, brown,

Cost Chart for Imported Woods

Comparative retail costs (per board foot)

Bocote	$11 to $16
Brazilian rosewood	$35 and up
Caviuna	$11 to $16
Cocobolo	$11 to $16
Ebony	$20 and up
Goncalo alves	$4 to $7
Kingwood	$16 and up
Mahogany (true and pseudo)	$2 to $4
Obeche	$2 to $4
Padauk	$4 to $7
Paldao	$4 to $7
Pernambuco	$16 and up
Purpleheart	$4 to $7
Putumuju	$7 to $11
Ramin	$2 to $4
Satinwood	$7 to $11
Teak	$7 to $11
Tulipwood	$16 and up
Zebrawood	$7 to $11

Note: It is difficult to quote prices because they are subject to daily fluctuations in the value of the U.S. dollar on the foreign market.

violet and black when freshly cut, darkens with age to reds and blacks that resemble Brazilian rosewood, for which it's been a popular substitute. Unfortunately, many of the areas where cocobolo grows are in political turmoil, and it can now be purchased only sporadically from a government-approved agent or party. Most of the best cocobolo comes from Nicaragua, but since the ouster of President Somoza, wood has been hard to get. Currency problems in Costa Rica have had a similar effect on supplies from that country. Panama, where cocobolo was first exploited in 1911, has had continuing production problems. With the United States decreasing its involvement in Panama, the situation is not likely to improve. Southern Mexico and Guatemala remain the only dependable sources, but they can supply merely half of what we once received, and then only sporadically.

Paldao (*Dracontemelum dao*), which grows in the Philippines, is a beautiful, light-brown wood, variegated by black streaks. It is in limited supply because the Philippine government stipulates that it can be cut only when it impedes construction. This wood was quite abundant on the market until the 1970s, but concern about its overexploitation led to the current severe limitation on cutting.

Zebrawood (*Brachystegia leonensis*), from western and equatorial Africa, is also becoming hard to get. With the decolonization of Africa, and subsequent withdrawal of European technicians, the newly independent countries are having difficulty with their production methods. Wood buyers can no longer be assured that zebrawood logs will be quartersawn, a procedure essential for proper kiln-drying, and are consequently reluctant to commit their company's funds. Thus zebrawood has doubled in price in the past year.

On the other hand, Brazilian kingwood or violetwood (*Dalbergia cearensis*), which had disappeared for about 20 years, is again available in limited quantities. This wood has a fine violet-and-black color and is truly a wood for the connoisseur of fine cabinets. Kingwood is a small tree, however, 3 in. to 8 in. in diameter, and prone to considerable degrade. The yield is therefore minimal.

Tulipwood (*Dalbergia frutescens*), beautiful with its red and yellow variegations, is presently available from Brazil in limited quantities. The log is small, the yield minimal, and the piece usually contains the pith of the tree, which results in some checking.

Pernambuco (*Guilandina echinata*), the violin-bow wood, is native to Brazil, but it grows only in the states of Bahia and Pernambuco. This wood is scarce mainly because of its remote geographic location, not because of overexploitation or government embargo.

The supply of some long-popular exotics has been more reliable. Padauk (*Pterocarpus soyaxii*) is a bright orange color when freshly cut, turning to rich maroon when exposed to sunlight. This wood comes from western Africa and is one of the most stable, durable woods available. It makes excellent flooring in high-traffic areas, and it is also good for exterior use. African padauk is quite abundant, and no shortages are foreseen in the near future. Another member of the genus, Andaman padauk (*P. dalbergoides*), also known as vermilion, comes from the Bay of Bengal's Andaman Islands, where it is logged by convict labor. These stands have been exploited since the mid-1800s, so now very little vermilion is available for import into this country. Andaman padauk is pink to red and maintains its color well. A third member of the padauk genus, narra (*P. indicus*), known as amboyna when in burl form, is indigenous to the South Pacific islands and is either red or yellow, depending on growth conditions. This species has been logged since the early 1700s and exported to Europe from the Philippines. There's currently a moratorium on cutting these trees where we have been used to getting them; however, stands of narra have been discovered in Papua New Guinea, and are being marketed as PNG rosewood, though narra is not related to the rosewoods.

Obeche (*Triplochiton scleroxylon*), from western Africa, and ramin (*Gonystylus spp.*), from Malaysia and Indonesia, have been abundant for many years and are in great demand in Europe and Japan, respectively. Both woods are relatively bland, good for carving and molding. Obeche is cream-colored, lightweight and soft (too soft for most furniture), and must be worked with very sharp tools. Ramin is straw-colored, heavier and easier to machine.

What of new woods and substitutes? First, the word "substitute" is inappropriate. No wood will be exactly like another wood. Each is unique, and though one wood will be similar in some respects to another, it will never perfectly replace it. Each wood should be recognized for its own characteristics and used accordingly. On the other hand, many jobs can be done by any of several woods.

The extent to which species are interchangeable can be illustrated with the mahoganies. During the 18th century, true mahogany was highly esteemed—dark reddish-brown in color, it was stable, easy to work and beautiful when polished. This was Cuban mahogany (*Swietenia mahagoni*), procured from the Caribbean islands. Around 1920, as supplies of this wood diminished, inroads were being made into Honduras. This country and its neighbors are the source for Honduras mahogany (*Swietenia macrophylla*), the wood that most cabinetmakers have been using to make fine furniture for decades. It is close in color and figure to the Cuban species, but

coarser. Recent political turmoil, currency instability and overgrazing of livestock in Central America have decreased the supply of Honduras mahogany, so a number of other woods are being sold as substitutes. Brazilian mahogany (*Cariniana legalis*) is not related to the *Swietenia* genus but is similar in appearance, and it is becoming more competitive in price and availability. It is lighter in color than the true mahoganies. Another stand-in is African mahogany (*Khaya ivorensis*), whose color varies from light brown to deep reddish-brown and whose texture is coarser than that of the South American mahoganies. This wood was quite popular during the 1960s, but higher prices now make it less attractive. Lauan (*Shorea spp.*), known as Philippine mahogany, has been marketed since the early 1920s as a mahogany substitute, although lauan varies considerably in weight and color, and its texture is coarse and difficult to finish. Lauan is popular in public-school industrial arts programs, as it is relatively inexpensive. Much of it is also made into plywood in Japan.

Caviuna (*Machaerium actufolium*), native to Bolivia, looks like Indian rosewood, but is richer in grain and color, does not have the fragrance and is usually cut on the quarter. It sands and polishes very well and comes in medium sizes. Flat cut, it has a most impressive figure of intermingled browns and purples. It costs less than Indian rosewood, and therefore could replace it in the marketplace. As with rosewood, however, some people develop a skin rash from handling it.

Goncalo alves (*Astronium graveolens*) is a beautiful wood that can be used in many furniture applications. It is golden in color, aging to dark red, with broad black stripes. Unlike most foreign woods, it comes in wide widths and long lengths. It grows in Brazil, and is plentiful at present.

Putumuju or arariba (*Centrolobium robustum*), also from Brazil, is a newly available, moderately priced wood. It is yellow, red and black, with some tinges of green. It seems to be abundant.

Purpleheart (*Peltogyne densiflora*), another Brazilian wood, is still quite abundant, compared with other exotics. The tree is usually large and yields wide, long, clear lumber. Purpleheart has a large amount of silica-oxide, as does teak, and the two woods are of similar densiry. The silica rapidly dulls cutting tools. Purpleheart is used mostly for accents (inlays and borders), rather than in large pieces, because of its weight and brilliant purple color.

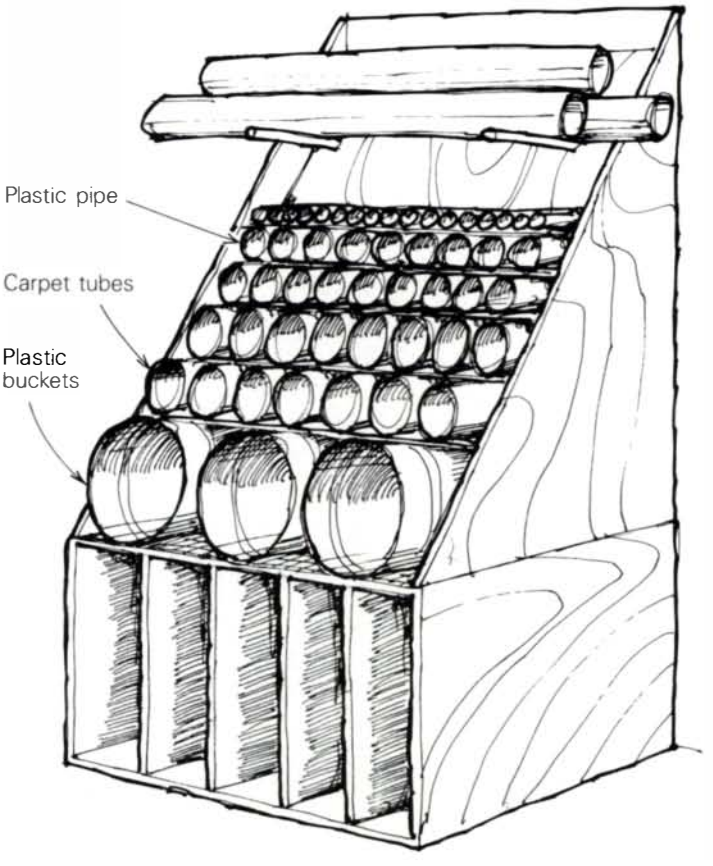
Bocote (*Cordia spp.*) is the color of tobacco and has irregular dark brown or blackish streaks. It is hard and waxy in texture and comes from a tree that reaches heights of 100 ft. Bocote grows in Central America and Mexico, and still can be obtained with relative ease at a moderate price. It makes beautiful turnings and small cabinets.

These and other woods, mainly from South America, are filling the need for exotic woods in contemporary woodworking. While some historically popular species are now hard to get, other less familiar species are becoming available. And while the general quality of wood, both domestic and imported, seems to be declining, a sharp eye can still find choice stock, whether in the forest or at the lumberyard. □

Paul McClure is a wood technologist who has worked in the lumber trade for 12 years. He has recently opened a hardwood retail outlet, a branch of Wood World, in Tempe, Ariz.

Storing precious scraps

by Tom Dewey



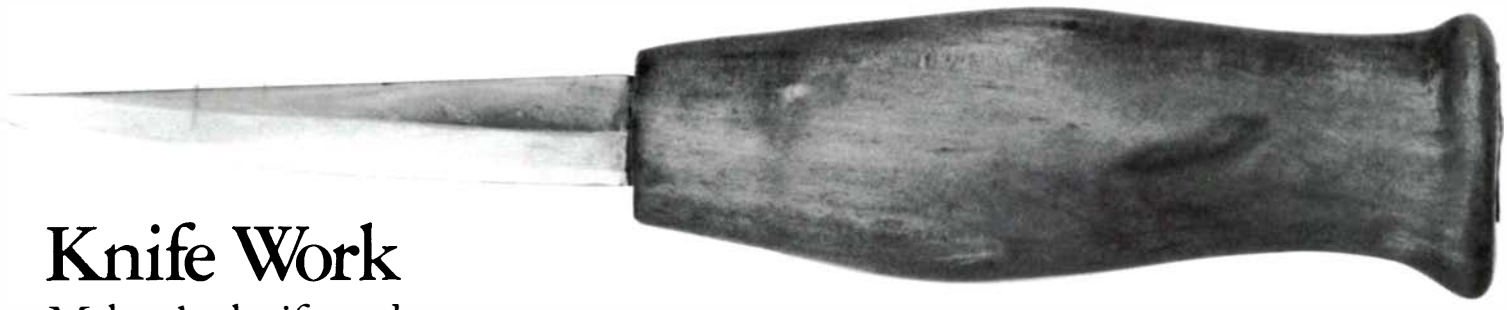
. . . And then there was the deceased frugal widow who, friends found, had very carefully labeled shoe boxes "pieces of string too short to save" and had, of course, just as carefully stowed them away. Like her, I had a scrap box into which I tossed little pieces of wood I didn't really need but couldn't bring myself to burn. I'd paw through the jumble, wasting time trying to locate that dandy piece of ebony I remembered being there. Most of the time I ended up cutting a new piece anyway, creating yet more scrap and an even thicker clutter.

It finally came to the point where it was either me or the scrap, and I was forced to deal with the problem. My solution occupies no more floor space than the original scrap box, holds a lot more, and keeps wood out where it sort of winks at me as I pass by.

I turned the original box on its side, made a sloping rack out of plywood and nailed this to the wall. I fashioned bins from 5-gal. paint buckets, sections of plastic drain pipe, carpet tubes and, for small pieces of wood, lengths of 1½-in. plastic pipe. Two broomstick braces—inserted through the rack into holes in the studs behind—hold more carpet tubes across the top of the main rack. I store longer pieces of molding, splines and shim stock in these. Plywood, wider boards, and odds and ends go in the bottom.

The rack has turned out to be so accessible that I find myself storing cutoffs as I work, instead of letting them pile up until I'm done. When I'm looking for a small turning square, I can invariably find just what I need. □

Tom Dewey makes custom cabinetry in Coudersport, Pa.



Knife Work

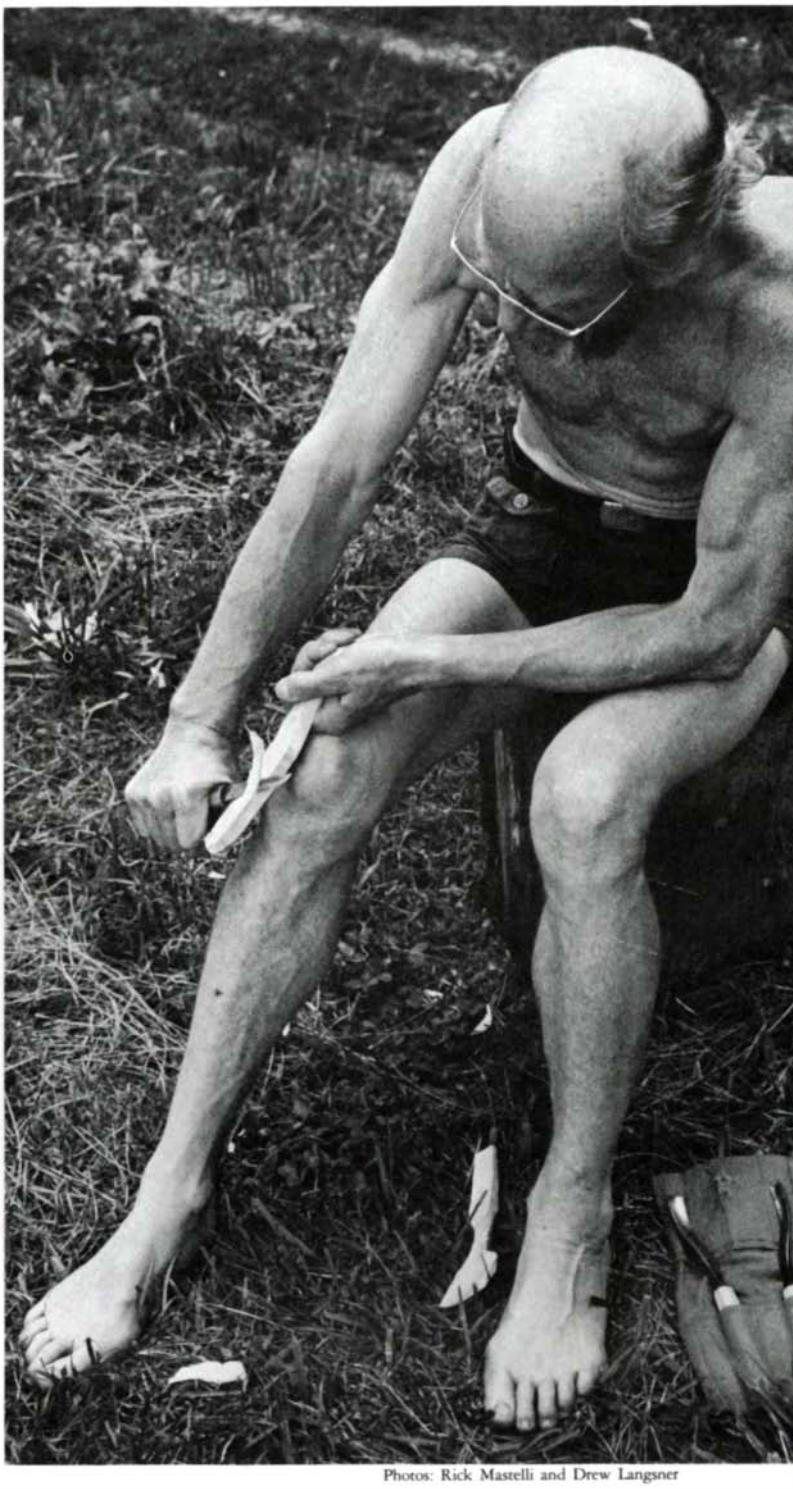
Make the knife and carve a spoon

by Rick Mastelli

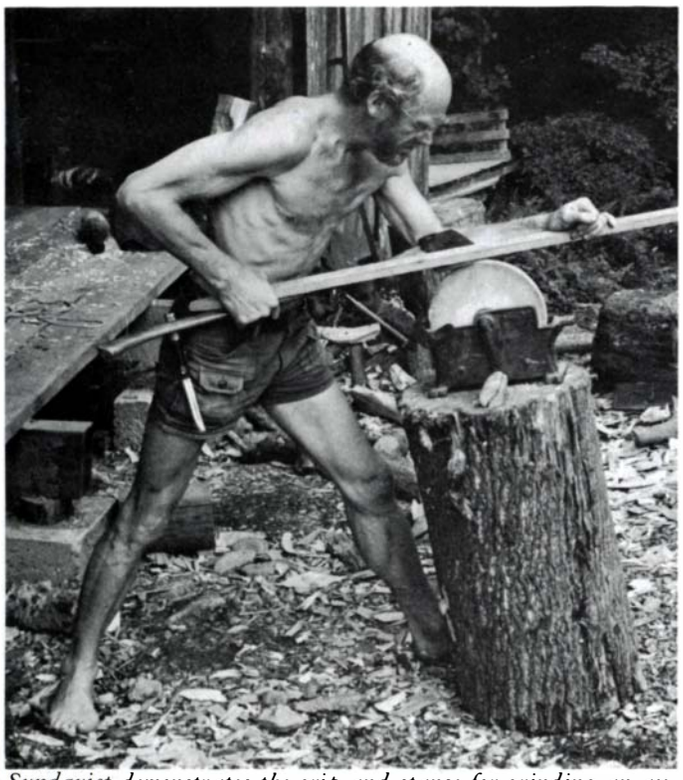
Winter nights are long in Sweden. When farmers go into the forest to cut the year's firewood, they make a point of also collecting bent limbs and crotches, blanks from which to whittle spoons in the evening months. In rural Sweden many men still wear knives, not as weapons but as ready tools, and it is part of the ritual of conversation to punctuate a sentence with a shaving from a stick. In some parts of the world whittlers carve figures or ornaments, and there are always some who just make chips. In Sweden spoons are traditional, and still popular. The centuries have yielded a deep understanding of hand-tool techniques, as well as of the form of the wooden spoon—together they evidence a refined simplicity.

A week-long workshop I attended last summer focused on these hand-tool techniques. The place was Country Workshops in Marshall, N.C., and the teacher was Wille Sundqvist, a wiry, 57-year-old Swede whose relationship to craft is long and thorough. As a boy he learned to carve by watching his father and grandfather, both of them farmers and winter woodworkers. When he was six years old, he discovered the first principle of knife work while squabbling with his brother. His brother grabbed the knife's handle and he gripped the blade, and when they pulled, he learned indelibly how knives slice. At 20 Sundqvist hurt his back in a forest accident, and so had to find a career other than farming. He went to wood-

Sundqvist uses innumerable knife grips and strokes. These two are among his most powerful, because they slice away from the body and require no 'safety stop' to protect the carver from the blade. At right, the hand that holds the blank rigid is lodged above the kneecap. The knife is held at an angle in the hand such that the stroke leads with the handle, the tip of the blade trails. The slice is powered from the shoulder and back, with elbow and wrist locked. Above, the slice is also from the handle toward the tip, but here leverage against the chest helps power it.



Photos: Rick Mastelli and Drew Langsner



Sundqvist demonstrates the grip and stance for grinding an ax. The backing board helps to maintain even pressure on the ax head as it is run diagonally over the grindstone.

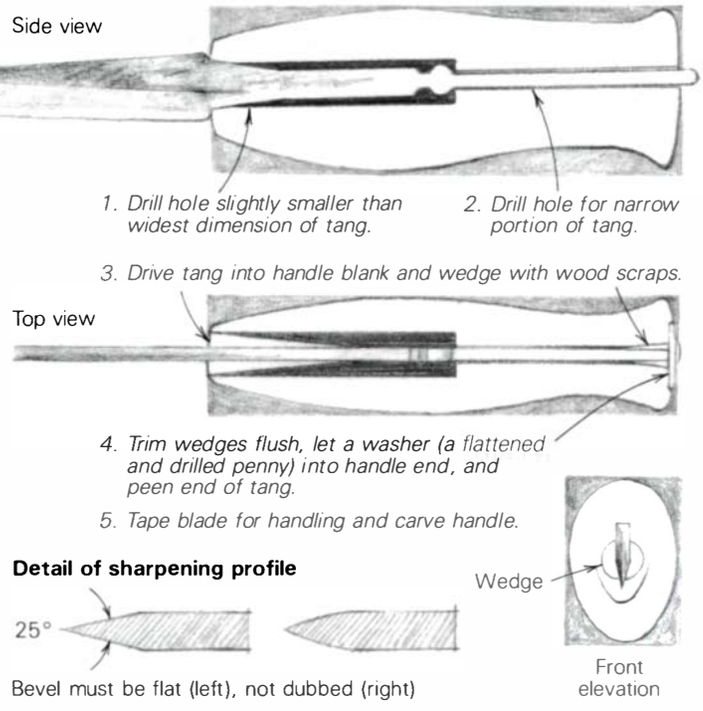
working school, where he apprenticed with the illustrious furniture designer Carl Malmsten. Later he taught woodworking at Malmsten's school, and in various elementary and preschool programs, then for ten years he taught others to be woodworking teachers. Since 1969 Sundqvist has been consultant to the Handcraft Society in the province of Västerbotten, researching traditional handcrafts and helping the disabled and the elderly become productive craft workers.

In Sundqvist's hands, ax and knife are powerful, precise tools. Throughout the week at Country Workshops we ten students were awed. Sundqvist could waste thick, measured slabs from an ornery dogwood branch, or with the same surety scribe vigorous detail into a spoon handle. Every inch of the knife blade or ax edge, every contour of their handles, had its purpose and right use. He showed us a profuse variety of traditional grips and strokes—useful not only because they direct the cut but also because they provide built-in safety stops, in that the cuts end when part of the hand or arm comes in contact with the work (or part of the carver's body), thus keeping the knife from slicing flesh. When you are sure of your stop, you can work with confidence and direct more energy into the cut. Not only his hands, but the whole of his body worked. Barefoot, shirtless, in shorts, he showed the interaction between thrust and safety stop, brace and swing, grip and lever. He did not say much; English does not come easy for him. We learned by watching him work.

It's shocking how much we modern craftsmen underestimate the basic tools. Knives sold for carving come with spindly handles and stubby blades, their bevels dubbed round by the buffing wheel. Axes are sold with their bevels made bulbous by a sanding belt, and with handles so skinny that your fingers bottom out on your palm. No wonder we figure these tools are good only for hacking at firewood. The quality of an artisan's work increases directly with his understanding of and respect for his tools. Thus Sundqvist began by having us make knives. We spent a full day fitting a 3½-in. long, laminated Swedish steel blade into a chunk of applewood, then shaping the wood to fit our own hands. We took another day fitting the knife into a wooden sheath with a leather collar we sewed wet around the knife's handle. After the leather dried and shrank, the knife could be eased out and snapped securely back into place, and afterward it hung from our belts to remind us how handy a knife can be.

We sharpened our tools so there was no rounding at the edge, and no secondary microbevel, for the surfaces that produce the edge have to be flat. Dubbing is right for edges that are meant to split wood; dubbing keeps the tool from sticking in the wood. And a microbevel is okay for a chisel, whose flat back registers the cutting edge. But for a knife, the bevel itself is that registration plane. When it is flat on the wood surface, the edge must be there too, ready to cut. These blades were manufactured by Erik Frost in Sweden and are called Sloyd knives by most woodworking supply outlets. You can see the lamination line halfway up the bevel. The softer steel sandwiching the harder makes the knife less brittle and easier to sharpen. We sharpened to a greater angle than is usually recommended: 25° for knives and gouges, 28° for axes. For knives, the bevels on either side of the blade are equal. For axes, if you are right-handed, you sharpen the left-hand bevel longer than the right, for more surface with which to guide the cut. Axes can be honed by moving the ax head over a stationary stone, but I found it easier to clamp the ax upright in a vise and move the stone over the bevels in small circles. Sundqvist showed us how to keep our eye on the bevel opposite the stone, looking for a thin line of honing oil to be scraped off the stone's surface and to run down the edge. Maintain the finest flow of oil, and your bevel will be flat. This technique also works for honing the carving gouges used to hollow the bowls of spoons. You hold the tool upright in one hand, bevel away from you, and rub the face of a stone

Fig. 1: Plans for a Sloyd knife handle



Making a spoon begins with a green crook that you split at the pith using the ax, driven by a maul, as a wedge (above). The top and bottom of the spoon are shaped first (above right), then the sides (right). Careful, measured strokes, always aimed below the hand that holds the blank, define the basic shape.

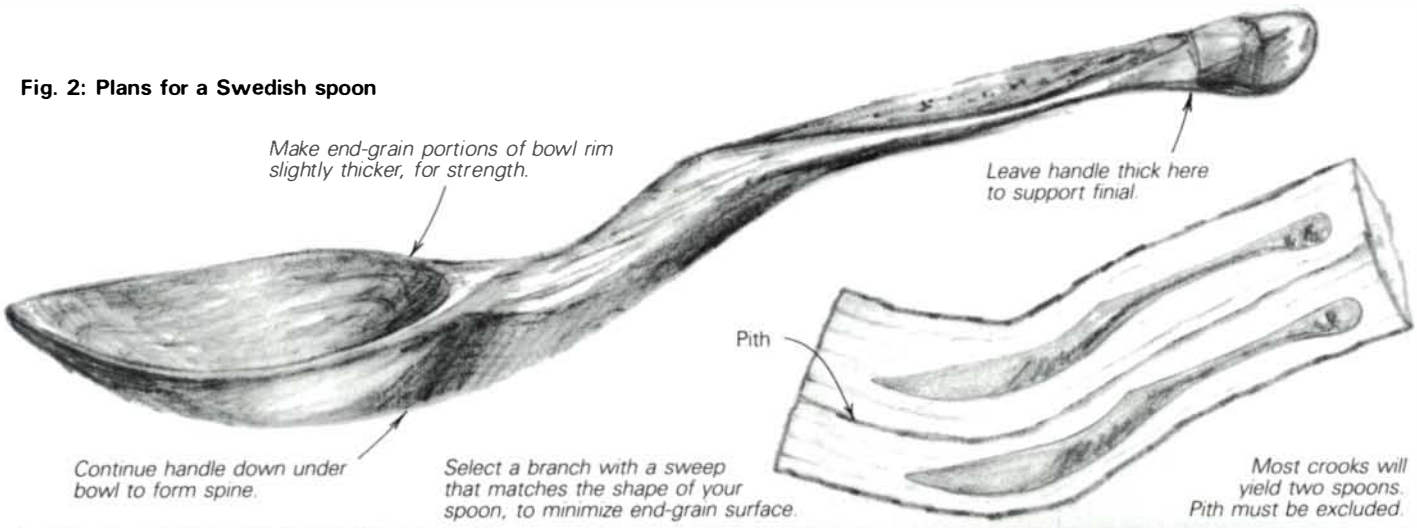
up and down, flat against the bevel. Rotate the tool slowly back and forth to present the whole of the bevel to the slip stone, all the while looking for the dribble of oil to leak over the edge. To remove the burr, slip the round edge of the stone up and down, flat against the inside of the gouge.

Any close-grained, dense wood will make a good spoon. The natural curves of branches make for a stronger utensil, because the grain can follow the shape. We had a pile of green crooks and crotches to work: rhododendron, dogwood, black birch, apple. At times it seemed that the spoons we were making were only vehicles for practice with knife and gouge. Eventually the tool and hand would work effortlessly for a while, and the infinite possibilities of the spoon would replace the challenge of simply using the tools. How make a lump of wood hold food, be comfortable to the hand and mouth, please the eye, enjoy use? The bowl of the spoon needs to be thin, to fit the lips, and so for strength it ought be oriented to minimize end grain. The stem of the spoon should position the bowl below the plane of the handle, and to satisfy the eye it should be narrow, so for strength it ought be thick and continue down like a spine, supporting the bowl. The top of the handle should be thin, to fit the hand, so for strength and visual balance it should be wide. A wide surface calls for decoration, so at the top ("to keep the eye from flying off," as Sundqvist puts it) you need a finial. Making a spoon, you learn how deep is the challenge—design that is infinite with possibilities, all coordinated by tradition and function. Suddenly, the wooden spoons you buy at the supermarket are two-dimensional.

It's surprising how much like a spoon you can shape a branch with only an ax. First the ax splits the branch in half (you drive it with a maul, like a wedge), to ensure that the pith will not be part of the spoon. The trick for the rest of the ax work is to support the blank solidly on the chopping block and far enough forward so that an overswing will not end in your leg. Hold the blank so that the thrust of the stroke is below your fingers. You shape the side view of the spoon first, including most of the bottom of the bowl, then you define the outline of the bowl and handle. This order gives you more stock to hold on to longer. The strokes that shape the stem near the beginning of the bowl are the most critical, because an overswing here can easily crack the bowl. For a more mincing stroke, you hold the ax closer to its head.

Now you sit down with your knife and a couple of gouges. The green wood cuts like cheese. The diverse grips for safe, forceful knife and gouge work are recorded in the photos of

Fig. 2: Plans for a Swedish spoon



Most of us pare by slicing from the stout end of a knife toward the tip. Sundqvist gets greater power arcing the blade from tip to handle, often using his thumb for leverage. Each stroke has its safety. Above, the thumb is held out of the knife's direction on the spoon end. At right, Sundqvist modifies this stroke to slim the middle of the spoon's handle by repositioning the thumb 90° to the stroke and rotating the knife in the palm about 30° toward the blank. Short, arced strokes stop before the thumb is touched.

It doesn't take long to shape the blank with the knife before it's time to hollow the bowl. Gripping the gouge as shown at left keeps the stroke short and safe. Most of the strokes are cross-grain, and they stop when the hand contacts the spoon. The rim of the bowl calls for special grips. The knife grip above may look dangerous, but it has its safety and is surprisingly controlled. The trick here is to put your little finger on the flat of the blade, which positions the heel of the hand along the back. Then both arms are braced against the ribs, and the hands move together like a pair of scissors. With the wrist cocked, it is not possible for the knife to reach the body.

These two strokes are both powered by the hand not holding the knife. They show how Sundqvist uses the whole length of the blade: the stout portion for heavy cuts, the tip for fine work. At top is the still-green blank. Wet wood is easier to shape, but to smooth the surface, the spoon is first dried overnight. Dry wood, above, frays less.

Gift spoons warrant decoration. Sundqvist first pencils in the shapes and letters, then uses the tip of the knife locked at about 60° to the surface, first in one direction, then the other, to remove a triangular chip of whatever length.

Sundqvist at work. Most of these positions feel strange at first, but by the time the calluses form, you have a physical memory. Your body reaches for the necessary posture to handle that excess of wood at the rim. For the underside of the handle, it reaches for another position. You don't think about it, you feel for it. But each time before you power the stroke, you think, *where is this edge going to stop?*, and you balance the tensions, or you adjust your hands so the edge doesn't end in your flesh. It's absorbing work. The conversations I enjoyed late into the night, unable to release my work for the day, were indeed punctuated with shavings.

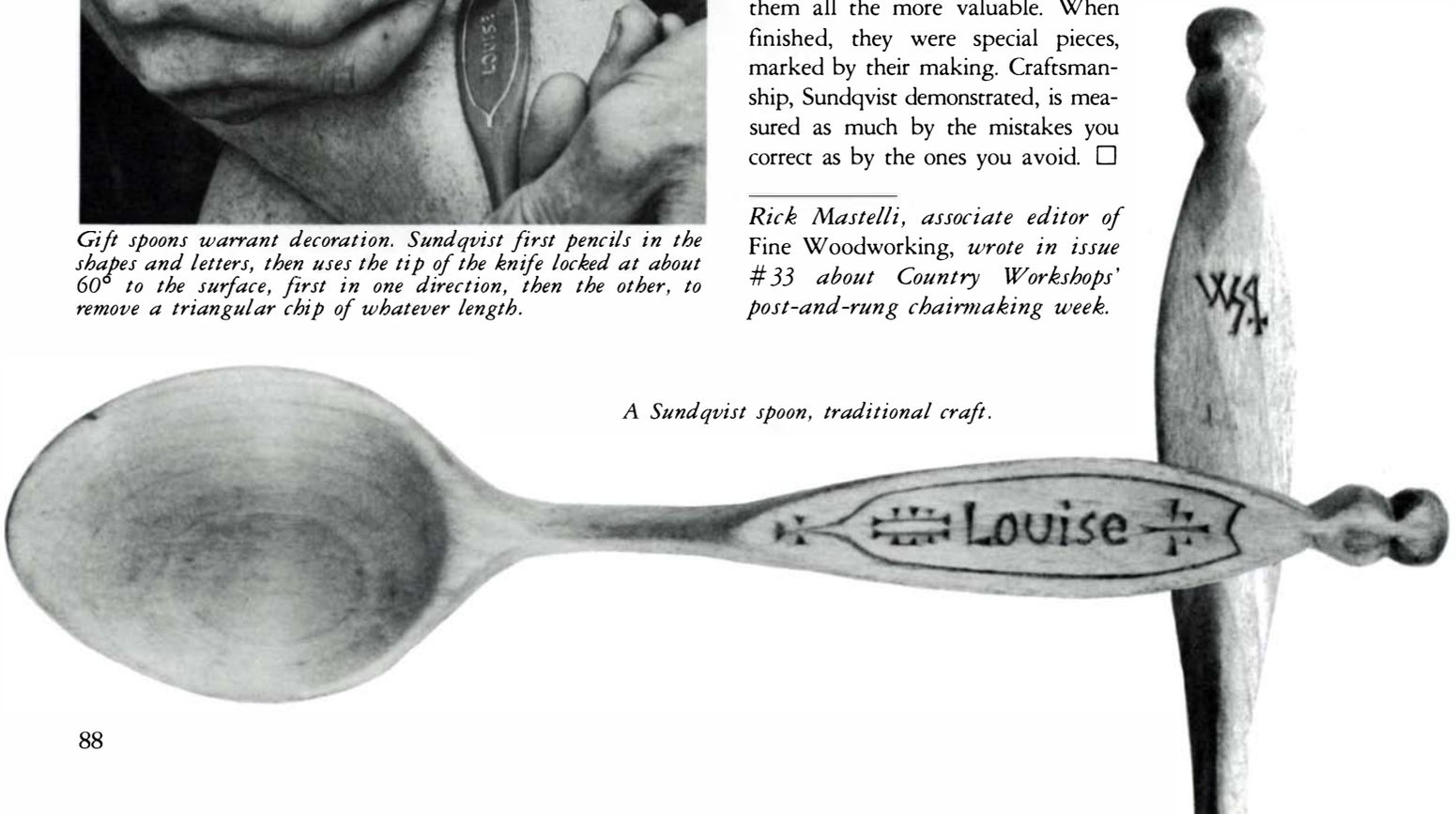
When the shape of the spoon is there, you rub the blank with a boiled potato to fill the pores and forestall checking. The blank dries over the stove until morning. Green wood is easy to carve, but it is trouble to smooth. The next day you lightly go over your dry blank with the knife, and then you sand, until your spoon is fit for hand and lip.

Sundqvist was a remarkable teacher. He would devote himself entirely to one student at a time. He would listen to your question or watch you work for a moment. Then, unable to tell you what to do, he would show you. It was unnecessary to explain to him what shape you had in mind. He would see it in the blank. It may have taken you half a day to realize what you were doing, but he knew in half a minute—you would see what force could be exercised, how much wood could be made to disappear, if only you held the knife *this* way. It was unnerving at first to hand over that precious lump of wood, with all your feeble little nicks in it, and then watch great chunks of it fly. But it was your own vision Sundqvist handed you back. And then he would hold your hands in his and shape them to the task.

He cared about every piece of worked wood. The more effort that had gone into it, the more valuable it became. There were no mistakes we could make nor defects in the wood we could uncover that did not summon his healing energies. I watched him painstakingly patch a misbored hole in a knife handle, even an incipient check in a spoon bowl. The pieces hardly seemed worth the trouble—they still looked like ax offal. But he saw them as works, and his fixes made them all the more valuable. When finished, they were special pieces, marked by their making. Craftsmanship, Sundqvist demonstrated, is measured as much by the mistakes you correct as by the ones you avoid. □

Rick Mastelli, associate editor of Fine Woodworking, *wrote in issue #33 about Country Workshops' post-and-rung chairmaking week.*

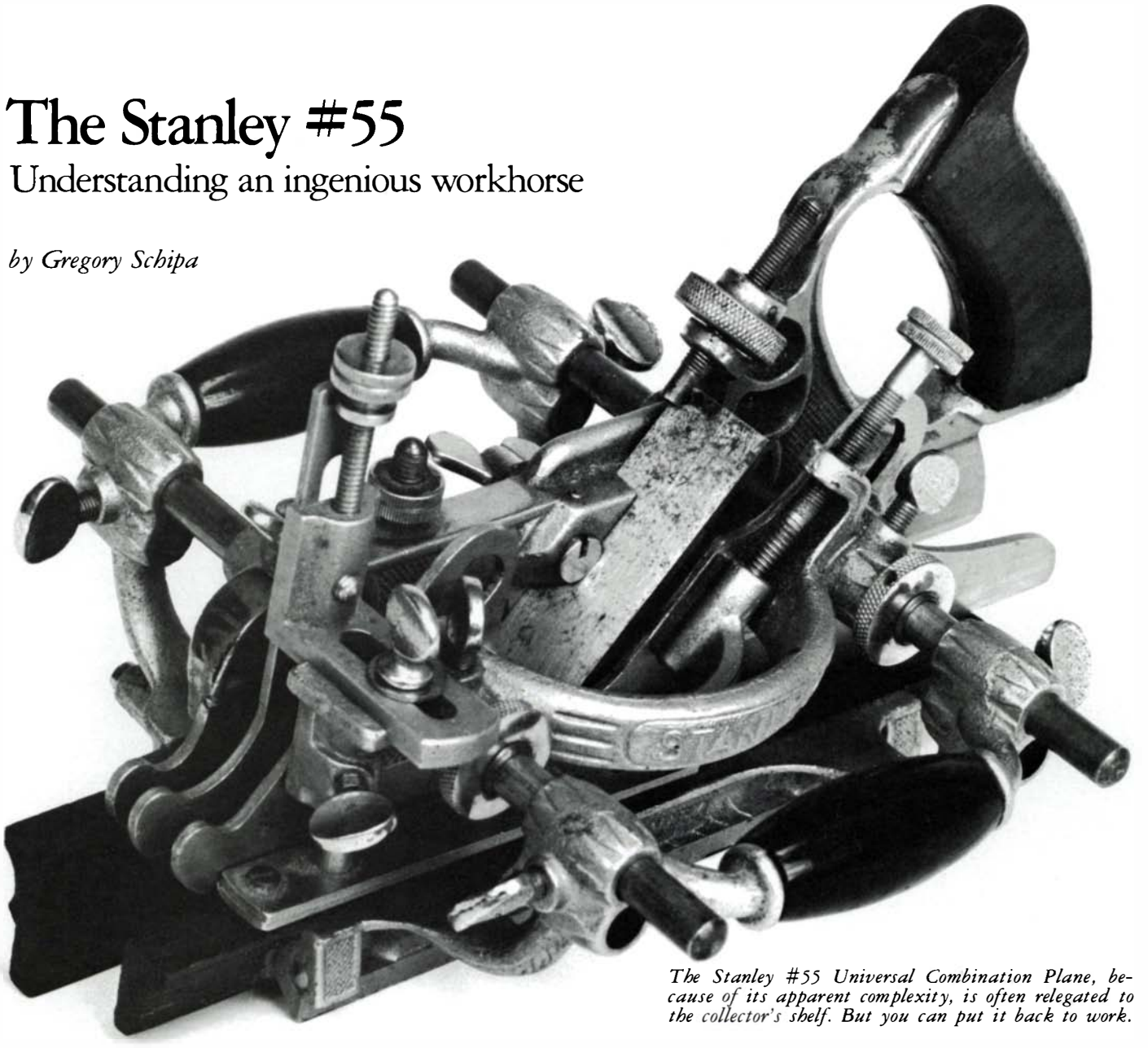
A Sundqvist spoon, traditional craft.



The Stanley #55

Understanding an ingenious workhorse

by Gregory Schipa



The Stanley #55 Universal Combination Plane, because of its apparent complexity, is often relegated to the collector's shelf. But you can put it back to work.

Most people, when they first set eyes upon a Stanley #55 Universal Combination Plane, are sure they've discovered the ultimate contraption, though one undoubtedly too crazy to work. That's what I first thought, yet many years later the #55 has grown to be a part of me. As the Stanley Tool Company modestly described it in their 1897 catalog:

> Combining as it does all the so-called 'Fancy' Planes, its scope of work is practically unlimited, making the Stanley #55 literally 'A planing mill within itself.'

I have my reservations about that sweeping claim, but there is no doubt that for the cabinetmaker, house joiner or restorationist, the #55 is a most useful and even addictive tool. With a little patience, you can set it up to do the job of any one of a hundred specialty planes, and it will duplicate period moldings you simply cannot find in the lumberyards, nor even mill with a spindle shaper.

History—Although the #55 seems to have landed from space, it is actually the product of a gradual, rational evolution. In the 19th century, single-purpose wooden planes, basically the same design as had been used in ancient Egypt and Rome, had multiplied until a cabinetmaker or housewright might have needed a hundred of them to fashion all the moldings in style, an expensive and weighty collection to store and transport. These beautiful wooden planes were also unstable, liable to check and warp.

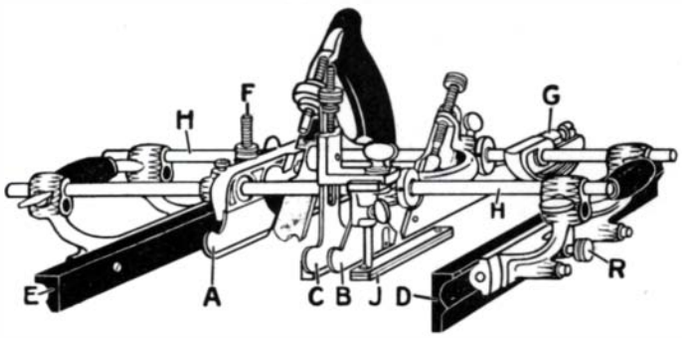
The Industrial Revolution provided a metal technology that avoided wood's drawbacks. In 1871, after successfully marketing a series of cast-iron bench planes, Stanley introduced the "Miller Combination Plane" as a replacement for the carpenters' plow—it employed metal screw threads instead of wood, and a sole that "would not warp or swell." Within a few years Stanley came out with the #45, which replaced a boxful of plows, fillisters and beaders. Meanwhile, improvements in machinery resulted in abundant, newly available mill-run moldings, which reduced the need for handwork and hastened the decline of the wooden molding planes. It was only a matter of time until the #55 came along and claimed to be able to take over all molding functions.

My crew and I have four of the contraptions, and they are invaluable for the restoration work we do. It's curious how we came to discover them. I had been using old wooden planes to duplicate moldings, and had even had a few new ones made for me by Norman Vandal (*FWW* #37, p. 72). I'd picked up some old metal planes, too, including a Stanley #45 with interchangeable cutters. I remember musing to myself that the #45 would be able to do just about anything if only it had sole runners that could be adjusted vertically as well as horizontally. And then I discovered the #55, which has exactly this feature. In my own day-to-day work, I'd gone

through the same evolution as had a generation of 19th-century housewrights.

The Stanley #55 Universal Combination Plane was developed by Justus A. Traut and Edmund A. Schade, who patented it in 1895. It was first marketed by the Stanley Tool Company in 1897, with 52 cutters (the number gradually climbed to 55), and remained relatively unchanged until it went out of production in 1962. There were 41 optional cutters as well, which are now quite rare. In addition, a craftsman could grind cutters of his own design out of flat tool stock. The catalog listed it as a "molding, match, sash, beading, reeding, fluting, hollow, round, plow, rabbet and fillester, dado, slitting, and chamfer plane." It is 10 in. long and weighs 15¾ lb., including all parts and cutters. The body is nickel-plated, and the fences and handles are rosewood. As much as the following description (quoted from the 1897 Stanley catalog) is a tangle of terminology, to a craftsman who could use this versatility in his daily work it must have been engaging reading:

> This plane consists of: A Main Stock (A) with transverse sliding arms (H), a Depth Gauge (F) adjusted by a screw, and a slitting cutter with stop. A Sliding Section (B) with a vertically adjustable bottom. The auxiliary Center Bottom (C) is to be placed in front of the cutter as an extra support, or stop, when needed. This bottom is adjustable both vertically and laterally. Fences (D) and (E). Fence (D) has a lateral adjustment

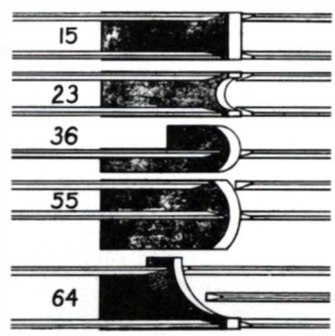


> by means of a screw, for extra fine work. The Fences can be used on either side of the plane, and the rosewood guides can be tilted to any desired angle up to 45°, by loosening the screws on the face. Fence (E) can be reversed for center beading wide boards. An adjustable stop (J) to be used in beading the edges of matched boards is inserted on left hand side of sliding section (B). A cam rest (G) aids stability.

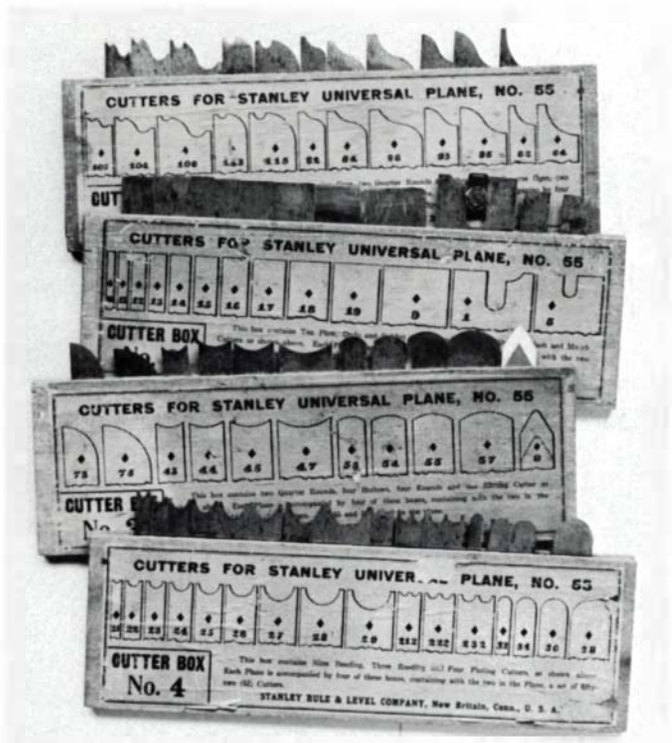
The #55 with all its cutters fits in a case the size of a shoebox, and it will produce handmade moldings of considerable depth and classic shape. It was never intended that the combination plane should outperform all individual molding planes, but rather that it should allow the craftsman at the job site to match whatever profile he might need. A #55, trimmed for work, weighs at least 3½ awkward pounds, whereas a small beading or molding plane weighs a balanced and comfortable 10 oz. to 14 oz. Over the course of a day, the difference is significant.

Also, even though the #55 is more straightforward than it at first looks, setting it up takes time. After setting three runners, the blade, two fences, spurs and perhaps the cam rest, you would certainly hesitate before disassembling everything to cut a plain rabbet. You'd grab the nearest rabbet plane—or an electric router—instead.

Despite its complexity, the Stanley #55 becomes easy to understand when you examine its relationship to some of the planes it replaces. In the drawing on the facing page, for instance, we see three old planes. The first, one of a pair, is a single-purpose plane that makes a groove on the edge of a ⅞-in. thick board (the other plane in the set makes a tongue). The next, a more versatile plow plane, has an adjustable depth stop and a fence on adjustable arms. The fillister plane has features that allow it to cut cross-grain rabbets. Both the grooving plane and the plow plane, instead of requiring a broad, flat sole like a bench plane, have a single, thin metal runner that limits the depth of cut on each pass. The main stock of the #55 has a similar runner. With one of its fences attached to the metal arms, the main stock of the #55 would closely resemble a plow plane, as shown at **A**, and, with none of its other parts attached, could be used to plow a narrow groove. A wider iron, however, such as cutter no. 15 in the small drawing below, would be difficult to use with a single runner, because if the plane tilted at all, the cutter would dig in. The #55 therefore has a second runner that can support the other side of the iron, as shown at **B** on the facing page. These two runners suffice for most of the #55's cutters. By designing this sliding-section runner to be vertically adjustable, Stanley made the plane capable of reproducing wide flutes (cutter no. 55) and thumbnails (no. 64), as shown at **C**. An auxiliary half-runner is used to support the middle of the wider cutters when necessary.

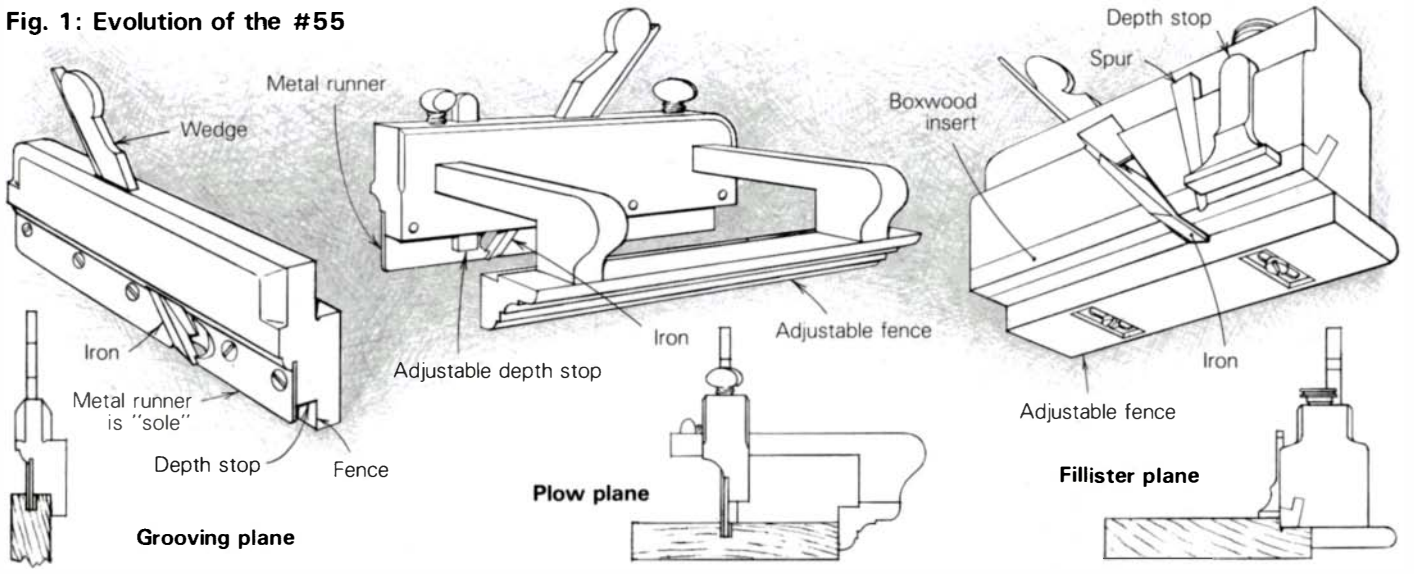


How it works—Setting the heights and locations of the runners is the key to setting up the plane. Two pairs of arms



Stanley's 52 (later 55) standard cutters were originally packed in flat wooden boxes. There were 41 additional cutters available, wider and narrower versions of the basic shapes.

Fig. 1: Evolution of the #55

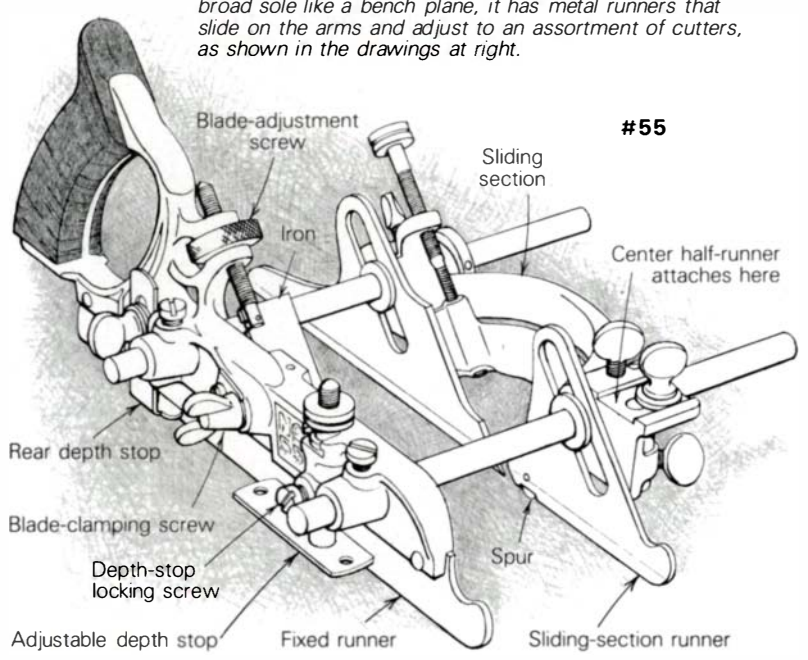


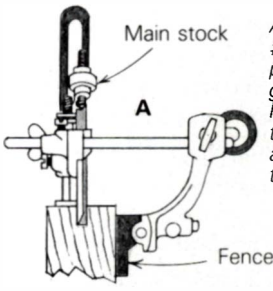
Grooving plane has only one function, hence no adjustments except for the wedge that locks the iron at the correct depth. The metal runner acts as the sole, preventing the iron from digging in. Fence and depth stop are built-in.

Plow plane, with adjustable fence and depth stop, makes grooves on the face of a board. Some plows have assorted blades of different widths; with others you plow grooves side by side if you need one wider than the iron.

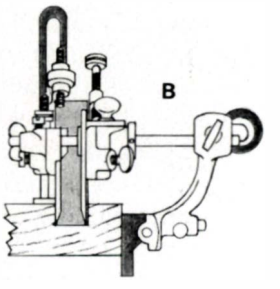
Fillister plane's fence and depth stop are adjustable. A sharp spur severs the wood fibers ahead of the iron, allowing the plane to work cross-grain. For efficiency, the iron is wider than the cut; the fence adjusts beneath it.

The "main stock" of the #55 has features derived from the wooden planes shown above. Instead of having a single, broad sole like a bench plane, it has metal runners that slide on the arms and adjust to an assortment of cutters, as shown in the drawings at right.

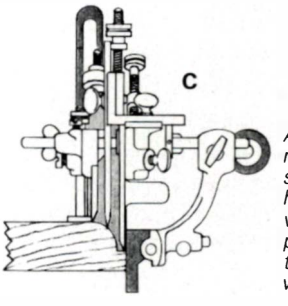




*At **A** is the main stock of the #55, with fence attached, performing the function of the grooving plane shown above. If limited to this single function, the plane would need no adjusting screws except those that set the cutter's depth.*



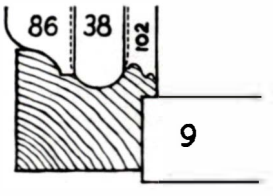
*At **B** the sliding-section runner has been added to the arms to support a wider, though still flat, cutter.*



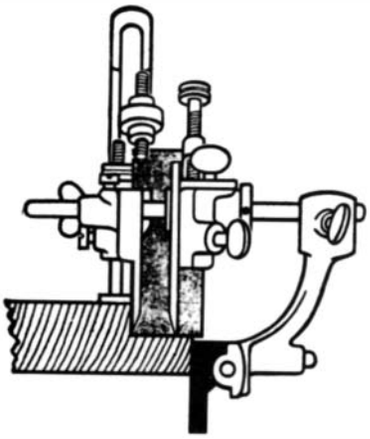
*At **C** the #55 performs as a molding plane. The sliding-section runner and the center half-runner are horizontally and vertically adjustable, and support various cutter profiles at the points where the cutter would tend to dig in.*

come with the #55: one set is 4½ in. long, the other is 8¼ in. long. To adjust the plane for different cutters, you simply slide the runner sections you need onto the arms, then clamp them in place by tightening the wing nuts. Runners, when you are using them at the outside edges of a cutter, should be set as close inside each edge as possible, so that they can bear against the sides of the groove being cut. To set the proper exposure of the cutter, I find it simplest to set all the runners exactly flush with the cutting edge, then to lower the cutter. This is easily done by turning a single, knurled nut—it tracks the iron up and down with almost no play.

The cutters: The 96 factory-made cutters, shown in the photo at the bottom of the facing page, are used one at a time in the #55. When a combination molding must be made, a series of shapes can be planed next to each other until the profile is complete. You usually plane the part of the profile farthest from the fence first, working progressively toward the edge of the stock on which the fence rides. Also, you must plane each shape on all your sticks before you change the cutter for the next part of the profile. It is tricky to maintain consistency, and a slip in any one of the operations means that you've ruined your molding. You need to plan for a lot of wasted sticks. I find that the moldings created this way are the least effective use of the #55 plane. Stanley liked to think that there were virtually unlimited options and combinations, and technically there are. Most combinations of cutters on a single piece, however, take consider-



able sawing and rabbeting in combination with the actual molding cuts. This is extremely time-consuming. Combined moldings usually come out a bit inconsistent as well. Instead, it is more practical to make a series of separate moldings, then combine them, such as by nailing on a cove-and-bead below a reverse ogee to form a nice cornice molding.



The fences: The #55's fences can be adjusted up and down—by means of alternative holes for the arms—as well as in and out. They also tilt to 45° for making chamfers. There are two major fences that come with the #55. The larger one has adjustment screws that help in setting the fence vertically parallel to the side of the cutter. Keeping the fence flat against the work is the best way to keep the plane perpendicular. If the fence is not parallel to the side of the cutter, the plane will run either into or away from the work, binding and cutting poorly. Stanley suggests using both fences whenever possible (one on each edge of the stock), but I find that this causes the plane to bind, and mostly I just use the smaller one.

When you use the plane, keep pressure toward the work, so the fence won't ride off (especially on coves and thumbnail moldings). Also, to keep the plane running straight, push the #55 with your right hand only—use your left hand to keep inward pressure on the fence.

Depth stops: The main depth stop adjusts with a single knurled nut. It works the same as the depth stop on the fillister plane in the drawing on p. 91, eventually contacting the top surface of the work and preventing the plane from cutting too deeply. There is another depth stop, located on the main stock behind the blade, which should be used whenever it can make contact. When you use the front depth stop alone, the plane tends to tip back. In addition, some of the cutters accept a little, built-in depth stop that can be adjusted with a screwdriver (note cutter no. 1 in the photo on p. 90).

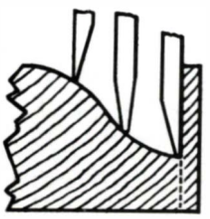
The spurs: The main-stock runner and the sliding-section runner both have adjustable spurs located just in front of the blade. As in the fillister plane, these sever the fibers ahead of the iron for a cleaner cut, and they must be kept sharp.

The slitting cutter: A knife-blade-like cutter can be set into a holder located behind the usual blade location. It is used to split strips off the edge of boards—similar to the Japanese splitting gauge in *FWW* #34, p. 52—and works faster and more neatly than a saw on thin stock.

Primary functions—Perhaps the function for which the #55 is best suited (or at least most easily applied) is beading, the creation of a small half-round with a groove (called a quirk) on the edge of a board, or occasionally in the middle. A bead was most often applied to embellish the joint (and to disguise wood movement) between two matched boards, or as the inside edge of window and door casings. If the cutter, depth gauge and fence are set properly, the bead will be perfectly shaped. A flat-topped bead means the depth is set too shallow; a flat-sided bead means the fence is too close to the blade. If there is a flat on the outside of the bead, the fence is too far from the cutter (you have created an astragal). The most common mistake in beading is letting the fence ride away from the work, which results in an enlarged quirk, and a shrinking bead.

Rabbets and grooves are simple with the #55. It is always easiest when rabbeting to use a cutter wider than the rabbet. The smaller fence can be adjusted so it bears on the edge of the stock below the blade, as shown at left. The plow function is accomplished very handily as well, although the narrower cutters are best.

Of the "fancier" moldings, the #55 cuts some well, but it makes others only with difficulty. The Grecian ogees (cutters no. 102-106) seem to work most easily, because the plane has less tendency to ride off the piece. On these and all fancy moldings, however, you must take care not to roll the plane out, or the moldings will be uneven and impossible to join on the same work without carving. Profiles that drop off away from the work tend to encourage this riding-off. Coves, Roman ogees and reverse ogees fall into this category, and the simple "thumbnail" or ovolo cut on the edge of a stile is the most difficult (the cutter is referred to as a quarter hollow). These cuts all call for a very shallow blade setting, and strong pressure toward the work. On many, Stanley recommends that you leave some stock uncut on the outside edge, as shown at left, to be trimmed off later. This traps the bottom runner and prevents it from sliding off the work.



Availability—Stanley's "miracle" tool is out of production. The combination planes that are on the market (the best two I've seen are the Record #405 Multi-plane and Stanley's #13-050 Combination) do not have the vertically adjustable fence and thus lose most of the functions that made the #55 so versatile. With the resurgent interest in hand-tool work, the popularity of the #55 is again growing. Unfortunately, these planes are usually found at the antique tool dealer's, where demand from the tool collectors, the nemesis of the joiner and cabinetmaker, has driven up the price. The planes seem to be harder to find each year, but the major dealers can usually come through with one for about $200 to $350, a price comparable to a new combination plane.

The number of cutters will vary according to the year that the plane was manufactured, but check to see that most of them are there and in good condition. Check the rest of the parts against a complete list (available from Stanley), and examine the castings for small hairline stress cracks, especially on the depth-gauge housing. Also check that the runners are not bent, but perfectly parallel. A hint: never put a #55 where it can fall from the bench—the results are disastrous. When you get your new/old plane home, keep it well oiled against rust, and spend some time sharpening and honing your cutters—they have to be perfectly sharp. □

Gregory Schipa, of Waitsfield, Vt., is president of Weather Hill Restoration Co., which takes apart period houses and refurbishes them. *The Stanley Tool Co. will supply instruction booklets to owners of the #55 (write R. West, Manager, Product Research Standards, Stanley Tool Co., 600 Myrtle St., New Britain, Conn. 06050). A 1980 reprint,* The Complete Woodworker, *edited by Bernard Jones (Ten Speed Press, PO Box 7123, Berkeley, Calif. 94707; $7.95), has 16 pages on the fine points of the #55.*

Putting an old #55 to work

by T.D. Culver

If you decide to buy a Stanley #55, first examine the plane body and all the parts for broken castings, bent runners and chipped cutters. A plane with bent or broken castings has been dropped and will be cranky. A "bargain" on a #55 may be no bargain. I would not buy one sight unseen.

If the plane is okay, check the cutters. Ideally, the bevels should still have the grind marks from the factory. If any of them have been badly honed, their profiles will be wrong. Count the cutters. My #55 came with 52 of the 55 regular cutters, including two sash cutters, and none of the 41 special cutters. I have yet to find a molding I cannot duplicate.

There are two positions for setting up the stock to be molded: on edge in the vise or flat on the bench. It is difficult to hold a piece narrower than about 2 in., so glue it temporarily to a waste piece. After molding the shape, saw it free.

If you are starting with a wide board and making narrow moldings, plane one edge, flip the board (paying attention to grain direction), and plane the other edge. Rip these moldings off, joint the edges and begin again. You can turn out a surprising amount of molding in a fairly short time.

The position of the stock determines how the fences will be set on the #55. When the stock is on edge, it is extremely useful to set up both fences, because then there is no worry of tilting the plane and spoiling the molding. Set the left-hand fence, place the #55 on the stock, and tighten the wing nuts as you squeeze the fences together hard. When you begin planing, there will be quite a bit of resistance, but it soon eases.

When you're planing work flat on the bench, the dogs and vise may not hold it against the considerable side pressure you need to exert. Or the board may not be wide enough to be clamped in the dogs and still overhang the benchtop. A few finish nails through the work and into the bench will hold and will not foul the fence arms. You can support the ends of long stock on sawhorses.

Usually only one fence can be set when the work is laid flat, which allows the #55 to tip and ruin the molding. After five years of struggling, I finally acquired a cam rest and it is worth every penny I paid. Contra the instruction manual, I set it opposite the fence on the front arm. By adjusting the screw so that the cam rotates stiffly around the fence arm, I can set the bottom of the cam even with the edge of the cutter. Now the #55 rides on two points instead of one. As the cut progresses, the cam pivots and continues to hold up its end of the plane. Be sure to twist the cam back to its original position when you start to plane another stick.

The cutter should protrude beyond the runners at the sides, just as it must at the bottom. Otherwise the runners will foul the molding. The depth of cut should be set very light for molding and slightly heavier for plowing. The runner on the sliding section may creep, causing the cutter to dig in, unless the thimble check-nuts are tightened. These are round, knurled nuts located on the outside of the sliding section through which the fence arms pass. Finger-tight is usually enough, though there are holes for a tommy bar. If the plane throat jams with shavings, you are taking too heavy a cut. Check that the sliding section hasn't crept up, or reset the cutter higher in the plane body.

You will find vernier calipers a great help in setting up the #55. Once the cutter is fixed, set the depth stop with the calipers, measuring to the cutter edge, not the runner. Then set the fence, measuring at both the front and the back, so that it is parallel to the runner. Be sure to square the bearing face of the fence to the fence arms.

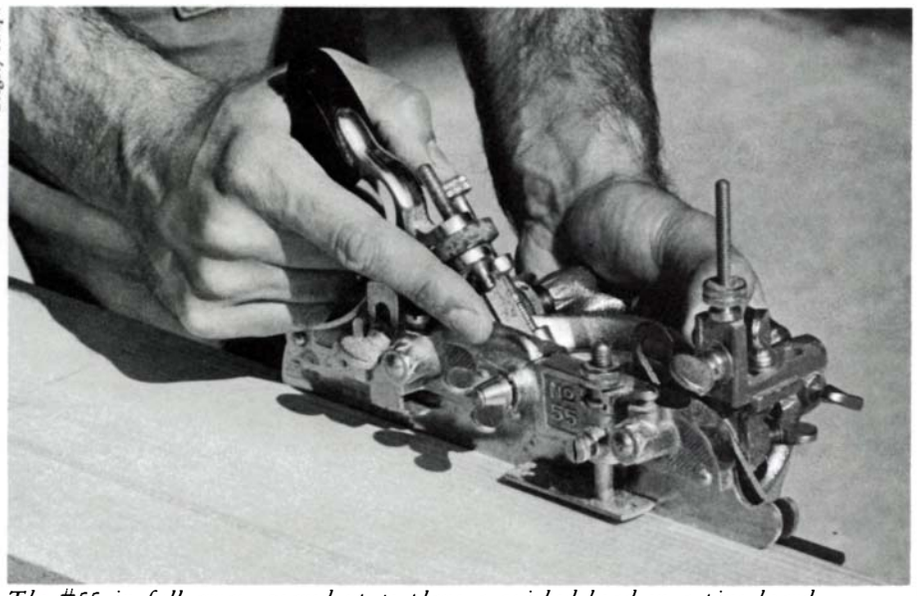
It is especially important to plane through the work in one continuous stroke. Choppy strokes will choke the plane and damage the molding. Clear a space in front of the bench and walk through each stroke with firm pressure against the fence. Shavings will curl out like excelsior and wind around your wrist. Clean out the throat when you're walking back for the next stroke, so the plane won't jam.

Clear wood is best, although very small, tight knots can be molded, with luck, in an easily worked wood such as walnut. Straight grain is helpful but not essential on many shapes.

The #55 is surprisingly effective in rabbeting and plowing plywood. Some split-out can be expected, but a heavy knife cut on the layout lines will minimize this. In desperate straits, costly hardwood plywood can be jointed, plowed and splined just like solid wood. The #55's no. 12 cutter makes a nice groove for ¼-in. fir-plywood splines.

The major problem with any antique plane is finding parts, although some parts for the Record No. 405 Multi-plane do fit the #55. Cutters for the Multi-plane fit both the #45 and #55, but the selection is not as vast as the original Stanley cutters. The fence arms are the easiest to replace—pieces of ⅜-in. mild steel rod work just fine.

I've had my #55 for six years, and every year it seems to work better and better. It is a complex tool, and it takes some time to learn well. That time will be amply rewarded one day, when you stand ankle deep in shavings and hold up to the light a crisp molding fresh from the plane. □



Gregory Schipa

The #55 in full array, geared up to plane a quirked bead on a pine board.

T.D. Culver is a carpenter and cabinetmaker living in Cleveland, Ohio.

Super-Surfacers

Fixed-knife planers slice the wood paper-thin

by Paul Bertorelli

At all of the woodworking machinery shows in recent years, knots of incredulous people have gathered around small Japanese surfacing machines that can peel off a perfect shaving as long and as wide as the board they plane. Called super-surfacers, the machines are fixed-knife planers fitted with a powered belt that propels the wood under the knife, cutting like an enormous, inverted hand plane. They leave such a glass-smooth finish on the workpiece that it's hard to decide which is more interesting, that shimmering planed surface or the shaving. Evidently the onlookers haven't solved this dilemma either, because relatively few of these machines have been sold in this country.

This marketing flop seems curious. The Japanese have always had a knack for making products that Americans will buy by the shipload, but they couldn't seem to give away super-surfacers, despite the trade show demonstrations, which left little doubt that the machines work. So why haven't more been sold? Are they too expensive? Do they not perform as advertised? Or have these companies simply reached the outer boundaries of what sometimes seems like an insatiable American appetite for the latest gadget?

Hoping to answer these questions, we borrowed two super-surfacers and tested them in our shop for four months last summer. Later, I queried Hitachi and Makita executives to learn about the origin of these fascinating tools.

It turns out that the super-surfacers were developed for Japanese house carpenters, who must cut and fit heavy beams and plane them to a mirror finish before hanging them. Powered fixed-knife planers were first made 20 years ago, though the operating principle goes back at least a century to a traditional tool that made thin shavings for use as wrapping paper. This device, similar to the Western cooper's plane, consisted of a 1-ft. wide plane iron with the edge projecting up through a heavy table. Wood was pushed over the blade by means of a pivoting arm that gave the operator the considerable leverage needed to shove the chunk over the knife to make a shaving.

In a tradition-bound industry like Japanese carpentry, super-surfacers were slow to catch on. But demand has become brisk enough to support at least four manufacturers—Hitachi alone makes 5,000 super-surfacers a year—and sophisticated surfacers now find use in production shops and factories, where they do what sanding machines do in the West. The Japanese firm that holds the early patents on powered fixed-knife planers, Marunaka International, even makes auxiliary knife sets which cut simple chamfers, rounds and rabbets. And Marunaka is reportedly experimenting with fixed-knife shapers and molders.

Super-surfacers do not replace conventional rotary-head planers. In fact, a good rotary planer is needed in conjunction with a fixed-knife machine, since the latter works only when it starts with flat stock of uniform thickness.

In the United States, these machines remain a curiosity—dealers estimate that fewer than 250 of them are in use. I contacted a few woodworkers who have them and found that the machines seem to do the job they're designed for.

Eric Anderson, of Cape Neddick, Maine, who makes furniture and kitchen cabinets, bought a Hitachi super-surfacer last summer. "Before I got it," Anderson told me, "I basically did what everyone else does—I used a belt sander." Now, said Anderson, he routinely feeds rotary-planed stock and cut-to-size cabinet parts through the super-surfacer. He gets a far better finish in a fraction of the time.

One California woodworker I was told about couldn't care less about the shiny surface—it's the shavings he wants. He lined up four super-surfacers end to end in his shop, feeds incense cedar through, and then bags up the shavings to sell as closet odorizers.

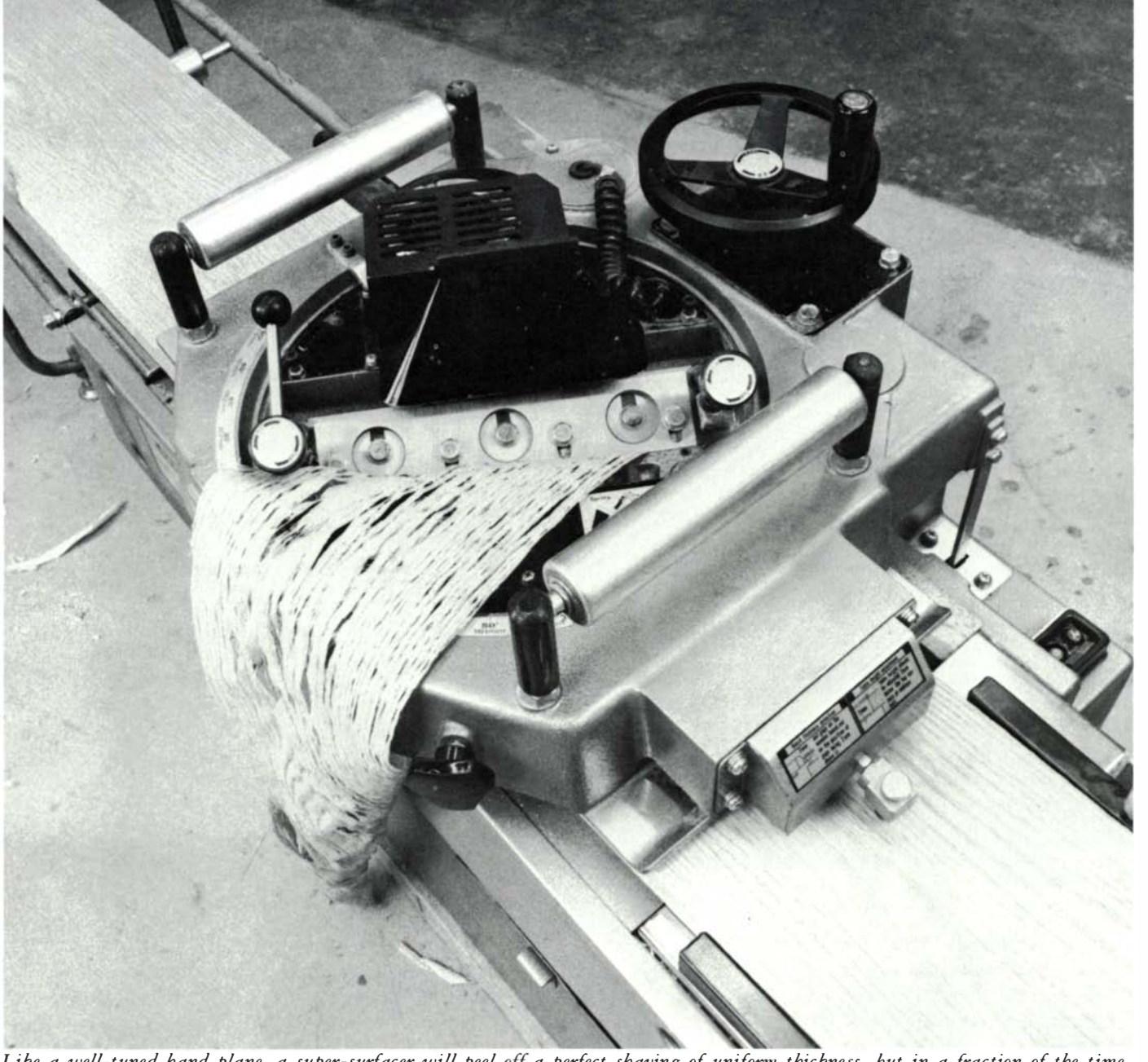
Not all buyers like their super-surfacers. Clarence Gross, of Lima, Ohio, bought a rotary planer and a super-surfacer last spring, planning to use both for planing rough lumber. The super-surfacer disappointed him: "Oh, it would do it all right, but after a while I just kept using the other planer. . . took too many passes to plane rough stock," Gross said. Intrigued by such experiences, I was anxious to try these machines for myself.

Using the surfacers—I have to admit I was skeptical when we first decided to borrow and test two super-surfacers. I had seen the ads and read the sales hype, but I had no idea what I would actually want to do with these two machines parked in the middle of the shop. They seemed like expensive gimmicks to me, albeit well-engineered ones.

I didn't doubt that they could plane softwood nicely, but what about hardwood? Once they were set up (Makita's LP 2501 and Hitachi's FA-700), I scoured the shop for the nastiest wood I could find: bird's-eye maple, crotch walnut and a piece of rowed-grain padauk.

The first thing that struck me was how forcefully the surfacer's heavy rubber belt grabs the stock out of your hand and shoots it past the knife. The board clatters right off the outfeed roller table, the shaving whooshes off the knife. I was amazed to find that the surfacers planed the walnut and maple nearly perfectly and did a respectable job on the padauk. After four months of testing and casual use of the machines for three woodworking projects, I can see lots of uses for these things, though at $2,500 for the Hitachi and $2,700 for the Makita—plus $600 to $1,500 for the essential sharpener—I can't, as an amateur, afford one.

As I worked with these tools, I realized that in principle a super-surfacer works exactly like a hand plane. For an iron, it has a massive $\frac{5}{16}$-in. thick knife, 10 in. long, $2\frac{1}{2}$ in. wide and tipped with high-speed steel. A similar secondary knife mounts atop the cutting knife to serve as a chipbreaker. In

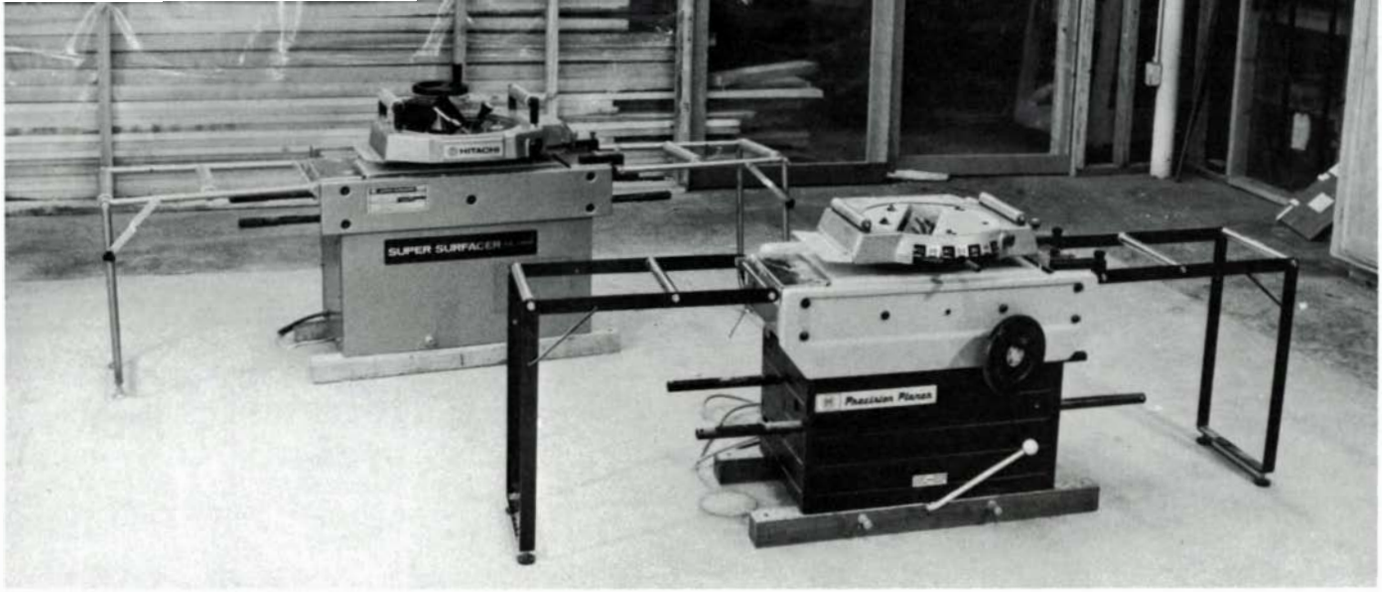


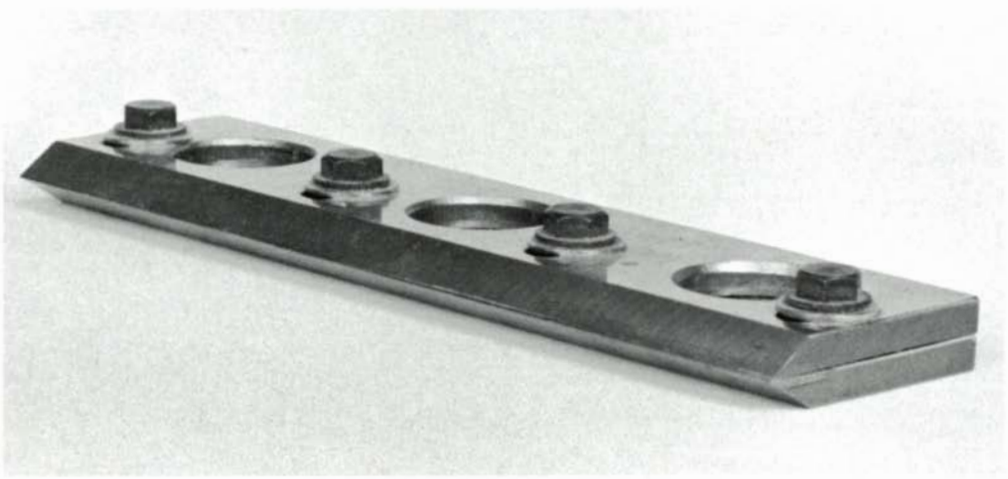
Like a well-tuned hand plane, a super-surfacer will peel off a perfect shaving of uniform thickness—but in a fraction of the time. This photo shows the Hitachi's knife set to about a 20° skew angle; the curled shaving is about 0.002 in. thick.

both machines, the knife assembly is bolted to a heavy cast-iron fixture which rides above the feed belt on adjustable columns. As with hand planes, super-surfacers require sharp knives and proper adjustment of both cutting depth and mouth opening. You adjust the mouths of these machines by moving a plate in the cutterhead and locking it down with bolts. In both softwoods and hardwoods, taking shavings about 0.002 in. thick leaves the best surface. Thicker shavings are possible, particularly in softwoods, but thicknesses over 0.008 in. or so draw protesting clanks from the feed mechanism, or else the board jams against the knife. The knives are bedded at a 35° angle—close to that of Japanese planes but shallower than the 40° to 45° of Western planes. You can vary the cut's angle of attack, from 0° (that is, the knife's edge at 90° to the length of the work) for soft, straight-grained woods, to 60° for harder, refractory woods. The effect is the same as skewing a hand plane in these woods.

I found one thing puzzling about both machines, however. Instruction sheets, though virtually incomprehensible, recommend higher angles of attack for softer woods than for hard. This made no sense—I skew a plane to ease the cut only in hard, tough woods. I later learned from Toshio Odate, a Japanese sculptor and sliding-door maker (*FWW* #34), that to get the best surface on softwoods, the iron in a hand plane should bed at about 30°. Hardwoods, Odate said, plane best with an iron bedded close to 40°.

Odate went on to contend that when you rotate the turntable on a super-surfacer from 0° to, say, 45°, you lengthen the cutting bevel where it strikes the wood, effectively lowering the bed angle. To illustrate his point, Odate whittled a mock plane iron out of a scrap of wood. When he sliced one corner off at 45°, the compound angle formed where this cut intersected the cutting bevel was indeed less than the original bevel angle. A little trigonometry showed that skewing the knife's turntable to a 60° angle of attack produces an effective bed angle of 19°, about half the bed angle when the knife meets the stock head-on, at 0°. This effect applies to hand planes as well: when you skew the angle of attack, you are effectively working with a lower-angle plane, although the effect isn't significant at skew angles less than 40°. In addition, the bevel of a skewed plane slices somewhat sideways into the wood fibers, instead of encountering them head-on, thus reducing the likelihood of tearout. This allows the machine to plane hardwoods, although Odate says it would work better if it had a higher or an adjustable bed angle. As presently designed, the machines are best suited for soft-





The Hitachi (above left) and Makita (right) super-surfacers are both overhead, fixed-knife planers designed for finish-planing large, dimensioned timber. Both will plane wood up to 10 in. wide and 7¼ in. thick in a single pass. Width capacity drops to a 5-in. maximum when knives are skewed to 60°. Fixed-knife planing exerts enormous forces on the machine, and its knife, as the photo at right shows, is far heavier than any found in a hand plane. Knife and chip-breaker are made of 5/16-in. thick steel. As with a hand plane, the high-speed steel-tipped knife must be sharpened frequently to get the best surface quality.

woods, even though American woodworkers are more likely to want to plane hardwoods.

Though they are identical in basic design, the Hitachi is generally sturdier and more sophisticated, and the one I'd pick if I were to buy. Its two spring-loaded, depth-adjustment knobs are easier to set than the Makita's pair of fine-thread bolts. The Hitachi has a pair of gauges for installing the knife correctly; the Makita has no such aids. Decoding the manuals takes real creative thinking—they're both awful.

We had no special sharpening equipment for our tests, but I wish we did. Ernie Conover, of Conover Woodcraft Specialties in Parkman, Ohio, who sells the Hitachi machine, recommends buying one of the two motorized grinders made especially for sharpening surfacer knives. The cheaper of the two grinders costs $600, but I think this extra expense should be considered part of the machine's price. You need razor-sharp edges and precise bevel angles to get the most out of a super-surfacer. Conover's method is to hollow-grind a 30° bevel on the grinder's 60-grit, 7-in. diameter wheel. Then he hones a 32° microbevel with a 600-grit, waterstone wheel. Between the coarse and fine wheels, Conover knocks off the wire edge with a hand slip-stone. Sharpening by hand is possible but difficult. I couldn't get good results.

I found it difficult, too, to measure knife durability. When planing poplar with a fresh knife, I got flawless surfaces through maybe 200 linear ft. Then surface quality dropped noticeably for about that much more work, before it was time to resharpen. A dull knife is most troublesome when you try to plane against the grain, which you must do somewhere along most boards. If you want to surface boards wider than the machine's 10-in. maximum, you can feed half of the width one way, turn the board end-for-end and feed the other half. Increasing the angle of attack reduces fuzziness and tearout, but it also reduces the effective cutting width of the machine.

Dirt, Conover told me, is the knife's worst enemy. Wood must be clean and butt ends should be sawn off, or at least cleaned, and their leading edges should be chamfered before they are fed into the machine. Boards that have been sanded shouldn't be surfaced; abrasive particles could be embedded in the wood.

Having these machines around was fun, and I found that compared with sanding equipment of equivalent capacity they're cheaper and capable of a far better surface. So why haven't more woodworkers bought them? It's tempting to argue that the technology is just too alien to the American way of doing things; we sand, whereas the Japanese plane. I think the real reason, though, is simpler: the makers of fixed-knife planers haven't explained well enough what they'll do. These planers do have a place in shops where lots of flat stock has to be smoothly finished. If they are ever marketed sensibly for just that purpose, I'll bet you'll see a lot more of them. □

Paul Bertorelli is an assistant editor of this magazine. Fixed-knife planers are available in the United States from these Japanese companies: Hitachi Power Tools U.S.A. Ltd., 4487-F Park Dr., Norcross, Ga. 30093; Makita U.S.A. Inc., 16 World's Fair Dr., Somerset, N.J. 08873; Southwest Machinery Co., 9507 Santa Fe Springs Rd., Santa Fe Springs, Calif. 98670 (Marunaka International); and also from Shinko Machinery Works, Inc., No. 740 Matsutomi-Kamigumi, Shizuoka City, Japan (Grand Super Surfacer).

Smoke Finishing
Rubbed-in soot colors pine

by Robert B. Chambers

Here's a smoked finish that can give provincial furniture a mellow patina. An acetylene torch, starved of oxygen, lays a coat of pure carbon on the wood. When you wipe the carbon away, the surface retains enough to give the piece a translucent glaze that allows the wood to age and develop natural color beneath it. Unlike the burning process popular for plywood in the early 1950s (*FWW* #18, p. 36), smoking does not raise the grain pattern or char the wood. I learned the technique from a graduate student in one of my woodworking classes when we were trying to create a driftwood effect for a stage design that had to bear close scrutiny.

I have used smoke finishing on pine, birch, basswood and little bits of Philippine mahogany. It works best on white and sugar pine, but does not work well if the wood has a high pitch content: the process brings the pitch to the surface, the carbon sticks to it, and you end up with black streaks. Small specks of pitch can look interesting, but for a uniform effect, the clearer and drier the wood the better.

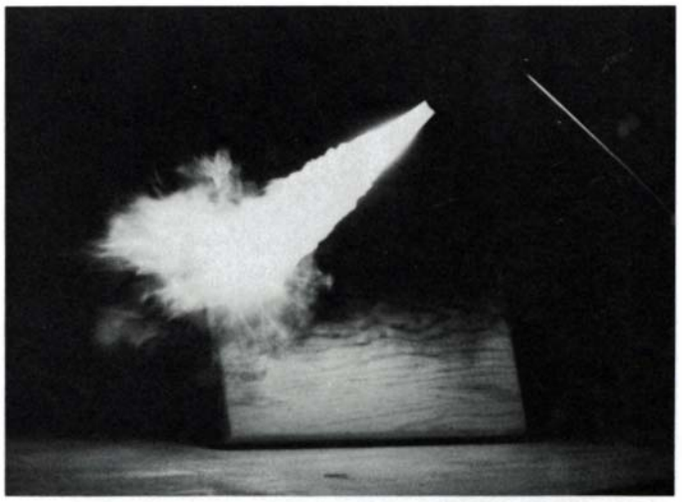
Generally, smoking will give you the same highlights and dark, low areas as a stain, but it doesn't interfere with the wood's natural color the way stain does.

As with any finishing, begin preparing the surface by thoroughly sanding or scraping. All traces of glue must be scraped or sanded away, or you will have light spots. After sanding, blow off the dust. It can build up in corners and crevices and keep the carbon from reaching the wood. If you don't have compressed air, a damp rag will work, but do not use a rag dampened with anything flammable. Be sure the wood is completely dry and dust-free before you begin smoking, or the coat won't be even.

The smoking itself is done with a standard oxygen and acetylene welding rig equipped with a heating tip. Do not use a standard brazing tip—the flame spread is too small and will result in burn lines. If you don't have an acetylene rig, you can get similar results by barely browning the wood with propane—don't blacken it—and then rubbing lampblack into the wood. This will give you an idea of what the finish looks like, but the acetylene will give broad coverage and work much better on an actual piece of furniture.

Set the oxygen pressure at 8 lb. and the acetylene pressure at 8 lb. Light the acetylene first and turn it up to a "mild roar." At this point little bits of black soot will be descending all around you. Add oxygen gently until most of the smoke is gone, but don't add so much that you get a secondary blue cone in the middle of the flame. It takes very little oxygen.

Now use the torch with long, even, slightly overlapping strokes to "spray" the wood black. Keep the torch head about 8 in. to 10 in. from the wood, depending on your particular rig. Follow through on each pass so that you begin the spray before you get to the work and continue it off the work in one steady motion. If you stop or backtrack you will get buildups, just as you would in spray painting. Continue until the piece is uniformly black. You will have a deposit of soot on the work—but no charring of the wood itself.



An acetylene torch, starved of oxygen, produces a large, yellow flame instead of a tight, blue cone. The yellow part of the flame is incandescent carbon, much of which is deposited on the wood.

When the surface is evenly wiped, some carbon particles remain as a coloring agent, and will be sealed in by top coats of polyurethane. Under the finish, the wood continues to age naturally.

Wipe the piece down thoroughly with clean rags, changing them frequently, until it takes a lot of elbow grease to get more carbon off the wood. Wrap the cloth around slivers, wedges or pointed dowels to wipe corners and crevices.

Now you are ready to seal the finish. My old standby is Sears satin polyurethane. I have found that it will harden the soft pine I like to work with, and make the wood stand up to the destructive spills, stains and teenagers of a normal household. It's best to spray on the first coat. If you do use a brush, though, just flow on the first coat with the grain. Brushing it will pick up the carbon, causing streaks. Experiment on a scrap to get a feel for it. Fine steel wool and a tack rag between coats will give you a good finish after about three or four coats. After that I usually finish up with a coat of Goddard's paste wax applied with 0000 steel wool and buffed with a soft cloth.

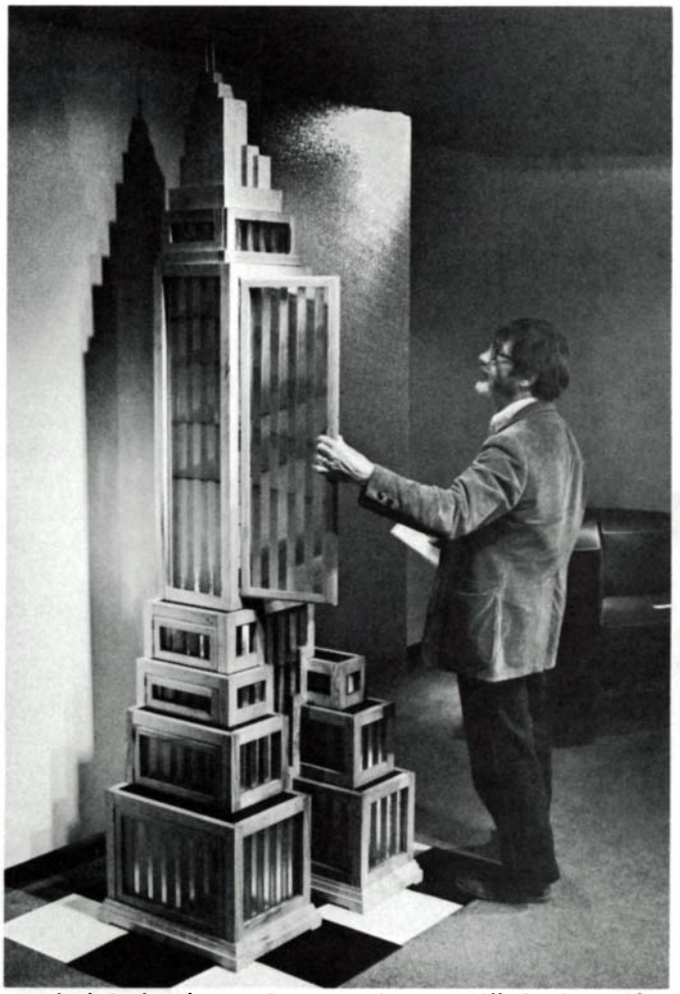
The first time I used this technique I was delighted with the immediate results, but I'm even more pleased by the way the wood continues to age and warm under the finish. □

Robert B. Chambers teaches in the theater department of Southern Methodist University and runs Design Imagineering in Richardson, Tex. Photos by the author.

The Rise of Artiture

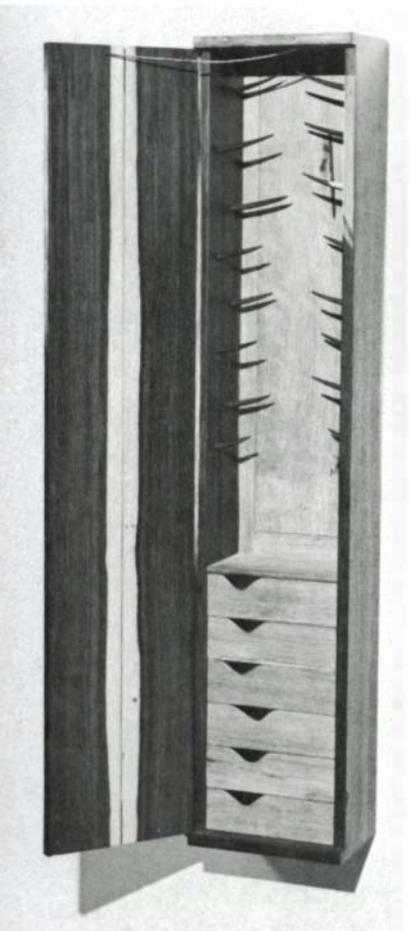
Woodworking comes of age

by Arthur Espenet Carpenter



Notebook in hand, Art Carpenter sizes up Bill Crozier's 'Skyscraper' at New York's Workbench Gallery.

Last summer I was invited east to view a number of woodworking shows, so that I might offer in this magazine some reflections on the state of the craft. After a full week devoted to touring various galleries, museum exhibits and the perennial great fair at Rhinebeck, I have concluded that woodworking has come of age. Thirty years ago wood was not part of the sophisticated craft scene. It was rarely included even in craft fairs, much less in museum and gallery exhibits, and then only in the form of small objects. Wood was outclassed by the aristocracy of clay, textiles and metals. I recall the hesitant acceptance that was given me in the mid-1950s, particularly by potters, when I became a member of a Bay Area cross-media craft group. It was only ten years ago that furniture and treen began to bloom and that wood came to take its place unabashed in the craft world. Now wood in furniture form is even being made into sometimes metaphoric objects of non-utility, metaphor being the usual sphere of the painter and the sculptor. The ceramicists were among the first from the craft world to invade that lofty territory.



'Krenovian' jewelry cabinet in rosewood and persimmon by Rob Sperber.

Ceramicists of thirty years ago made pots to use, and worried over the lip of a cup. Today prestige accrues to those who make artifacts that, though made of clay, cannot be used as pots. Some woodworkers seem to be going in the same direction, that is, toward fame by investigating material and form to the exclusion of function. My daughter Victoria calls this work "artiture," artifacts that have the traditional form of furniture, but are not of any practical use. I am not sure what the impulse is for making much of the artiture I saw, whether it is for play, pun, farce, or a quick ego fix. But to cut a chair in half, paint it striped, and hang it on a wall draws much more attention, brings ten times the money, and is much easier than making a chair that works, and that sings with the care of its maker.

The titles alone of the shows I saw are telling: "Young Talent—New Directions" headlined the display at Workbench Gallery in Manhattan, the work of five new graduates of various woodworking schools. "Furnituremaking: The Design Approach" named an eclectic assortment at the Pritam and Eames Gallery in Easthampton, Long Island. And coming and going through the San Francisco airport I was treated to "Artists' Furniture" on view in the North Terminal Connector Gallery.

Fully a third of the work I saw exhibited as furniture was really artiture, so I had ample opportunity to deal with my initial reaction to this stuff, which was distrust. I also saw many handsome pieces that genuinely could be called furniture or treen, so some people are still minding the store. At Pritam and Eames, Hank Gilpin's maple writing table (not shown) stood out in a crowded room as a piece made with affection and consideration, as did the Krenovian wall-hung cabinets made by Rob Sperber (far left). A graceful, very sittable, almost edible upholstered chair by John Dunnigan (*FWW* #31, p. 97) was the most comfortable thing in the room, though obviously meant only for the most decorous of rumps, certainly not my scuzzy jeans. The color of this chair (my memory says a dusty mauve or peach or both) and of Dunnigan's round amaranth-topped table (not shown) with pink plastic

John Dunnigan's peach chair: 'graceful, sittable, almost edible.'

rim and wenge legs exemplified a happy trend: the use of color. The predominant hues I tasted in the summer of '82 ran from mauve to salmon with touches of rose. I remember a couple of decades ago when the color was burnt orange, and it seemed to have simultaneously occurred in all parts of the hinterland, to gather for all to squint at in the 8th Pasadena Design Show in 1962.

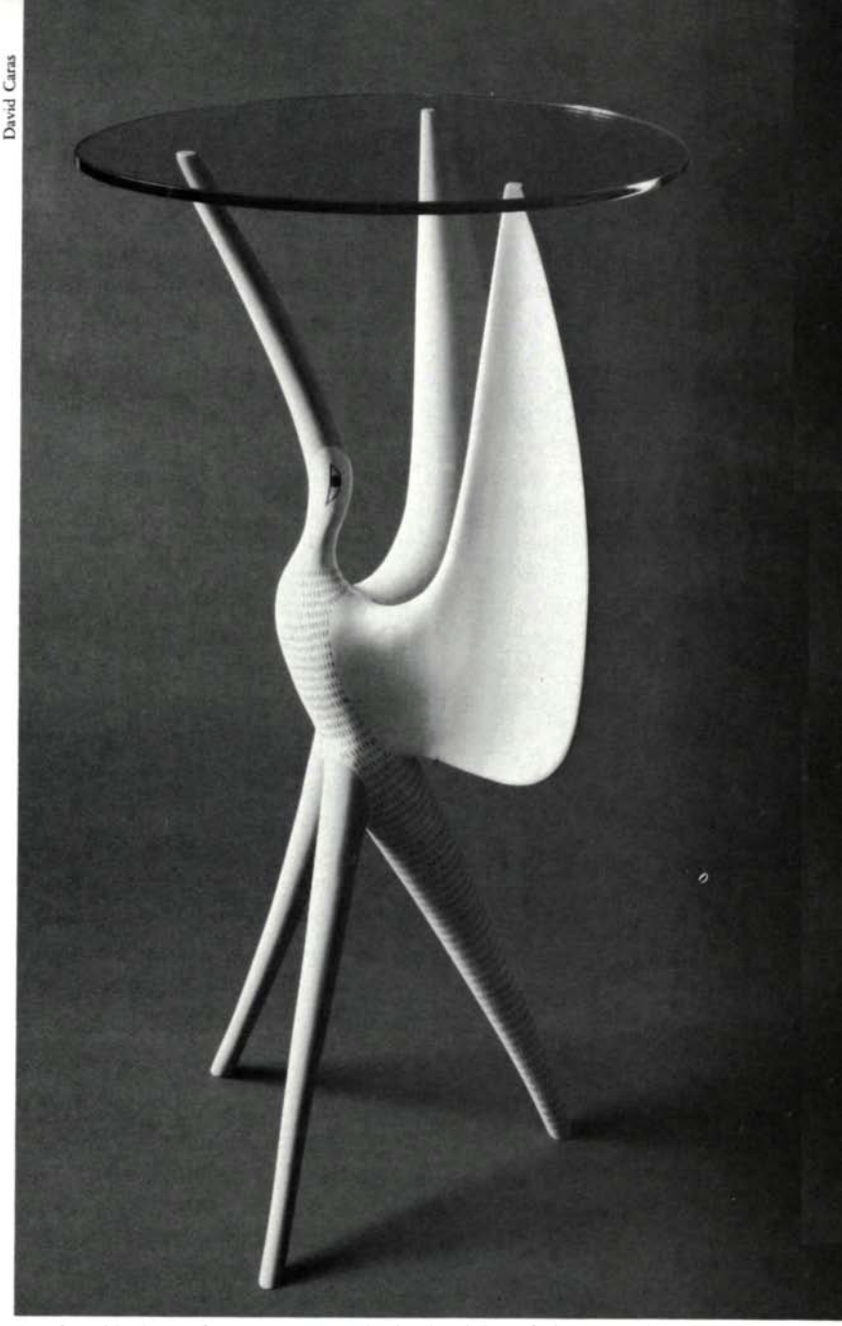
Salmon is a sedate tone. It drew me to Dan Bailey's velveteen-upholstered chair at Rhinebeck (*FWW* #35, p. 12), its pearwood surfaces laboriously tooled. It drew me to Janice Smith's velvet-upholstered couch (below) at the Workbench Gallery. A close look at the wood in this piece, however, revealed that the stepped forms of the sides and back, although regular, had not been matched for grain. I found this a bit disconcerting—like unaligned slots in the screws that hold hardware, it represents a forfeiture of the expression of craftsmanship. I had a similar response to her otherwise pleasing maple wall cabinet (below left). Detail should abet form, not clash with it. Another of Smith's pieces, a set of table and chairs in cherry (below right), was a harmony of curved triangles, and is comfortable furniture as well. I had no quarrel with the grain here, perhaps because cherry's figure is subdued.

Velvet-upholstered sofa of maple and walnut by Janice Smith.

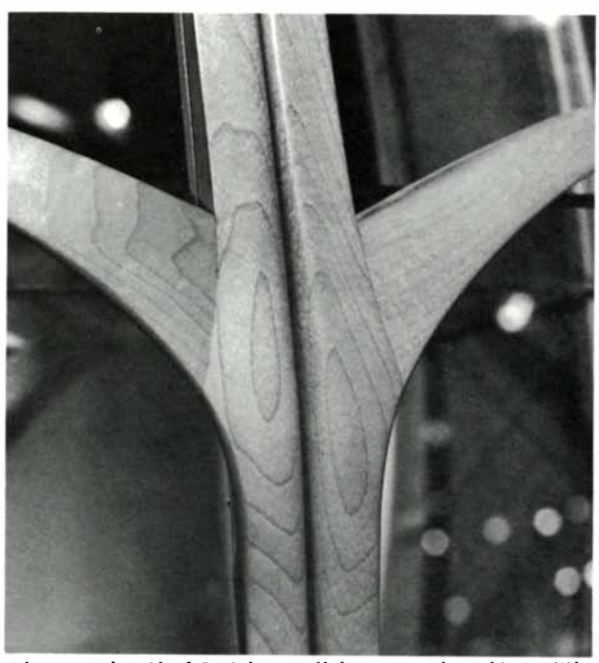
Still under the friendly umbrella of furniture I would include a small glass-topped plant stand by Judy McKie (right), the glass being held up by a firmly rounded and painted stork, both playful and functional. And the work of Ed Zucca (*FWW* #30, p. 97), some of it, also functions as furniture—although the coffee table (not shown) that I saw at Pritam and Eames was fit for the Star Ship Enterprise, it would still hold a coffee cup.

I have mentioned only a portion of the work I saw, the

David Caras



Stork table by Judy McKie, '. . .both playful and functional.'



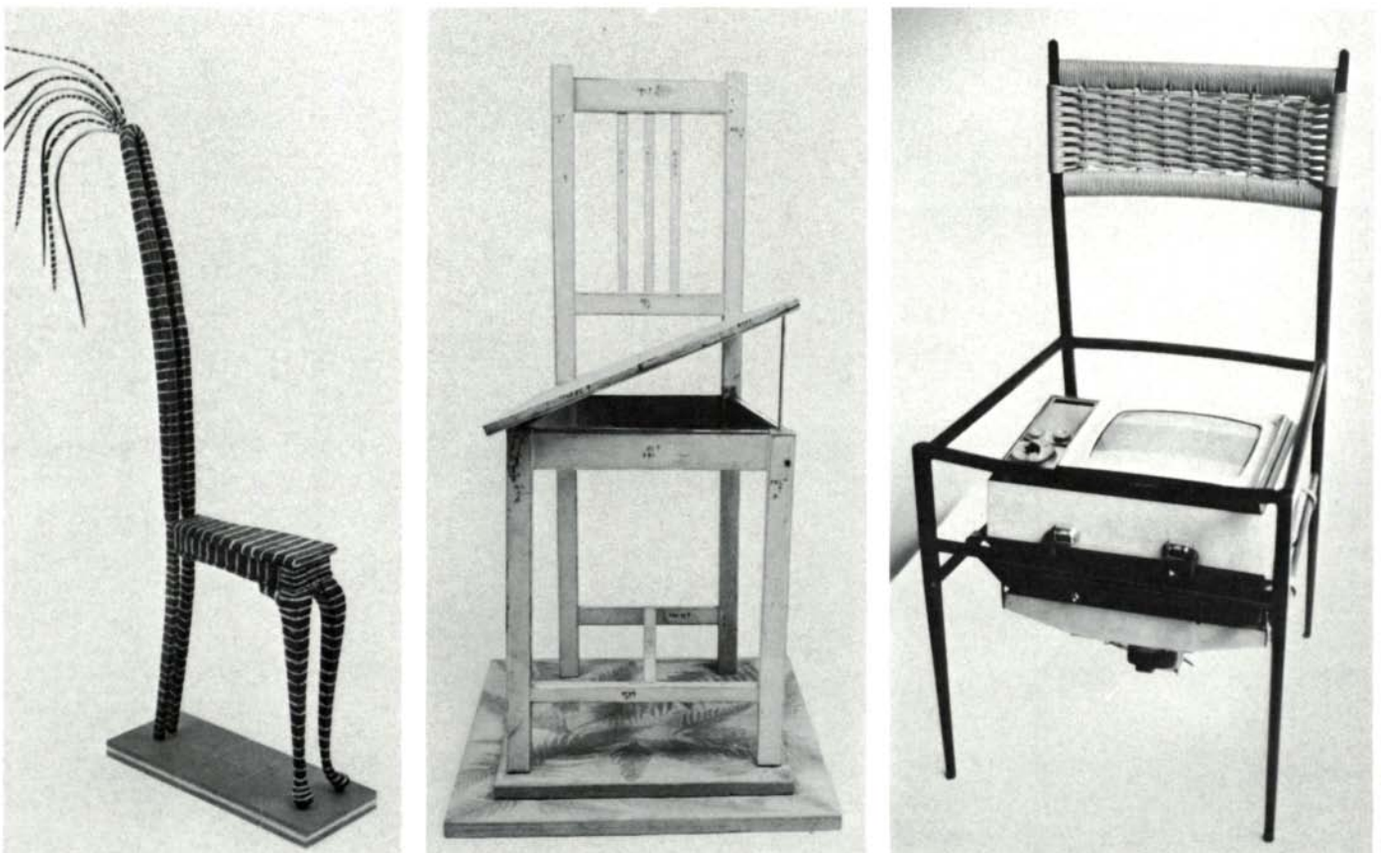
Above, a detail of Smith's wall-hung maple cabinet. The figure of the wood here does not reinforce the symmetry of the form. At right, her cherry dining set.

pieces of genuine furniture that piqued my interest during that hurried, hot week in June. But my prime concern was to understand artiture—what to make of those pieces that were in the shape of furniture but were not furniture. There is a difference between a chair as furniture and a chair as artiture. Like a tire and a doughnut, they are similar in form. Still they belong on different shelves, for they were made for different purposes. A craftsman makes a chair to afford comfort and beauty, through the apt use of material. An artist makes a chair as metaphor, through the apt use of form and/or color. Both of these activities are investigative. The craftsman starts from his chosen material and deals with the chair as a thing to be explored for its own useful sake; the artist deals with the chair as a piece of language, sometimes commenting on nothing more than itself, as with Nam June Paik's chair (below right); sometimes commenting on something other than itself, as with Margaret Wharton's "Bantam Chair" or "Recital" (below left and center).

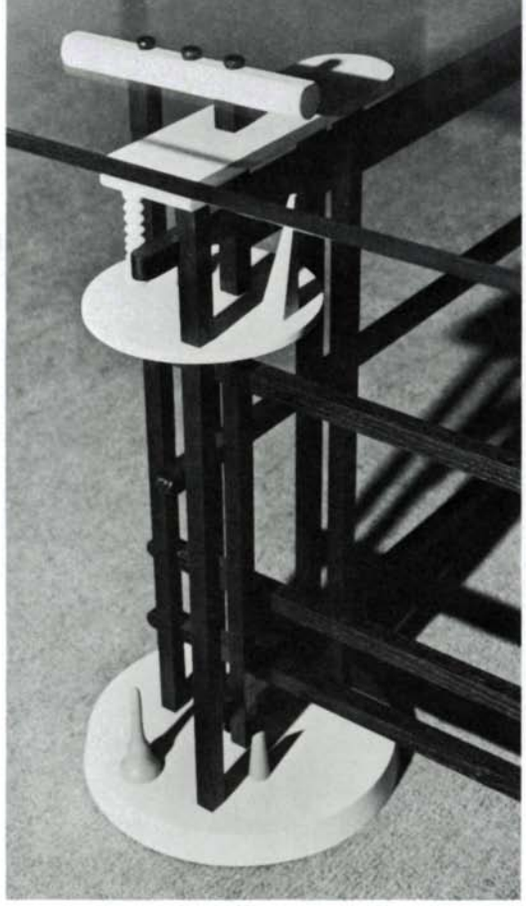
Grey wool upholstered chair by Tom Loeser.

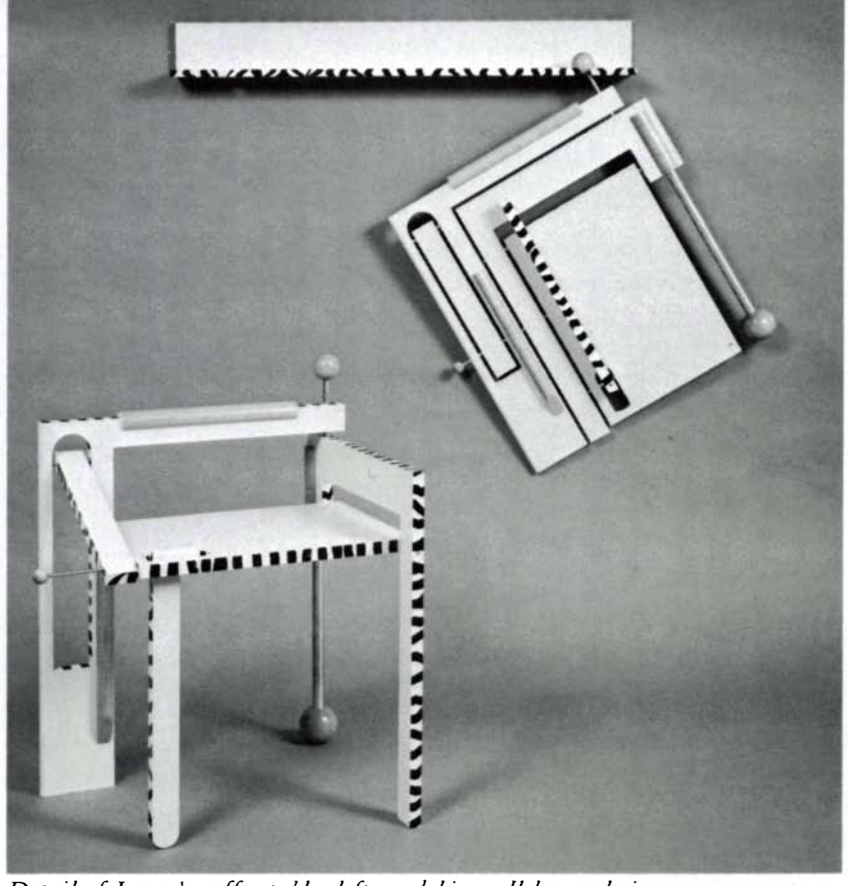
As it was displayed, much of the artiture I saw last summer was confused with furniture—both forms indiscriminately occupied the same gallery spaces. If tires and doughnuts are shown together, the effect is bound to be laughable, since you don't know from what perspective to view them. At least this was the effect on me—being slow to change gears, I kept trying mentally to sit in the art, and it didn't work. A few museums have recognized the profound difference, but other institutions have not. It would be of benefit to the public as well as to the utilitarian and the metaphorist to define the two separate endeavors when they're displayed. By my definition, "furniture" is objects made to serve a physical need. If done humanely, with skill, and with sensitivity for the user as well as to the material (whether or not it's wood), furniture can transcend function and speak to one's feelings as well. Artiture not only does not attempt this, but it is frequently antipathetic to the very ideas of humanity, craftsmanship and empathy, not to mention function. On the contrary, taken as furniture, much of it is torturous, and some of it just lies in wait for the unwary.

Among the latter I would include a dark gray triangular chair with red piping (above), made by Tom Loeser. It's an enticingly acute form, and its look of softness invites sitting. When you do, however, you find yourself stretched on the



Chair metaphor: 'Bantam Chair' and 'Recital,' by Margaret Wharton. Photos: William H. Bengtson, courtesy of the Museum of Contemporary Art, Chicago. 'TV Chair,' right, a pun by Nam June Paik, was on view at the Whitney Museum of American Art.





David Caras

Detail of Loeser's coffee table, left, and his wall-hung chair.

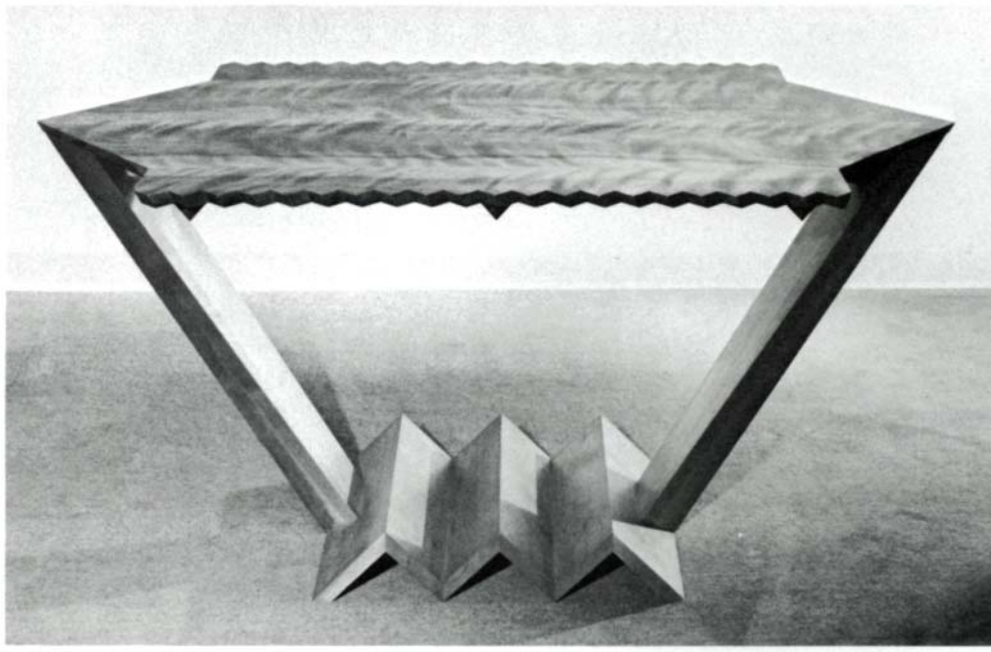
rack of discomfort. The back is too low, the seat too hard and the arms too far apart. This chair should have been defined as artiture, or some such art form, particularly because it *looks* usable. Otherwise, the tendency is to judge it by furniture criteria, which is to say unfairly. As nicely made dada, it works; furniture it ain't. Loeser's glass-topped coffee table (detail above), also seen at the Workbench Gallery, is a matrix of ¾-in. square wooden rods painted black, with little cream and turquoise Monopoly pawns stiffly clambering among them. It felt like a futuristic cityscape, quite compelling. But then I touched it, to discover that secretly it is a wrist and ankle guillotine. The tinker-toy support would cascade the glass top through any flesh unwitting enough to bump into it. If made of welded steel, the underpinnings could function as firm support, but in wood it's like setting a man-size mousetrap.

A folding chair by Loeser, called a "wall-hung chair" made of plywood and maple (above right), was an ingenious mechanism that could be pinned into the shape of a chair or into a plaque and hung on the wall on its own hanger. At least this Loeser piece was uncompromisingly artiture, and it could not entice this country boy into risking a sit. Even so, I enjoyed Loeser's use of color and his play with space. I think he should fabricate a whole series labeled "people traps," for I saw no other work more siren-like.

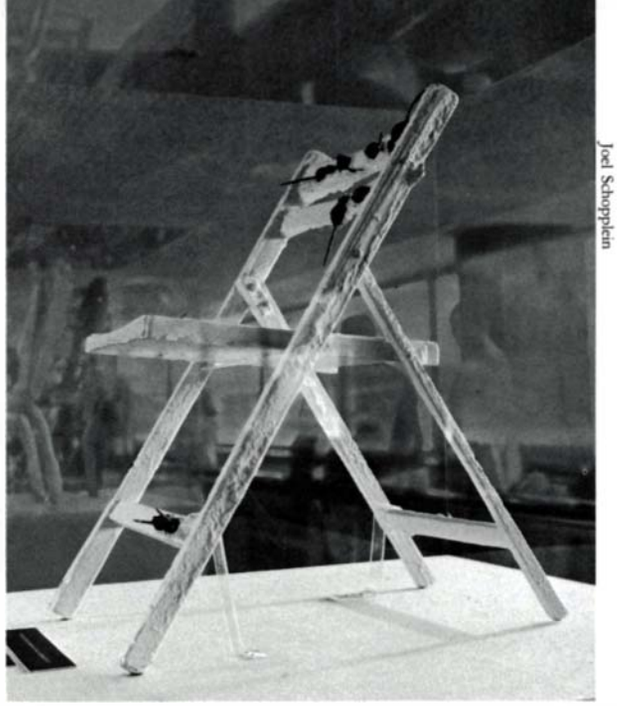
Among people-traps I would include Ed Zucca's sawtoothed table (right)—one that I would hardly want to pull up to or even sidle near for fear of laceration. However, it evoked what I hope it was meant to evoke—sawteeth—and it is a remarkably appropriate shape for the sharply figured curly birch it's made from. Not much artiture is concerned with material; this was a pleasant exception.

Zucca's table is cousin to a chair (not shown) made by Samuel J. Lemly that I saw in the San Francisco Airport exhibit. It too was spiked, but to inhibit even the most unwary. A veritable ironmaiden, but couchant, its seat was a multitude of pointed pieces of wood. I can only assume that this was a projection of someone with a horrible itch or a rather inhospitable comment about mankind in its sitting position.

The airport show was a mine of artiture, with only a smattering of furniture. There was a hat sculptured on a chair, titled "Texas Taste," by Robert Bourdon, all of wood and exacting workmanship (top left, p. 102). There were mice on a chair by Clarice Dreyer (top right, p. 102)—a folding chair painted white, with black aluminum rodents affixed to various surfaces. It was titled "Tomorrow's Yesterday," and it evoked for me a feeling of abandonment, or of the aftermath



Curly birch sawtooth table by Ed Zucca.



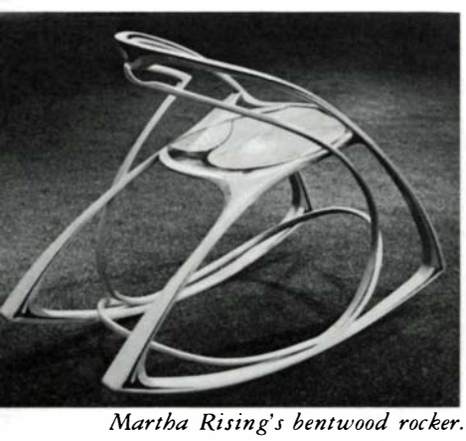
Joel Schopplein

Chairs with titles: 'Texas Taste,' left, by Robert Bourdon, and 'Tomorrow's Yesterday,' by Clarice Dreyer.

of World War III, though then even the mice will be dead on the dead chairs. A gargantuan cane chair done by David Ireland, entitled "South China Sea," proved that the form was the form was the form, no matter what the scale. There was "Turquoise Table," a three-crooked-legged table by Rita Yokoi, which looked like papier-mâché painted by a Fauvist, and there was a steel table by Michael Todd, labeled "Kandinsky Table," warmed-over visual art. Perhaps I shouldn't label these and Yokoi's and Todd's other tables at the SF Airport "artiture," for they would function in appropriate settings, but they are intentionally much more self-conscious than serviceable. But then again, so is a lot of 19th-century furniture.

Most artiture pieces had little to do with wood and less to do with craftsmanship, but they used a form traditionally crafted in wood to make some comment and/or a visual joke. Percy Gibbar's right-angular plywood construct with fish collage on all surfaces was entitled "Sportsman's Chair." It was sittable, though that obviously was not the point. So with Nam June Paik's "TV Chair" (bottom right, p. 100), seen at New York's Whitney Museum. Paik's pun was somewhat stronger than Gibbar's: a TV slung below the seat of a chair frame, the TV facing up with a steady picture of itself via a video camera on the ceiling. At the same Whitney show were a group of chair forms by Lucas Samaras, wildly painted and manipulated, called "Chair Transformations." Miro might have done these, if he'd painted in 3D with a square toothpaste tube.

I would guess that most makers of artiture call themselves artists. A contemporary definition, recently hazarded by a conceptualist, is that artists are those who call themselves artists. I wouldn't call most makers of artiture craftsmen, for that implies a sensitivity to the structure of materials, and few of the pieces I saw evidenced much concern for that. Whatever would work to fit the idea was used—or whatever was at hand. Not many make artiture from a craft base. Part of the reason, I'm sure, is the time and patience needed to acquire skill and to practice craftsmanship, and its modest rewards. Wendel Castle's tromp l'oeil pieces (*FWW* #11, p. 48, and #12, p. 87) are a prominent exception: artiture made with careful skill. Another such exception is Martha Rising's chair form (left) entitled "Delight," which was part of the SF Airport show. As furniture it could easily be called "Hazard," for it has some of the siren overtones of Loeser's work. But it is a delight of bent forms and fine joinery, a tour de force of craftsmanship which if taken a step further could have become a parody of the bender's art.



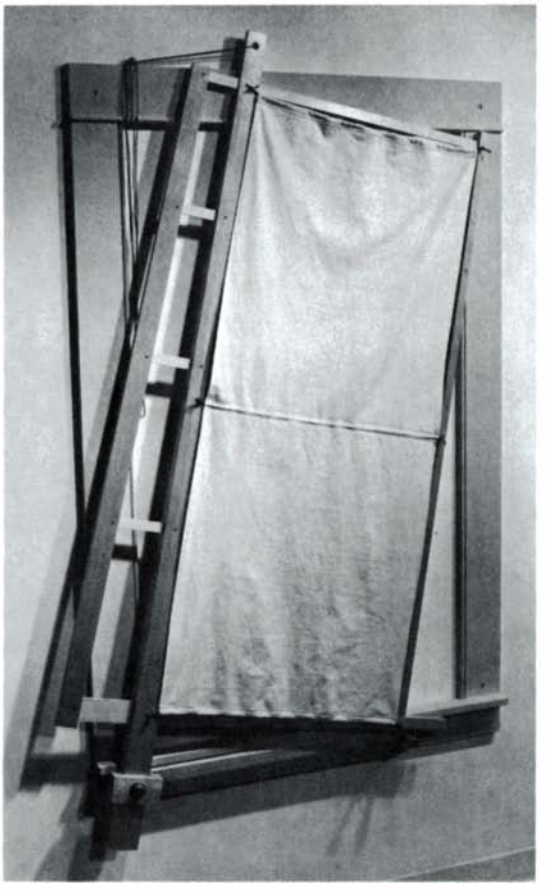
Martha Rising's bentwood rocker.

The chair is the most prevalent form of artiture, perhaps because the chair is immediately recognizable and offers many more possibilities of form and meaning than the inverted U's of tables, the boxes of chests or the ambiguity of stands. It also is the form that is most intimate with the human body and therefore perhaps conveys more meaning consciously and unconsciously than other furniture forms. Crude artifacts for sitting probably were the first furniture. They are the elevators of people, both literally and figuratively.

At Pritam and Eames, Wendy Maruyama exhibited her renditions of chair artiture, more static than those of either Samaras or Rising. Maruyama had three prosaic square-framed wood chairs (one is shown below) that were painted as if by Jackson Pollock in three circus colors, with a pane of heavy glass as the seat upholstery. They reminded me of the many kitchen chairs I've seen that have been used as painters' easels or as stools for house

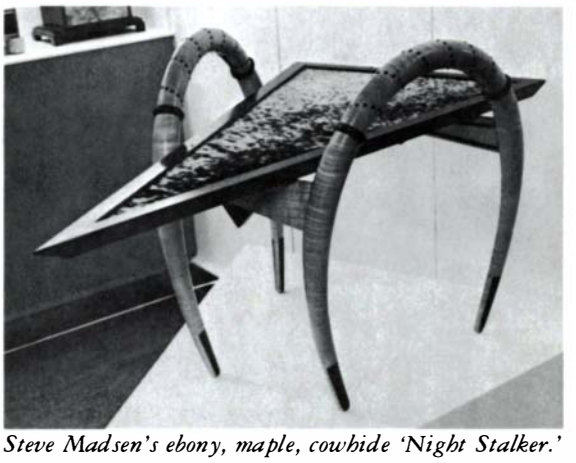
Glass-topped chair and Mickey Mouse chair, by Wendy Maruyama.

Photos above: Dean Carruthers/Don Reese



By Jim Fawcett: 'Experimental Craft #2,' in wenge, spruce and fabric, above, and 'Window Shade' in spruce, lignum, beech and canvas.

painting. But the glass said "keep off," or maybe "under glass," a signal to the initiated that this was not abused furniture, but pure artiture. Maruyama also had a chair painted speckled charcoal (facing page) with a 6-ft. long back ending in large circle forms that unfortunately (or so I thought) reminded me of Mickey Mouse. Once that happens, forget it—all one ever sees is Mickey Mouse, no matter how serious the designer's purpose. Later I learned that Maruyama herself refers to the piece as her Mickey Mouse chair, and I was delighted, for I see the chair now as a parody of the regality and puffery of high-backed chairs. I don't know whether Maruyama sees it this way, but artiture when it teases the seriousness of furniture, even gratuitously, does service. As in Loeser's pieces, I came to enjoy the color, flair, fantasy and whimsy.



Steve Madsen's ebony, maple, cowhide 'Night Stalker.'

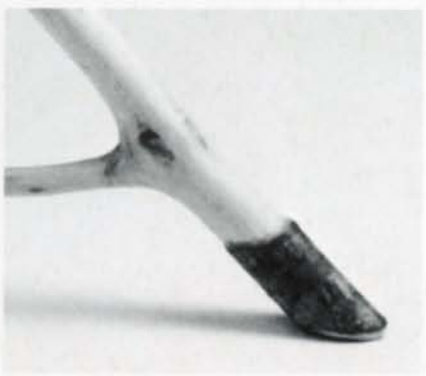
Like all categorizations, the term "artiture" is a convenience, a net that doesn't catch all the non-utilitarian fish. Some just have their tails caught. Such is the work of Jim Fawcett, whose pieces at the Workbench Gallery (top) were fetish furniture for pilots—those in the air and on the sea. His propeller-propped seating experiments cover both monoplane and helicopter; the lighthouse cabinet is probably as effective as a lighthouse as it is as a cabinet; and the wall-hung piece labeled "Window Shade" was as evocative of sailing as any visual metaphor I can remember. All these were done with fine craftsmanship and spirit, well worked wood and tastefully selected hardware. They also stepped outside of furniture in that they dared to not take the traditional form of their semi-functional function.

There is not space enough to go into all the treen on view in that week in June and its mythic and ritualistic evocation, but a little table (left) that I saw at Rhinebeck had obviously sprung from this venerable craft—its maker, Steve Madsen, is recognized for his finely wrought constructs. This triangular, skin-topped and horny-legged table form (after the Art Deco artist Clement Rousseau) is an example of the fine, crisp, exacting detail work that went out with Art Deco and is now reappearing with its renaissance. I'm impressed with the intricate craftsmanship in many of the pieces I saw. Just so long as it remains in the service of design and is not the object of it.

When I first viewed artiture I didn't know what to make of it. It wasn't beautiful, it wasn't usable and it didn't say anything to me. It seemed an acquiescence to the lopsided cultural hierarchy of wit over feeling, cleverness over discipline. I still feel this way about a good deal of what I see. But then there are artists like Margaret Wharton, who can say so much with her chair metaphor, or Nam June Paik, who can play so tongue in cheek with a chair frame, and there are craftspeople like Martha Rising, exercising her medium to its limit, all around the form of the chair, and it's okay. □

Art Carpenter is a furnituremaker and teacher in Bolinas, Calif. For a profile of Carpenter's own work, see FWW *#37, pp. 62-68.*

Branching Into Chairs



Photos: Joel Schopplein

"I have always been intrigued by the forest and have sought ways to earn a living while dealing directly with the trees," writes John Coonen of Sonoma, Calif. Coonen, 37, is a gardener and orchardist who, on hot summer afternoons and rainy winter days, builds stick furniture. Here's how:

"Originally, inspired by the nice-looking furniture legs I see in brush piles, I used whatever forest trees I liked. Later, though, I found the tanoak (*Lithocarpus densiflorus*) to be the best, due to its strength in smaller dimensions and its fairly straight branches.

"I find a place in the coastal hills where the oak has been cut years before and has stump-sprouted into a multi-trunk tree. Then I look for the trunk with the best Ys and saw it into chair parts or just interesting pieces. The seats I chop out of first-growth, burnt-out and hollow redwood stumps, a beautiful fine-grained wood hidden under charcoal. Headrests are black oak. It's difficult to find natural rockers in trees, so I shape elm or birch lumber.

"I begin with the back Ys. I might go through my entire inventory of branches to match a good pair. Then I find pairs of legs. If the four legs look okay tenoned (drawknife and hollow auger) into the seat, I proceed with the back and headrest. Many misbored angles during the first years were either plugged and rebored, or cursed and added to the kindling pile.

"Most of all I enjoy cutting the materials out in the woods and seeing the sticks finally glued together into furniture. The construction itself is slow and nerve-wracking."