

JULY/AUGUST 1981, No. 29, \$3.00

Fine Woodworking



Woodworking in Mendocino

Fine Woodworking Books



From the woodworking shops of today to the woodfinishing shops of Paris in the 1920s, from the techniques of master craftsmen to the finished pieces of serious amateurs, our books cover the world of woodworking with the same care and attention as Fine Woodworking magazine.

For more information about our books and how to order them, take a look at the pages opposite (an order form is included for your convenience). If you're not happy with any book you order, we'll be happy to refund your money.

Fine Woodworking Techniques 1. \$15.00
*Tage Frid Teaches Woodworking—
 Joinery: Tools And Techniques.* \$16.00
Biennial Design Book. \$10.00
Design Book Two.
 \$12.00 softcover, \$16.00 hardcover
Make a Chair from a Tree. \$9.00
88 Rue de Charonne:
Adventures in Wood Finishing. \$10.00
Fine Woodworking Techniques 2. \$15.00
Understanding Wood. \$18.00



The Taunton Press

52 Church Hill Rd., Box 355, Newtown, CT 06470

© 1981 The Taunton Press

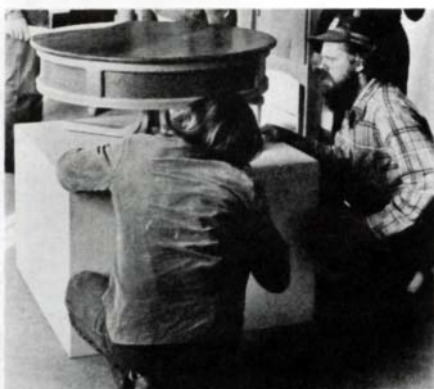
Editor John Kelsey
 Associate Editors Rick Mastelli
 John Lively
 Deborah Fillion
 Art Director Tage Frid
 Senior Editor Linda Kirk
 Copy Editor Linda D. Whipkey
 Editorial Secretary

Contributing Editors R. Bruce Hoadley
 Simon Watts

Consulting Editors George Frank
 A. W. Marlow
 Lelon Traylor
 Jim Richey

Methods of Work

Correspondents/England Roger Holmes
 John Makepeace
 Pacific Northwest Jonathan Cohen
 California Alan Marks
 New England Rosanne Somerson
 Richard Starr
 Washington, D.C. Stanley N. Wellborn



Cover: You can always spot the craftsmen at a woodworking exhibition—they're pulling out the drawers, peering under tabletops and fingering the finishes. Table, above, was made by Tom McFadden. The Mendocino Woodworkers Association holds two juried shows every year. Beginning on p. 36, the award winners from last November's show tell how they work wood and why they do it in Mendocino. Photos: Nicholas Wilson © 1980.

THE TAUNTON PRESS

Paul Roman, publisher; Janice A. Roman, associate publisher; JoAnn Muir, director of administration; Laura Cehanowicz Tringali, editor/books; Jon Miller, communications; Lois Beck, secretary to the publisher.

Marketing: Jack F. Friedman, director; Ellen McGuire, assistant sales manager; Karl Ackerman, sales coordinator.

Advertising Sales: Richard Mulligan, manager; Vivian Elling Dorman, Carole Weckesser, sales coordinators.

Art: Roger Barnes, executive art director; Lee Hov, E. Marino III, Jeanne Criscola.

Production: Cynthia Lee Nyitray, manager; Barbara Hannah, darkroom; Nancy Zabriskie Knapp, typesetting; Kathryn Olsen, paste-up.

Fulfillment: Thomas P. Luxeder, manager; Carole E. Ando, subscription manager; Gloria Carson, Dorothy Dreher, Marie Johnson, Cathy Sakolsky, Nancy Schoch, Kathy Springer, Cathy Sullivan, Terry Thomas; Viney Merrill, mailroom manager; Robert Bruschi.

Accounting: Irene Arfaras, manager; Madeline Colby, Elaine Yamin.

To subscribe to *Fine Woodworking* in the United Kingdom, write: Sumaco Woodworking Library, Suma House, Huddersfield Rd., Elland, West Yorkshire HX5 9AA England. To buy Taunton Press books in the United Kingdom, write: Bell & Hyman Publishers, Denmark House, 37/39 Queen Elizabeth Street, London SE1 2QB, England.

Fine Woodworking®

JULY/AUGUST 1981, NUMBER 29

DEPARTMENTS

- | | |
|------------------------|------------------------------|
| 4 Letters | 26 Books |
| 10 Methods of Work | 28 Adventures in Woodworking |
| 20 Questions & Answers | 32 Events |

ARTICLES

- 36 **Woodworking in Mendocino** by John Kelsey
 A close look at the new generation of artist-craftsmen
- 44 **Two-Board Chairs** by Drew Langsner
 Plans and methods from a Swiss woodworker
- 47 **Wooden-Drum Stroke Sander** by A. W. Marlow
 Shop-built machine saves space and money
- 52 **Five Basic Spindle Laminations** by Ted Pack
 Glued-up turnings produce various patterns
- 54 **Geometric Turnings** by Nick Engler
 The work of John Barklow
- 56 **Inlaid Turnings** by Fran William Hall
 Decorating with plugs
- 57 **More Inlaid Turnings**
- 58 **Sanding and Finishing on the Lathe** by David Ward
- 59 **Variations on the Frame and Panel**
 New designs for machine woodworking
- 63 **The Pin Router** by Dennis R. Wilson
 Basic setups for this versatile machine
- 65 **Homemade Overhead and Pin Routers**
- 66 **Grinding** by Frank Klausz
 Use your tool rest only as a fence
- 67 **How to Sharpen** by Ian J. Kirby
 A keen edge makes all the difference
- 70 **Japanese Blades** by Toshio Odate
 Traditional sharpening methods
- 74 **Pole-and-Wire Joinery** by Len Brackett
 The quick way to build
- 76 **Man-Made Boards** by Simon Watts
 Working with particleboard and fiberboard
- 82 **The Woodcraft Scene**
 The Apprenticeship by Richard Starr
- 84 **The Pipe Organ Reborn**

Fine Woodworking (ISSN 0361-3453) is published bimonthly, January, March, May, July, September and November, by The Taunton Press, Inc., Newtown, CT 06470. Telephone (203) 426-8171. Second-class postage paid at Newtown, CT 06470, and additional mailing offices. Copyright 1981 by The Taunton Press, Inc. No reproduction without permission of The Taunton Press, Inc. *Fine Woodworking*® is a registered trademark of The Taunton Press, Inc. Subscription rates: United States and possessions, \$14 for one year, \$26 for two years; Canada, \$17 for one year, \$32 for two years (in U.S. dollars, please); other countries, \$18 for one year, \$34 for two years (in U.S. dollars, please). Single copy, \$3.00. Single copies outside U.S. and possessions, \$4.00. Send to Subscription Dept., The Taunton Press, PO Box 355, Newtown, CT 06470. Address all correspondence to the appropriate department (Subscription, Editorial or Advertising), The Taunton Press, 52 Church Hill Road, PO Box 355, Newtown, CT 06470. United States newsstand distribution by Eastern News Distributors, Inc., 111 Eighth Ave., New York, N.Y. 10011.

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

Letters

Tage Frid's article suggesting equipment for a one-man woodworking shop (*FWW* #24, Sept. '80) is enlightening but disappointing. I am a tool-and-die maker by profession, and a woodbutcher by hobby. What slips me, is why in a one-man shop you would select machines that stand idle 95% of the time, and contribute only 2% to 5% of the progress of the finished product?

I am not a salesman for a radial saw, but it is quite obvious that manufacturers of radial saws have done a poor job of enlightening the trade on the wide range of work you can do quickly and accurately on this machine. A radial saw and a gluing bench are all the equipment I have. I am now making twelve grandfather clocks, of my own design, for the grandchildren. With the exception of the hinges in the door, there are no screws or nails in these clocks. All joints are either mortise and tenon or tongue and groove, glued together. . . .

The radial saw has three built-in adjustments that will correct all errors in three planes, if, and it is important, you lock the column to the base when you make these adjustments. This can be accomplished by tightening screws that control the fit of the taper key to the machine's column.

For ripping, the saw head must be tightened on the arm by a thumbscrew. Under heavy cutting it tends to come loose. To overcome this, I made a right and left-hand bracket, which, by tightening a socket-head screw, I clamp securely on the arm. The saw head is then locked between the two brackets. By loosening one knurled-head screw and tightening the other, you can move the head any direction you desire. The knurled-head screw has a 32-pitch thread. One full turn will advance the head $\frac{1}{32}$ in. One half-turn will advance the head $\frac{1}{64}$ in. One quarter-turn will advance the head .008 in. You can get very fine, accurate adjustments consistently. You cannot approach this accuracy on a table saw where you move the fence by hand.

All my projects are made of cherry wood, which I buy roughsawn. I do all the planing and edging with my radial saw. To accomplish this I made an 8-in. diameter aluminum back-up plate of $\frac{1}{2}$ -in. thick aluminum. This supports the sawblade when cutting on one side only, for planing. . . . By controlling the feed you can get a finish acceptable to varnish with little or no sanding. You do not get the hard, glazed, ripple surface you get on a wood planer. With a 10-in. saw, I can plane boards $4\frac{1}{8}$ in. wide.

I make all mortises with a router cutter, with two stops clamped on the fence. The stops control the length of the mortise and also the position of the mortise on the workpiece. . . . With the saw in vertical position and the workpiece held flat on the tabletop, held firmly against the fence, I cut all grooves, tongues and tenons with a 7-in. adjustable dado saw. . . . On molding work, the Sears radial saw has a cutter holder that will hold any of the twelve blades of various profiles. You can generate any profile you desire. I also have a planer head that will plane large areas, and a jigsaw attachment. I have a hardened insert in the table, which leaves the jigsaw with little unsupported area. I saw all table legs on this saw. I have sawn work $2\frac{1}{4}$ in. thick with it.

I find the Sears radial saw with accessories to be a rugged machine that can take a lot of hard work, and give a good account of itself. I enjoy working with it. As far as woodworking goes for me, the days are too short and the nights too long.

—Raymond H. Haserodt, Lyndhurst, Ohio

Eugene Wengert's article on the state of our forests (*FWW* #27, March '81) provoked me to calculate wood yield in the micro-economy of my shop. The figures are startling.

I made six window sashes from 20 bd. ft. of mahogany, a

single plank that actually measured 120 in. long, $2\frac{1}{16}$ in. thick and $11\frac{1}{8}$ in. wide. Milling and resawing to avoid knots and maximize yield gave me the 24 rails and stiles I needed, one extra of each to insure against clumsiness, four small sticks of scrap, plus a full bag of chips, dust and shavings.

The original plank contained 2,753 cu. in. of wood; the finished sash contains 1,606 cu. in., 58% of the plank. The leftover bits total 311 cu. in., or 11%. That leaves 836 cu. in. of trashed wood, 31% of the plank. Wengert writes that I started out with only a quarter of the living tree, the rest being left in the forest and at the mill. Thus, my windows are a mere one-seventh of the tree. Six-sevenths, 85%, has been wasted along the way—one chip at a time.

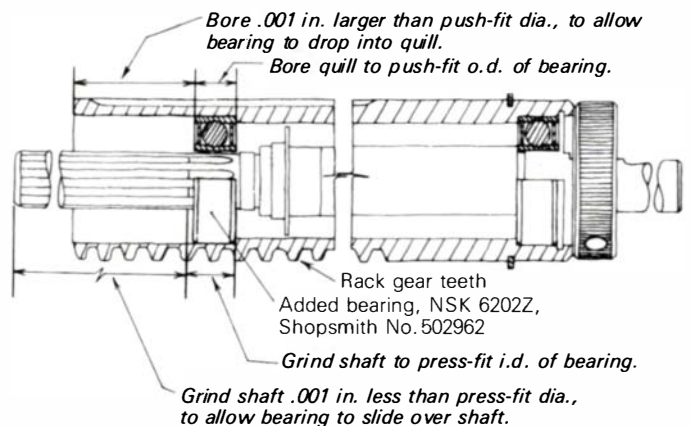
Like diligent ants, we labor in the service of cosmic entropy, whittling highly ordered living systems into homogenous piles of useless little chips. What fools we are!

—Larry Green, Bethel, Ct.

In the spirit of the fellow who drove a nail into his finished piece (*FWW* #24, Sept. '80), I sometimes leave a nick or a blemish here or there, something that obviously could have been avoided or sanded out, just to indicate that the piece was handmade. I realize that there is a fine line between such blemishes and sloppy workmanship, but the rest of the piece could decide that.

—F.W. Fais, Mentor, Ohio

Here is a tip Shopsmith Mark V owners will find helpful. I purchased a new Mark V about a year ago, and was pleased to find it a highly versatile and a generally well-built machine. However, the amount of side-to-side play in the spindle was, in my opinion, somewhat excessive. This play was particularly noticeable when drilling and turning. It appeared to be due to the fact that the spindle is supported by a single ball bearing at the front of the quill. Replacement of this bearing yielded no noticeable improvement. I took the quill and spindle to a local machine shop run by an experienced tool-and-die maker. He examined the parts and confirmed the feasibility of adding a bearing to the rear of the quill. The modification is shown in the sketch.



The splined outside diameter of the shaft was ground to permit press-fitting the new bearing onto the shaft (the amount of grinding required is minimal; thus the depth of the spline teeth is not significantly altered). The quill was then chucked in the lathe and bored to accept the outside diameter of the bearing as a push-fit. Note that this bore must be deep enough to permit full retraction of the quill into the machine without interference between the bearing and the face of the splined drive inside the machine. The bore and the outside diameter of the shaft were then slightly relieved to facilitate assembly of the components. This

**The bit is...when you get
our point, you've got the**



EDGE.

At Morris Wood Tool, we believe woodworking enthusiasts deserve the same top performance from their cutting tools as the major manufacturers. So we've put together a twelve-piece, reasonably-priced set of our most-used drills boxed in a handsome solid mahogany case.

These American-crafted bits are made of the finest carbon tool steel available and are precision ground for clean, accurate drilling without 'skating' or splitting. Sizes range from 1/8" to

7/16" for a 3/4" drill chuck and from 1/2" to 1" to fit a 1/2" drill chuck.

Serious hobbyists will find our set of brad point drills is a good investment, because a bit of quality makes a big difference in woodworking projects.

\$78.00
including shipping



MORRIS WOOD TOOL Co., INC.

HWY. 11-E, P. O. BOX 249, MORRISTOWN, TN 37814 CALL 1-800-251-0994 IN TN (615) 586-0110

NEW!

Easy to use
on detailed
surfaces.



Deep Penetrating
with urethane added
for extra durability.

INDEX TO ADVERTISERS

Advantage Machinery Co., Inc.	8	Furniture Designs	21	Sperber Tool Works Inc.	17
American Intertool, Inc.	25	Garrett Wade Co.	17, 29	Stanley Tools	17
American Machinery & Motor	13	General Woodcraft	21	Sterling Hardwoods, Inc.	31
American Woodcrafters	25	Gilliom Mfg., Inc.	17	Stewart-MacDonald	7
AMI, Ltd.	12	Glenn Wing Power Tools	23, 30	Syracuse Woodcarving Supply	33
Anson Industries Inc.	24	Heritage Design	21	T & K Lumber Co., Inc.	27
Ball & Ball	16	Highland Hardware	7	The Taunton Press	2, 2A, 2B, 7, 22, 29, 82A, 82B
Belsaw Power Tools Co.	15	Hobbywoods	27	Tech Plywood & Hardwood	9
Boston University	19	Horton Brasses	15	Tiffany Fine Woods	33
Brigham Young University Press	12	Hot Tools, Inc.	7	Turncraft Clock Imports Co.	23
The Brink & Cotton Mfg. Co.	23	Industrial Abrasives Co.	27	Turning Point Mfg. Inc.	9
Buck Bros. Inc.	23	John Harra Wood & Supply Co.	33	Unicorn Universal Woods Ltd.	14
Buckeye Saw Co.	13	Johnson's Workbench	18	Watco-Dennis Corp.	31
Chem-Tech	17	Kaymar Wood Products, Inc.	21	Weird Wood	15
Cherry Tree Toys	9	Kountry Kraft Hardwoods	17	Welbeck Sawmill Ltd.	21
Chester B. Stem, Inc.	22	Kuempel Chime & Clock Works	27	Wetzler Clamp Co., Inc.	8
College of the Redwoods	23	Kuster Woodworkers	13, 31	Willard Brothers Woodcutters	35
Conover Woodcraft Specialties	24	Lee Valley Tools Ltd.	13	Williams & Hussey Machine Corp.	31
Craftmark Products, Inc.	33	Love-Built Toys & Crafts, Inc.	33	Winchester Carbide Saw, Inc.	9
Craftplans	33	Mason & Sullivan Co.	25	Wisner Tools	21
Craftsmanship in Wood Inc.	18	Maurice L. Condon Co., Inc.	31	The Wood & Tool Store, WI	29
The Crane Creek Co.	9	Morgan Veneers	19, 21	The Wood & Tool Store, TX	31
Croy-Marietta Hardwoods, Inc.	8	Morris Wood Tool Co., Inc.	5	Wood is Good Co.	9
The Cutting Edge	27	Morrison Originals	9	Wood Shed	32
Deft, Inc.	5	Native American Hardwoods	33	Wood World	17
Delmhorst Instrument Co.	19	The Nutty Co., Inc.	9	Woodbutcher Tools	19
Derda Inc.	32	Paxton Hardware	13	Woodcraft	19
Design Group	17	Peter Child	9	Woodline the Japan Woodworker	14
Dorsett Publications, Inc.	19	Pootatuck Corp.	13	Woodshop Specialties	30
Emperor Clock Co.	15, 19	Prakto, Inc.	23	Woodworkers Supply, Inc.	21
Equality Screw Co. Inc.	13	Primrose Center	18	Woodworks	21
Esslinger & Co.	6	R. Jackson Mfg.	21	Working Wood	15
Excellence in Woodworking	11	Russ Zimmerman Woodturner	7	The Xylophile's Co.	27
The Fine Tool Shops Inc.	25	Sand-Rite Mfg. Co.	16	Yukon Lumber Co.	12
Fisher Hill Products	31	The Sawmill	7		
Frank Hubbard Inc.	27	Shopsmith Inc.	9		
Frank Mittermeier, Inc.	15	Singley Specialty Co., Inc.	15		

ADVERTISING SALES OFFICES

National:

Richard Mulligan
The Taunton Press, Inc.
52 Church Hill Rd.
PO Box 355
Newtown, CT 06470
(203) 426-8171

New England:

Granville M. Fillmore
98 Peartree Point Rd.
Darien, CT 06820
(203) 426-8171

Southern:

Jack Cozier and Timothy John Nelson
Marketing Communications Inc.
5115 South Vandalia, Suite E
Tulsa, OK 74135
(918) 496-8777

Midwest:

Edward Schaedel and Tim Schaedel
Edward A. Schaedel & Son
934-A Apparel Center
Chicago, IL 60654
(312) 329-0885

Western:

William Hague and Richard Ayer
Media Sales Associates
26944 Camino de Estrella
Capistrano Beach, CA 92624
(714) 661-2423

modification has eliminated the spindle's side-to-side play, resulting in increased accuracy in both the drill press and horizontal boring modes of operation. It has also greatly reduced the amount of chatter encountered in faceplate lathe work. Total cost of this modification was less than \$20, including the machining and the purchase of a new bearing.

—James E. Harriss, Dubuque, Iowa

Why not a club for woodworkers to get together and share ideas and learn? As a woodworker and the manager of a bookstore, I make sure that I have the best selection of books on woodworking in town. As I talked to my customers it became evident that there was a need for some kind of fellowship, a way of sharing ideas and techniques. When an Austin Hardwoods franchise opened, I got to know Frank Flynn, the sales manager. He liked the idea, so we began to plan.

I put up a sign near the cash register, which read, "Woodworker's Club—if interested, please leave your name and address with the manager." Our first mailing, in December, 1979, was 50 letters. We held our first meeting in a warehouse in January, 1980, with 53 people attending. Half of them had heard about the meeting from a friend. We recently held a weekend seminar on chairmaking, with author Michael Dunbar, and more than 115 people attended.

Now we meet at a technical school where we have the needed space and equipment for demonstrations. We meet quarterly, but might go to bimonthly meetings later on. We planned to name our group the Pittsburgh Woodworkers Club, but when members joined from West Virginia and Ohio, we named it the Western Pennsylvania Woodworkers Club. Our dues are \$5 a year. After five meetings, we have

130 members and a mailing list of 200, and we're making plans for a show and sale of members' work in the fall.

From our experience, I would say that there are several ingredients to start a club:

You need people who are interested in woodworking.

You need someone responsible for getting things going.

You need a focal point, such as a hardware store or lumberyard where woodworkers come regularly, which will assist by taking the name and address of those interested or at least will put up a sign giving your name and phone number.

You need a place to meet.

These are the basic ingredients. Speakers will be there when you need them—there were 10 professional craftsmen at our first meeting. We can call on any of them for demonstrations. You will find the same kind of talent in your own area. You can start a club, enjoy fellowship, and learn new techniques to enhance the greatest craft in the world.

—William L. Asher Jr., Pittsburgh, Pa.

EDITOR'S NOTE: For details about another club, see page 36.

On pages 51 and 52 of the March issue, (*FWW* #27), Richard Newman is pictured sawing "... mother-of-pearl the traditional way." No he is not. He is using the saw upside down.

The jeweler's saw was developed centuries ago and is used with the handle below the V-notch supporting the work. The teeth of the blade point toward the handle. These teeth, as a rule, have no set and the blade fits snugly in the slot it cuts. One end of the blade is clamped in what is a direct extension of the handle, and the frame of the saw is adjusted so it holds tension on the other end of the blade. The reason for all of

Quality Movements

• CLOCK MUSIC •

THE WORLD'S FINEST LINE OF MUSICAL MOVEMENTS # M100 \$2.⁵⁰ In Quantity These are High Quality Movements from the World's Largest Manufacturer of Music Units. Plays 18 Musical Notes for about 3 Minutes on a Single Winding. Measures 2 1/8" x 1 11/16" x 13/16" High. Specify Tune Wanted: <table style="width: 100%;"> <tr> <td>Lara's Theme</td> <td>You Light Up My Life</td> </tr> <tr> <td>Brahms Lullaby</td> <td>Sesame Street</td> </tr> <tr> <td>Love Story</td> <td>Ave Maria (Schubert)</td> </tr> <tr> <td>Raindrops Keep Falling</td> <td>Silent Night</td> </tr> </table> 1 or 2 @ \$4.00—3 to 9 @ \$3.50—10 to 24 @ \$2.95—25 to 49 @ \$2.75—50 to 99 @ \$2.50.	Lara's Theme	You Light Up My Life	Brahms Lullaby	Sesame Street	Love Story	Ave Maria (Schubert)	Raindrops Keep Falling	Silent Night	ALMOST AS SMALL AS A WATCH! Weighing only 1.25 ounces, this Versatile Movement will carry a sweep second hand and run for over one year on a single "AA" cell—only 9/16" thick this compact unit can be fit into any type case or panel. A single center nut enables the movement to be easily fixed to a dial. The hand setting knob, seconds setter, and battery compartment are conveniently located on the back. Accurate to (+) 10 seconds per month. # 475 Tiny Quartz 2 1/4" Square—2 1/4" Diagonal \$4.75 In Quantity 1 or 2 @ \$8.50—3 to 9 @ \$7.00—10 to 24 @ \$6.50—25 to 99 @ \$5.75—100 to 299 @ \$5.25.	# 500 Quartz Pendulum \$9.²⁵ In Quantity This compact unit can be fitted into any type of enclosure, case or panel. The pendulum does not affect quartz accuracy of one minute per year, so that various lengths of 8 to 14 inches may be used. Noise from movement is negligible, only ticking sound of pendulum can be heard. 1 or 2 @ \$13.95—3 to 9 @ \$12.75—10 to 24 @ \$11.25—25 to 99 @ \$10.25—100 to 299 @ \$9.25.
Lara's Theme	You Light Up My Life									
Brahms Lullaby	Sesame Street									
Love Story	Ave Maria (Schubert)									
Raindrops Keep Falling	Silent Night									

DELIVERY FROM STOCK—CLOCK PRICES INCLUDE HANDS—HANGERS—PLEASE ADD \$1.50 FOR POSTAGE

PLEASE SEND _____

☐ CHECK FOR FREE CATALOG _____

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

Esslinger & Co.

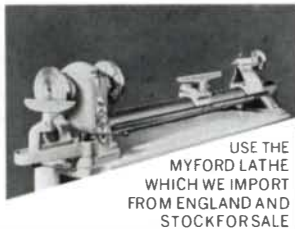
P.O. BOX 43561 ST. PAUL MN 55164
TOLL FREE-ORDERS ONLY-800-328-0205
INQUIRIES-INFORMATION-612-452-7180

WOODTURNERS

TWO-DAY INTENSIVE WORKSHOPS

for beginning and experienced turners. Offered throughout the year, each with a maximum of two students. Cutting techniques emphasized for bowl and spindle turning. Hands-on practice in sharpening, turning, and finishing.

SORBY TOOLS unhandled with ferrule included 6-IN-1 CHUCK available for all lathes DOUBLE STICK TAPE INFORMATION ON TOOL SELECTION, sharpening and other items of interest.



USE THE MYFORD LATHE WHICH WE IMPORT FROM ENGLAND AND STOCK FOR SALE

\$1 FOR ALL BROCHURES. WORKSHOP ONLY: 35¢ STAMPS
RUSS ZIMMERMAN, RFD 3, BOX 59
PUTNEY, VERMONT 05346

...Learn how the pros

Carve Realistic Feathers



...HOT TOOL!

\$15.95 Plus \$1.50 POSTAGE
Mass. Residents add 5% tax.
Dealer Inquiries Welcomed

SEND TODAY FOR BROCHURE

HOT TOOLS, Inc. 9 Hawkes Street • Marblehead, Mass. 01945

MASTERTONE-STYLE BANJO BLUEPRINT
Completely-detailed, \$5.50 postpaid.



For free catalog of banjo & mandolin kits & components, call us toll-free:

1-800-848-2273 In Ohio call 614-592-3021

STEWART-MACDONALD
BOX 900 F ATHENS, OHIO 45701

MOVING?

Your postmaster will forward your magazine only if you request it.

We don't want you to miss an issue, so please send us your new and old addresses at least six weeks before we publish.

The Taunton Press
Address Change
PO Box 355
Newtown, CT 06470

EXOTIC AND PRECIOUS WOODS

ROSEWOODS
EBONIES
COCOBOLO
ZEBRA
BUBINGA
PADAUK
KOA • BOCOTE

Logs, lumber, sawn veneer and musical instrument components.

Wholesale inquiries only.

Wood is our business,
so make it your business
to call or write:

The Sawmill

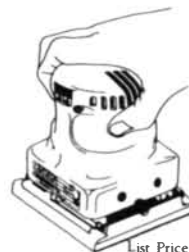
THE CF MARTIN ORGANISATION
P.O. Box 329
Nazareth, Pennsylvania 18064
215-759-2837

Help us spread the word

We're trying to expand our distribution of *Fine Woodworking* magazine into lumber yards, hardware stores, tool shops and other non-magazine retail outlets that woodworkers frequent.

If you know any likely candidates in your area, please send me their name and address and I'll get in touch with them—*Jack Friedman, Marketing Director*, The Taunton Press, PO Box 355, Newtown, CT 06470 or call (203) 426-8171.

Fine
Woodworking



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 4 3/8".

List Price \$68.00 **\$54.95** POSTPAID

SANDER OFFER EFFECTIVE THRU DEC. 31, 1981.

JAPANESE WATERSTONES



Set of 2 **\$29.50**
POSTPAID.

WATERSTONE OFFER EFFECTIVE THRU DEC. 31, 1981.

Makita

BLADE SHARPENER
Model 9820-2



Sharpens jointer and planer knives up to 12" 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.

Model 9820-2 **\$195.00** POSTPAID

ACCESSORY JIG for chisels and plane irons \$10.00
Postpaid. Sharpener offer effective thru December 31, 1981.

Makita

PLANER-JOINTER & TABLESAW
Model LM 3001



12" automatic feed thickness planer, 6" jointer, and 13" table saw. Two 115 volt motors. Tablesaw table is 16" x 27". Maximum depth of cut is 4 3/4". Jointer table is 59" long. Weighs 420 lbs.

PLANER-JOINTER Model 2030 (not pictured)

Planer-jointer similar to LM3001 above but with no tablesaw. 2 HP 115 volt motor. Weighs 275 lbs.



Makita

THICKNESS PLANER
Model 2040

15 1/2" automatic feed thickness planer. 7 1/2" maximum thickness capacity. 2 HP 115 volt motor. Weighs 254 lbs.

Makita

BANDSAW Model 2116



ACCURATELY AND POWERFULLY RESAWS BOARDS UP TO 12 1/2" WIDE. Depth of throat 13". Wheel size 16". Height of machine 52". Weight 297 lbs. Blade width 1/4" up to 2 3/8". Motor 2 HP. Industrial type machine priced for the small professional shop or serious amateur. Demonstrated at World Woodworking Expo 80.

Bandsaw and planers shipped freight prepaid to anywhere in 48 adjacent United States.



freud

Carbide saw blades, shaper cutters, and router bits are available from Highland Hardware. Send \$1.00 for our catalog containing specifications of Freud carbide cutting tools.

To order sander, waterstones, or blade sharpener, send check, money order, or Mastercard/VISA info to:
HIGHLAND HARDWARE

1034 N. HIGHLAND AVE., N.E., BOX 29F
ATLANTA, GEORGIA 30306 (404) 872-4466

Send \$1.00 for specifications and prices of Makita power tools illustrated here. Send \$3.00 for a full catalog and one year subscription to Wood News our quarterly newsletter. In Atlanta, visit our showroom to see a demonstration of our Swiss-precision INCA shaper, jointers, planers & saws.

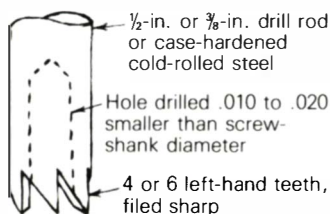
this is that as the power cut is made, the work is held firmly against the notch by the pressure of the cut, and the pull of the blade is taken directly by the handle. The spring of the frame holds that part of the blade above the work under constant tension, and so straight.

When the saw is used upside down, as Newman is using it, the teeth of the blade point toward the end of the arm. As the power cut is made, the work is held against the V-notch and the blade below the work is pulled on by the end of the frame. In pulling on the blade, the frame springs, the blade above the work, no longer under tension, arcs, binds in the cut and breaks. . . . Also, with his hand holding the saw below the work, where it belongs, Newman would no longer have to cock and cant his head in order to keep his cut in view.

—Robert M. Rose, Metairie, La.

In March '81 (p. 14) you had two ways to remove broken screws. I have never tried the hot wire, but here is a better hole saw, used with a reversible drill. Rotating left handed, the screw shank jams in the hole and the power drill unscrews the broken screw. You have to catch only about 1/8 in. of screw. An old-time ship's carpenter showed me how when I had to remove hundreds of broken screws on a boat replanking job.

—Donald Warner, Deerfield, Ill.



breaks, keep your cool, turn off the machine, stand back and wait two minutes. Only then, carefully open the top door.

In observing students' reactions to blade breakage, there is a very early tendency to open the door to see what is happening. They do not realize that the upper wheel can run on silently for several minutes after the motor has stopped. This wheel, especially if it is large and heavy, can quickly pick up the blade and project it at the operator.

—Rob van Nieuwenhuizen, Barry's Bay, Ont.

. . . Frid writes, adjust the tracking until the blade rides in the middle of the rim. This does not work for all bandsaws. In some, the blade will have to run on the front of the rim, otherwise the blade will cause the wheel to tip over the center of balance, and the blade will come off at the back of the wheel.

The ideal position for the blade is with the teeth just outside the rubber. This will work perfectly for wide blades, but not for 1/4 in. or smaller.

—John Kolkman, Thornhill, Ont.

I recently received the moisture-meter plans I ordered through a classified ad in *FWW* #26, Jan. '81. The plans came from J. Pray, Sangerville, Me., and have been very disappointing to me. The plans do not explain how to build a moisture meter at all but rather how to make the probes that can be used together with a commercial multitester. While the probe is essential for moisture testing, the plans for it certainly aren't worth the \$7.50 he charges. . . . I estimate the expenditure for the device would approach \$70, plus labor, with no guarantee of success. Compared to the price of a low-cost commercial moisture tester, about \$120, the real savings is questionable.

—Jerry Matusik, Grafton, Ohio



CROY-MARIETTA HARDWOODS, INC.

Top quality hardwoods and hardwood products —at prices that can't be topped!



We are a direct producer. No middle men. You receive the advantage of buying directly from the producer.

See for yourself. Send \$1 for our Full-Color Brochure and Price List. (Dollar is refunded with your first order.)

VISA and MASTERCARD accepted

P.O. BOX 643 • 121 PIKE ST., MARIETTA, OHIO 45750
1-614-373-1013

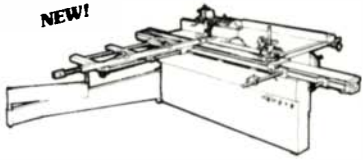
Name _____

Address _____

City _____ State _____ Zip _____

HOWEVER YOU CUT IT, WE HAVE AN ADVANTAGE

We are pleased to introduce you to our precision circular saws. Several unique models are available including fixed and sliding table types with blade capacities from 10" to 16". Shown is our model 8733, the only saw of its kind with an integral shaper and laterally adjustable blade for exact setting. Constructed of the highest quality components and expertly machined, these saws carry our full guarantee unmatched by anyone else in the industry.



Quality machinery
for fine woodworking

VISIT OUR NEW SHOWROOM TO SEE OUR FULL LINE UNDER POWER.
SEE US AT BOOTH 200, L.A. CONVENTION CENTER, SEPT. 24-27.

ADVANTAGE MACHINERY COMPANY, INC.

Send \$1.00 for
Illustrated Literature



P.O. BOX 484
DEPT. 8255 W. BARNSTABLE, MA 02668
Phone 617-362-6942 Telex 808193 PCI, attn: AMC






**ASK FOR FREE CATALOG
SOLD THROUGH LEADING DISTRIBUTORS
WETZLER CLAMP CO., Inc.**

43-13 11TH STREET
LONG ISLAND CITY, N.Y. 11101
TEL. 212-784-2874

MAKE TOYS Plans, Hardwood Wheels, Parts Catalog \$1.00
Cherry Tree Toys, 2547 8th St. Berkeley, CA 94710

TOOL CABINET
Full-size furniture plan laid out in frame by frame fashion, for easy following.
Woodworkers, show your skill, impress potential customers when they come in your shop & see a nice cabinet like this. This cabinet when built, will have room for all your hand tools. Size: 32"W x 19"D x 68"H. Order Plan No. 130 \$12.00
MORRISON ORIGINALS
P.O. BOX 15272, DETROIT, MICHIGAN 48215

The Finest Precision Carbide Saw Blades
CALL US TOLL FREE 800-336-7304
In Virginia Call Collect (703) 667-1151
WINCHESTER CARBIDE SAW, INC.
2635 Papermill Rd., Winchester, Va. 22601

EXOTIC AND DOMESTIC HARDWOODS
Baltic Birch, Marine Woods, Hardwoods & Plywood in stock
TECH PLYWOOD & HARDWOOD LUMBER CO.
110 Webb St., Hamden, Conn. 06511
No mail order
Retail sales only Large complete stock
Come visit our large warehouse and select your own Lumber.
Tel. (203) 777-5315

WOODCARVERS WHITTILERS
7 DESIGNS IN EASY-CARVING JELUTONG
Pre-cut and marked wood blanks with a scale model in each kit. Mallets, Tools. Send stamp for FREE Brochure!
WOOD IS GOOD CO., DEPT. F
BOX 46, COULTERVILLE, CA 95311

WOOD SCREWS
REPEAT OF A SELL OUT!!!
1000 #8 x 1 1/4" Flat Head Wood Screws-PHILLIPS \$14.99
1000 #8 x 1 1/4" Flat Head Wood Screws-SLOTTED \$14.79
Money Back Guarantee. Add \$2.50 for shipping. VISA and Mastercard accepted. FREE Catalog.
THE NUTTY COMPANY, INC.
135 Main Street, Dept. FW 71
Derby, Conn. 06418

WOODWORKERS-SLIDE materials off YOUR shop tools onto OUR wide rollers for: safety, accuracy, and convenience
SUPPORTABLE SUPPORTABLE SUPPORTABLE
Folds for easy storage & other unique features.
For info. Send \$1 to: Turning Point Mfg. Inc. RR-2A Davenport, N.D. 58021

POLYETHYLENE GLYCOL
The new wood stabilizer and chemical seasoning agent.
Make crack-free table tops from log cross sections and flawless bowls and carvings from green scrap wood. \$1.00 for catalog.
The Crane Creek Company
Box 5553 F
Madison, Wisconsin 53705

PROFESSIONAL TURNING TOOLS
Fittings and accessories
Send one dollar bill for catalog
PETER CHILD
The Old Hyde, Little Yeldham,
Halstead, Essex, England.

You'll Save More than Ever Before

with Shopsmith's
6th National Summer Sale
\$125⁰⁰ off the MARK V...



the tool to start with...
the system you grow with!

Our National Summer Sale is a special event that many woodworkers have been looking forward to all year. It offers the finest savings possible on the MARK V multi-purpose woodworking tool — the complete home workshop.

With this compact and economical unit, you can perform the five most important woodworking functions — sawing, drilling, boring, turning and sanding. And you can expand with a full line of Shopsmith accessories that allow you to do just about any home shop operation imaginable.

Discover how woodworking can be easier and more enjoyable. Learn how projects can take on a more professional look.

Find out how the

MARK V home workshop can help you fulfill every one of your woodworking dreams.

Sale Deadline
— August 31,
1981!

Write TODAY
for **FREE** Information!

We'll be happy to send you a kit filled with facts about how you can become a better woodworker. It's free and there's no obligation. But act now, so you'll have time to make your decision and save \$125.00 when you order your MARK V during the sale. Fill in the coupon and mail it to us today!



Shopsmith Inc.

The Home Workshop Company
750 Center Drive
Vandalia, Ohio 45377
Dept. 355X

☐ **YES!** Mail to: Shopsmith, Inc., 750 Center Drive, Vandalia, Ohio 45377

Tell me more about the MARK V and how I can save \$125.00 during the Summer Sale. I understand the information is free and I am under no obligation.

☐ I have requested information from Shopsmith before, but want to make sure I receive this offer.

Name _____

Address _____

City _____

State _____ Zip _____

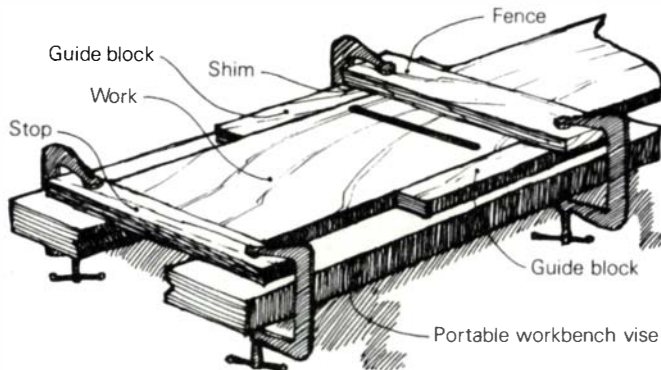
Dept. 355X

Methods of Work

Dadoing guide

Sketched below is a quick setup I use for repeated dadoing operations with my router and portable workbench/visé. It's so simple, yet it's more accurate and quicker to use than the fence-clamped-to-the-board approach. Make the parts from stock the same thickness as the boards you're dadoing. Clamp the fence atop two guide blocks to form a bridge over the work as shown. Shim the fence off the two guides with cardboard or veneer. This should leave enough clearance so the stock will slide in under the fence easily. Now just push the workpiece in under the bridge, snug against the stop. Clamp the workpiece to the workbench somewhere behind the fence, set the router to proper depth and go to town. The guide blocks not only guide the workpiece, they also support the router base near the edge of the board.

—Josh Markel, Philadelphia, Pa.

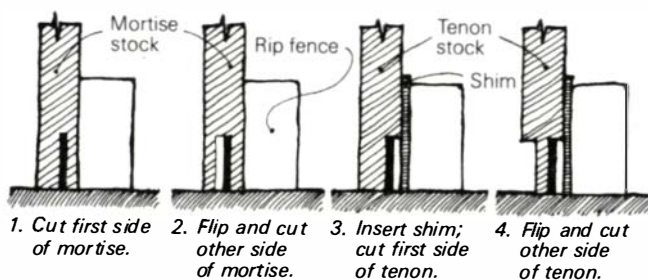


Cutting corner bridle joints

This procedure eliminates the tedious fence adjustments and frustrating $\frac{1}{32}$ -in. errors that go with cutting open mortise-and-tenon joints on the table saw. It is based on a thin auxiliary fence or shim that's exactly as thick as the saw kerf of the blade you're using. The shim stock, made of thin plywood (door skin) or surfaced from solid stock, should be as wide as your fence is tall, and should be long enough to clamp to your fence—say 8 in. by 16 in.

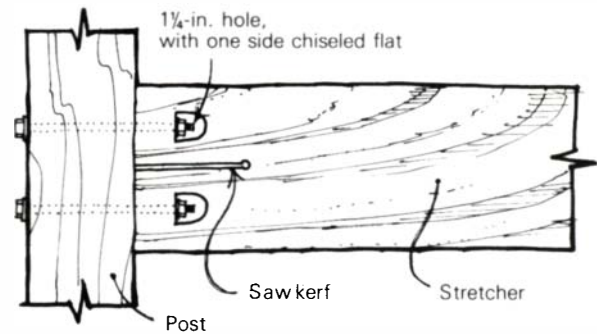
To use, set up the saw to cut the open mortise. Saw the mortise as usual by passing both cheeks of the stock over the blade. Do not adjust the fence to saw the tenon. Simply clamp the shim to the fence and saw out the tenon—first one face then the other. The shim repositions the tenon stock just to the other side of the cut line. The joint will be just right.

—John F. Anderson, Bottineau, N.D.
and Ivan Hentschel, Kingston, N.J.



Easy stretcher joint

One of the easiest stretcher-to-post joints (used on European workbenches and machinery stands) is to butt-join the parts using two bolts engaging captured nuts. The simple joint eliminates the precision fitting required with mortise and tenon. In fact, with this joint, bolt holes should be bored oversize to accommodate adjustments or inaccuracy. Twin bolts keep the joint tight and the members perpendicular,



but there's a problem: The wide stretcher is restrained cross grain against the post, making it prone to splitting.

Here's a solution to the problem: Pre-split the end of the stretcher by sawing a kerf down the middle of the stretcher for 3 in. or 4 in. The split is an adaptation of twin tenons. The slot allows the wood to move across its width, relieving the stresses from changes in humidity. Drill a hole through the stretcher at the end of the slot so that splitting forces are distributed around the circumference of the hole rather than focused at one point.

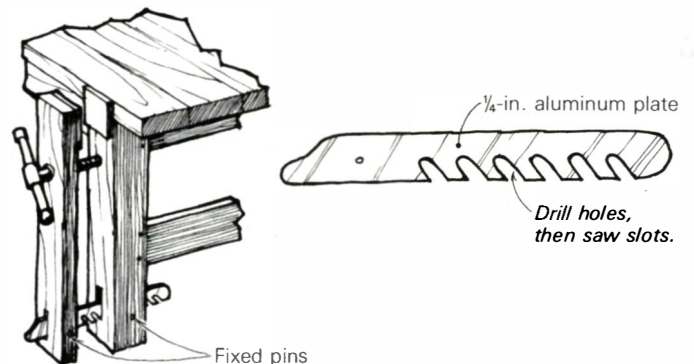
—Richard Starr, Thetford Center, Vt.

Improved leg-vise adjustment

On all the leg vises I've seen, to change the jaw opening you have to wiggle a pin out of a hole near the floor and fiddle it back into the next hole. Here's a design with fixed pins you can work with your foot—just step on the adjustment foot and it disengages, then kick the bottom of the moving jaw to where you want it.

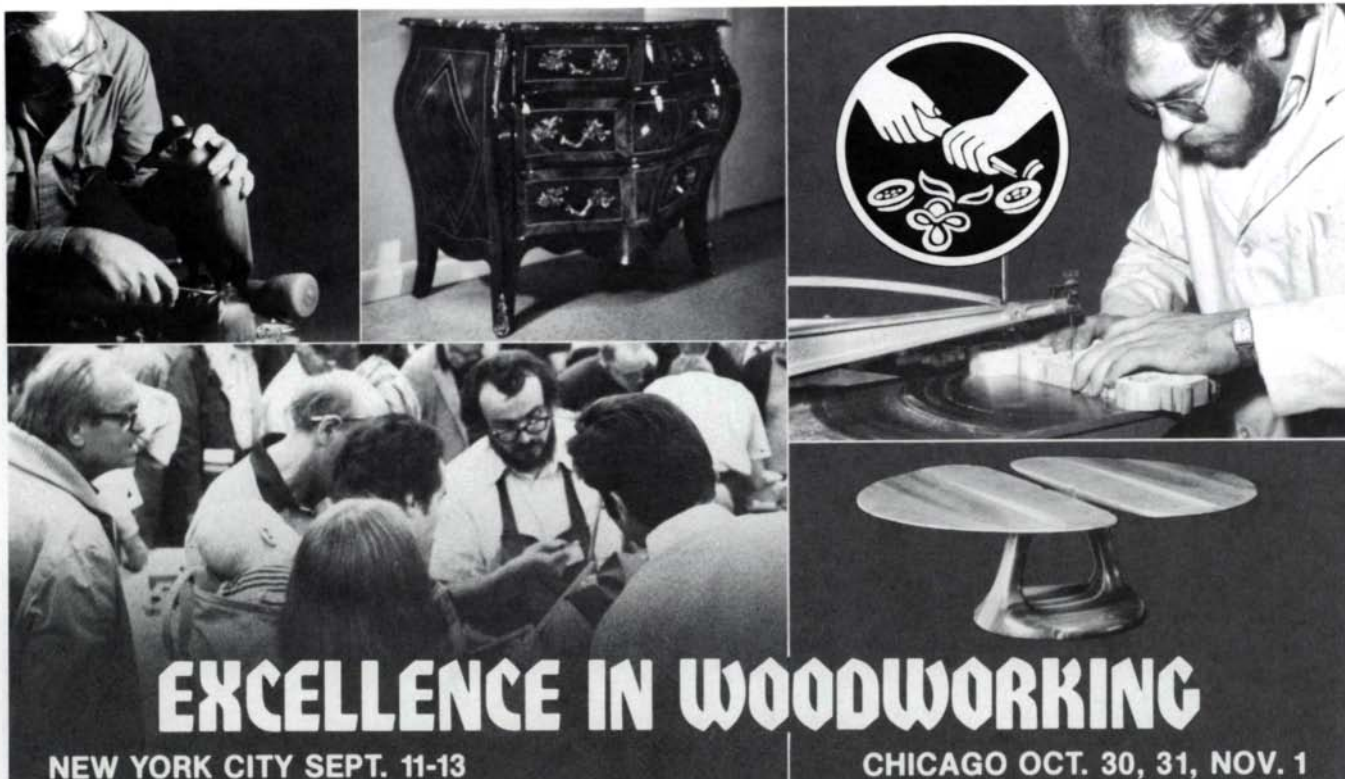
The trick is to make the adjustment foot not out of wood but out of $\frac{1}{4}$ -in. aluminum plate scavenged or from a sheet-metal dealer. To make the slots, drill a series of holes in the plate and saw into them from the edge with a hacksaw or a bandsaw. You can saw most aluminum alloys on the bandsaw with regular wood-cutting blades. Aluminum tends to grab drill bits, so clamp the adjustment foot down before you begin drilling.

—Geraldo Bennuccio, Oakland, Calif.



Check-free drying for green bowls

If you hesitate to turn bowls or other lathe projects from green log slices because of the checks and cracks that develop as the wood dries, here's a cure that is effective, free, uses no chemicals and requires no kiln. The secret is to bury your project in wood chips while it dries. During the rough turning of the bowl I accumulate a fair amount of green wood chips. I add chips left over from previous projects—all the chips I can find. I dump the chips in a box and bury my bowls in them, leaving at least a couple of inches of chips around all sides. I bury the bowl again after each work session and, after the project is completed, I leave it in the chips for a month. That's it. Sound too simple? Apparently the chips absorb the moisture from the green workpiece without letting it dry too



TWO COMPLETE SHOWS FOR SERIOUS WOODWORKERS

See the latest tools and supplies in the Trade Show Section

View the industry's newest machinery in action . . . see and test the world's finest woodworking tools . . . compare choice veneers, exotic woods and a myriad of supply items . . . and marvel at floor demonstrations by some of America's outstanding woodworkers.

- Hand & power machinery
- Special-purpose tools
- Woodturning equipment
- Wood shop accessories
- Abrasives & adhesives
- Finishing products
- Woods and veneers
- Publications

See beautiful one-of-a-kind creations in the Woodcraftsmen Gallery

. . . a showcase of creations for sale by craftsmen also available for commission projects. Of special interest to architects, interior designers, galleries, furniture dealers, dept. stores and qualified individual buyers of fine woodworking.

- Chairs
- Desks
- Cabinetry
- Tables
- Carvings
- Turnings
- Reproductions
- Decorations
- Special-purpose furniture
- Other creations

Show Admission \$5.00

Friday 12-9 p.m. Saturday 12-8 p.m. Sunday 12-6 p.m.

New York City September 11-13, 1981

Madison Square Garden Center-Exposition Rotunda
Penn. Plaza, 7th Avenue-31st to 33rd Sts.

Chicago, IL. October 30, 31, Nov. 1, 1981

Hyatt Regency Downtown, Wacker Hall
Off Michigan Ave. at Wacker Drive

Attend interesting Woodworking Seminars presented by outstanding woodworkers

Everything you wanted to know about woodworking!

Three seminars, each on a major aspect of wood and its use in cabinet making, turnery and furniture construction. Presentations by well-known craftsmen in each field, supplemented by slides and films. Question & Answer sessions after each seminar. Seminar fees include a portfolio of illustrated material.

SEMINAR SPEAKERS

New York Show

R. Bruce Hoadley, Ph.D., Prof.,
Wood Science & Tech., U. of Mass.
John Harra, President of
John Harra Wood Supply Co.

Frank M. Knox, Moderator, ornamental wood turner, management consultant, past president of Int'l. Wood Collectors Society.

Robert F. Snider, Ph.D., Chem. Eng., Franklin Chem. Ind.
George Frank, Master cabinet maker and wood finisher.

Arthur O. (Don) Newell, Ph.D., Chem. Eng. & furniture designer.
John Ebels, VP. H. Behlen & Bros. Mfr. woodworking finishes.

Chicago Show

Paul McClure, Wood Technologist, Frank Paxton Lumber Co.
Regis B. Miller, Ph.D., Wood Anatomist, Forest Products Lab.

Robert F. Snider, Ph.D., Chemical Eng., Franklin Chem. Ind.
Ian Kirby, Woodworker & Designer, Kirby Studios.

Tage Frid, Renowned Woodworker, Designer and Professor
John Ebels, V.P., H. Behlen & Bros. Mfr. woodworking finishes.

SEMINAR I

Thursday, 2-5 pm

Wood and its properties

Wood, what is it and how it acts . . . physical & chemical properties . . . hardwoods & softwoods . . . density & grain patterns . . . temperature and humidity . . . polymerization . . . toxicity . . . identification & classifications. Slides of rare and exotic hardwoods in ornamental turnery on an 1853 Holtzapffel lathe.

SEMINAR II

Friday, 9-12 noon

Glues & woodworking joints

Cabinet and woodworking joints . . . preparation of surfaces . . . gluing & design . . . end & edge gluing . . . glues/applications . . . effect of oils and resins . . . water & acid resistance . . . working life & drying times . . . glue line problems . . . temperature & humidity . . . clamping problems . . . correcting glue stains.

SEMINAR III

Saturday, 9-12 noon

Finishes and finishing

Wood preparation for finishing . . . abrasive papers, steel wool and scrapers . . . wood fillers/sealers . . . staining/toning . . . finishes, natural & synthetic . . . compatibility in re-coating . . . acids, oils & waxes . . . removing old finishes . . . water & alcohol . . . brushing, spraying, wiping . . . toxicity, safety measures.

RETURN COUPON FOR SEMINAR RESERVATIONS . . . LIMITED SEATING

Seminar ticket includes show admission . . . a \$5.00 saving!

CHECK LOCATION: ☐ NEW YORK CITY ☐ CHICAGO

☐ SEMINAR I ☐ SEMINAR II ☐ SEMINAR III

No. of tickets _____ No. of tickets _____ No. of tickets _____

☐ My check is enclosed for all 3 Seminars @ \$100 per person \$ _____

☐ My check is enclosed for Seminars checked @ \$40 per Seminar, per person \$ _____

Name _____

Address _____

City _____ State _____ Zip _____ Phone _____

Return to: Marvin Park & Assoc., 600 Talcott Rd., Park Ridge, IL 60068, 312/823-2151

For tickets and information write: Marvin Park & Assoc., 600 Talcott Rd., Park Ridge, IL 60068 312/823-2151.

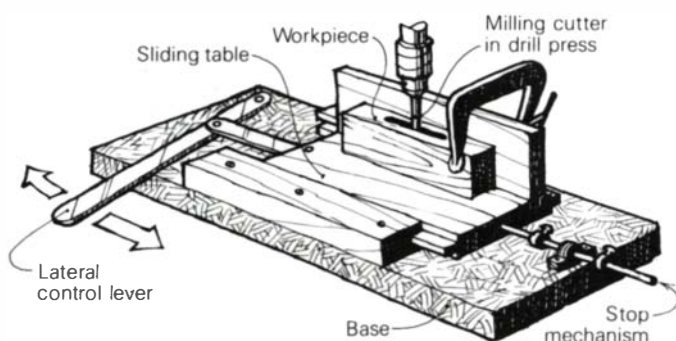
fast. I have used this procedure with a large number of projects using several species of wood without a single failure.

—William Wisniewski, Albion, Pa.

Drill-press mortising fixture

Here's a fixture for cutting mortises on the drill press using fluted end-milling cutters. A lateral control mechanism, made from 1/8-in. steel plate, pivots at three points and gives the fixture the back-and-forth movement needed to cut the mortise. The stop mechanism is a 1/4-in. rod that passes through a collar piece that is screwed to the base. Two sliding collars, fastened in place on the rod with setscrews, limit the movement of the sliding table. To use, clamp the fixture to the drill-press table. Clamp the work to the fence and set the stop collars for the size mortise needed. Your right hand, on the drill-press feed, controls the depth of the mortise, while your left hand controls the lateral movement for the length of the mortise.

—Mario Rodriguez, Brooklyn, N.Y.

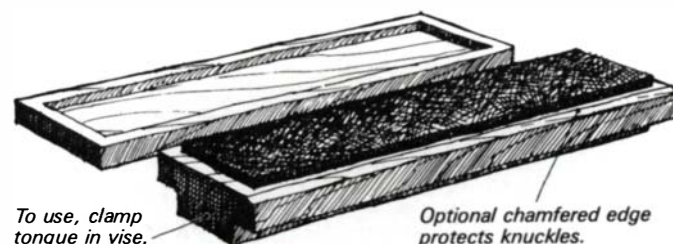


Hazardless honing

Here is a simple combination storage box and jig that will enable you to use your oilstones more effectively and safely. What makes the box unique is a wide tongue cut into the bottom. In use, the tongue is secured in a woodworking vise, ensuring a stable, firm foundation for the oilstone.

To make the box, cut blocks for the base and cover from any hardwood. Use a drill press with a multispur or Forstner bit to remove most of the waste. The cavity in the base should be about half as deep as the stone. The cavity in the cover should be 1/16 in. or so deeper to provide clearance. Chop out the remaining waste with a chisel, making sure the stone fits snug in the base and doesn't rock. To complete the box, saw away the bottom corners of the base to leave the tongue.

—Al Ching, Fullerton, Calif.



Enhanced table-saw miter gauge

For five years I have looked unsuccessfully for a 10-in. table saw with a "rolling table" facility for crosscuts and miters. The one I'm familiar with is a big, old Oliver. The new Rockwell and Powermatic sliding table attachments are similar in concept and are fine if you have \$2,000 to spend on the

HEGNER

World's First

MULTIMAX-2

UNIVERSAL PRECISION SAW

VERSATILITY
unmatched
by any band saw

OPERATION
superior to any
jig or scroll saw

HEGNER SAWS CUT:
PRECISELY, RAPIDLY; EVERY Kind of Wood up to 2";
Plastics up to 1 1/2"; Non-Ferrous Metals up to 3/4"; Med.
Hard Steel up to 3/8"; Turning Radli as small as 0.002"; No
Relief Cuts necessary; No Finishing necessary

HEGNER Saws mean QUALITY for Fun & Profit
(Model Polymax-3 also available)

For free Catalog write to:

AMI, Ltd.

Advanced Machinery Imports

2735 Tanager Dr., FW
WILMINGTON, DE 19808
Phone 302-999-9233

HEGNER Saws are also displayed and demonstrated by our dealers below:

CALIFORNIA:
THE CUTTING EDGE
3871 Grand View Blvd., L.A., CA 90066 phone 213/390-9723
1836 Fourth St., BERKELEY, CA 94710 phone 415/548-6011

NEW YORK:
GARRETT-WADE COMPANY
161 Avenue of the Americas, N.Y., NY 10013 phone 212/695-3358

TEXAS
DALE WOODCRAFT & TOOL CENTER
12323 N. Central Expwy., DALLAS, TX 75243 phone 214/233-6949

• TEAK • EBONY • MILLWORK • DRY KILN FACILITY • BASSWOOD •

• PADOUK • BIRCH • CHERRY • WALNUT •

YUKON LUMBER CO.

520 W. 22nd St. • Norfolk, Virginia 23517 • (804) 625-7131

• POPLAR • OAK • MAPLE • ASH • MAHOGANY •

• COCOBOLO • BUBINGA • PURPLEHEART • ROSEWOOD • WENGE •

Artistic Woodturning "is the first book in the field that is written for the advanced lathe man but is so clearly written (with 720 step-by-step photos) that even a novice can easily follow the instructions and produce extraordinary results. If you don't grin with joy while you first flip through the 255 pages, I'll eat my hat!" *Reviewed in Leichtung Fine Tool Catalog.*

Send \$19.95 for clothbound or \$15.95 for paperback to:

Brigham Young University Press
205 UPB/939, Provo, UT 84602

BAND SAW BLADES

Industrial Quality
Welded to Your Specifications
Wood or Metal Cutting (specify)

Blade Widths	Available Teeth Per inch	Price/Inch Length
1/8", 3/16", 1/4", 1/2", 5/8", & 3/4"	(3 to 32) (3 to 18)	\$.04 \$.05

To Figure Band Price: Blade Length
in inches X Price Per Inch + \$1.85 Weld Charge
Add \$2.00 to order price for shipping and handling.
Minimum order price \$10.00. Prices expire 12/31/81
Discount of 10% on 10 or more blades. Prompt delivery.

Send Payment
With Order To:
BUCKEYE SAW CO.
550 W. MC MICKEN
CINCINNATI, OHIO 45214



FURNITURE HARDWARE



Paxton B-4 Catalog. \$1.50
UPPER FALLS, MD. 21156

For the largest
inventory in the East
of woodworking
machinery & supplies
Powermatic, Rockwell
and Makita
call, write or visit

American Machinery & Motor Co., Inc.

22-24-26 Howard St.
New York, N.Y. 10013
Telephone (212) 226-4577

Fine hand tools

The finest tools from around
the world are now available to
the Canadian woodworker.

For our 96 page colour catalogue,
send \$1.00 to:

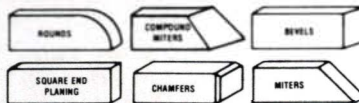
Lee Valley TOOLS LTD.
857 Boyd Ave., Ottawa, Ont. K2A 2C9

Any wood,
soft or hard,
it's



THE WOOD-FITTING WIZARD

Strong wood joints need accurate cutting—or planing and sanding to fit. Sawing can't do it, but razor-accurate **TRIMMING** can! The **LION MITER-TRIMMER** accurately trims wood ends to a glass smoothness. Any angle from 45° to 90°. With this trimmer, you'll make perfect miter joints in minutes; you'll trim square ends plane-smooth ready to join. The **LION MITER-TRIMMER** also does a fast, precise job on bevels, rounds, compound miters and chamfers with ease! Super sharp tool-steel knives will make thousands of cuts and last for years. A precision-engineered tool, the **LION MITER-TRIMMER** is priced under \$200.00.

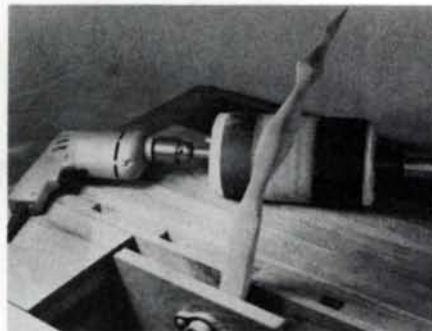


FREE BROCHURE shows how the **Lion Miter Trimmer** can make you a "wood-fitting" wizard with greater accuracy, using less time and effort. *Write today!*

POOTATUCK CORP.

Dept. FW-7, R.R. 2, Box 18
Windsor, VT 05089 (603) 675-2105

You'll take pride
in your sanding ...



... if you use the Kuster **AirSander**.™

The *portable* inflatable professional drum sander. Designed to give you multiple benefits in contour sanding, sculpting, both coarse and fine removal, plus the most delicate finishing touch!

A wide range of sizes and grits for all of your sanding needs. What else do you need? Nothing more than a bicycle pump!

Write today for descriptive literature and complete price list.

Kuster Woodworkers

Box 34
Skillman, New Jersey 08558

AT LAST...
The Package You
Have Waited for:

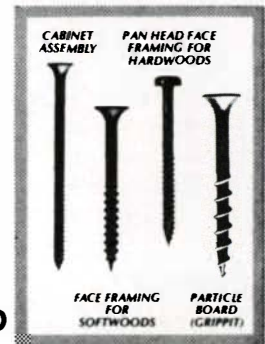
Handi-Pak by ESC



Specialized Screws for your
Woodworking. In packages of
50 - 100. (Hinge Screws: 500)

CASE-HARDENED STEEL

won't
snap
in half.
**RAZOR
SHARP**
Points
penetrate
easily.
Phillips &
Square
Drive
STOCKED
for



IMMEDIATE SHIPMENT.

FREE DELIVERY

Satisfaction guaranteed or your money back.
(\$25.00 MINIMUM ORDER)

Please send

- ☐ SamplePak (3 screws for inspection)
☐ Fastener Guide/Price List

Company _____

Address _____

City _____

State/Zip _____

Phone () _____

Name _____

Title _____



SCREW CO. INC.
Box 1296-M
El Cajon, CA 92022

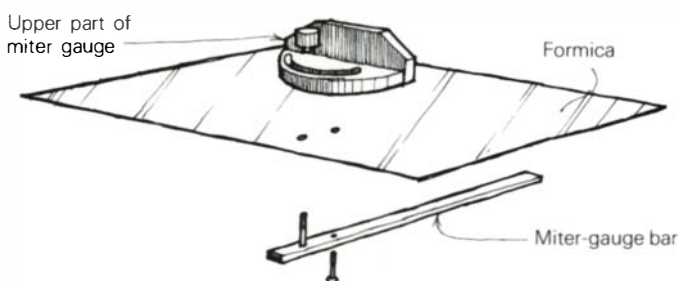
(714) 562-6100. Ext. M
800-854-2921 Ext. M
Calif: 800-552-8844, Ext. M

FWW81-7

saw and rig. They take up room on the left of the saw and are really designed for the large stock requirements of a cabinet shop. There are plywood jigs that sit atop the saw and serve the purpose, but I've found them to be inaccurate. My solution is simple, inexpensive and as effective as the expensive attachments if you are not cutting whole sheets of plywood.

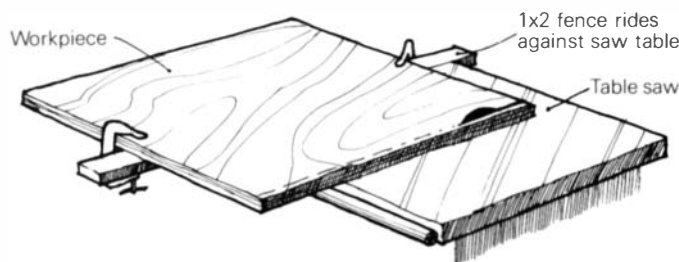
Simply take your miter gauge apart and insert a piece of Formica between the miter-gauge bar and the protractor fence. Cut the Formica the same size as the left half of the table and fasten the smooth side down. When using the fixture you can press down on the piece of wood being crosscut without causing the wood to bind as it slides on the table. The Formica spreads the pressure over a wider area. The addition of a backboard faced with abrasive paper practically eliminates creep.

—Michael J. Hanley, Cedarburg, Wis.



Crosscutting wide panels

Here is an accurate and simple way to crosscut plywood panels or boards that are too wide to cut using the saw's miter gauge. Start with a straight 1x2 longer than the panel is wide. Clamp the 1x2 underneath the panel so that it becomes a fence that



runs against the saw table's edge. Carefully measure and position the fence using a framing square. Then clamp the new fence to the panel with C-clamps. The method can be adapted to ripping plywood and wall paneling by lengthening the fence. By clamping the fence to wide panels at an angle, you can make miter cuts that are virtually impossible any other way.

—Steve DeLay, Hollister, Calif.

Auto-finishing tips adapted to wood

My shop is next door to an auto paint-and-body shop. Through the association I have been able to adapt several of their methods and products to wood finishing. It seems that the technology of auto-finish suppliers is steps ahead of their wood-industry counterparts. Certainly their marketing is.

First, I use naphtha (VM&P brand) as a wetting agent for rubbing down intermediate finish coats with wet/dry sandpaper. Naphtha's advantage is that unlike oils or water, it evaporates quickly and cleanly. You can remove the sanding scum with steel wool, wipe with a naphtha-dampened rag, and the surface is clean and dry, ready for the next coat.

Second, two DuPont auto-finish products, the 3679 re-

Unicorn Universal WOODS Ltd.

SPECIALTY FOREIGN & DOMESTIC HARDWOODS & SOFTWOODS VENEERS

LUMBER FOR EVERY WOODWORKING APPLICATION

OVER 80 SPECIES AVAILABLE:

EUROPEAN BOXWOOD	•	ENGLISH BROWN OAK
PERNAMBUCO	•	CORDIA
ENGLISH CHESTNUT	•	ROSEWOODS
OLIVEWOOD	•	EBONY
ENGLISH HOLLY	•	LABURNUM LOGS
CUBAN MAHOGANY	•	EUROPEAN PLUM
SOLID THUYA BURLS	•	LEMONWOOD
	•	CURLY ENGLISH SYCAMORE
	•	ANDAMAN PADOUK
	•	BURLED LOGS

AIR DRIED & KILN DRIED FLITCH CUT LOGS
COMPREHENSIVE STOCK AVAILABLE FROM 1" TO 6"

WRITE FOR FREE PRICE LIST
MINIMUM MAIL ORDER \$100.00
WHOLESALE INQUIRIES INVITED

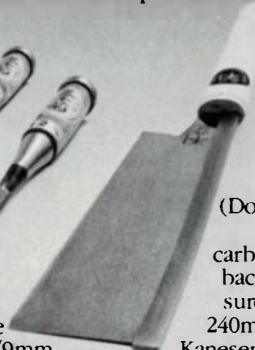
137 JOHN STREET, TORONTO, CANADA M5V 2E4 977-3791

A THOUSAND YEAR TRADITION OF QUALITY TOOLS FROM THE JAPAN WOODWORKER

Designed and constructed of superior materials to meet the precise demands of the professional.

Chopping dove-tails? Our dovetail chisels (Umeki Gata Nomi)

have thin, triangular crosssections which offer little resistance in tight cuts. Razor sharp edges. Handles of Japanese Red Oak. Three sizes: 6mm (1/4") \$19.55/9mm (3/8") \$20.75/12mm (1/2") \$22.65. Set of three—\$56.65 (10% discount).



Mitre cuts? Crosscutting? Dovetails? These are

Japan's finest cutting saws (Dozuki Noki Giri). Blades of high carbon steel. Rigid back & fine set assure precision cut. 240mm (9 1/2" blade) Kanesen—\$27.15. Entire dovetail set & saw—\$74.40. Write today for our new 32-page catalog. Send \$1.50.

Woodline the Japan Woodworker

1731 Clement Ave., Alameda, CA 94501
(415) 521-1810 Dept. FW29

Name _____

Address _____

City _____

State _____

Zip _____

Chisels — 6mm/\$19.55/Order #15.307.06

— 9mm/\$20.75/Order #15.307.09

— 12mm/\$22.65/Order #15.307.12

— Set of 3/\$56.65/Order #15.307.00

— Kanesen dovetail saw/\$27.15/Order #01.117.01

— Entire dovetail set/\$74.50

— New 32-page catalog/\$1.50



Calif. resident add 6% tax

DO-IT-YOURSELF

FINE FURNITURE KITS

- Heirloom quality
- Solid 3/4" hardwoods
- Easy to assemble
- Factory direct prices
- Money back guarantee



- Many models
- Prompt shipment



Send \$1.00 for color catalog

EMPEROR® CLOCK COMPANY

WORLD'S LARGEST MANUFACTURER
OF GRANDFATHER CLOCKS

Dept. F401 Emperor Clock Company
Fairhope, Alabama 36532



BUTTERNUT, WALNUT, ROSEWOOD, PINE, CHERRY, BUCKEYE and about a dozen other woods, in boards, slabs and freeform cut ovals. Pieces up to 6" thick, 3' wide and 16' long in some species. We specialize in coffee tables, benches, bars, carving stock, clock ovals and movements, accurately cut for you to finish. We sell by mail and from our fantastic wood "museum," 9-5 except Sunday. Send 50¢ for brochure.

WEIRD WOOD, Box 190FW
Chester, Vt. 05143, 802-875-3535

HORTON BRASSES

Nooks Hill Road, P.O. Box 120F
Cromwell, CT 06416
Tele: (203) 635-4400



Mfrs. of Cabinet and Furniture
Hardware for Homes and Antiques
Send \$1.50 for a Catalogue

The craftsman's quarterly
magazine from England

PUBLISHED BY Quailcraft

LANSDOWNE W'HE. LANSDOWNE RD.
ALDERSHOT. HANTS. ENGLAND.

'WORKING WOOD'



Volume 3 No. 1

Drawing for Design; Windsor
Chair Definitive; International
Whittling; Tool Collector's Club;
Quality Drawer Making; The
Mitred Dovetail; Introduction
to Woodcarving; Reports
on Auctions; Watch Case in
Ebony; Plus much more!!!

RATES: Specimen copy \$6
1 year U.S. & Canada \$20
U.S. Funds Only

Name _____
Address _____
City _____ State _____
Zip _____ I enclose check
\$ _____ please start with _____
(State Spring/Summer/Fall/Winter)
ALL BACK ISSUES AVAILABLE

THE MAGNIFICENT MALLET

- 14-oz... \$6.00
- 18-oz... \$6.30
- 24-oz... \$6.60
- 32-oz... \$6.90

+ \$2.25 Pstge.

Top Quality • Extra Durable • One-Piece
Lignum Vitae Carver's Mallet

Liberal discount to Schools and Dealers.
FREE 24-P. German steel tool catalog-write:

FRANK MITTERMEIER, INC.

IMPORTERS OF FINE TOOLS SINCE 1936

Dept. FW-7, 3577 E. Tremont Avenue
Bronx, New York 10465

USE ON:
Drill press
Small motor
Lathe
Shopsmith
Rockwell
Montgomery Ward
Craftsman
1/4" Elec. drill

Sleeveless DRUM SANDER

NO PRE-MADE SLEEVES TO BUY

ECONOMICAL—Simply cut sandpaper from standard size sheets. **UNIQUE** way of holding paper to drum. Twist of key and paper is tight. **SPONGE RUBBER** backing insures long wear of paper. Hubs 1/2" bore. Price includes 1/2" adapter but upon request we will substitute a 3/4" adapter for small drills. **ADD \$2.25 PER ORDER FOR HANDLING.**

- 1" x 3" long \$12.70
- 2" x 3" long \$13.75
- 2 1/2" x 3" long \$14.40
- 3" x 3" long \$15.70

ABOVE 4 DRUM \$51.20

2 1/2" x 4 1/2" \$19.90
3" x 4 1/2" \$21.25
Above sizes (without adapters) also available with 1/2" 20 R.H. Thread (Sears, Ward).

3/4" bore (Shopsmith) except 2"x3"
Send Check or Money Order
MONEY BACK GUARANTEE

SINGLEY SPECIALTY CO., INC.

P.O. Box 5087-F
Greensboro, N.C. 27403



Your home workshop can PAY-OFF

BIG...

START
YOUR OWN
MONEY
MAKING
BUSINESS!

Earn Extra Income

Right At
Home.



BELSAW
3-IN-1

Power Feed
Power Tool.

SEND FOR
FACTS TODAY!

Planer Molder Saw

Three power tools in one —
a real money-maker for you!

The BELSAW Planer/Molder/Saw is a versatile piece of machinery. It turns out profitable precision molding, trim, flooring, furniture...in all popular patterns. Rips, planes, molds separately...or all at once. Used by individual home craftsman, cabinet and picture framing shops, lumber yards, contractors and carpenters.

Never before has there been a three-way, heavy-duty woodworker that does so many jobs for so little cost. Saws to width, planes to desired thickness, and molds to any choice of patterns. Cuts any molding pattern you desire. Provides trouble-free performance. And is so simple to operate even beginners can use it!

30-Day FREE Trial! SEND FOR
EXCITING FACTS
NO OBLIGATION—NO SALESMAN WILL CALL

RUSH COUPON TODAY! BELSAW POWER TOOLS
9324 Field Building
Kansas City, MO 64111

BELSAW POWER TOOLS Co.
9324 Field Building
Kansas City, MO 64111

FREE
BOOK

☐ YES, please send me the FREE Booklet that gives me complete facts about Belsaw's Planer-Molder-Saw and full details on how I can qualify for a 30-Day Free Trial right in my own shop. I understand there is No Obligation and that No Salesman will call.

Name _____

Address _____

City _____

State _____ Zip _____

tarder and the 3602S acrylic lacquer thinner, work very well used with nitrocellulose and acrylic modified wood lacquers. Add the 3679 in small amounts to a cheaper utility thinner to upgrade it for use in finish-coat mixtures. The 3602S is a good damp-weather blush retarder and warm-weather thinner.

Third, I have adapted the auto shop's mist coat to produce a superior finish. After a piece has had its last finish coat and it has "flashed" or surface-dried (5 to 10 minutes) I recoat with a wet coat of one part lacquer to four parts thinner. This procedure seems to eliminate any overspray and overspray dust. It adds greatly to the surface uniformity. Little if any rubbing will be needed to produce a fine finish.

—Steve Ulrich, Kingsville, Tex.

Cutting circles on the bandsaw

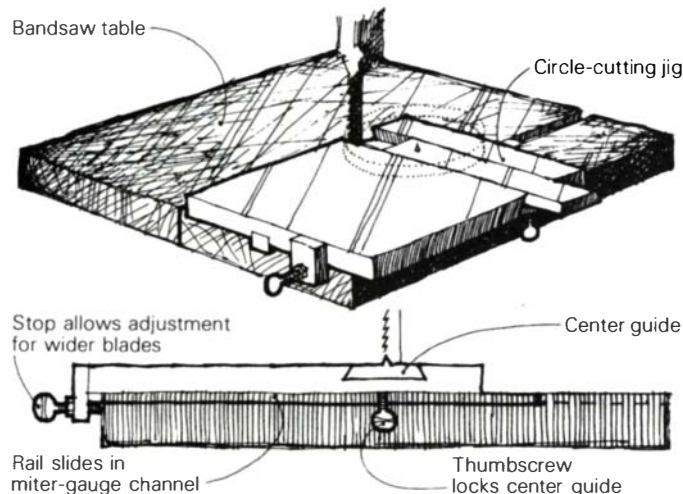
The circle-cutting jig I use in my shop offers several advantages over other circle-cutting jigs published in Methods of Work. First, because the jig uses the miter-gauge slot in the saw's table, no clamps are necessary. This not only saves time but also guarantees perfect size duplication even if the jig is removed from the saw. Second, since the jig's base stays in a fixed position relative to the blade, you can put marks on the base to calibrate circle sizes. Third, you can reverse the sliding-dovetail center guide to cut large circles. And last, an adjustable stop can easily be added on the front of the jig so it can be used with a variety of blades. The stop ensures that cutting always takes place at the true tangent of the circle.

To use, set the center guide to the desired radius, lock it in place with the setscrew and place the circle blank on the center pin. If the blank cannot have a center hole in it, then cut a dummy disc from plywood and secure the blank to the

dummy disc with double-sided tape. With the jig's rail riding in the saw's miter-gauge slot, ease the jig straight into the blade until the stop contacts the front of the saw table. Then turn the blank until the circle is completed.

Although you can make the jig from solid stock, it is easier to make the dovetail slot if you laminate the base. My jig (shown below) is made of acrylic plastic, which is threaded for the two thumbscrews. If you use wood, let in square nuts for the thumbscrews and secure them with epoxy.

—Thomas G. Marston, Mill Creek, W. Va.



Folding saw-dolly

I have to share my shop space with an automobile and other "foreign objects" so from time to time I have to move my

UNDERSTANDING ORIGINAL HARDWARE

The William and Mary Period (1680-1720)

Brass was almost a precious metal before 1770. Brass founders in the colonies were few in number; therefore, almost all the hardware was imported from England during this period. The hardware that was available, was small in size, and used sparingly. All the brass parts (backplate, drop, bail, post, and nut) were cast. Most of the earliest pieces were finished only where they would show. To embellish an otherwise plain pull, they were chisel chased by hand. Hand chisel-chasing is the art of creating a complete design through repeated hammer blows struck using many specially shaped steel chisels. Chisel-chasing indents the metal, unlike engraving, which removes it.

Our current catalog (mailed for \$4.00) illustrates 16 fine quality reproductions from the William and Mary period.

BALL AND BALL
463 West Lincoln Highway
Exton, Pa. 19341 • (215)363-7330

ALL-PURPOSE CONTOUR SANDER

for the WOODWORKING INDUSTRY



Complete with 6" dia. x 7" wide and 3" dia. x 7" wide pneumatic drums and 3/4 H.P. single phase motor.

PNEUMATIC DRUMS:

Available in 2", 3", 4" and 6" diameters in both 7" and 9" widths. 8" dia. x 9" wide is also available.

ABRASIVES:

Abrasive sleeves to fit all Sand-Rite pneumatic drums can be ordered from stock in grit #'s 60 to 150 in resin-bond garnet cloth. Coarser and finer grits can be made on special order.

Write for free brochure & price list.

Sand-Rite MFG. COMPANY

1611 NORTH SHEFFIELD AVENUE • CHICAGO, ILL. 60614 • 312/642-7287

For Hardwood Lumber



WOOD WORLD

9006 Waukegan Rd.
Morton Grove, IL 60053
(312) 965-4420

Over 50 species

- Rosewood • Teak • Zebrawood
- Walnut • Oak • English Yew
- Bubinga • Cherry • Mahogany

PORTABLE CHAIN SAW MILLS



Mill Your Own Lumber!

Four precision built, lightweight models available in either single or double engine versions. Capable of milling logs on site up to 50" wide, 1/2" to 15" thick, and any length.

Described in: Popular Science, June 1978
James Krenov - Fine Art of Cabinetmaking.

FOR FREE BROCHURE AND PRICES WRITE TO:

 **SPERBER TOOL WORKS INC.**

BOX 1224B • WEST CALDWELL • N.J. 07006 • U.S.A.
TELEPHONE: (201) 744-6110

CHEM-TECH T-88 BONDS JOINTS BETTER

The finest wood binding epoxy adhesive on the market. T-88 will cure at temperatures as low as 35° F. without shrinking. This strong, durable 1:1 mix will adhere to moist surfaces and is very easy to use, even if you're inexperienced. Clear amber formula forms virtually invisible joints. Waterproof? Absolutely!

Special price for initial order only —
1 pint \$7.95 P. Pd. U.S.A.

CHEM-TECH, Dept. K
4669 Lander Road, Chagrin Falls, OH 44022 (216) 248-0770

FREE PLAN WITH FIRST ORDER



BLUEPRINTS

FOR WOODEN TOYS, GAMES, PLAQUES, PUZZLES

CATALOG \$1.00 (REFUNDED WITH FIRST ORDER)

DESIGN GROUP FULL SIZE • EASY TO READ BLUEPRINTS
P.O. BOX 514, DEPT. E, Miller Place, N.Y. 11764

HARDWOODS FOR SALE

Walnut Cherry Oak
Clock and Table Slabs
Catalog - \$1.00

KOUNTRY KRAFT HARDWOODS
RR 1, Lake City, Iowa 51449

BUILD YOUR OWN POWER TOOLS

METAL PARTS KITS AT LOW FACTORY DISCOUNT PRICES FOR:

- 12-IN. BAND SAW
- 18-IN. BAND SAW
- 8-IN. BELT SANDER
- SPINDLE SHAPER
- 10-IN. TILT/ARBOR SAW
- COMB. DRILL PRESS-LATHE

PLANS Full Size Patterns \$300 EACH (ON ORDER)

KITS FROM \$34.99 to \$139.99

Step-by-step plans, photos show how. No machining or welding. 81,000 in use. 5-Year Guarantee. Send \$3.50 for plans (PPd) or 50 cents for Catalog.

GILLIOMFG., INC. Dept. FW-7, St. Charles, Mo. 63301

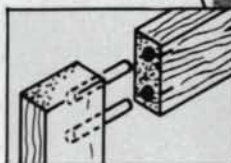
SUPER DOERS QUIZ #3

How can you take the guesswork out of woodworking?

Perfectly matched holes!
Jig guides drill bit accurately.

Depth gauge stops drill at desired depth.

Fast, easy doweling for stronger mitre and corner joints. And no guesswork!



Comes with six guides 3/16" to 1/2".

STANLEY DOWELING JIG

Want more reasons why Super Doers can't do without Stanley? We've got a book full of them. Send \$1 for Stanley's fact-filled catalog to: Stanley Tools, P.O. Box 3000C, New Britain, CT 06050.

STANLEY
helps you do things right.®



Warning - Protect your eyes
- Wear safety goggles when using power tools

©1981, Stanley Tools, Division of The Stanley Works. Super Doers is a trademark of Stanley Tools.

Our Japanese grinder. Because who else gives you such economy, exceptional function, and easy handling?

For sharpening and regrinding your edge tools, you'll really get a lot of mileage from this motorized grinder.

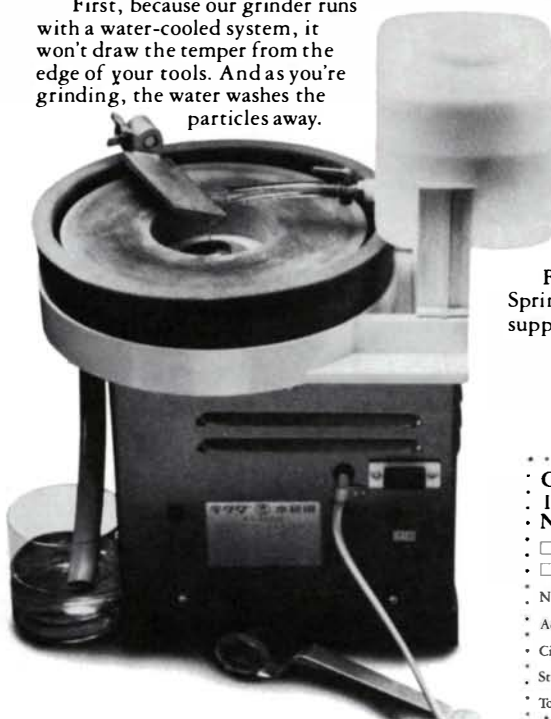
First, because our grinder runs with a water-cooled system, it won't draw the temper from the edge of your tools. And as you're grinding, the water washes the particles away.

Second, our grinder is a fully-equipped sharpening system. Centering around a slowly revolving flat stone equivalent to a natural Hard Arkansas. Substitute coarse grit and extra-fine stones are available.

And our Japanese grinder runs very smoothly. It's quiet, compact, and whether you buy the Standard or Heavy Duty version, it's completely portable.

Our Japanese whetstone/grinder. Engineered to sharpen your tools and produce mirror-like bevels and razor sharp edges like no other grinder in the world.

For more information, send for our free Spring 1981 catalog supplement.



Garrett Wade Co., Dept. FW-7-81
161 Ave. of the Americas,
N.Y., N.Y. 10013

☐ Send me your free 1981 Spring Catalog supplement.
☐ Send me your latest full-line Garrett Wade Catalog @ \$1.

Name _____
Address _____
City _____
State _____ Zip _____
Total amount enclosed \$ _____

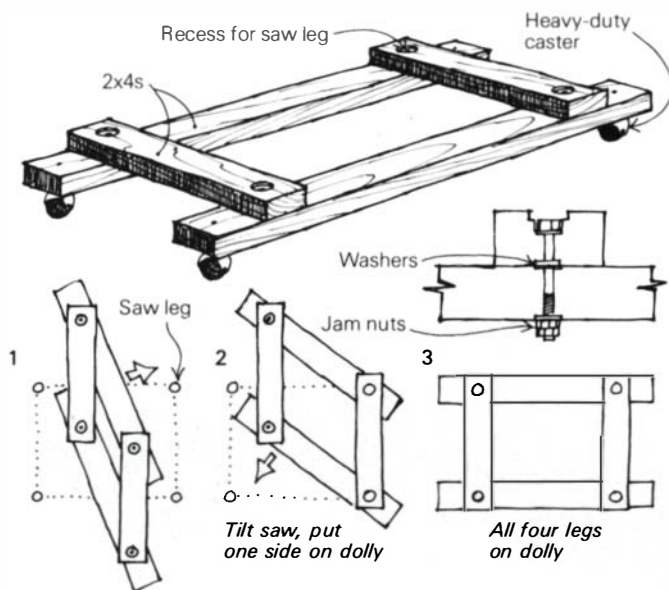


table saw, which is on a four-legged, sheet-metal stand. To avoid having to drag the saw across the floor, I made a dolly that collapses like a pantograph. The folding action allows me to load the saw on the dolly one side at a time as shown in the sequence above.

—Robert E. Warren, Camarillo, Calif.

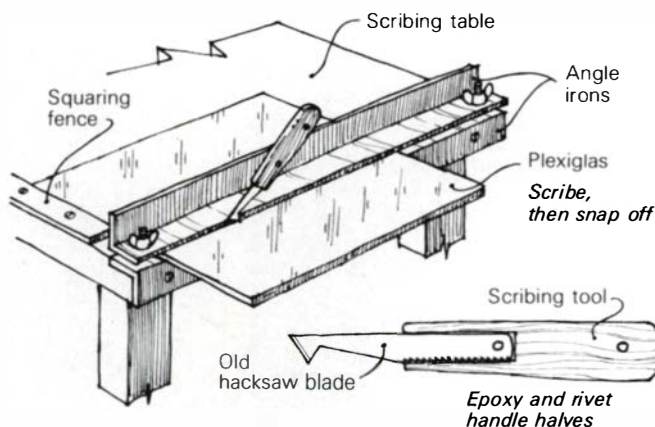
Cutting Plexiglas

You can quickly and easily cut Plexiglas with these two tools. To make the scribing table, start with a sturdy bench and add two lengths of angle iron for a vise as shown in the sketch. Set

the bottom angle iron into the bench so it's flush with the bench top. Weld two short sections of $\frac{3}{8}$ -in. threaded rod to the bottom iron so you can tighten the top iron on the Plexiglas with wing nuts. The scribing tool is a piece of hacksaw blade fit to a handle and ground as shown.

To cut the Plexiglas, tighten it in place on the scribing table. Then drag the scribing tool across the Plexiglas using the top iron as a guide. The tool should produce a thin, continuous curl on each pass. After several passes, whack the projecting Plexiglas with your hand. It will break clean and square.

—Jay Wallace, Ashland, Ore.



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

JOHNSON'S WORKBENCH

SPECIALIZING IN:

- FINE HARDWOODS
- WOODWORKING SUPPLIES
- WOOD CARVINGS
- UNIQUE GIFTS

Complete selection of Domestic, Imported and Exotic Woods.
Domestic and Exotic Hardwood Veneers, Hardwood Veneer Plywoods — all thicknesses.
Hand Carving Tools and Wood Blocks up to 4" thickness.
Complete selection and inventory of Woodworking and Cabinetmaking needs.

Write for our Price List.

L.L. JOHNSON LUMBER MFG. COMPANY
JOHNSON'S WORKBENCH

Locations: 51315 U.S. 33 South Bend, IN 46637 Phone: 219/277-8350
P.O. Box 278 Charlotte, MI 48813 Phone: 517/543-2727

We Control Our Quality Because
We Have Manufactured Our Own Lumber Since 1909.

An intensive full-time learning situation emphasizing traditional technique as well as modern methods of wood-working.

Individual level instruction, ample work areas and an industrially furnished machine room provide a stimulating and efficient learning situation for the serious woodworking student of limited experience. Benchspaces available for Fall 1981. For further information write or call:

PRIMROSE CENTER

for

Fine Woodworking and Furniture Design

401 West Railroad St. Missoula, Montana 59801
Phone - (406) 728-5911

POWERMATIC

**NOW IN STOCK—
FULL LINE OF
POWERMATIC
EQUIPMENT**

**16 Species
Domestic and Imported Hardwoods**

Evening Woodworking Classes Available—(203) 659-0767

CRAFTSMANSHIP IN WOOD INC.

27 Commerce St.
Glastonbury, CT 06033

INCH-SCALE SPOKEN HERE



Miniatures craftsmen across the globe know that small scale projects demand full-size skills. And a lot of these craftsmen have learned the inch-scale language from:

THE SCALE CABINETMAKER

TSC is published quarterly. 1 yr., \$15.00; 2 yrs., \$29.00; sample issue, \$4.25. Order from Dorsett Publications, Inc., P.O. Box 87F, Pembroke, VA 24136.

WOODBUTCHER

Shelter Institute Bldg.
38 Center Street
Bath, Maine 04530
207-442-7939

TOOLS

This English dovetail saw
will help you cut a fine line.



and our price will trim the cost.

Send \$2.00 for our special catalog and price list.

SAVE 20% ON TIGER OAK VENEER! 20 SQUARE FEET ONLY \$10.00

POSTPAID anywhere in USA
send for FREE veneering catalog

Hurry! Introductory offer!

You save 20%

Send \$10.00 today and receive 20 square feet of top quality Tiger Oak veneer in 3 foot lengths. Hundreds of uses for antique restoration or original projects. FREE catalog sent upon request. 101 varieties of exotic veneers, inlays, supplies. Simplified veneering instructions included. Hurry! Learn how to create beautifully veneered furniture quickly, easily using newest contact technique that you learn fast.

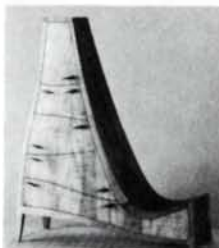
MORGAN VENEERS, DEPT. F04K32
1123 BARDSTOWN RD., LOUISVILLE, KY. 40204

Jere Osgood

Lamination

and
Wood
Furniture
Design

May 19-
June 26,
1981



For information about
summer, evening,
and academic-year
courses:

Program in Artisanry
Boston University
620 Commonwealth Ave.
Boston, Ma 02215
617/353-2022

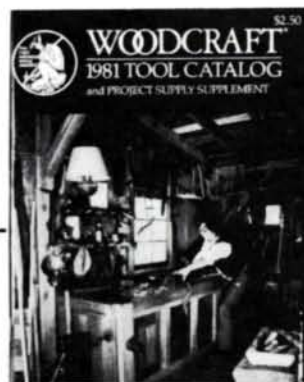
Delmhorst Model G-22 Wood Moisture Detector



SOLID STATE
COMPACT
LIGHT WEIGHT
DIRECT READING
6% TO 30% WOOD
MOISTURE RANGE

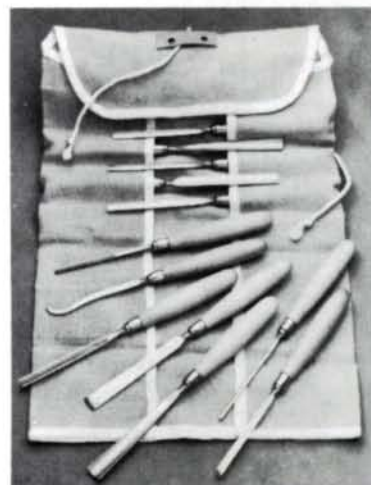
This is an excellent instrument for the craftsman. Moisture content is read immediately and directly on the meter dial. This is of great assistance in the drying and/or purchasing of lumber as well as in controlling wood moisture content at any step of production. A complete line of electrodes increases the accuracy and usefulness of the instrument.

Delmhorst Instrument Company
908 Cedar Street, Boonton, New Jersey 07005
201/334-2557



128 PAGE CATALOG AVAILABLE NOW

Our new catalog details over 3000 imported and domestic products, tools, benches and accessories which allow you the results you want with the satisfaction of using the best tools available. Many of these products are not generally available at local outlets. Send for your catalog today and see for yourself.



CARVING SET SPECIAL OFFER

This 12 piece set offers an excellent grouping of top quality tools for any fine craftsman. The tool blades are of tempered Sheffield steel with beautiful English beechwood handles. The set includes a tool roll to protect these fine tools. A \$126.00 value now priced at \$69.95.

52B10-D \$69.95 ppd.



WOODCRAFT®

Dept. FW81, 313 Montvale Ave.
Woburn, Mass. 01888

Please send _____ Carving Set(s)
52B10-D \$69.95

☐ I enclose \$1.00 for a 2 year subscription to the Woodcraft Catalog (free with order)

Payment by

☐ Check enclosed ☐ VISA
☐ Mastercharge ☐ American Express

Expires _____

Name _____

Address _____

City _____

State _____ Zip _____

FREE COLOR CATALOG



Build Your Own
Grandfather Clock
Prices Starting Under

\$250

(including movement
and dial)

- Do-it-yourself case kit, parts pre-cut
- Finished clocks
- Solid 3/4" hardwoods: black walnut, cherry, oak
- Heirloom quality
- Factory direct prices
- Solid brass West German chiming movements
- Money back guarantee
- Prompt shipment

MASTERCARD and
VISA ACCEPTED



EMPEROR®
CLOCK COMPANY

WORLD'S LARGEST MANUFACTURER
OF GRANDFATHER CLOCKS
Dept. 931 Emperor Industrial Park
Fairhope, Alabama 36532

I've made several trunks for my wife, who likes to paint them with different designs. The lids are rounded, and I make them by nailing and gluing 1/8-in. plywood panels to the curved pine end pieces. Filling the nail holes results in an unsightly surface when painted. How can I remedy this? Also, I've been using Titebond yellow glue. Is this the right choice?

—Don Nicholas, Tacoma, Wash.

I don't think that one thickness of 1/8-in. plywood is enough for a trunk because it's too inviting a thing to sit on, which would break the glue joint. Because you are making several of the trunks, I suggest that you build a two-part gluing form for laminating the tops (*FWW* #6, Spring '77, p. 37). Glue two 1/8-in. plywood panels together in the form first. When this glue is dry (I'd use Titebond), remove the curved panel from the form and glue it to the pine frame. Use plenty of clamps. Make the radius of the form slightly smaller than the radius of the pine end frames. This will help compensate for springback and make gluing a lot easier. Since this method doesn't use nails, you don't have to worry about filling holes.

—Tage Frid

Why is clear white pine preferred over clear fir (which is cheaper and readily available in most areas) in making wooden window and door frames? I'd like to use fir on the job because it's less expensive, but don't want to regret it later.

—Jerry Clancy, St. Louis, Mo.

For sash, trim and millwork, a prime consideration is the grade of lumber. The quality of the finish is affected not only by knots and other blemishes but also by cross grain associated with knots which have been excluded by ripping or trimming the lumber.

A second consideration is the evenness of grain with regard to earlywood and latewood. White pines, sugar pine and Ponderosa pine are fairly even-grained, and therefore ideal for millwork. The true firs are uneven-grained, having significantly denser latewood than earlywood. Working them results in more grain-raising and uneven finishing characteristics. Douglas-fir would be most troublesome from this standpoint.

The pines also yield cleaner, sharper detailed surfaces in moldings, with less splintering than firs; pines hold screws and other fasteners better. Grade for grade, pine is the better choice. You'll have to decide whether the fir is enough cheaper to compensate for its disadvantage.

—R. Bruce Hoadley

I have a walnut drop-leaf table and the leaves have moderately cupped. Is there any way to remedy this situation?

—John Smoot, Baton Rouge, La.

I have had some success in unwarping wide boards from antique tables using the following method: On a sunny, dry day, soak the concave side of the board with water and lay it in the grass, convex side up. Let it dry for a while.

Alternately, wet the concave surfaces of two cupped boards and clamp the wet sides together and set them in a dry shop. Monitor their progress every half hour or so. If the boards were sawn from compression wood, or are wide planks rift-sawn from near the pith, this procedure will have only temporary effects, or it will not straighten the wood at all. If the procedure works, coat both sides of the wood with the same finish to equalize moisture exchange and keep the wood from warping again.

—Jim Richey

I have used shellac sticks in a number of repair jobs and have not been successful in removing the excess after melting the initial amount into the opening. I've tried to chisel it, but it always seems to crack. I've also tried sanding with 400-grit wet/dry paper, using a solution of turpentine and linseed oil

as a lubricant. This smooths out the shellac, but always removes the finish on the surrounding areas. Is there any solution to this problem?

—Tom Hansen, Brooklin, Maine

Chipping usually will occur when cutting or scraping a burn-in stick repair. This is caused by the brittleness of the material when it cools. The best method for removing burn-in stick is to use a system developed several years ago by Mohawk Finishing Products. The trade name for their materials is "No-lift burn-in sticks," and a solvent called "Brasiv." These sticks look like the standard shellac sticks, but they contain certain resins that make them more stable and easier to work. Furthermore, the solvent is mild, works well with these sticks, and does not react with most finishes.

The procedure is to melt several drops of the burn-in stick into the damaged area and smooth it down. It should be reasonably level, and raised just slightly above the rest of the surface. I find the best knife has a small bent blade, which is heated over a clean alcohol flame.

The final leveling is done by taking a piece of 400-grit wet/dry paper and wrapping it around a small felt block. Apply the Brasiv to the sandpaper and gently remove the excess burn-in stick. Use the sandpaper only as a carrier for the solvent, and be careful not to abrade the surrounding undamaged finish. If you are working with a delicate finish, the sandpaper can be omitted, and the solvent applied directly to the felt block, although this does take a little longer.

Finally, let the repaired area dry for 10 minutes, and then use steel wool to even out the shine. These products and more information can be obtained from Mohawk Finishing Products, Inc., Rt. 30 N., Amsterdam, N.Y. 12010.

—Rick Butz

I'm an amateur woodworker and make stocks for my own rifles. I've used linseed oil a number of times, and recently tried polyurethane as a stock finish. I'd like to know if you have any thoughts on tung oil as a gunstock finish. How does it compare to varnishes and to other oils?

—Ralph Gustin, Brookings, S. Dak.

Stock finishing is a favorite topic of mine. In fact, back in the 1950s, Tom Samworth published my book, *Gunstock Finishing and Care*. It has since been reprinted by Stackpole Books. Tung oil is the best finish for a gun you use in the field. It is a better moisture shield than any other drying oil, and is probably better than the commercial varnishes and penetrating oils, for the same reason.

You can use pure tung oil (sold by Sutherland Welles, 403 Weaver St., Carrboro, N.C. 27570 and Woodcraft Supply) or polymerized tung oil, which Welles also sells. The pure tung oil dries to a dull finish, and I've never found a way to get a decent sheen. I prefer polymerized tung, which gives you a much higher sheen. You get a decent gloss, especially if you apply several coats thinly, well rubbed in by hand.

Thin down the first coat of tung with mineral spirits. Use about 75% oil to 25% thinner by volume so that it penetrates deeply. Apply it fairly wet, particularly on end grain at the butt, at the fore-end tip and the pistol grip. Soak the inside of the inletting. Where end grain soaks it up quickly, apply until no more soaks in. Then wipe it all down and let it sit for 48 hours. Don't let it build up on the surface during this first seal coat or you'll get uneven gloss later.

After it's dried for a couple of days, start rubbing in by hand a thin coat of the oil, unthinned. Let it dry 24 hours, and repeat. What you're doing now is building up a thin layer on the top of the wood. One seal coat followed by two thin coats should be all you need to achieve a moisture-resistant, durable finish that resists abrasion, handling and perspiration.

Watco Danish Oil should work well also, as should Water-

Over 70 Different
HARDWOODS
 FOR WOOD CARVING & HOBBY CRAFTS
 From Afrormosia to Zebra Wood
Kaymar Wood Products, Inc.
 4603 35th S.W. Seattle, Wa. 98126
 206-932-3584

● **TOY PARTS**
WHEELS—PEGS—BALLS
Send 25¢—Catalog Wood Parts
WOODWORKS Box 79238
 Saginaw, TX 76179

WOODWORKERS!
FREE! Simplified
 Instruction Manual
 Plus Catalog
 101 veneers, cane, plans, lumber, picture
 frame & embossed moldings! *Save 25%! Hurry!*
BOB MORGAN WOOD, DEPT. FO4K33
 1123 Bardstown Rd., Louisville, Ky. 40204

THE WISNER PLANE
Edge Trimming Block
 An improved Stanley #95 with fence and shear blade
 for precise square cutting. Heirloom-quality
 Bronze—\$94.50 plus \$2.50 shipping. This tool is
 handcrafted to an extraordinarily high standard in
 limited production. Send for details to:
Wisner Tools, 259 Whaley St., Freeport, NY 11520

Rc62 IS THE WOODWORKERS
DREAM COME TRUE
 • Ideal for bowl turning • Used for wet or kiln dried wood • Heavy weight controls shock
 loads & reduces vibration, giving the woodworker crisp & fine cuts that you can't obtain with
 lighter tools. • Wear resistant (refractory coating on hard steel). • Holds cutting edge longer
 than best tool steel gouges. • \$34 each • \$2.00 for shipping. The Rc62 was developed
 by a metallurgist/bowl turner.
 FOR FURTHER INFORMATION WRITE TO:
R. JACKSON Mfg. RD 5, Box 320
 Oak Ridge, NJ 07438

CATALOG of FULL-SIZE
FURNITURE PLANS \$1⁰⁰
 Wonderland for woodworkers! Over 150 full-size furniture
 plans! Tables, desks, curio cabinets, chairs—etc. Every-
 thing in full-size detail just like the plans fine furniture
 manufacturers use. Early American, Danish, Modern,
 Mediterranean, Spanish, English. Your dollar refunded
 with first order. Send today.
FURNITURE DESIGNS, Dept. KF-71 1425 Sherman Ave.
 Evanston, Ill. 60201

Build Your Own Family Heirloom
SWING ROCKER
 • Pre-cut do-it-yourself kit.
 • Pre-sanded, ready-to-finish.
 • 6 to 8 hours assembly time.
 • Money back guarantee.
 • Plans and parts available.
 Write for our FREE brochure.
HERITAGE
 DESIGN
 P.O. BOX 103 PHONE (319) 465-3270 MONTICELLO, IOWA 52310

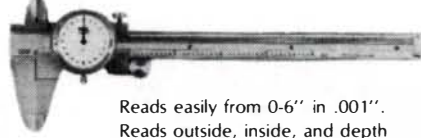
MOST COMPLETE SELECTION
IN CONNECTICUT
 25 SPECIES OF
 HARDWOOD • HARDWOOD PLYWOOD
 VENEERS • MARINE LUMBER
GENERAL WOODCRAFT
 100C BLINMAN STREET NEW LONDON, CONN. 06320 203-442-5301

We Carry Machinery & Tools by:
 • General • Rockwell • Makita
 • Williams & Hussey • Shopsmith
 • Milwaukee • Ulma
 and many other fine woodworking tools
WELBECK SAWMILL LTD.
 Durham, Ontario N0G 1R0
 (519) 369-2144

Where the experts buy their tools
WOODWORKER'S SUPPLY
 5604 Alameda N.E. Albuquerque, New Mexico 87113
PRECISION WOODWORKING
CALLS FOR PRECISION MEASURING TOOLS
SALE ENDS AUGUST 15, 1981

POCKET CALIPER

 Beautiful solid brass and wood
 construction. Measures to 5" in 32nd's, inside
 and outside dimensions.
 103-200 **\$13.75**

DIAL CALIPER

 Reads easily from 0-6" in .001".
 Reads outside, inside, and depth
 measurements. Stainless Steel,
 hardened, satin chrome finish.
 119-052 **\$69.95**

ANGLE DIVIDER

 Divide and bisect any
 angle. Makes fitting
 moulding, trim, and
 the marking of miters
 a snap. Machined steel,
 nickel plated.
 119-013 **\$19.95**

PENCIL COMPASS

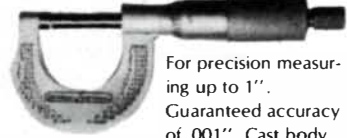
 Adjustable for circles up
 to 8". Positive lock
 holds any pencil or pen
 securely. Precise adjust-
 ment, excellent value.
 119-053 **\$3.25**

DIAL INDICATOR

 The most accurate way
 to set up jointers,
 planers, and shapers.
 Test for shaft run out,
 bent tools. Measures
 0-1" in .001".
 Magnetic base with
 flexible arms works in
 any position.
 119-050 **\$79.95**

DEPTH GAUGE

 6" stainless steel rule
 reads in 32nd's and
 64th's. Spring tension
 locks ruler at any posi-
 tion for easy depth or
 angle measurement.
 30°, 45° and 60° set-
 tings on both sides.
 119-054 **\$7.95**

MICROMETER

 For precision measur-
 ing up to 1".
 Guaranteed accuracy
 of .001". Cast body,
 machine cut graduations. At
 a price everyone can afford.
 119-051 **\$12.95**

TRAMMEL POINTS

 Marks circles too large
 for ordinary dividers.
 Hardened steel points
 are eccentric ground
 for fine adjustment.
 Complete with pencil
 holder to replace leg
 when so desired.
 119-032 **\$15.55**

STRAIGHT EDGE

 Precision ground straight edge for setting up machinery and layout to the most exacting standards. Satin
 chrome finish - 39" long.
 516-016 **\$17.95**

WOODWORKERS SUPPLY, INC.
 5604-B Alameda N.E., Albuquerque, N.M. 87113

PLEASE SEND ME
 QTY. PART # DESCRIPTION PRICE TOTAL
 Name _____
 City _____
 State _____ ZIP _____
☐ VISA ☐ MasterCard ☐ Check
 CARD NUMBER _____ EXP. DATE _____
 UNDER \$30.00 add shipping **\$3.00**
 TOTAL ENCLOSED _____

lox Transparent Seal, Minwax Antique Oil, McCloskey's Tungseal Danish Oil and ZAR Wipe-On Tung finish. They all are excellent products and should do what you want if you treat them as penetrating-type finishes and not surface varnishes. This means using a thinned-down first coat followed by a well-rubbed second coat. Don't let the oil build up in the checkered areas. You'll never get it off once it dries.

Avoid using water-base finishing products on gunstocks, as they will introduce water into the wood. This is a good way to warp the forearm and change the point of aim, as the warped wood will bear against on the barrel.

—Don Newell

I have a five-piece bedroom suite made of mahogany, and I want to refinish it. Many years ago the furniture was covered with a thick coat of white paint. What should I use to strip the paint, and once done, how should I refinish the set?

—Robert Dalbo, Dubois, Pa.

Modern paint removers are formulated so as not to harm or affect the wood underneath. However, some of the nonflammable, water-rinse types may change the color of the mahogany. On the other hand, a water-rinse type would probably do a better job in your case; therefore, you should first experiment on an unimportant piece or area, and see how you fare. If it does stain the wood, you'll have to turn to a solvent-base, flammable remover.

Your greater problem will be how to clean the wood once you've removed the paint. Most probably you'll find a varnish finish underneath the paint, and under that a pore filler. To do a proper refinishing job, all that must come off. This is the most important and most delicate part of the job. Use a good, strong laundry detergent in warm water and scrub the

pieces repeatedly, until all the varnish and filler has been washed away. I repeat: Experiment first on an unimportant piece, and if you are satisfied, proceed with the main job.

When your wood is really clean, your work is more than halfway done. Only you can decide what finish to apply, since that will depend on your personal preferences, your skill and your experience.

—George Frank

I've been turning some bowls that I've glued up from rings of eight segments each. But I've had problems with small pieces chipping out on the inside trailing edge of each segment. Experimentation doesn't give me an answer, and the only solution I can think of is using more segments so the grain in each piece is straighter. Any advice?

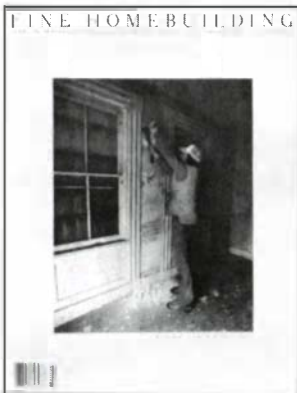
—A. Romanow, Winnipeg, Manitoba, Canada

The problem is the same when turning solid stock, except that there are only two places where the end grain rips out. Whether you're using a chisel or a scraper, the tear-out will be deeper according to the thickness of the chip you are taking. So, as you near the final shape, take lighter cuts to minimize the depth of the torn fibers.

Care in assembling the blank is important. The worse your miters fit and the thicker the glue line between the segments, the worse tear-out becomes. Peter Child recommends using a wide, heavy scraping tool with a fresh burr on it for taking the final cuts. Some turners take the burr straight from the grinder, but you might try treating it as if it were a cabinet scraper—hone the top surface flat, hone the bevel smooth and raise the burr with a hard steel burnisher. Take the lightest cuts you can manage as you approach the finished surface.

This procedure will help you minimize the tear-out prob-

FINE HOMEBUILDING



**The
new
magazine
about
fixing up
old houses
and building
new ones.**

It takes a lot of pluck to restore an old house or build a new one all by yourself. It also takes a lot of information to do it right: Ideas to get you thinking, facts about the building process, and the experiences of those who have already done it.

That's where *Fine Homebuilding* comes in. It's the only magazine about building and rebuilding houses written for people who are going to do the work themselves (or maybe have some of it done). People who are seriously interested in ending up with a fine house—livable and nice, but not necessarily expensive.

For more information, write us. Better yet, send \$14 for a one-year subscription (Visa or MasterCard accepted) to The Taunton Press, Box 355, Newtown, CT 06470 or use the order form in the back of this magazine. If you're not pleased, we'll be happy to refund.



The Taunton Press

52 Church Hill Rd., Box 355, Newtown, CT 06470



HOUSE OF TEAK

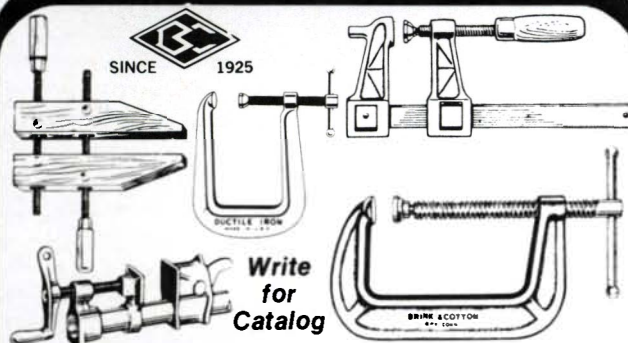
The boldest inventory in America of kiln-dried hardwood lumber from all over the world—ranging from domestic Ash to exotic Zebrawood. Wholesale inquiries only. Chester B. Stem, Inc., 2708 Grant Line Road, New Albany, Ind. 47150.

OF SPECIAL INTEREST

- English Yewwood lumber. Perfect for reproduction of Yewwood chairs.
- Now available: the whitest wood. One-inch-thick Holly lumber.
- For larger items: four-inch-thick Honduras Mahogany, 6 to 14" wide.



College of the Redwoods
Mendocino Coast Educational Center
is pleased to announce the inauguration of
a one-year program in
Fine Woodworking
under the direction of
James Krenov
Write for further information:
College of the Redwoods
Mendocino Coast Center
444 N. Main St.
Fort Bragg, Ca. 95437



SINCE 1925

Write for Catalog

THE BRINK & COTTON MFG. CO.
P.O. BOX 3035, BRIDGEPORT, CONN., U.S.A. 06605



TURNCRAFT CLOCKS

- Enjoy the satisfaction of making and owning a clock you have created. 20 plans to choose from.
- Complete and simplified plans. Easy to read, detailed construction. Ask any Industrial Education Instructor about the quality of Turncraft Plans and Service.
- Choose from Grandfather, Grandmother (Traditional, Early American), School, Cottage, Bracket, Steeple, Vienna Regulator, Wag-on-Wall.
- Movements, dials, hardware and all component parts related to clock building.
- New 72-page catalog—\$2.50 refundable on \$25.00 order. Add \$1.75 for 1st class mail.
- Special Discounts to Industrial and Quantity users.
- Special Discounts to Schools.
- Send \$4.50 for the plan 7020 as shown.

TURNCRAFT CLOCK IMPORTS CO.
Dept. FW811
611 Winnetka Ave. No.
Golden Valley, MN 55427
Phone: 612-544-1711

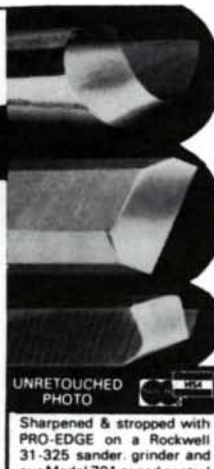
Pro-Edge*

The EFFORTLESS WAY to SUPERB EDGES

Adapts to most 1 inch Sander/Grinders
Send for our new FREE bulletin which gives details & prices on Pro-Edge*, the Customized Rockwell 31-325 Belt Sander/Grinder, & other accessories enabling you to produce the edges shown.

*As Described in POPULAR MECHANICS March, 1981, page 50

Prakto, Inc. P.O. BOX 1023
Birmingham, Mi. 48012 • 313/549-3833
CANADA: J. Philip Humfrey, Ltd. • 3241 Kennedy Rd.
Scarborough, Ont. M1V 2J9 (416) 293-8624



UNRETouched PHOTO

Sharpened & stropped with PRO-EDGE on a Rockwell 31-325 sander/grinder and our Model 701 speed control

Objective: Quality Makita industrial power tools at an affordable price.

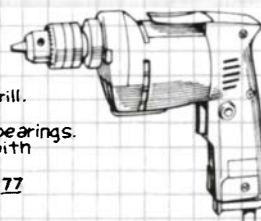


#2401 B Makita 10" Miter Saw. Ideal for cutting wood, plastic & aluminum. Cuts miters up to 45° left and right. Positive stops at 45° right and left and 90°. Electric brake for instant stop. Safety lock to prevent accidental starts. Accommodates all 10" x 5/8" arbor blades.

List \$284.00 Sale \$233.33

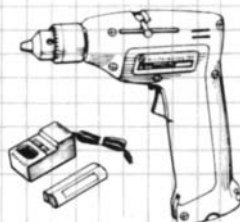
#6510 LVR Makita 3/8" Variable Speed, Reversing Drill. 0-1050 RPM, 3.3 lbs. Welded armature - all ball bearings. Double reduction gearing with industrial chuck.

List \$99.00 Sale \$77.77



#6010 DWK Makita Cordless 3/8" Reversible Drill Kit 600 RPM, 7.2 V. One hour fast charge with removable battery. Beautifully balanced, 2.4 lb. construction. Battery, charger with storage case and holster are standard equipment.

List \$124.50 Sale \$95.55



Glenn Wing
POWER TOOLS

1437 S. Woodward Ave.
Birmingham, Michigan 48011
(313) 644-5440

Sale prices apply while quantities last.

Write for a Rockwell catalog on Portable and Stationary Tools. Enclose \$2.00 for postage or our complete catalog at \$6.00 including postage.

Rockwell • Stanley • Bosch • Milwaukee • Makita



INSIST ON FAMOUS BUCK BROTHERS

to make the most of your woodcraft skills...since 1853

Buck Brothers has been the premiere manufacturer of fine cutting and turning tools here in America since 1853.

Now, as then, all Buck Brothers turning tools, chisels and gouges are hand forged, hand ground and finely finished in the tradition of old English craftsmanship.

You are sure to appreciate the weight, balance and responsiveness of these fine hand tools. See how they make the most of your skills.

OUR 1981 CATALOG IS READY.
WRITE FOR IT TODAY.

BUCK BROS. INC.
ESTABLISHED 1853
Millbury, Mass. 01527 Dept. FW-781



lem, but it won't prevent torn end-grain. Finally you have to sand out the torn areas. Start with coarse 50-grit or 60-grit paper, then proceed through 80, 120 and 220-grit paper. It helps if you can reverse the rotation of the lathe, sanding half the time in one direction, half in the other. Some turners have been able to get good results with a disc sander while the lathe is running, using a 3/4-in. thick foam pad between the disc and the paper.

Follow-up:

Re Glenn Behrle's problems with steam-bending mandolin slats (*FWW* #26, Jan. '81, p. 28), I'd add that slats will crack at the curl interfaces if you, first, try to bend excessively thick pieces of wood and second, if you overwet and overheat them with steam. Best to thin your slats between $\frac{7}{64}$ in. and $\frac{3}{32}$ in. and use a hot-pipe bending system (*FWW* #10, Spring '78, p. 62), with a small-diameter (1½ in. to 2 in.) bending iron. Small slats will bend easily over a hot pipe after they have been dipped momentarily in water. No soaking or steaming is necessary. Be sure to adjust the pipe temperature to about 250°F, not so hot as to cause instant scorching when the piece is slowly worked over it.

Maple in thin strips bends very easily. So easily, in fact, that lute makers take their $\frac{1}{16}$ -in. curly slats and bend them dry over a hot pipe, or alternately train a teakettle spout on them for 30 seconds and bend them with their fingers, using no pipe or form at all.

With slats thicker than $\frac{1}{8}$ in. you will get cracking along the curl with any of the above procedures, especially if you further soften the material with excessive steaming. Finally, for best results, select pieces that have tight, tiny curls rather

than large, wavy ones. They hold together far better and yield a finer bent surface. —*Bill Cumpiano, North Adams, Mass.*

Like John Schulte (*FWW* #27, March '81, p. 24), I too have encountered problems using the glue-joint cutter. Santner's answer didn't seem to address the problem directly, so perhaps my method will interest some readers.

As Santner says, the stock must be jointed, planed and thickened, though the last step can be omitted if the stock is face-jointed on one side. The stock, of course, cannot be thicker than the height of the cutter.

Set up the shaper for normal, counterclockwise rotation. Adjust the fences for a full depth of cut, but no more. Don't try to align the center of the cutter; instead, set the bottom of the cutter at or slightly below the level of the table; then lock the spindle. Run the first board partly through. Stop the machine and adjust the outfeed fence to support the stock properly. Now cut joints on the right-hand edge of each board (except for the outside edge of the right-hand piece).

Next, invert the cutter and reverse its rotation and re-adjust the fences, testing with a piece of scrap stock. Test-fit the piece of scrap stock to one of the previously jointed boards to determine if any adjustment in the height of the spindle is required to make the two pieces fit flush. When everything is right, proceed to cut the other edges. Be sure to keep the shaper table free of dust and chips, or variations in the depth of cut can result. And also make sure that your fences are parallel.

—Donald N. Sweeney, Newton, Mass.

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



THE CONOVER HAND HELD AIR WHEEL SANDER

A unique new portable sanding tool.

This extremely useful tool accepts 2½" diameter sleeves, which are held in place by inflating the rubber bag which covers the spindle. Inflation is accomplished with a small tire valve at the base of the handle. By varying the inflation pressure, shapes from concave to convex are easily accommodated with the same machine. The unit is powered via a ¼" shaft protruding from the end. The shaft may be chucked in either an electric drill, a flexible shaft, or an air motor.

#162 The Conover Hand Held Air Wheel Sander \$75.00 ppd.

#163 Hand Air Pump for above Unit \$7.75 ppd.

#162S Package of 4 resin bond aluminum oxide sleeves for above unit available in 80, 100, and 150 grit (specify.) \$10.75 ppd.





Black & Decker Air Motor for Air Wheel Sander

The best way to power an air sander is with the air motor pictured above. Engineered by Black & Decker to be the optimum motor for the job, it delivers ½ HP turning at 2800 rpm.

#164 The Black & Decker Air Motor \$190.00 ppd.

#16234 A Conover Special All the above \$260.00 ppd.
A \$283.50 Value SAVE \$23.50



ICONOVER

Conover Woodcraft Specialties, Inc.
18124 Madison Rd., Parkman, OH 44080
(216) 548-5591

Name _____

Address _____

City _____ State _____ Zip _____

shop tool different
Name _____

Address _____

City _____ State _____ Zip _____

please print clearly

HOW MANY	DESCRIPTION	ITEM PRICE	TOTAL PRICE

☐ Payment enclosed — check or money order ☐ charge to Visa ☐ Master Charge

card number _____

Master Charge, enter four digits below card no. _____

card expiration date _____

signature _____

Total amount _____

Ohio residents add 4% sales tax _____

Grand total* _____

INCA-PRECISION SWISS STATIONARY POWER TOOLS

**Don't just buy a woodworking machine,
buy what a machine can really do.**

**NEW,
THREE-WHEEL
BANDSAW**
for wood,
plastics;
3-speed
Throat 20"
Cutting Height . . . 8"
HP 1.5



Industrial quality INCA Saws, Jointers, Planers, and Shapers all designed for precision production and priced for the perfectionist craftsmen, cabinetmakers and hobbyists.

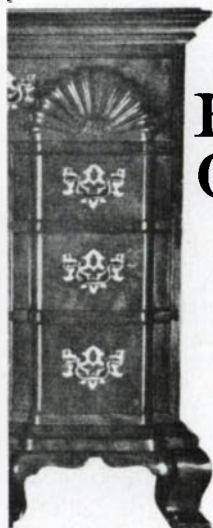
INCA INCA PRECISION **ANSON**
SWISS TOOLS

Send \$1.00 for postage and handling for INCA full line catalogue to:

ANSON INDUSTRIES INC.,
4115 San Fernando Rd., Glendale, CA 91204
*(exclusive Western distributors
for all states West of the Mississippi River.)*

Dealer inquiries invited

Before Your Next Woodworking Project



Send For Our Catalog

We'll tell you about our fine selection of hardwoods, veneers and turnings to meet all your needs!

Send 50¢ for the details to:

**American
Woodcrafters**

Est. 1875

1025 S. Roosevelt Ave., Piqua, Ohio 45356



Save \$30 on 100 assorted 1/4" sabre saw blades

**THESE ARE THE FINEST BLADES MADE, WITH ONE
JUST RIGHT FOR EVERYTHING YOU'LL EVER CUT.**

This is a real bargain. But these are not bargain blades. Not by any means. Made in Switzerland, recognized as the best by most sabre saw manufacturers, these FTS blades sell singly for \$50.00.

Now, to introduce ourselves, we'll give you every kind of blade you'll ever need at our direct importer's wholesale price.

ALL YOU GET

You get coarse blades for cutting large sections of lumber; shorter blades with different teeth sets for smooth, fine cutting of softwoods, hardwoods and composite boards; hack saw-like blades for metals of every kind; special blades for Formica® and most other plastics, for ceramics, masonry, gypsum, plasterboard, leather and rubber; plus blades for scroll cutting, for flush and top cuts.

Of course, all the most frequently used blades are repeated, so you'll always have one that's sharp, never have to run to the hardware store if a blade breaks or to get a blade for a special job.

NO-RISK TRIAL

Complete with a Quick Selection Guide. Color coded FTS

Blades fit every popular 1/4" sabre saw. Order on our 15-day money back guarantee.

To charge it, call **800-228-5454** toll free, 24 hours—7 days. (in Nebraska 800-642-8777) If you prefer, clip and send this ad with your check for **\$19.95** plus \$1.50 shipping and handling. (CT residents include sales tax.) There's no risk or obligation. (Order No. 205-1077)

**TD: The Fine Tool Shops Inc. Dept. FWT1
20-28 Backus Ave.
Danbury, CT 06810**

☐ Payment enclosed (to Fine Tool Shops Inc.)

☐ VISA ☐ Master Charge ☐ Am. Ex.

Acct. No. _____ Exp. Date _____

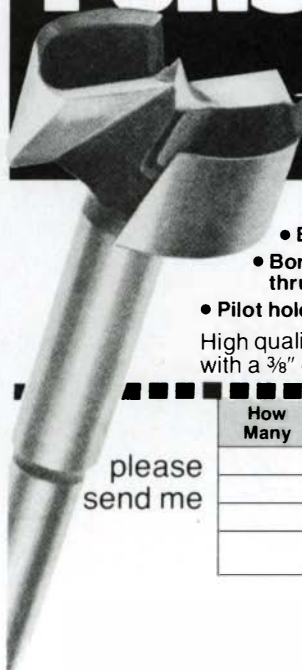
Signature _____

NAME _____ Please Print

ADDRESS _____

CITY _____ STATE _____ ZIP _____

FORSTNER BITS



- Drill flat bottom or thru holes.
 - Bore clean holes in thin stock, veneers, or end grain.
 - Bore any arc of a circle, ovals or curved openings—flat bottom or thru. Hole sides are satin smooth.
 - Pilot holes for rabbeting, mortising, and grooving.
- High quality carbon tool steel. Can be used in any portable drill with a 3/8" or larger chuck.

please
send me

How Many	Description	Price Each	Total Price
	4 pc. set—5/8", 3/4", 7/8", 1"	@ \$ 49.95	
	4 pc. set—1 1/8", 1 1/4", 1 3/8", 1 1/2"	@ \$ 59.95	
	4 pc. set—1 5/8", 1 3/4", 1 7/8", 2"	@ \$ 89.95	
	12 pc. set—one of each of the above (Save \$39.90 on 12 pc. set)	@ \$159.95	

Net Amount of Order

F Shipping, Handling, and Insurance

Illinois Residents Add 6% Tax

Total

\$1.75

☐ Check or Money Order enclosed

☐ Master Charge ☐ VISA

ACCT. # _____ EXP. DATE _____

NAME _____

ADDRESS _____

CITY _____ STATE & ZIP _____

Phone: 312-640-7766

AMERICAN INTERTOOL, INC.

1600 Jarvis Ave.,
Elk Grove Village, IL 60007

Every time it chimes you'll remember that you built it.



There is a great personal pride in owning a **Mason & Sullivan** heirloom quality clock.

Build your own from plans or easy-to-assemble kits for all levels of skill. The finest hand-matched hardwoods, solid 3/4" in walnut, oak, cherry or Honduras mahogany Precision imported movements and chimes. Solid brass dials. Choose from Grandfather, Grandmother, wall, desk, mantle and more. A Mason & Sullivan clock. Yours for the making, at a price you can afford.

Send \$1.00 for our new 32 page catalog today.



Name _____

Address _____

City/State _____ Zip _____

Mason & Sullivan Co.

Dept. 2120 Osterville, MA 02655

EDITOR'S NOTE: Many thousands of craftsmen have been encouraged and inspired by James Krenov's three books, which Jim Sedwick reviews below. The occasion for printing Sedwick's appreciative remarks is the publication this spring of a fourth book by Krenov, a photographic encore that gives his admirers a closer look at his furniture. It features 20 pieces, most of them showcase cabinets, which Krenov describes in a simple, thoughtful text and illustrates with 165 photographs, 50 in color. Titled *James Krenov: Worker in Wood*, the new book costs \$24.95 from Van Nostrand Reinhold Co. (7625 Empire Dr., Florence, Ky. 41042).

A Cabinetmaker's Notebook by James Krenov. *Van Nostrand Reinhold Co.*, 7625 Empire Dr., Florence, Ky. 41042, 1976. \$14.50, *hardcover*; 132 pp.

The Fine Art of Cabinetmaking by James Krenov. *Van Nostrand Reinhold Co.*, 1977. \$16.95, *hardcover*; 192 pp.

The Impractical Cabinetmaker by James Krenov. *Van Nostrand Reinhold Co.*, 1979. \$16.95, *hardcover*; 160 pp.

That space in the woodcraft library for sensitive and perceptive writing, conspicuous amid the historical and technical texts around it, has been filled with three remarkable books by James Krenov. These books, most enjoyably read in their order of publication, contain the thoughts of a man deeply concerned with our craft, what it is and where it may be heading.

A Cabinetmaker's Notebook is an introduction to Krenov, his work and his attitudes. In writing of his rich and romantic life, from Siberia to Sweden, from boatbuilding to the Malmsten school and then to his one-man shop, he shares with us the joys and anxieties of working alone, close to fine wood and tools. The joys are "working well" with fine wood planes, beautiful woods, and the discoveries one makes about the medium, the tools and oneself. And the anxieties: Can one maintain integrity in method and result? Is one good enough to follow a way that demands discipline and hard work, a way labeled "impractical?" And can one survive? Krenov offers no answers to these questions that press the sensitive craftsman. Rather, he offers priorities, inspiration and a path, and he assuages the feelings of those who are worried about competition, originality and a lack of public and critical response. There is a section of fine photographs and clear discussions about wood pieces he has made. We encounter surfaces and edges that were the result not of a belt sander but of a sensitive hand and sharp tool. The question arises: How does he do it?

The Fine Art of Cabinetmaking details Krenov's way with wood and tools. With wood, it is observation, closeness, patience. It's the excitement of working with air-dried, fitch-cut wood, of resawing it to suit one's intentions but with a sensitive regard for its qualities. With tools, it is getting along with small, fine machinery and making fine hand tools. In his workshop Krenov takes us through the processes of doweling, dovetailing, coopering doors, making fine drawers, joints, and frame-and-panel construction. He relates these techniques to the aesthetic and expressive content of a piece, so that they are not ends in themselves, for he wants us to see our craft not only as knowledge, but as knowledge and emotion.

The Impractical Cabinetmaker is an elaboration of Krenov's thoughts on woodcraft. He discusses the intricacies of making showcase cabinets, using "real" veneer and the subtleties of the knife hinge. We see the making of an open showcase, a cabinet "carved" with the sensitive use of hand tools, a writing table and a chess table. The making of these pieces illustrates what Krenov calls "composing"—building without a preconceived design and working directly in wood. This is a process of discovery, where what he calls good design becomes a part of

the craft process. For Krenov, the first step toward making is "logic of purpose," the wholeness of feeling good about what is to be done and about its meaning. From here it is a path of dream and discovery, perhaps frustrations, but not a path with originality and techniques as ends in themselves. In fleeting chapters, Krenov muses on the impulse for making an object, on mistakes and on getting started. Beautiful photographs, as in his other books, show that piercing clarity of his work: We see a pearwood music stand, serene and blushed with heartwood, a writing table with a feline stance, and a regal rosewood wall cabinet.

Krenov notes a change in direction and attitude in the crafts, that there is emotion in the making and wanting, and asks that we "look for the person in the object." Rather than follow names and trends, we must look closely at content and workmanship. Here, he contends, there is a need for criticism and help from those who write about and promote crafts.

Throughout these books runs a vein of defensiveness, which Krenov acknowledges in *Impractical*. He defends craft as a way of living rather than as a way of making a living, and he defends the satisfactions the work brings. In a time of visual superficiality, the craftsman must "establish a living relationship with his material." This may mean going the way alone, for Krenov perceives a "parting of the ways." Krenov writes with a passion that may disturb some, but it is never without an underlying hope that what is important in our craft will survive. It is the attitude of the amateur, to love one's work and material more than anything else about the craft, which is important for James Krenov.

—Jim Sedwick

Thonet: 150 Years of Furniture by Christopher Wilk. *Baron's Educational Series, Inc.*, 113 Crossways Park Dr., Woodbury, N.Y. 11797. \$18.95, *hardcover*; 143 pp.

The bentwood furniture of Thonet is remarkable from several viewpoints. It represents a technical breakthrough in the shaping and joining of wood. It is stylistically versatile, maintaining both popular and avant-garde appeal through 150 years of changing taste. And it is a commercial success story—Michael Thonet is the Henry Ford of the furniture industry. This book is a history of the Thonet business from its origin as a one-man cabinet shop in 1819, through its mergers with other bentwood companies to become the largest furniture conglomerate in history, and to its separation into German and American companies. The information comes largely from company catalogs and records, and the book is replete with photographs of the wide range of Thonet furniture: early bentwood designs, tubular steel furniture of the 1920s and 1930s, and the plastic and bent-ply furniture since 1950. The book is less informative about the technical concerns behind Thonet's styles. In outlining the problem of tension failure in solid wood, for example, we don't learn that steam is the heart of the process until late in the discussion. The aesthetic influences of and on the Thonet line are also thinly handled in places, though valuable insights do come from this sustained look at one company's prodigious output. Wilk points out, for instance, that the popularity of bentwood furniture in the late 19th century is probably a more direct source of the Art Nouveau style than has been noted. Still, as Wilk concludes, it is unlikely that Thonet or his sons considered themselves artists. They were producers of commercial furniture, and this book is strongest as a compendium of all they made in answer to the demand for innovative, inexpensive, lightweight, mass-produced furniture.

—R.M.

Jim Sedwick works wood in Wiliamsville, N.Y.

FINE OZARK MOUNTAIN HARDWOODS

kiln dried
1/2" - 4" thick

alder, aromatic cedar, ash,
cherry, red oak, white oak,
black walnut

T & K Lumber Co., Inc.
P.O. Box 356
Springdale, AR 72764
(501) 751-8049

We sell one board or a truckload.



HARPSICHORDS & FORTEPIANOS

Build it yourself from
one of our kits or let
our experienced crafts-
men build it for you.

*Three Centuries of
Harpsichord Making
by Frank Hubbard
(\$17 postpaid)*

For brochure
send \$1.00 to:
**FRANK HUBBARD
INCORPORATED**
144-W Moody Street,
Waltham, MA 02154
(617) 894-3238

MAKITA

More Power Tool
for Your Money

Model		List	Sale
2030	12" Planer - 6" Jointer	\$1880	\$1425
2040	15 1/2" Thickness Planer	1680	1235
2116	16" Bandsaw, resaws to 12 1/2"	1880	1425
3600B	2 3/4" H.P. Plunge Router	268	205
3601	1 1/4" H.P. Heavy Duty Router	178	140
9401	4" x 24" Dustless Belt Sander	248	188
9924DB	3" x 24" Dustless Belt Sander	190	145
B04510	12,000 RPM Finish Sander	68	48

We will not be undersold on Makita tools! Give us
a call! All tools are freight prepaid to continental
U.S.A. Send \$1.00 for Makita catalog and pricelist.

We also carry Inca power tools, Delmhorst mois-
ture meters, Watco finishing products and a wide
variety of Kiln-dried, cabinet grade hardwoods.

Lumber Special: 4/4 Select and better Black
Cherry, 12" and wider. \$3.25/b.f., 50 b.f. min-
imum purchase.

THE XYLOPHILE'S COMPANY

138A Loudon Ave., Lexington, Ky. 40505 (606)-254-9823

America's Quality Kits For Over 50 Years

Save **50%**-Build your own
Grandfather Clock



Build a quality Grandfather Clock by
Kuempel that can be a true heirloom
in your family for years and years.
Available in easy-to-follow plans or
complete semi-assembled hand-
crafted kits with illustrated instruc-
tions. We'll show you how to as-
semble your own at less than half
the cost. Write for Free descriptive
literature.

KUEMPEL
CHIME & CLOCK WORKS
Dept. 109 - 21195 Minnetonka Blvd.
Excelsior, Minnesota 55331

FREE SANDING BELTS

DIRECT FROM THE MANUFACTURER

(Manufactured at 642 North Eighth Street, Reading, Pa.)

With your order of one dozen or more belts, we will send you six FREE. All belts are aluminum
oxide first quality. Our electronic presses make smooth bump-free splices.

Check your size and how many dozen.
We will ship assorted grits unless
otherwise specified.

9" x 11" Paper Sheets
(100 sheets per package)

- ☐ 1" x 30" - \$10.75/doz.
- ☐ 1" x 42" - 10.80/doz.
- ☐ 1" x 44" - 10.85/doz.
- ☐ 3" x 18" - 11.75/doz.
- ☐ 3" x 21" - 12.25/doz.
- ☐ 3" x 23 1/4" - 12.70/doz.
- ☐ 3" x 24" - 12.75/doz.
- ☐ 3" x 27" - 13.25/doz.
- ☐ 4" x 21 3/4" - 14.75/doz.
- ☐ 4" x 24" - 15.25/doz.
- ☐ 4" x 36" - 18.95/doz.
- ☐ 6" x 48" - 20.90 1/2 doz. (3 FREE)

- ☐ 40-D- \$25/pkg.
- ☐ 50-D- 22/pkg.
- ☐ 60-D- 20/pkg.
- ☐ 80-D- 17/pkg.
- ☐ 100-C- 15/pkg.
- ☐ 120-C- 15/pkg.
- ☐ 150-C- 15/pkg.

A/O Finishing Paper

- ☐ 180-A- \$12/pkg.
- ☐ 220-A- 12/pkg.
- ☐ 280-A- 12/pkg.

Wet or Dry S/C Paper

- ☐ 220-A- \$19/pkg.
- ☐ 320-A- 19/pkg.
- ☐ 400-A- 19/pkg.
- ☐ 600-A- 19/pkg.

Other size belts on request.

Prompt delivery from stock.
MONEY-BACK GUARANTEE.

Add \$2.00 per doz. ordered for shipping and handling—PA residents add 6% sales tax.

☐ Check or Money Order.

☐ Master Charge ☐ VISA Exp. Date _____

Acct. # _____

Name _____

Address _____

City, State & Zip _____

INDUSTRIAL ABRASIVES CO.
644 North Eighth Street
Reading, PA 19603

Hobbywoods

Hobbywoods

*Amateur
or professional—
NOW you can get
fine DOMESTIC WOOD
By MAIL with complete
confidence!*

We stock one of the
largest selections of
domestic woods of all
kinds and sizes on
the East Coast.

- KILN-DRIED
- CABINET-GRADE
- HARDWOODS
- ETC.

Hobbywoods

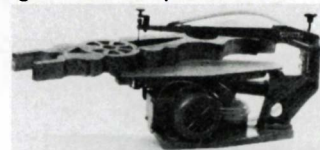
WRITE
OR PHONE
FOR FREE INFO
& PRICE LISTS

**1305 EASTERN AVE.
BALTIMORE, MD. 21231
PHONE 301-732-6071**

SPECIAL NOTICE TO INCA DEALERS

The Cutting Edge in Los Angeles, Cal-
ifornia manufactures accessories that
fit your fine line of INCA power tools,
like our custom-made leg extensions.
For complete details and accessory
catalog sheet write or call today.

Hegner Dealerships Available



As Western States (and Western
Canada) exclusive distributor of the
versatile Hegner Jig Saw, the world's
first universal precision saws, we are
looking for dealers in the Western
States and British Columbia.

(213) 390-9723

Mail today to: **THE CUTTING EDGE**
The Cutting Edge
Attn: Bob Schwarz, President
3871 Grand View Blvd.
West Los Angeles, CA 90066

☐ Yes—send me a list of accessories you
manufacture to fit INCA power tools, plus
dealer information.

☐ I am interested in a Hegner dealership;
send details.

Name _____

Company _____

City, State, Zip _____

Phone _____

Adventures in Woodworking

REPRODUCING THOSE OLD-TIME FINISHES

BY GEORGE FRANK

Several letters on my desk are awaiting replies. My policy is to answer inquiries promptly; these are unanswered because they all contain the same question and there is no simple answer. The question is: How can I reproduce those rich antique finishes?

There is no such thing as a single, standard, rich "antique" finish. There are as many antique finishes as there are antiques. If there is a basic rule for recreating an old finish, it is this: Have a sample. You must know the finish you are after. Beyond this, anything goes and any way is good as long as it brings you closer to your goal. There are no other rules, but there are a few tricks of the trade that may help. Before telling about them I want to relate three anecdotes.

In September, 1951, I was summoned to the office of a prominent decorator. He showed me a little wine table, commenting that it was a "genuine antique." They were used in elegant homes 150 to 200 years ago to rest the wineglass on, while the guest lounged in an easy chair. He asked me to make 12 copies of the small table to give his customers at Christmas. There would be no story had he not then said, "I know you cannot reproduce the patina of this fine piece, but do your best." Late in November I delivered the 13 tables, and even today he does not know which one is the original.

A few years later a decorator asked me to her store on 57th Street in New York. She had two antique doors from France, and she asked me to build an armoire incorporating the two doors. She repeated the other decorator's words about how I would be unable to reproduce the fine old finish. I took my time, and so it was nearly a year later when I asked her to come to the shop. She could hardly believe her eyes, and she thanked me for a magnificent job. Then, maybe thinking that she'd gone overboard, she added, "Of course, I can see the difference between the doors and the rest, but I doubt my customer ever will." Could she? I did not use her doors; in fact, I still have them. They were simply too far gone to use in the armoire. I wanted to give them back, but since she "recognized" them, I did not. If she reads these lines, she is welcome to pick them up.

In 1943 an apartment fire damaged a small Empire chest, scorching the finish and part of a door. The owner asked if I could salvage her "precious, fine piece," since "it was made by true craftsmen of the past who had pride in their work, unlike the woodbutchers of today." She also believed that quality and knowhow belong only to the past.

Two months later I delivered her restored cabinet. "Now," she said, "this masterpiece of ages past will again grace my home." I have her "masterpiece of ages past," and she has a copy, hastily made. Still, she made the best bargain. Her antique was a poorly made fake, while my replacement was made with far greater care—but I'll trade again, if she wants.

The point is that in each of the three cases I had a sample to go by, a color and a finish to copy. There are no products or set ways to reproduce antique finishes, but I will tell you about a few tricks. I do so reluctantly, since these ways are unorthodox, and I am practically discrediting myself.

The little table was made of Cuban mahogany. Its original finish was medium brown, by now mostly faded to blond. The finish was varnish, finely rubbed, well aged. The grain was only faintly readable. Needless to say, my 12 tables were

made of the same wood, carefully selected to match the grain of the original. All the details were precisely duplicated. To reproduce the finish I started with rabbit-skin glue. This glue comes in approximately 6-in. by 6-in. sheets, and it has a fantastic power to absorb water, which is the main reason I like it. The dry sheet has to be soaked for a day or so before being cooked into a thick soup. This soup, which gels when cold, is extremely helpful in imitating antique finishes. It can be tinted by waterstains, and it can be loaded with dry colors. This colored or loaded glue can be spread over the wood in incredibly thin layers. How thin? The volume of the noise made by a snowflake landing on the windowsill parallels the thickness of the coatings I work with.

To produce the faded look on my tables I coated them with such glue, loaded with chalk and French ochre. The rabbit-skin as a binder permits me to leave on the wood, after sanding or steelwooling the excess, just as much of the coloring matter as I want, exactly where I want.

The next operation is the application of the varnish, again not done by the book. I use fast drying, clear, glossy varnish, but I cut it drastically, especially at the beginning: Ten parts thinner to one of varnish for my first three or four coats. I let every coat dry thoroughly and sand between coatings. I keep on staining between coats, varying the stain according to my sample and my imagination. I know that waterstain will not go through varnish, but I use it. If the job needs it, I use a second, maybe a third coat of rabbit-skin glue, spiced with the shade the wood lacks. With each application I get nearer to the finish of the sample. In the meantime, I do not forget the distressings on the model. Bruises, scratches, dents, wormholes, spots, burns—you name it—are faithfully repeated, but I try not to overdo them.

As I progress, my coatings get heavier and my rubbing more thorough. When I am satisfied with the similarity, I apply the last coat of varnish full strength, and read the label on the can. If it says the varnish will dry in 12 hours, I time myself and 11½ hours later I go over it with a coating of rabbit-skin glue, this time a little more concentrated and containing no colorants. The next day I wash the glue off with lukewarm water, rub the varnish with pumice and later with rottenstone. By then my finish looks almost identical to the sample. The last, infinitely thin coating of glue produces cracks invisible to the naked eye, and microscopic dust fills them up.

The decorator's two French doors were made of walnut, stained chocolate-brown, with graying areas. My armoire was built entirely of old lumber, and in its construction I copied all the shapes and profiles of the antique doors, down to the most minute details. Finally the armoire entered the finishing room. I had on hand (from my Paris shop) some *brou de noix*, the classic walnut stain. (American walnut crystals are just as good, sometimes.) I made a fairly strong brew of it, added some soda ash, and dyed the armoire everywhere: inside, outside, over, under, front and back, as was done by the craftsmen of yore. After sanding I repeated the operation, and by then I had my basic color, lacking black and darker brown. The next morning I came to the shop with a tin of cocoa, mixed in some lampblack, and stirred it into semi-liquid beeswax. Waxed with this creamy concoction the finish improved. Wax finishes, at least the good ones, cannot be rushed. Three or four days later I rubbed down the armoire with burlap and muscle power. Then with some fine steel

George Frank shares more wood-finishing lore in his new book, Adventures in Wood Finishing (Taunton Press, \$9.95).

THE WOOD and TOOL STORE at PUNKIN HOLLOW

FEATURING

- COMPLETE LINE OF RECORD TOOLS
- TYZACK SAWS
- SASH CLAMPS
- LAMELLO FASTENING SYSTEM
- MAKITA POWER TOOLS
- SELECTED BOOKS
- QUALITY HARDWOODS and VENEERS
- JAPANESE WOODWORKING TOOLS

WOODWORKING SEMINARS WITH...

IAN KIRBY on October 23rd, 24th, 25th
and November 20th, 21st, 22nd

- For a new and different catalog — send \$1. Refundable with 1st purchase.
- All inquiries — Write, Call or Visit

N 34 W 24041 W. Capitol Drive
Pewaukee, WI 53072 414-691-9411
VISA and MASTERCARD



There's a wealth of information and ideas in the back issues of *Fine Woodworking*.

Each issue of *Fine Woodworking* takes a detailed look at many aspects of our craft, in effect building a growing library of woodworking techniques. It's valuable information that doesn't go out of date.

The back issues are \$3.00 each postpaid. For a complete listing, write us for tables of contents. To order back issues, use the handy form in the front of this magazine.



The Taunton Press

52 Church Hill Road, Box 355, Newtown, CT 06470 1981 The Taunton Press



There's a name for a joiner's bandsaw this professional and this versatile.

INCA Model 710.

And we're pleased to have the Injecta INCA name on the newest, most precisely engineered bandsaw anywhere.

First, because it's very versatile. Our new Injecta INCA bandsaw has a 20" throat that's large enough to accommodate extremely wide pieces and complex curves—and has an 8" depth of cut that even permits resawing of thick boards. Blades range from an extraordinary 1/16" to 1", well-supported by ball bearing guides, top and bottom. No other bandsaw allows you to do fretwork this delicate, as well as resaw using a 1" blade. For handling very large stock, extension rails enlarge your table area to 40" x 20".

Second, because it's powerful. Our new INCA bandsaw has three standard speeds, and it's powered by a 1 hp. or 1½ hp. motor. So you can crosscut, make joints, make complex curves and shapes, and rip through just about any tough wood or non-ferrous metal with ease.

Third, because it's economical. Our 20" bandsaw is less than \$1350, including stand and 1 hp. motor. Backed by our famous Five-Year Limited Warranty.

There's only one name that matters when you're looking for a bandsaw this unique. Ours.



See the New INJECTA INCA Bandsaw at these Dealers:

GEORGIA Highland Hardware 1034 North Highland Ave. NE Atlanta, GA 30306 (404) 872-4466	MICHIGAN Farmers Supply, Inc. 630 North Silverleaf Gladwin, MI 48624 (517) 426-4549	PENNSYLVANIA Ardmore Hobbies 19A Woodside Ave. Ardmore PA 19003 (215) 896-6615
INDIANA Woodcrafter Supply Center 1715 North Sherman Dr. Indianapolis, IN 46218 (317) 359-9607	Herb David Guitar Studio 209 South State St. Ann Arbor, MI 43104 (313) 665-8001	VERMONT Sterling Pond Tools 412 Pine St. Burlington, VT 05401 (802) 862-0186
KENTUCKY The Xylophile's Company 138 East Loudon Ave. Lexington, KY 40505 (606) 254-9823	NEW HAMPSHIRE Mahogany Masterpieces RFD #1 Wing Road Suncook, NH 03275 (603) 736-8227	VIRGINIA Day Hardware 800 Baker Rd. Virginia Beach, VA 23462 (804) 497-6417
MARYLAND Craftwoods, Inc. York Road & Beaver Run Lane Cockeysville, MD 21030 (301) 667-9663	NEW YORK Arthur Reed/Wood Artisan 454 West Third St. Elmira, NY 14901 (607) 732-5510	WASHINGTON, D.C. W.S. Jenks & Son 738 Seventh St. NW Washington, D.C. 20001 (202) 737-7490
MASSACHUSETTS Harland B. Foster, Inc. 15 Bridge St. Great Barrington, MA 01230 (413) 528-2100	Stender Woodworks 9339 Boston State Road Boston, NY 14025 (716) 941-6388	WISCONSIN Mark Duginske 1010 First Ave. North Wausau, WI 54401 (715) 675-2229

Dealer inquiries are invited.

Garrett Wade Co., Dept. FW-7-81

161 Ave. of the Americas, N. Y., N. Y. 10013

☐ Send me information on the new 20" INCA Bandsaw, Model 710 FREE.

☐ Also, send me the complete INCA machine catalog. I enclose \$1.00.

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

We ship to retail customers
throughout the United States.

wool I started to work on the highlights. I repeated the staining, waxing and rubbing week after week, for ten weeks.

To add layers of color, I used my arsenal of dust balls. These are made of thick cloth, the size of a small handkerchief, made into a ball-like container and filled with rottenstone powder. I have about ten of these, the dust in each a different hue. To the rottenstone I add white, yellow, pink or black, or I forgo the rottenstone and use burnt or raw umber, or burnt or raw sienna powder.

As the armoire approached the look of the sample I stopped using my dark-colored wax. Instead, I dusted the wood with the dust I judged most appropriate and waxed over it, building up finish and color.

The finishing touch was again unorthodox. After letting the wax dry for a week I rubbed it out as hard as I could and padded a good layer of shellac over it. I know that one is not supposed to use shellac over wax, yet I did and it worked. The armoire acquired a pleasant, smooth shine, very close to the finish I was to match. The next day I cut the gloss of the shine using dry rottenstone on a rag and muscle power. When I achieved a very close match, I stopped.

So far I have been talking about reproducing antiques made mostly of solid wood. Other techniques are used for veneered pieces. Antiques with inlay or marquetry often used woods that were artificially colored before the logs were made into veneers. These colors frequently faded, and this is hard to imitate. I knew a manufacturer in Casablanca, Morocco, who left reproductions on the roof of his factory, exposed to rain and sun, to fade them. I worked in a Paris shop where we used a battery of lamps. Most shops, however, used chemicals like oxalic acid, chlorine, or a mixture of muriatic acid and

potassium dichromate—dangerous if not handled carefully.

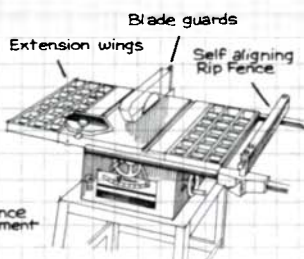
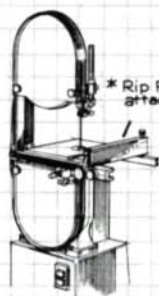
On the veneered antique there are more details to imitate than fading: The finish acquires, with age, a golden hue; the veneer cracks or develops minute warpings, and the original glass-smooth finish becomes wavy; and some veneers separate from their backings. The golden hue is comparatively easy to reproduce. Before finishing, we can wash the piece with a very concentrated brew of tea, or we may dissolve a minute amount of auramine (a modern aniline dye) in alcohol, and add a few drops of this to the shellac we use for French polishing. The cracking should be produced after finishing, by alternating exposure to dampness and to dry heat. A manufacturer in Orleans, France, stored his reproductions in his very damp cellar for a few months, and dried them in heated, well-ventilated rooms to produce these crack-ups. A faster method is to cover reproductions with mud, repeatedly, and dry them with a gas torch.

There is no way to describe all the tricks of the trade used to reproduce antiques. The Orleans manufacturer upholstered some fine chairs with costly damask and placed them in a chicken coop for hens to roost on. Horse manure was and still is used to age wood, and the smart craftsman uses only aged wood for reproductions. In this trade the rule is: anything goes as long as it gets you closer to the sample you are copying. There is no such thing as a rich, antique finish, there are only well-copied antiques. The most important tools are your head and your imagination. □

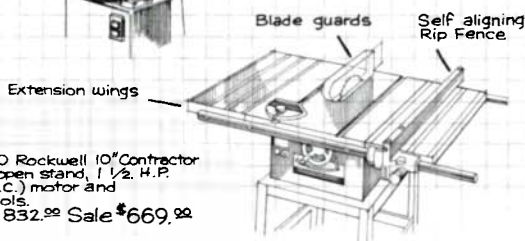
Fine Woodworking buys readers' adventures. Suitable length is 1,500 words or less—up to six typed pages, double spaced. Please include negatives with photographs.

Objective: Quality Rockwell industrial power tools at an affordable price.

*28-240 Rockwell 14" Band Saw with open stand. List \$523.99 Sale \$429.99. Above with 1/2 H.P. motor and controls. Only \$589.99.



*34-621 Rockwell 9" Contractor Saw, open stand, 1 H.P. motor and controls. List \$549.99 Sale \$449.99.



*34-410 Rockwell 10" Contractor Saw, open stand, 1 1/2 H.P. (T.E.F.C.) motor and controls. List \$832.99 Sale \$669.99.

*Optional equipment



Glenn Wing
POWER TOOLS

1437 S. Woodward Ave.
Birmingham, Michigan 48011
(313) 644-5440

Write for a Rockwell catalog on Portable and Stationary Tools. Enclose \$2.00 for postage or our complete catalog at \$6.00 including postage.

Rockwell • Stanley • Bosch • Milwaukee • Makita

POWERMATIC

MODEL 26 SPINDLE SHAPER



Here's one of
the best shapers
you'll ever own.

Besides its massive C.I. and steel construction (450 lbs.), you'll find two speeds—center mounted fence casting with micro adjust fence segments—oil lube system for bearings—plus many more features. We also have all the Powermatic and Rockwell Cutters in stock.

We also stock CARBORUNDUM Abrasives (belts and sheets) in most of the popular sizes.

And we can supply you with DoALL highest quality band saw blades as well as top name brand carbide tip circular saw blades.

We stock Acme edge and contour sanders, Sand Rite air bag sanders, plus many more.

USED STATIONARY SHOP EQUIPMENT is accepted in trade or purchased outright.

Write or phone:



WOODSHOP SPECIALTIES

P.O. Box 1013 East Middlebury, VT 05740
802-388-7969



Sterling Hardwoods, Inc.

"Quality Lumber — Friendly Service"

Ash, Basswood, Birch, Bubinga, Butternut, Cherry, Cocobolo, Cottonwood, Ebony, Curly & Bird's-Eye Maple, Red & White Oak, Pines, Poplar, Purpleheart, Walnut, Mahoganies, Iroko, Teak, Rosewoods, Kingwood, Tulipwood, Pearwood, Padouk, Zebrawood.

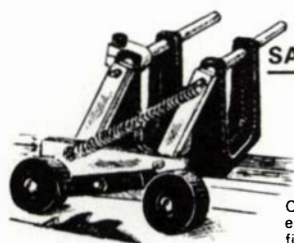
Many thicknesses 4/4 — 16/4 in stock, specializing in bird's-eye and curly maple.

Wood for furniture, flooring, paneling, veneers, carving, turning, custom milling.

Send for pricelist S.A.S.E.

412 Pine Street
Burlington, VT 05401
802-862-0186

SAVE TIME — SAVE SPOILAGE —



SAVE FINGERS!

with
RIPSTRATE™

Canted wheels hold even warped stock firmly against fence of table and radial arm saws. Prevents kickbacks. Adjusts itself to different stock thickness. No need to guide work with hands — just push through with stick. \$49.50 postpaid. Money back guarantee. Brochure available. Send check, m.o. Visa or M/C.

FISHER HILL PRODUCTS

FISHER HILL FITZ WILLIAM NH 03477

603-585-6883

BEAUTIFUL WOOD FINISHES

Watco Danish Oils provide an elegant, extremely durable penetrating finish IN the wood, not ON it! Primes, seals, hardens, protects and beautifies in one fast, easy application.



Natural and Medium, Dark and Black Walnut colors for all woods. Write Watco-Dennis Corp., 1756-22nd St., Santa Monica, Calif. 90404, Dept. FW-71

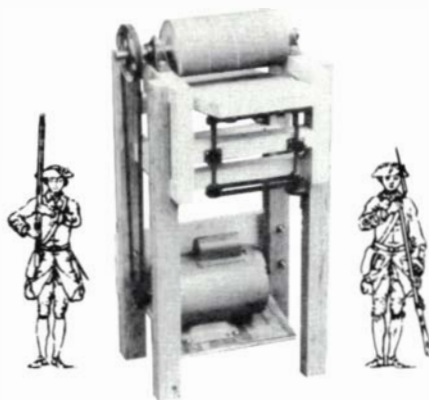
the Wood & Tool Store



1936 Record Crossing
at Harry Hines
west of St. Paul Hospital
Dallas, Texas 75235

214/631-5478

Makita &
Vega Power Tools
Hardwoods/
Fine Hand Tools
Books & Magazines



★ The DynaSand™ ★

A parts kit, a motor, and some scrap lumber pieces! That's

... the **Kuster DynaSand™**... the newest, most welcome addition to your woodworking shop! The best machine you could possibly have for accurate, yet inexpensive thickness sanding. Rugged, for fast dressing of coarse stock, yet supersensitive for that fine furniture surface! Send for your **DynaSand™** kit information today! And don't forget to ask about **AirSander™** and **Sand-Aid™**, the amazing pneumatic drum combo for your intricate contouring needs!

◀ Kuster Woodworkers ▶

Box 34, Skillman, New Jersey 08558

DOMESTIC & FOREIGN HARDWOODS

Quality stock for
Cabinet Work

Most all sizes from
1" up to 4" in thickness

HARDWOODS

ASH—BASSWOOD
BIRCH—BUTTERNUT
CHERRY—CHESTNUT
EBONY—MAPLE—OAK
POPLAR—ROSEWOOD
TEAK—WALNUT
Also hardwood plywoods

SOFTWOODS

SUGAR PINE—CYPRESS
CEDAR—SPRUCE
DOUGLAS FIR etc.

MAURICE L. CONDON CO., INC.

248 Ferris Avenue
White Plains, N.Y. 10603
914-946-4111

Open Saturdays 8 AM until noon

This W&H Molder / Planer Will Add Versatility And Economy To Your Workshop

Versatile — Because it does so many jobs so easily: base-boards, picture frames, raised panelling, models, miniature doll furniture, and much more. Converts from molder to planer in two minutes.

Economical — Because it does the job of several tools. Eliminates machine shop setting. Helps cut the cost of restoring old homes, building new ones. Cast iron and steel construction assures long, trouble-free life.

For molding, select from 40 sets of standard knives, or have special knives made from a sketch or sample of finished molding up to 7" wide.



For planing, converts waste and rough-sawn wood to dressed lumber, virtually free of wave and chatter marks. Planes boards up to 14" wide; planes down to 1/16".



Handfeed and powerfeed models available, starting from \$410.00. Master Charge and VISA cards accepted. Free brochure on request.



WILLIAMS & HUSSEY MACHINE CORP.

DEPT. 16, Milford, N. H. 03055
Call toll-free 1-800-258-1380

Events

Events listings are free but restricted to workshops, fairs, lectures and exhibitions of direct interest to woodworkers. The next deadline is July 1, for events beginning Sept. 1 to Nov. 15.

CALIFORNIA: Summer Woodworking Classes—woodworking techniques for sculpture, James DeVore, July 27 to Aug. 27; each, \$495. Write Skip Benson, California College of Arts and Crafts, 5212 Broadway at College, Oakland, Calif. 94618.

CALIFORNIA: Workshops with James Krenov, July 20 to Aug. 7, Mendocino. Details from Creighton Hoke, College of the Redwoods, Summer Program in Fine Woodworking, 542B N. Main St., Ft. Bragg, Calif. 95437.

CALIFORNIA: Carving Show—San Fernando Valley chapter, California Carvers Guild, July 11-12, Topanga Plaza Mall, Canoga Park.

CALIFORNIA: National Woodworking Machine and Furniture Show, September 24-27, Los Angeles Convention Center.

CALIFORNIA: Seminar on tools, July 12 and 26. Cutting Edge, 1836 4th St., Berkeley.

CALIFORNIA: Woodcrafts Exhibit—Sept. 1-14, Cutting Edge, 3871 Grandview, Los Angeles.

CALIFORNIA: Woodworking Seminars with Arthur Espenot Carpenter, Baulines Craftsmen's Guild, July 11-12 and Sept. 26-27. Signature Gallery, 127 Clement, San Francisco 94118.

CONNECTICUT: Summer Workshops—spinning wheel design and construction, Bud Kronenberg, July 11-12; steam-bending, Robert Green, July 20-24; chairmaking, Bruce Beeken, Aug. 10-14; period furniture restoration, Tim Philbrick, July 25-26; advanced joinery, Robert March, Aug. 1-2. Brookfield Craft Center, PO Box 122, Brookfield, Ct. 06804.

GEORGIA: Weekend Seminar—carcase and drawer making, July 11-12, repeated July 25-26, \$50; building the cabinetmaker's plane, Aug. 22-23, \$50. Contact McGee's Woodworks, 218 South Blvd., Carrollton, Ga. 30117.

GEORGIA: Saturday Seminars led by George Berry. Accuracy in woodworking, July 11; molding, July 18; cooping, July 25; \$60/month or \$25/class. Write 745 Edgewood Avenue N.E., Atlanta, Ga. 30307.

ILLINOIS: Excellence in Woodworking—trade show and gallery, Oct. 30 to Nov. 1. Hyatt Regency, Chicago. Exhibitor deadline, Aug. 1. Marvin Park & Associates, 600 Talcott Rd., Park Ridge, Ill. 60068.

IOWA: International Wood Carvers Congress, July 31 to Aug. 9, Fairgrounds, Davenport. Contact Chester Salter, Greater Mississippi Valley Fair, 2815 West Locust St., Davenport, Iowa 52804.

IOWA: Woodworking Demonstration by Tage

Frid at Paxton Lumber, Des Moines, Sept. 26; contact Steve Krohmer, (515) 283-2137.

KENTUCKY: Woodworking Symposia—turning, July 20-22; joinery, July 23-25, \$150 ea. Contact Dr. James R. Hall, Berea College Industrial Arts Dept., CPO 758, Berea, Ky. 40404.

MARYLAND: Exhibition at the Baltimore School for the Arts, Oct. 15 to Nov. 6. Deadline for exhibitors, Sept. 1. Contact Maryland Crafts Council, 5706 Smith Ave., Baltimore, Md. 21209.

MICHIGAN: Wood Carvers Show, August 1-2, Eddie Edgar Sports Arena, Livonia.

MISSOURI: Wood Collectors Society meeting, Sept. 21-23 at Point Lookout. Contact Damon Vincent, PO Box 255D, Hollister, Mo. 65672.

NEW HAMPSHIRE: Exhibit of Walker Weed's wooden furniture, Aug. 8 to Sept. 20. Jaffe-Friede Gallery, Dartmouth College, Hanover.

NEW HAMPSHIRE: National Craft Exhibit, all media, sponsored by the League of New Hampshire Craftsmen, June 20 to Sept. 7, Currier Gallery of Art, 192 Orange St., Manchester.

NEW JERSEY: Workshops—Chinese influence on contemporary furniture, Bob March, July 11; design problems, Giles Gilson, July 18. \$65 each. Craft fair, July 25-26. Write Sherrie Posternack, Peters Valley, Layton, N.J. 07851.

NEW MEXICO: Woodworker's Show—Sept. 4-8, LaFonda Hotel, Santa Fe. Contact "Once a Tree," PO Box 2604, Santa Fe, N.M. 87501.

NEW YORK: Contemporary Handmade Furniture in wood and metal, Sept. 15 to Oct. 24. The Elements, 766 Madison Avenue, NYC.

NEW YORK: Excellence in Woodworking East—Sept. 11-13, Madison Square Garden, NYC. Exhibitor deadline, July 1. Write Marvin Park & Associates, 600 Talcott Rd., Park Ridge, Ill. 60068.

NEW YORK: Furniture Exhibit by Jon Brooks and Howard Werner, Sept. 10 to Oct. 25. Workbench Gallery, 470 Park Ave. S. at 32 St., NYC.

NEW YORK: Marcel Breuer: Furniture—Museum of Modern Art, NYC. July 25 to Sept. 15.

NEW YORK: Marquetry Society of America convention, July 24-26, Wagner College, NYC. Annual Show, Sept. 2-29, World Trade Center. Write PO Box 224, Lindenhurst, N.Y. 11757.

NEW YORK: Song-bird carving, Mary Worriow, Aug. 17-28. Write Thousand Islands Museum Craft School, 314 John St., Clayton, N.Y. 13624.

NEW YORK: 5th Annual American Crafts Festival, July 4-5 and July 11-12, Lincoln Center, NYC.

NORTH CAROLINA: Country Workshops—white oak basketry, Louise Langsner, July 20-24, \$150; country woodcraft, Drew Langsner, Aug.

3-7, \$175; post-and-rung chairmaking, Dave Sawyer, Aug. 17-21, \$175. Write Drew Langsner, Rt. 3, Box 221, Marshall, N.C. 28753.

OHIO: Columbus Chippers Expo, July 11-12, Veterans Memorial Building, Columbus.

OHIO: Marietta College Craft National, all media, Oct. 31 to Nov. 29; entry deadline, Sept. 12. Contact Arthur Howard Winer, Marietta College, Marietta, Ohio 45750.

OKLAHOMA: Demonstrations by Tage Frid at Paxton Lumber—Sept. 19, Tulsa; contact Kevin Ishmael, (918) 665-2411; Sept. 22, Oklahoma City, contact Brad Courtney, (405) 235-2137.

OKLAHOMA: Carving Show, Eastern Oklahoma Woodcarvers Association, July 31 to Aug. 2, Woodland Hills Mall, 71st and South Memorial, Tulsa.

PENNSYLVANIA: 10th Woodturning Symposium and show, with 25 instructors, Sept. 11-13. Write Albert LeCoff, Amaranth Gallery, 2500 N. Lawrence St., Philadelphia, Pa. 19133.

SOUTH CAROLINA: Exhibition—wood, fiber, clay, glass and metal, Aug. 29 to Nov. 8; wood workshop with Tage Frid, Sept. 11-13. Contact Tamara Noble, Greenville County Museum of Art, 420 College St., Greenville, S.C. 29601.

TENNESSEE: Summer Courses—turning, Mark and Melvin Lindquist, July 20-24 and July 27 to Aug. 7; designing furniture, Bob Trotman, Aug. 10-14. Write Arrowmont School of Arts and Crafts, Box 567, Gatlinburg, Tenn. 37738.

UTAH: Workshops—furniture design, Alan Peters, July 13-17; wood laminating and bending, William Keyser, July 27-31. Write Brigham Young University, 242 HRCB, Provo, Utah 84602.

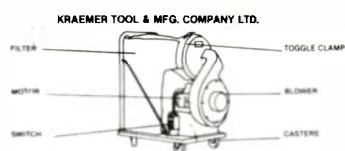
WEST VIRGINIA: Workshops—musical instrument construction, Paul Reisler and Paul Yeaton, July 12 to Aug. 14; cabinet and furniture building, Mark Warner, July 12-25; white oak basketry, Bill Cook, Aug. 9-14. Write Augusta Heritage Arts Workshop, Davis & Elkins College, Elkins, W.V. 26241.

WISCONSIN: 150 Years of Working Wood on the Wisconsin River—exhibit of tools, furniture, artifacts, Sept. 5 to Nov. 29; demonstration of cabinetmaking tools, Mark Duginske, Sept. 13 and Oct. 11. Marathon County Historical Society, 403 McIndoe Street, Wausau, Wis. 54401.

WYOMING: Four-day Professional Seminar Sept. 24-27 on design, techniques, marketing, with Bob Stocksdale, Art Carpenter, Gary Bennett, Dean Santner, Wendell Castle, Doug Ayres. Fee \$50. Jackson Hole Arts Center, PO Box 11, Jackson, Wyo. 83001. Phone (307) 733-3462.

BRITISH COLUMBIA: Celebration of Wood—exhibition and sale, Aug. 1-15, Robson Square, Vancouver. Contact Circle Craft, 348 Water Street, Vancouver, B.C. V6B 1B6.

KTM PORTABLE DUST COLLECTOR



WRITE FOR KRAEMER DUST COLLECTOR CATALOG ENCLOSE 2.00 FOR POSTAGE & HANDLING OR OUR COMPLETE CATALOG AT 4.50 INCLUDING POSTAGE & HANDLING.

KTM Portable dust Collectors do not need expensive duct work. Connections to dust sources can be made with Flexhose and Clamps.

Units can easily be moved to different locations or can be changed into stationary units by removing the heavy duty casters.

LET US HELP YOU WITH YOUR WOOD DUST SHAVINGS, CHIPS, & MORE. WRITE OR CALL FOR DETAILS.

VISA MASTER CHARGE, OR CHECK FREE CATALOG WITH PURCHASE. F.O.B. NILES, MI.

ROCKWELL - POITRAS - STANLEY - PROGRESS - KRAEMER - BOSCH - MAKITA

DERDA INC
Woodworking Machinery Distributors

616-683-6666
1195 W. BERTRAND ROAD
NILES, MICHIGAN 49120

VISIT US AT OUR BOOTH AT EXCELLENCE IN WOODWORKING CHICAGO

FINE VENEERS

- Full Length Flitches
- All Types & Thicknesses
- Rapid, Same Day Service
- Wide Choice Designer Veneers



NO ORDER TOO LARGE OR TOO SMALL

NEW 1980-81 CATALOG
SEND \$1.00

Remember us - We're the veneer specialists!



WOOD SHED
1807 Elmwood Ave., Dept. 11
Buffalo, NY 14207
Telephone 716-876 4720

HARDWOOD FOR SALE

Tiffany Fine Woods
Whitehall, Wisconsin 54773

Manufacturers of select hardwood
Millwork, dimension stock and ties
(715) 538-4285 Jerry or Willie



Patterns Catalog
over 250 designs and supplies
CATALOG FREE!

Love-Built Toys & Crafts, INC.
Dept. 262 TAHOE CITY, CA 95730

SYRACUSE WOODCARVING SUPPLY

Div. of Art World
2910 Erie Blvd. E., Syracuse, NY 13224

We carry a complete line of FOREDOM POWER TOOLS & accessories. Also Xacto tools and supplies, glass eyes, Henry Taylor Woodcarving tools, L.C. German made woodcarving tools, sharpening stones, vises, clamps, and all sorts of woodworking equipment. Our catalog on request \$1.00

HAVE WE GOT A PLAN FOR YOU!

Select from 115 plans and patterns for do-it-yourselfers to make a wide variety of useful and delightful items, including furniture, toys and outdoor projects. Order your Craftplans catalog today. Send \$0* to:

CRAFTPLANS, Rogers, MN 55374



NATIVE AMERICAN HARDWOODS

WALNUT, BUTTERNUT, CHERRY
CURLY & BIRDSEYE MAPLE
Most other Domestic Woods

- EXTRA WIDE/EXTRA THICK STOCK
- SPALTED WOODS
- TURNING & SCULPTING BLOCKS
- SOLID SQUARES

Cabinet & Economy Grade Lumber
Stock for Woodwork Flooring, Paneling

NO MINIMUM—MAIL & FREIGHT SHIPMENT
DETAILED LISTING 50¢ (716) 942-6631

D.A. BUCKLEY, R1, W. VALLEY, N.Y. 14171

MAKER'S MARK BRANDING TOOL

NOW! Brand your own name permanently on wood and leather handcrafts! Simple to use. Long lasting. U/L approved electric handle. Brands full name. Guaranteed.

FREE ILLUSTRATED LITERATURE!

CRAFTMARK PRODUCTS, INC.
DEPT. F-7
P.O. BOX 6308, MARIETTA, GA. 30065

POWER TOOL SALE



Powermatic

10" Table Saw Model 66 complete with: 48" rails; single phase 2hp (115/230 volt) motor; push button switch.
Sale \$1399

10" Deluxe Contractor's Saw Model 62 Heavy duty 1 1/2hp; 115/230 volt; 1 or 3 phase motor; push button switch; 48" rails; complete.
Sale \$1199

Shaper Model 26 complete with: 2hp (115/230 volt) motor; single phase push button switch; interchangeable 3/4" and 1/2" spindles.
Sale \$1555

Lathe Model 45 complete with: 4 speed gap bed; single phase 3/4hp motor (115/230 volt); single phase push button switch; safety guard.
Sale \$1499

6" Joiner Model 50 complete with: single phase 3/4hp (115/230 volt) motor; single phase push button switch; stand. **Sale \$920**

14" Bandsaw Model 141 complete with: single phase push button switch; stand; 1/4" blade; 3/4hp motor. **Sale \$950**

Belt/Disk Sander Model 30B complete with: 12" disk sander, 6" x 48" belt sander, interchangeable tilting table 90° to 45°, stand, 3 or 1 phase 1 1/2 hp (115/230 volt) motor, push button switch. List \$1385. **Sale \$1099**

Lathe Model 91 complete with: variable speed 175 rpm/1100 rpm, 25" swing over gap bed, 20" swing over bed, inboard spind 1 1/2" distance between centers 38" 600 lbs, 1 1/2 hp, 1 or 3 phase (115/230 volt) motor, magnetic control, safety guard. List \$2921 **Sale \$2499**

DeWalt

Model 7744-10 10" Radial arm saw: 2 hp; 115 volt; 3450 rpm motor cuts 3" deep at 90°; 2 1/8" at 45°; crosscut to 13"; rip 24 1/2"; stand; 6" dado set. **Sale \$350**

Model 7790-10 12" Radial arm saw: 3 1/2 hp; single phase; 115/230 volt; 3450 rpm motor; 5/8" arbor; cuts 4" deep at 90°; 2 3/4" at 45°; crosscut to 16"; rip 27"; stand; 12", 45 tooth C.T. saw blade. **Sale \$779**

Model 3516 14" Heavy duty radial arm saw: 3 hp; 1 phase; 230 volt; 3450 rpm motor; 1" arbor; 40" arm; crosscut to 24"; rip 38"; cuts 4" deep at 90°; 2 3/4" at 45°; steel table; legs. **Sale \$2150**

Model 7748-10 10" table saw: 2 hp; 120 volt; 3450 rpm motor; rips 24"; cuts 3 1/2" at 90°; 2 3/8" at 45° guard; 6" dado set; dado/shaper insert; 10" plywood/ veneer blade; table saw book. **Sale \$325**

Notice To Our Customers

We regret any inconvenience caused by delays in shipping.

We have recently changed locations and encountered problems during the move.

These problems have been remedied and we can now provide our usual prompt service.

Catalog

The 1980-81 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.**

John Harra Wood & Supply Co.

511 West 25th Street, New York, NY 10001 212-741-0290



Makita

15 1/2" Planer 2040 2hp 115 volt 6500 rpm motor; full cutting range: 1/4" thru 7 1/2"; 2 quick set knives; speed reducing kit; delivered assembled. **Sale \$1225**

12" Planer/6" Joiner 2030 2hp 115. volt motor; full cutting range: 1/4"-6 1/4"; 2 quick set knives; speed reducing kit; delivered assembled. **Sale \$1399**

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 1/8" blades. List \$1880 **Sale \$1399**

3/8" Cordless Drill 6010DW; forward, reversible, screwdriver kit, 600 rpm, 1 hour fast charger pack, high torque motor. Lists \$112. **Sale \$83**

3 1/4" Planer 1900B Full 4 amp; 15,000 rpm; 115 volt motor; only 5.5 lbs.; cutting depth 1/32". **Sale \$102**

3x24 Belt Sander (dustless) 9924DB; Full 7.8 amps; 1300 ft/min.; only 10.2 lbs.; 10 free belts. **Sale \$150**

Finishing Sander B04510 Heavy duty; double insulated, 12000 rpm, 4 3/8" x 4" pad size. **Sale \$45**

1 1/4hp Router 3601B "D" handle design; calibrated depth of cut; accepts 1/2", 3/8", 1/4" shank bits; collet; wrenches. **Sale \$140**

Unidrill 6000R Drill/Screwdriver combination; 3.3 amp motor; 3/8" capacity; quickchange clutch; reversible; variable speed 0-2600rpm belt clip. **Sale \$110**

Freud

saw blades

Model	Diam	Teeth	Arbor	Use	List/SALE
72 ME	10"	40	5/8"	All Purp	\$61 /\$36
73 MD	10"	60	5/8"	Cut Off	\$76 /\$45
84 MD	10"	50	5/8"	Rip/Cross	\$72 /\$43
AD 600	6"	8	5/8"	Adj Dado	\$60 /\$39
71 MA	10"	18	5/8"	Rip	\$57 /\$36
72 MF	12"	48	5/8"-1"	All Purp	\$82 /\$54
76 MB	12"	60	5/8"-1"	All Purp	\$99 /\$67
84 MF	14"	70	5/8"-1"	Rip/Cross	\$120/\$80
72 MB	7"	30	5/8"	All Purp	\$53 /\$33
72 MD	9"	36	5/8"	All Purp	\$62 /\$39
74 ME	10"	80	5/8"	Thin Kerf	\$90 /\$56
71 MB	12"	20	1"	Rip	\$67 /\$42
84 MC	10"	40	5/8"	Rip/Cross	\$68 /\$42
DADO 3	8"	18	5/8"	1/4"-1 3/16"	\$148/\$100

SAND PAPER

Cost/10 belts, BELT SIZE

GRIT	3x21"	3x24"	4x24"
120, 100, 80	\$9.5	\$10.5	\$17.50
60, 50	\$10	\$11	\$18

GREENLEE



Greenlee brad point drills: have precision ground flutes that shave the inside of the hole smooth, a sharp brad point that prevents skating and two razor sharp cutting spurs keep holes extra clean. Made from the finest grade of high carbon steel, tempered for long life. Designed for use in drill press or 3/8" portable drills. The set includes 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2" bits and a protective pouch. **SALE PRICE \$15**

CLASSIFIED

Experienced WOODWORKER to do millwork and fine joinery on first-class sailing yachts, steady work, benefits. Cherubini Boat Co. Inc., 222 Wood St., Burlington, NJ 08016.

APPRENTICE VIOLINMAKERS AND RESTORERS: Positions available. Good salary and benefits. Background in woodworking and/or music helpful. Must be willing and able to learn. Bein & Fushi, Inc., 410 S. Michigan Ave., Chicago, IL 60605.

WOODWORKING JOURNALIST to join Taunton Press staff as assistant editor. Successful candidate must have job experience in cabinet or general woodworking shop, plus job experience as a writer or editor, or proven deftness with the English language. Drawing and photographic aptitude an asset; relocate to western Connecticut. We offer liberal benefits, challenging work, good working conditions. Send resume and letter stating salary requirements, with photos/slides of recent work in wood, to: Personnel Manager, The Taunton Press, Box 355, Newtown, CT 06470.

Established custom WOODWORKING SHOP, house and land in Putney, VT 05346. Call or write Simon Watts (802) 387-5379.

COLORADO: Custom cabinet shop including equipment and work in progress. Tom Triplett, Realty Executives, Box 867, Montrose, CO 81401.

Custom WOODWORKING SHOP for sale. This extraordinary shop located in a barn includes living quarters, all standing and portable machinery, inventory and vehicles. Greater Boston area. Reply to: Fred Murphy & Sons, 315 Main St., Dept. K, Wilmington, MA 01887.

YOU BUILD FROM PLANS
UNIQUE GRANDFATHER CLOCK
— ALL WOOD MOVEMENT —
AND FASCINATING CABINET ESPECIALLY
DESIGNED TO DISPLAY THIS MASTERPIECE
ALSO PLANS FOR CRADLES, HURRICANE LAMPS,
GUN CABINETS, SPINNING WHEELS, AND MORE.
SEND \$1.00 (REFUNDABLE) TO:
ORIGINALS IN WOOD
P.O. BOX 2061
AKRON, OHIO 44309

ATTENTION
FLORIDA WOODWORKERS
We have exotic, native
hard and soft woods,
table slabs, veneers, etc.
HENEGAN'S WOOD SHED
7760 Southern Blvd., West Palm Beach, FL 33411
305-793-1557

ITI
TOOLS
MALLET
CARVING KNIVES
SHARPENING STONES
1981 Catalog of Tools, Materials and Accessories
Two Dollars
Sculpture House Inc. Dept. B, 38 E 30th St. (N.Y.C., N.Y. 10016)

Grand Opening in **NEW JERSEY**
Fine Woods Ltd.
297 Rt. 22 East, Greenbrook, N.J.
(behind Colonial Square Mall)
featuring
K.D. Foreign & Domestic Hardwoods, Carving
Blocks, Turning Squares, and Spalted Woods.
All wood stored in humidity-controlled warehouse.
Wholesale—Retail
(201) 752-4884

WANTED: Fine crafted handmade toys and juvenile furniture for custom toy store. Please send photo and description of items to: Mystical Toys, PO Box 319, Mystic, CT 06355. All photos returned.

SEEKING HIGH-STYLE REPRODUCTIONS, custom or specialty. Send photos/slides/prices to Charles Sutton, PO Box 11803, Winston-Salem, NC 27106.

ROCK-A-WAY specializes in the buying, selling and production of fine handcrafted rocking furniture, toys and abstract art. We sell to individual and commercial buyers. Terms to fit the needs of each artisan. Send photos and terms to Rock-A-Way, PO Box 552, Bronx, NY 10467.

UNIQUE OPPORTUNITY FOR WOODWORKERS! 10-Day Caribbean Cruise-Seminar aboard the SS Rotterdam, Oct. 30-Nov. 9, 1981. Top faculty—space limited. Call (703) 434-1796 or write: Travel Counsellors, Inc., PO Box 1345, Harrisonburg, VA 22801.

WOODTURNING—Are you interested in woodturning as a hobby? Take a two-day intensive course for beginners from a qualified instructor. Write PRACTICAL WOODTURNING, PO Box 102, Orangeville, Ontario, Canada L9W 2Z5.

Quartersawn FAS WHITE OAK lumber. AD 4/4, 75¢/sq. ft. Wayne Benjamin, Stenersen Corporation, Cockeysville, MD 21030. (301) 666-1111.

VERMONT FURNITURE HARDWOODS, Box B-1, Chester, VT 05143 offers fine kiln-dried hardwoods for the craftsman, superior custom millwork and a consignment showroom for artisans' products. Write for brochure.

LUMBER, wholesale, retail, hardwood, softwood, plywood, milling. \$200 shipping minimum. Amherst Woodworking, 575F, Northampton, MA 01061. (413) 584-3003.

ROSEWOOD AND COCOBOLO LUMBER. Rosewood, widths 6 in. to 18 in., lengths, 8 ft. to 16 ft. Dry, FAS, \$3.85/bd. ft. MWW Co., Box 362, Albion, CA 95410. (707) 877-3408.

LOCAL LUMBER CO. Fancy hardwoods, custom milling and kiln drying. 161 Bowers Hill Rd., Oxford, CT 06483. (203) 888-6509.

4/4 KD Appalachian cherry, \$1.40/bd. ft. Clear oak shorts, 3 in. and wider, 3 ft. to 5 ft. long, \$1/bd. ft. Other fine hardwoods. Brochure available. VERMONT FURNITURE HARDWOODS, Box B-1, Chester, VT 05143.

Imported
European
Hardware
HINGES AND LOCKS FOR
CABINETS AND DOORS.
RUSTIC STYLE POLISHED IRON,
BRASS AND COPPER.
For Information
4325 WEST DESERT INN, SUITE 5
LAS VEGAS, NV 89102

Wood-
working
Books
HUNDREDS of
TITLES available.
world's largest
selection
send for free list:
BARK Service Co.
P.O. Box 637
Troutman, NC
28166

KILN-DRIED BASSWOOD. Excellent for making toys, figures, decoys, wood burning. Write Blue Mustang, Box 173G, Racine, WI 53401.

KILN-DRIED HARDWOODS. Available direct from the mill in most domestic species. 500-ft. minimum per item. Pike Lumber Co., Village of Akron, IN 46910. (219) 893-4511.

BOSTON AREA Woodworkers. Hardwoods, softwoods, plywoods, accessories. Cutting-to-size, planing. Open Saturdays, (617) 666-4030.

FINE CABINET PLYWOOD. Cut sizes—full sheets. Many species and thicknesses. Free Catalog! Plywood Depot, Box 897, Gaylord, MN 55334.

WALNUT AND OAK VENEER PANELS. Sizes up to 4 ft. by 7 ft., limited supply. Wright, Inc., Valley Industrial Park, Centerbrook, CT 06409. (203) 767-2052 between 9:30 and 3:00 P.M.

PREMIUM HARDWOOD VENEERS, fiberbacked. 47 species, to 4 ft. by 12 ft. Chevron, butcher-block, regular match. Pamphlet, 50¢. Sunwood, 1141 N. Belvedere, Tucson, AZ 85712.

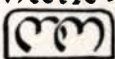
Bargain-priced HARDWOOD LUMBER, caning, musical instrument material, kits and supplies. Catalog, \$1. Crane Hardwood Enterprises, PO Box 1073, Bedford, IN 47421.

LUTHIER'S SUPPLIES: Imported tonewoods, tools, parts, accessories for violins, violas, cellos, basses and guitars. Catalog, 25¢. Credit certificate enclosed. International Violin Company, Ltd., Dept. C, 4026 W. Belvedere Ave., Baltimore, MD 21215. (301) 542-3535.

GUITAR, BANJO, violin, mandolin-making materials, accessories, books. Piano-tuning kits. Catalog \$1. International Luthiers Supply, Box 15444, Tulsa, OK 74112.

Mahogany, cherry, oak, walnut DOWELS, BUTTONS, PLUGS. Extra long spiral-groove dowel pins, 48-in. dowels. Odd Ball Supply, Box 133, No. Attleboro, MA 02761.

Profitable Cabinetry. SPIRAL-BOUND SHOP MANUAL with comprehensive text. Fully illustrated with diagrams and proven professional step-by-step procedures. Tool, hardware and materials list, pricing and bidding hints, professional tricks and secrets. Indispensable to contractors, individual craftsmen, owner-builders and cabinet shops. Includes tack-up shop print with all key information. \$10 postpaid. Artisan Woodworkers, 21415-A Broadway, Sonoma, CA 95476.

Hitachi Power Tools
THE STATE OF THE ART
CATALOG \$1
METRIC MACHINERY CO
 **TEL: 800 391**
ADVANCE-N-C
(919) 998-4051 27006

Real Wood Veneer
.024 Thick, Flexible
2' x 3' \$9.45, 2' x 96" \$35.95
Includes postage and handling
Walnut • Cherry • Teak • Mahogany
FINISHING PRODUCTS
4611 Macklind
St. Louis, MO 63109 • 314-481-0700

OVERHOLTZER'S Guitar Making book, molds, tools. Pamphlet, 50¢. 5531 San Juan Ave., Citrus Heights, CA 95610.

JAPANESE WOODWORKING TOOLS since 1888. Free catalog. Tashiro's, PO Box 3409, 618 So. Jackson, Seattle, WA 98104. Recording telephone, (206) 323-7750.

BOSTON WOODWORKERS! INCA IN NEW HAMPSHIRE. Visit our workshop in Bear Brook State Park (one scenic hour north). Mahogany Masterpieces, authorized Inca dealer. (603) 736-8227. 5-year guarantee, service, no charge for set-up and delivery.

MACHINERY & POWER TOOL catalog. Send 25¢ to Wilke Machinery Co., 1519 Mt. Rose, York, PA 17403.

BAXTER WHITNEY #24 planer. Yates #281 bandsaw. The House Carpenters, Box 217, Shutesbury, MA 01072. (413) 256-0108.

WOODWORKERS—SUPPORTABLE offers increased safety, accuracy, convenience, when sliding large materials off shop tools onto Supportable's ten wide rollers. Info, \$1. Turningpoint Mfg., Dept. D2, Davenport, ND 58021.

Penetrating TUNG OIL FINISHES, stains, dyes, resins. Free brochure. Woodfinishing Enterprises, Box 10117, Milwaukee, WI 53210.

Rare imported CARNAUBA WAX. Pure type one. Minimum order 1 lb. \$7/lb. postpaid. Golden Imports, 12462 Bodega Way, San Diego, CA 92128.

FREE GUIDE to beautiful wipe-on wood finishing. General Finishes, Box 14363FC, Milwaukee, WI 53214.

Catalog of wooden toy patterns, wooden toykits and toymakers supplies. Send \$1 to TOY DESIGNS, PO Box 441-F, Newton, IA 50208.

GEARLESS CLOCKWORKS, wooden. Complete plans, drawings, templates, \$4. Candlepress, 1124-F NW 40th Ave., Gainesville, FL 32601.

BAND-SAWN BREADBOARDS. Stylish contour lamination. Plans \$4. Tierra Design DS, Box 40020, Albuquerque, NM 87196.

BRANDING IRONS made to order. Brand your name, initials, monogram on wood or leather. Logos and signatures faithfully duplicated. Write for information and sample brandings, giving size and inscription wanted, and intended use. "Hallmarks of distinction, worthy of your labor." Norcraft Custom Brands, Box 277F, South Easton, MA 02375.

R. SORSKY
BOOKSELLER
New and Out of Print Books.
Frequent catalogs. \$1.50.
Woodworking Exclusively
Box F5, 3845 N. Blackstone
Fresno, California, U.S.A. 93726
Member American Booksellers Association

 **Whittling and Carving**
Tools and Supplies
New 1981 catalog—50¢ (refundable). American made, quality tools, exclusively.
WARREN TOOL CO., INC.
Rt. 1, Box 12-BF, Rhinebeck, NY 12572 (914) 876-7817

CATALOG OF 200 WOODEN TOY PATTERNS, toymaking supplies, books. \$1 refundable. Love Built Toys, F6, Tahoe City, CA 95730.

TABLE KIT for woodworkers: detailed plans and instructions for 8 different tables with necessary lumber for any one—selected, KD, solid American cherry, \$45, \$69 plus \$10 handling and shipping. Plans only, \$9.50. TuggleWood, Dept. FW, PO Box 21436, Louisville, KY 40221.

Accurate miters. Save time. Eliminate errors. SINE-SET provides 1.5 degree accuracy to miter gauges, bevel squares. Brochure. Craft Design Innovations, 4221 E. 41st., Tulsa, OK 74135.

GOLDLEAF, sheets, rolls, supplies, tools, technical literature. Art Essentials, Ltd., Box 260, Monsey, NY 10952.

WOOD&TOOL EXCHANGE

For Sale

Cherry 3 in. KD FAS, 6 in. to 14 in. by 6 ft. to 12 ft., \$4/bd. ft. Also good 1-in. to 2-in. butternut. SASE for details to Farr, Box 1299, Coaldale, AB T0K 0L0. (403) 345-3232.

Ebony and plainsawn rosewood sizes 1½ in. wide by ¾ in. thick by 6½ and 8 in. long. Would like to unload lots of it fast. Box 32, Haddon Hts., NJ 08035. (609) 546-2903.

Plywood, walnut 2 sides, 5 ply, ¾ in. thick, over 100 pieces, up to 2 ft. by 3 ft. Send 50¢ for listing. P. Hutchins, Cabinetmaker, 370 Dover Dr., Winston-Salem, NC 27104.

Stanley #55. 47 cutters only \$100. Doyle Myers, 4235 Hazelhurst Dr., Ft. Wayne, IN 46804. (219) 432-1659.

Green lumber: quartersawn oak \$1/bd. ft., cherry \$1/bd. ft., walnut \$2/bd. ft. After 4:00 P.M. call L. Lyle, (803) 638-6070. Walhalla, SC.

Record 405 plane, 40 cutters, 22 hand screws, both never used. Rockwell Uniplane. S. Pawlowski, 16 Diamond St., Brooklyn, NY 11222.

Collection 29 Goosewing axes, all old and good. (608) 763-2222. Other antique tools.

Crescent 14-in. table saw, cast-iron 3-ft. by 4-ft. table, no motor, \$750. Platt, N. Grafton, MA 01536. (617) 839-2012.

14-in. bandsaw \$300. Toolkraft 6-in. jointer \$210. Lathe \$190. All new. David Turnage, Hillcrest, Greenville, NC 27834. (919) 756-4778.

Lion Miter Trimmer. Little used, mint condition. \$145, prepaid. Robert Gordon, 18560 Jewel Crest Dr., Muskego, WI 53150.

12-in. lathe, incomplete; jig saw; jointer; floor-model drill press; shop vacuum; 3 PH motor for unisaw; 12-in. lathe tailstock; mortising attachment. \$300 for all. Box 84, Ossining, NY 10562.

Eastern white pine, 2 in. D and better, select, KD. Random length, 4 in. to 12 in. wide. \$1.25/bd. ft. in 500-bd.-ft. lots. 1,500 bd. ft. total. Matt Burak, RFD, Danville, VT 05828. (802) 748-9378.

Nearly new single-phase totally enclosed fan-cooled industrial motors 1½, 2, 3, 5, 7½ HP. P. Fuge, 161 Bowers Hill Rd., Oxford, CT 06483. (203) 888-6509.

Wormy chestnut cove mold paneling, 1930, never used, beautiful. 700 ft., \$2,900. Combination 12-in. table radial saw, 5 in. jointer, 1924, nice, \$595. M. Morrison, 2111 Messick, N. Bloomfield, OH 44450. (216) 889-3770.

Delta 11-in. D.P. mortising attachment, complete, ¼, ⅜, ½, \$75. Record dowelling jig with 18-in. extension, \$30. Workbench edge vise, \$25. R. Gustin, 1426 Lejeros Dr., Brookings, SD 57006. (605) 692-5847.

Stanley #55. Excellent condition. Complete except for nos. 104 and 32 cutters. Best offer received by August 1. Setzler, Star Rt. 57, Dublin, VA 24084.

2 each arbor with pillow block bearings and sheaves. Ideal for home-made shaper. Also industrial wood-working machinery. Write for description. Laszlo Gigacz, Clinton St., Box 19, Jordan, NY 13080.

Rare chestnut T&G wood. Up to 1,000 bd. ft. @ \$3/bd. ft. Dick Martin, Rt. 2, Box 328, Berea, KY 40403. (606) 986-8569.

34-in. Sperber chain saw mill available to cut your hardwood trees into boards. Fee: portion of wood or hourly rate. Paul Ruhlmann, 16 Avon Pl., Arlington, MA 02174. (617) 646-8466.

Boice-Crane floor-model spindle shaper and 50 cutters, 1 HP, 110V motor. \$1,500. Bob Ochenas, 204 W. Dudley, Maumee, OH 43537. (419) 893-6912.

Barnes No. 3 woodturning lathe, circa 1900 with 4-pedal foot power and cast-iron seat. Excellent condition, \$850 firm. J.P. Fennell, 11 Meetinghouse Ln., Topsfield, MA 01983.

Inca 10-in. cabinetmaker's saw, mortising attachment, tenoning device, 8-in. carbide blade, 1½ HP, magnetic control, \$700. Rick Hardy, Rt. 1, Frankfort, KY 40601. (502) 875-2072.

Wood

Flitches to 50" wide...walnuts, cherries, oaks, maples, beeches, pines, ash, paulownia, fruits... over 25 species of soft and hardwoods.

Over 3000 outstanding pieces. All shapes and sizes in our showroom. Many unusual stump and root cuts...also, dimensional lumber.

We feature fine burls, feathers, curls, and clear grains, gathered, cut and dried at our own mill. Trees with outstanding characteristics, some 200 years and older.



Please send 50¢ for our pricelist

Willard Brothers
Woodcutters



300 Basin Road
Trenton, NJ, 08619
Call (609) 890-1990



A large quantity of brand new dental cutters available—to settle estate. Box of 6, \$2. Write to: P. Selter, PO Box 24, Warren, MI 48090.

Stanley #55, all 52 cutters, tools and instruction book. Near mint condition. \$375 postpaid. Box 53, Clinton, CT 06413. (203) 669-7382.

Wanted to Buy

Old L.S. Starrett Co. scraper with the ball-and-socket joint on the handle. R.H. Heenan, 310 North Ave., Atlanta, GA 30301.

13-in. to 16-in. surface planer. Rockwell or General preferred. Don Shepherd, 2243 N. Champlain, Arlington Hts., IL 60004. (312) 392-8777.

Thickness planer/jointer, Makita 2030 or Inca 10½ in. W.J. Storey, 12 Salado Rd., Rt. 9, St. Augustine, FL 32084. (904) 471-1248.

SITUATIONS WANTED

New England or Maritime Canada-bound journeyman cabinetmaker seeks high-quality furniture, fixture position. Bryan Black, 1981 Piner Rd., Santa Rosa, CA 95401.

Desire apprenticeship with master woodworker or carver. Have tools and some experience. Will relocate. Dan Kaylor, 1322 34th St., Allegan, MI 49010. (616) 673-6040.

Apprenticed traditional boatbuilder of 2 yrs. seeks work with cabinet/furniture maker, self-taught. Prefer Boston to Cape Cod or Fla. Carl Emilson, Box 214, Cohasset, MA 02025.

Dedicated woodworker, 5 yrs. varied experience, seeks work in limited production furniture/cabinet shop. Resume and photos. Chris White, RD 3, Putney, VT 05346. (802) 387-4584.

Swedish grad. student wants to work 1 yr. in USA. 5 yrs. training, last 2 at Malmsten, as in Krenov's books. I know cabinetmaking, carving, marquetry. Gösta Arvidsson, Tomtebgatan 37, 11338 Stockholm, Sweden.

Skilled craftsman, 9 years experience in cabinet/furniture making. Seeking relocation in Virginia or adjoining states. Interested in high-quality work. M.P. Roddenberry, 5815 Butler Rd., Little Rock, AR 72209.

Cabinetmaker position, Phila. area; to begin fall '81. 3 yrs. experience furniture design/construction, carving, restoration, refinishing. Own tools. David Page, Rt. 8, Box 450A, Roanoke, VA 24014. (703) 989-4457.

Apprenticeship sought in New York City with master furniture maker. Trad. or contemp. Have 4 yrs. shop experience. Coll. grad. 26. John M. Johnson, 107 E. 35th St., New York, NY 10016. (212) 889-4453.

Carving apprenticeship desired. Have 1 year experience. Additional experience in finish carpentry. Will relocate. Jim Beyer, 2836 McFarlin, Dallas, TX 75205. (214) 696-2617.

The CLASSIFIED rate is \$3 per word, minimum ad 15 words. Payment must accompany order. The WOOD & TOOL EXCHANGE and SITUATIONS WANTED rate is \$2 per line, minimum three lines, maximum six lines, limit two insertions per year. Allow 30 letters or spaces per line, including name and address. The Wood & Tool Exchange and Situations are for private use by individuals only. Commercial accounts must use Classified. Please inquire for DISPLAY CLASSIFIED rate. Send to: *Fine Woodworking*, Advertising Dept., Box 355, Newtown, CT 06470. Deadline for the Sept./Oct. issue is June 25th.

FINE WOODS

Most California species, including black walnut, laurel, maple and redwood. We inventory a wide variety of sizes and grades—veneers, slabs, etc.—including lace burl.

The higher grades are exceptionally beautiful, possibly the finest available. We also carry interesting and unique laminated cabinet material.

Write or call for samples and product information.



3201 Petaluma Blvd. N.
Petaluma, California 94952
(707) 778-1445

CANADIANS Demonstrations and Sales

Fine Quality Hand Tools
Inca Woodworking Machines
Myford Woodturning Lathes
Shopsmith Multi-Purpose Machines
Rockwell Machines & Power Tools
Williams & Hussey Molder-Planers
Makita Machines & Power Tools

For descriptive literature and our low prices send \$1.

J. Phillip Humfrey, Ltd.
3241 Kennedy Road #7
Scarborough, Ontario
Canada M1V 2J9
(416) 293-8624

WISH BOOK CAN BE YOURS

Three pound, 832 page catalog, as big as a Sears catalog, but devoted to tools, supplies, and machines for every trade or craft. If you work with wood, metal, plastics, electricity—electronics, graphics, ceramics, leather, gardening, science, drafting, service trades, auto or home repair, or arts and crafts, you need this giant of a catalog.

Over 60,000 items. A valuable reference.

NAME BRANDS, DISCOUNT PRICES

Send \$5.00 or credit card number to get your catalog

McKILLIGAN SUPPLY

FWC 781, Johnson City, N.Y. 13790



Southern New Hampshire

RARE OPPORTUNITY

Completely equipped woodworking shop and tools in professionally restored small historic brick converted factory/home. 3 BR's. 2 baths, dining, living, kitchen. Every imaginable luxury. Elect. heat, fireplace, stoves. Entire floor for hobbies or home industry. Attached showroom or store. Surrounded by mill pond, waterfall. Turbine in to reactivate. Once in a lifetime and only 130M firm.

Write P.O. Box 244
Cape Porpoise, Me. 04014
All inquiries answered.



The Mendocino coast. Photo: Staff.

Woodworking in Mendocino

A close look at the new generation of artist-craftsmen

by John Kelsey

Part of today's woodworking renaissance is a new generation of artisans who've found in our craft not just a way to make a living, but a way of life. They're usually self-taught rather than schooled or apprenticed. They often approach wood not as mere material to be worked, but with the respectful passion of a poet. Given the choice between a tedious but profitable production job and an interesting but less profitable woodworking challenge, they'd probably choose the challenge. Or else, they'd build kitchen cabinets to buy the time and materials for what they really want to build. They're likely to find more useful truth in James Krenov's impractical books than in Tage Frid's how-to texts.

Many of these craftsmen were hippies during the 1960s, weirdly bearded longhairs now straightened up and settled down with wife and kids. Others have abandoned lavish educations and high-technology careers, preferring to plane wood instead of program computers. These craftsmen have decided they'd rather work wood than do anything else.

These ideas of woodworking as an art, or as a Druidic dialog with the living tree, or as a vocation to which one has been called, are very much of our own time. Krenov (see *Books*, p. 26) has done much to encourage those he calls "the outsider craftsmen," to justify putting aesthetic or spiritual

concerns ahead of the mundane practicalities of making a living. I doubt that anybody thought about woodworking in such ways during the 18th and 19th centuries—indeed, these attitudes seem incomprehensible to many senior craftsmen today. Still, these young craftsmen share with the older generation a seriousness of purpose, love for the craft and respect for hard and skillful work. Above all, they insist upon finding a harmonious life in some beautiful place, rather than a raucous hustle for fame or affluence in some asphalt city.

Thus all over North America you can find woodworking enclaves that don't seem able to support populations of professional craftsmen, yet nonetheless do. There's Eugene, Ore., Bucks County, Pa., or Santa Fe, N.Mex., or the mountains of Colorado and of Vermont—and there's Mendocino County on the northern coast of California.

Although Mendocino is typical of a dozen woodworking enclaves, several things make it an appropriate focus for this report. There's a thriving, mutual self-help organization, the Mendocino Woodworkers Association, that's done much to make its members better craftsmen who are better able to survive. Krenov himself has just moved here from Sweden, to work and to teach, because of the warm support he's found for his lyrical approach to the craft. He'll be directing a new



Wall cabinet by Creighton Hoke, 16 in. by 24 in. by 6 in., maple and ramin, won recognition of excellence at the Mendocino Woodworkers Association show. Hoke came to Mendocino from Richmond, Va., for James Krenov's class—an influence that's apparent here. He's now the coordinator for Krenov's program at College of the Redwoods.



Entry door at the Seagull Cafe in Mendocino, made by Brian Lee. The Seagull is completely woodworked from the bar upstairs to the restaurant below. Photo: Staff.

woodworking program at the College of the Redwoods in Fort Bragg, starting this fall. Finally, it's a place of remarkable beauty, where the very sunlight seems alive.

The habitable land on this coast is a narrow shoreline cut by river valleys and mountain ridges, rising eastward into the Coast Range and its tractless redwood forests. By official statistics Mendocino is not a prosperous county, subsisting mainly on tourism, fishing and logging. Most towns were built around sawmills; the county's commercial center, Fort Bragg, surrounds an enormous Georgia Pacific lumber mill. Although it may rain, and foggy mist rolls off the Pacific most mornings, it never gets really cold here—life on a low budget is neither uncommon nor unduly harsh.

With San Francisco a three-hour drive to the south, and Portland 500 miles north, Mendocino remains in many ways a rural backwater. Yet it's close enough to the Bay Area to attract moneyed tourists—stands selling chainsawn redwood burls for clocks and tabletops line the roadside—and to be a summer center for the arts, crafts and theater. Furthermore, it's somewhat more prosperous than official statistics would suggest, for any forest glade can grow an illicit crop of *sinsemilla*, a highly prized kind of marijuana.

The town of Mendocino, sitting atop a bluff that juts into the foaming Pacific, is a century old (ancient for California), but its Victorian ambience has been carefully preserved and enhanced. Wandering around the town last January, I was struck by its variety of public woodworking. Bars, food stores, hotels, ice-cream parlors and even banks sport well-crafted wooden fixtures, sometimes as just a lone flower amidst the Formica, other times a whole vision in solid wood and stained glass. Clearly, there are woodworkers around here—although

few live right inside town. Also, among the more conventional arts and craft galleries that abound, there are several featuring contemporary wooden furniture, sculpture and accessories. Although they're a valuable outlet for work built on speculation, five years ago the galleries' high markup was the prod that led to forming the woodworkers' association. The makers wanted their show-work to remain affordable, and they needed a way to market without middlemen.

Brian Lee is the energetic zealot who called that first meeting of the Mendocino Woodworkers Association, and until recently he's been the force behind it. He recalls, "We were all blown away by the number of woodworkers who came out of the forest. We all knew there were others around here, but we had no idea there were so many." The upshot was a show and sale held at a local church hall. The work on display was better than anybody had expected, and the public did indeed come out to see it and to buy it. Since then, the association has held two shows a year. I used the list of award winners from last Thanksgiving's show to select craftsmen to interview for this article.

It costs \$10 a year to join the association, and anybody seriously interested in fine wood craftsmanship can join. Today the association has 125 members, 90 of them living inside Mendocino County. Almost two-thirds of those, Lee estimates, are professional craftsmen—no small feat in a county whose population is only 60,000, spread thinly along 50 miles of coastline. Lee says all the serious woodworkers belong, then he quickly adds that none of the redwood-burl dealers do, nor do many of the local carpenters or building tradesmen. On the other hand, membership does include several sculptors of national reputation. This confirms for me that the as-

sociation mainly comprises the new generation of craftsmen.

The association quickly found plenty of things to do besides shows and sales. It's been a clearing house to connect customers to craftsmen and to divide large jobs among several shops. It's helped newcomers get started by locating shop space and by sharing information about tools, suppliers and markets. There's a sporadic newsletter, sometimes a collective lumber purchase at the lowest wholesale price, and several members own shares in chainsaw milling gear. As a result, all the shops I visited had enviable piles of choice hardwoods. The group has even lobbied the state legislature and forest industry to increase appreciation for (and access to) the 20-odd hardwood species that grow on the redwood's fringes.

The members have also helped each other by organizing weekend workshops where technical and business expertise can be shared, by arranging field trips to mills, shops and such Arts and Crafts shrines as the Gamble House in Pasadena (*FWW* #12, p. 40). More important than any of this, however, is not fierce competition but camaraderie. Its benefits can be such simple ego-food as having one's work admired by a respected peer, or the kind of searching criticism that propels a craftsman in a whole new direction. Miniaturist Crispin Hollinshead put it this way: "My work has grown just from hanging out with others, I learn by watching them evolve." Sculptor Trent Williams was plainer: "It kept me alive. I didn't know anything about tools and wood when I came here; I've learned all that from the other woodworkers."

Although he's no longer the pivot about which the association turns, Brian Lee remains its most vigorous advocate. You find Lee near the town of Caspar, at the end of a bumpy road through the redwood forest, in a crazy-quilt house and shop he built in the spaces between the giant trees. He's 34, came here with the hippies, and got into woodworking via tree surgery. Later he worked as a carpenter and maker of built-in cabinetry, and today he bustles around the middle of a pleasant maelstrom sometimes known as Jughandle Woodworks.

Lee's shop is not much bigger than a double garage, with low ceilings, walls solid with cans of finish, shelves of tools new and old, and rafters festooned with jigs and sawblades. Here Lee the businessman will make almost anything, so long as he's allowed to make it well—from kitchens, doors and windows to furniture for a Catholic church. But in his own soul, in an alcove off the main shop, he's a woodturner, transforming choice lumps of wood into delicate bowls and plates. He usually avoids the simple contemporary silhouette for a compound-curved outline that (when it works) reminds me of antique porcelain. His techniques combine cutting and shear-scraping, and his product is flawless. I couldn't find a sanding scratch or swirl on one of several dozen turnings. Each bowl goes out with a hand-lettered card telling where and how Lee got the wood and how he felt while turning it. The turnings do sell, but neither quickly nor profitably. Nevertheless, Lee makes increasing amounts of time for turning, for this is what he would rather do—his art. He can be reverential toward his wood when showing his turnings—"impractical" attitudes nurtured by his friend Krenov.

Although his shop is busy and productive, Lee admits he lives by the skin of his teeth. "There's no woodworkers on welfare here," he told me, "but there's no savings accounts or new cars either." It was in talking with Lee that I first heard the slogans that for me have come to represent Mendocino:

"This is a magic place, and if you're *meant* to be here, you *will* be here."

Trent Williams lives in a tiny cabin a few hundred feet from Lee's shop. He won the association's sculpture award at last November's show, and he represents an extreme. He's always wanted to be a sculptor and he seems to live only to work in his own painstaking way. Williams has electricity but no power tools. The evening I visited, he showed me how he'd spent the entire day just positioning his current sculpture on its base. Move it a hair, take a long look and pare a shaving off the base, look again, pare off some more. He said he sometimes spends several days looking at the work in progress, waiting to know what to do next.

"My manufacturing process just takes a long time," he said. "I used to think, 'If only I could get fast at it,' but I can't. I need to do it with hand tools. Machines aren't sensitive, the shapes they make are limited, and they're noisy. You have to be calm to work like this. In the city, life was too frantic. There are other priorities there, like paying the bills. Here there are no bills. Being a sculptor can be my priority."

Williams is 37, five years removed from dropping out of his city job. For a small income he spins records at a local disco, and for relief he plays flamenco guitar. Even so, Williams has to sell his work, for when he's finally done with a piece on which he might have spent three months, he says, "I want to see it *gone*." Unlike many of the Mendocino craftsmen, Williams doesn't sell locally, but ships to an art gallery in San Francisco. This year he hopes to add a Los Angeles outlet, for, he says, "The market is there—connecting with the market is the problem." His sculpture is abstract, but small and irresistibly touchable. You can't keep your hands off a finished piece. Said Williams, "I know that somewhere there is a guy who wants this piece, who needs it. I have to get it to him. You don't see sculpture in houses here, because here you already have all the wood you'll ever want. It's people in the city who need this, and I do a service by making it for them." The several pieces now out in galleries are priced in the \$500 to \$800 range, a range he's inching upward. "Something always seems to sell just when I'm desperate, and I go on. I'm lots happier now than in the city," Williams said.

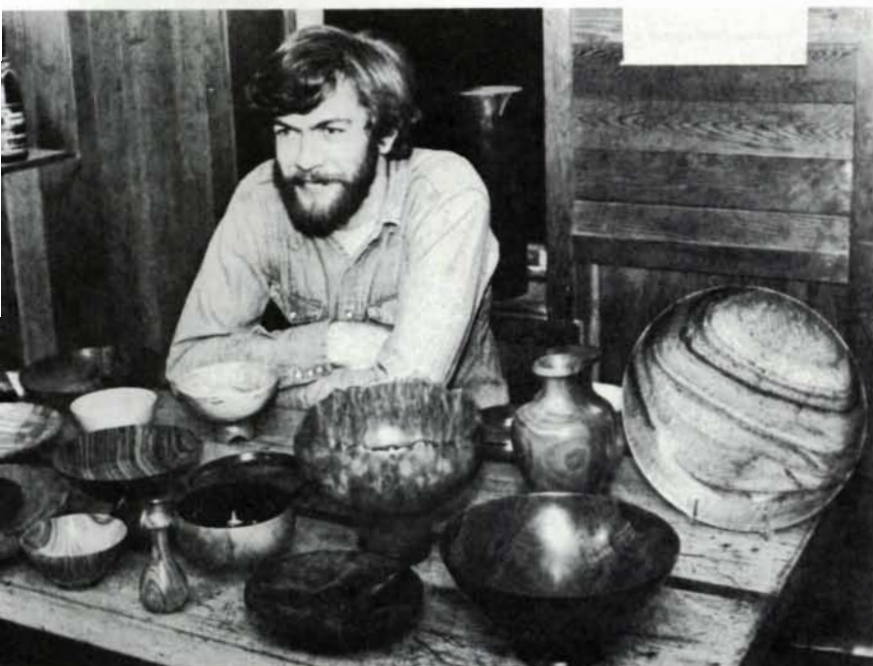
Crispin Hollinshead, producer of exquisite miniature furniture for the collector's market, represents a different approach to the problem of staying alive. His goal is to generate the \$1,000-a-month income he needs by working 100 hours or less each month. He almost did it last year, and this year he's certain he'll succeed. The rest of the time, Hollinshead doesn't care to think about economics. He makes what he wants to make, finding special pleasure in delicately faceted wood-and-glass showcase cabinets for his miniatures, and he pursues his myriad other interests. Hollinshead has found his niche, although it wasn't always thus and it hasn't been easy.

Hollinshead, 34, is a tall man, wispy-bearded and articulate. Before coming to Mendocino seven years ago, he was an aerospace engineer in San Diego, work he simply did not enjoy. "So I quit, and the question was, go where to do what? I wanted to find a way to balance the rational and the emotional sides of me, the spiritual and the intuitional. It was tourist season and everyone told me there just wasn't any housing. Within three days I'd found a place to rent, a house where I'd once been an overnight guest. I took that as a sign and moved in."

He found work as a carpenter's helper, later going on his



Dory, above left, by Robin Thompson of Branscomb, Calif., told visitors they'd found the woodworker's show last November. It's 14 ft. long and 54 in. wide—fir hull, mahogany seats and trim, oak deck and dagger board, ash oars. Above right, association members set up the show at This Is Not Art gallery in Mendocino. In the foreground is an adjustable bed by Stephen Heckerroth of Albion.



Above, Brian Lee, founder of the Mendocino Woodworkers Association, with his turnings. The bowl-on-stand at his right elbow won recognition of excellence at the Thanksgiving show. Photo: Staff.

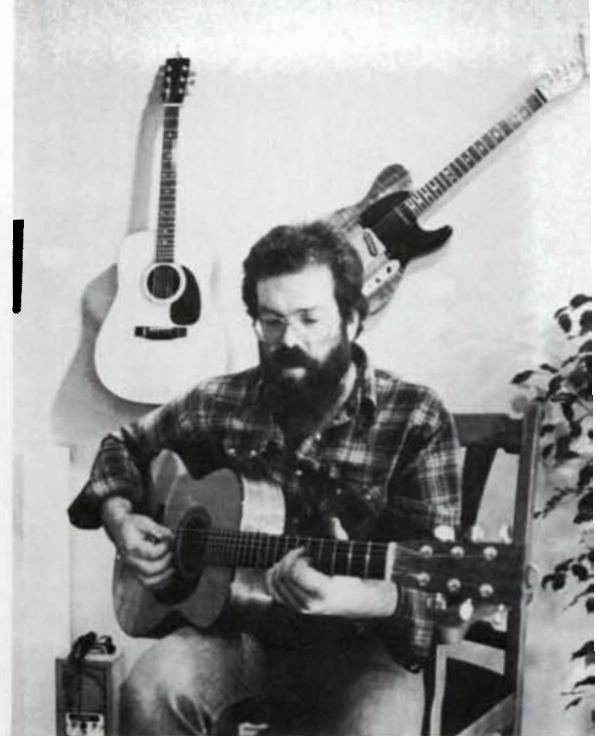


Right, 'Marduk,' by Trent Williams, mardrone, 7½ in. by 5¾ in. by 14¼ in., won best sculpture award. Left, Williams rubs oil into a sculpture. Photo: Staff.





Crispin Hollinshead displays his miniature furniture in intricately faceted wall cabinets (left). He works to one-twelfth scale, in editions of 12 or 16, signed and dated for the collector's market. Below, miniatures by Hollinshead, which won the prize for best minor piece (under \$150) at last November's woodworking show: rocking chair, 2 in. by 2 3/4 in. by 4 in., ebony; spinning wheel, 3 3/4 in. by 1 3/4 in. by 3 3/8 in., madrone.



At right, David Matlin demonstrates his acoustic guitar, winner of the prize for best joinery, 41 in. by 16 in. by 4 3/4 in., mahogany, Sitka spruce and ebony.



Chest of drawers by Nelson Lindley (left and above), 32 in. by 17 in. by 46 in., black acacia, big-leaf maple, black oak and Port Orford cedar with routed-dovetail drawers. Lindley (right) locates bumps and valleys in his planer bed. Photo: Staff.



own to produce full-size spinning wheels, plus wooden jig-saw puzzles. They didn't do well, and he lost momentum when he took time off to build his shop. He recalls, "The association had a show coming and I'd always seen shows as permission to do crazy things, so I built a miniature house. It was priced at \$1,200, and of course it didn't sell, but a local lady gave me a list of shops that sold miniatures. I went to them and found a whole other world. So I made an edition of 12 little spinning wheels, $\frac{1}{12}$ scale. A local miniatures shop sold three of them the first week. Finally, I had connected."

Since then, Hollinshead has made rocking chairs of ebony, folding screens, blanket chests, gate-leg tables and tiny vases, all to one-twelfth scale in editions of 12 or 16, signed and dated. He sells them to a dozen shops as far afield as Utah, where they fetch \$100 to \$150 each at retail. The miniatures market is already established, and it embraces two distinct classes of work. "There's stuff selling for \$40 or less at retail, saturated with imports from Taiwan. I can't compete there. Then there's the upper market, over \$100 retail with no visible ceiling. I decided early to do that trade, nothing else. Several collectors have made a point of acquiring one of everything I've made." At Thanksgiving his miniatures won the prize for best minor piece, for work priced under \$150.

Hollinshead's shop contains the usual range of full-size tools, a table saw with a thin-rim veneer blade and an assortment of jigs for handling tiny pieces. His favorite tool, though, is a 6-in. metalworker's lathe, and his basic finish is the sheen left by a sharp hand plane. "I dislike sanding," he explained. "I like to design and make, then I lose interest. So the hand-planed surface appealed to me, and in Krenov's summer class I realized that at my scale, the hand-planed finish is practical and competitive." The day I visited, Hollinshead was turning hickory flooring scrap into 16 upright spinning wheels. He'd have put six hours in each wheel when done, and would get \$75 for each.

"I feel really good about it," he said. "I've been able to decide what I want to make and how many. I always get my price, and I never make the same thing again. I have lots of free time. And because they're multiples I can devise jigs, which I really enjoy. Also, I can get several thousand dollars out of somebody else's scrap wood, which I love."

The association's prize for best joinery went to David Matlin's acoustic guitar. As guitar repairman, Matlin keeps the whole county in music, drawing broken instruments from seven music stores. As an artist, he makes an acoustic and a couple of electrics a year—labors of love, for the acoustic guitars are too expensive to sell, the electrics barely return minimum wage. Matlin doesn't mind—he thrives on repair work and spends seven days a week at it. He's been in business four years in a shop he built near his home, and believes he's the only full-time luthier in the county. He says he's never been happier; it shows in the pleasant neatness of his workspace, as well as in the calm he radiates when he talks.

As with Hollinshead, finding his place wasn't easy. By now, the litany is becoming familiar to me: Matlin, 35, quit pre-medical school ten years ago, followed a psychedelic vision from Philadelphia to Mendocino, got married, then wondered what to do with his life. "I played guitar, and one day I realized that somebody must also make guitars. I found a course at the Guitar Research and Development Center in Vermont, determined that I could do it, so here I am."

Guitar work involves the whole range of woodworking

skills, plus electronic ability, plus an astute ear. "This work satisfies so many of my appetites," Matlin said. "Anything on a guitar can be changed to suit the player, and that's especially satisfying, to make an instrument sound just the way a player imagines it should. Guitars are sound machines where less is more, simplicity where everything works together."

Since freight surcharges make eastern hardwoods cost as much as exotic woods here, a goal of the woodworkers association is promoting local timber. Almost 30 hardwood species grow at the edges of the redwood forests and in commercial orchards along the river valleys. Most of these woods aren't commercially exploited, although a few smaller mills do saw them. Thus the association's shows include an award for best use of local wood, which Nelson Lindley won last Thanksgiving. He'd built a six-drawer chest (facing page, lower left) with top and handles of black acacia (a deep reddish color), black oak drawer fronts and frame, big-leaf maple side panels, Port Orford cedar drawer bottoms and back.

Lindley's shop is a 20-ft. by 30-ft. space in a large shed he rents from a rancher, on the coastal highway north of Fort Bragg. He works alone, he says, because he can't afford the time to train and supervise employees. The shop is fully equipped, but with light-duty machines, and the day I visited it was living proof that everything's not roses, even in the magic forest. The shop was a chaotic mess, for Lindley was cleaning up and rearranging after a large job, and was also tearing down his 12-in. Parks thickness planer. "If I'd known the castings were so bad I'd never have bought it," he grumbled as he showed me the valleys and hills he was lapping out of its bed, and a disintegrating bushing in the machine's main frame that he wasn't sure how to fix.

Lindley is 30, married with two children, educated as a commercial photographer and has been working wood here for seven years. Most of that time he's made kitchen cabinets and store fixtures. But last summer when the recession set in, "Everything stopped dead. I realized how dependent I'd become on the building trades. I had to shift my angle of attack." Although Lindley enjoys built-in cabinetry, he'd always dreamed of designing and building quality furniture one piece at a time. He took advantage of the lull to build his chest of drawers on speculation for the association show, 85 hours spread over nine long days, and at \$1,400 the biggest thing he'd ever done without money up front. It was sold shortly after the show and it brought in a commission for another chest. Said he, "The association is an information exchange, but it's also an inspiration. It awakened me to the fact that I can build quality furniture and find a market for it. People know quality and they can't find it. They know good stuff is worth the extra money."

Still, at that moment the firm market consisted of enough work for only two months, with a lavish entry door next on the list. Lindley's business has always grown by referral and repeat order, and he was confident more work would roll in. "People have made verbal commitments," he said, "but I never take any money until I have the design they want drawn on paper." With the drawing he estimates the price, then logs materials and hours and bills at an hourly rate—"I try for \$19. It's easier to get a high hourly rate for worse stuff; the less I enjoy the work, the more I'll want to be paid for it. For work I really want to do, I'll take less money."

Lindley's chest happens to exemplify the style of work



Craig Marks scrapes the seat of a rosewood high chair (left). Photo: Staff. Writing desk by Marks (right), 37½ in. by 23 in. by 29 in., Honduras rosewood and California walnut, was judged best in show at Thanksgiving.

that's common in new-generation enclaves like Mendocino, a style some call Craftsman Modern. It also provides an instructive contrast with the deliberately innovative furniture that's valued in art-school woodworking environments.

Although the chest evokes simple and timeless country furniture, you go back only 100 years to find a solid precedent, to the Arts and Crafts movement generated by William Morris and his followers (*FWW* #26, p. 54), and in particular to the California version of Arts and Crafts developed by Charles and Henry Greene (*FWW* #12, p. 40). Today, the most influential practitioner is Sam Maloof (*FWW* #25, p. 48), whose work Lindley greatly admires.

This furniture, above all, is simple and straightforward, relying for visual effect on careful proportions, exposed joinery, plain but neat detailing and the figure of the wood itself. It prefers solid wood over veneer, clear oil finishes instead of stain and high shine, and eschews such decorative flourish as moldings and applied carving. Whereas the last century's iconoclasts struggled to find the appropriate role for their machinery, today's craftsmen have no difficulty moving from machine tools to hand tools and back again, as the job dictates, with the electric router their preeminent hybrid of a powered hand tool. On the side panel of Lindley's chest, the routed radius joining rail to stile is characteristic, as are the routed drawer dovetails and the top's buttery edge. Compared to the high-style contemporary furniture you'll find in San Francisco or Boston, his chest seems naive, almost rustic.

Although he prefers to work alone, Lindley lends a corner of his shop to Bob Bannon, a graduate of Rochester Institute of Technology's furniture program and a recent migrant to Mendocino. Bannon's experience at the Thanksgiving show reveals the difference between these two worlds, for he entered a sophisticated coffee table that sprang from laminated bentwood curves instead of from rigid legs. The association's technical jury decided the table swayed too much for coffee to remain in the cup. Bannon argued that part of his art is imitating the sway of the living tree, carefully controlled. The jurors compromised by allowing him to show the table but not to put it on sale.

The piece that won best in show, an honor confirmed by public ballot during the show itself, was Craig Marks' rosewood-and-walnut desk (above). Marks is a newcomer to the

area, just 25 years old, who is forming himself under the double star of Krenov and Maloof. He hopes to be able to make it doing work that's more refined, and more expensive, than is common here. Marks first came up last summer to attend Krenov's five-week course, where he built the desk. In line and feel, and with its lush, dark wood, it's reminiscent of Maloof. So is the ingenious bandsawing of its curved front apron, whereby the fall-off became stock for the drawer front. But its hand-planed surfaces and difficult joinery speak like Krenov, as does its small scale and the maker's careful attention to figure patterns in the wood.

That desk sold for \$2,000, another like it is bringing \$3,200. A wealthy family had commissioned the rosewood high chair Marks was making the day I visited. Thus he is encouraged to believe he can do well with lavish furniture, although few of the local craftsmen agree. "It's just a matter of getting in touch with the work and getting fast at it, and getting it to the city market," Marks said. "I plan to do it by building pieces on speculation for sale through galleries."

Following his summer with Krenov, Marks returned to Los Angeles to wind up his affairs and gather his tools. By December, he was in Mendocino to stay. He'd quit his job as a groundwater geologist a year earlier to struggle as a woodworker, and in this he was inspired by the example of Maloof, whom he'd been visiting, starry-eyed, since high school. His life's savings were enough for a full shop of new Powermatic machinery, now installed in the narrow slice of barn he rents from cabinetmaker Gary Church. Because he does little else besides work, Marks figures that what's left of his savings will keep him afloat for another year if need be.

Church, although he no longer participates in shows, is among the association's founders and important in local woodworking. Now 38, he was among the first of the new breed to set up shop here; one of the few to have learned from a cabinetmaker father, and one of the very few to earn a good living. Church's interest is kitchens, which he strives to make "creative and interesting for me and for the client. Other craftsmen aren't developing kitchens much, but people like things that are different, as long as they're functional."

Like so many of the others, Church lives here because it's beautiful. Sitting in front of windows looking along the ridge to the sea, he suggested that such beauty could be a handi-



Gary Church (left) makes innovative kitchens; behind him are sample doors and drawer fronts. Philip O'Leno (right) is as close to a period furniture maker as you can find in Mendocino—he works in the turn-of-the-century California Arts and Crafts style. Photos: Staff.

cap. "It makes it harder to create; you're always competing with the surroundings, and you can't win. In the city, things come in opposition or reaction to the surroundings. A lot of people came here to drop out because there's no hustle here, but there isn't much money, either." I asked him to predict Krenov's impact, and he replied that it could only be beneficial. "But if a lot of young woodworkers follow Krenov here, they'll find it slim pickings—unless they're meant to be here and they're willing to be poor."

I had heard this before, and I found it again on the next ridge north, at the home of Philip O'Leno, the first to knuckle down here, 13 years ago. O'Leno lives and works in as idyllic a spot as I've ever seen, at the end of a narrow dirt road with the forest a step to the east and the ocean shining across the western horizon. His low, old farmhouse hunkers down between the tiny hair-styling studio operated by his wife, Ea, and his own tilting barn of a shop. There's blacksmithing gear by the shop-wide doors, a crowded but well-swept woodworking space within and a lumber-crammed cranny off one side. A small window peeps through the forest toward the rising sun. The setting sun fills the doorway.

Here O'Leno makes cabinets, tables, doors, lamps, beds and benches, plus an occasional restaurant bar. He works exclusively in the California version of the Arts and Crafts style. He's a serious student of design whose work could drop unnoticed into an 80-year-old Greene and Greene interior. He's very good, and he could prosper if he would run a business-like operation in San Francisco or Los Angeles. But O'Leno prefers to work alone, prefers to stay here, and prefers that his work stay here too. He gets no satisfaction from out-of-town orders, doesn't even like to leave home for a weekend. For to O'Leno, as for many of the others, the trade-offs are simple: This is "the choice beauty spot on the planet." □

For more information

... about the Mendocino Woodworkers Association, send a stamped, self-addressed envelope to Box 95, Caspar, Calif. 95420.

... about James Krenov's classes, write Creighton Hoke, Woodworking Program, College of the Redwoods, 545-B North Main St., Fort Bragg, Calif. 95437.

... about galleries that feature quality woodworking, write: Gallery Fair, Box 263, Mendocino, Calif. 95460; Artisan's Guild Store, Box 1515, Mendocino, Calif. 95460; This Is Not Art, Box 309, Mendocino, Calif. 95460.

How they jury shows

One of the most useful things a woodworking organization can do for its members is to organize and sponsor public shows of their work. An often troublesome bugaboo is how, or even whether, to screen the work that's entered. When the Mendocino Woodworkers Association planned its first show, there was a lot of resistance to jurying of any kind, but the more experienced craftsmen insisted. Since that show was a great success, there's been no opposition to jurying. A peculiarly democratic method of doing it has evolved, one that contributes to high standards without being autocratic.

Any association member can enter the semiannual show. Last Thanksgiving, more than 30 members brought almost 90 pieces of their work. The night before the event, a technical committee screens the work to weed out bad craftsmanship. When a piece is rejected the jurors take pains to explain exactly why. They even arrange instruction if that's warranted—I heard, for example, about a chest that was rejected for sloppy drawers. The maker stomped out in anger, but later accepted a day of instruction from a member who had mastered drawer-making. Sometimes a maker will be allowed to display a promising piece that's technically flawed, but not to sell it.

The next morning, a different three-man jury (at Thanksgiving, a local sculptor and two craftsmen from woodworking associations in neighboring counties) awards cash prizes in such categories as best sculpture, best joinery, best use of local woods, best minor piece (under \$150) and best overall. The association solicits prize money from area businesses.

The technical jury, and often the awards jury as well, is drawn from the members of the Mendocino Woodworkers Guild, an honorific group of journeymen within the larger association. Members can be elected to the guild by a chicken-and-egg procedure. During each show, all the craftsmen participating, whether guild members or not, get to nominate new guild members from among themselves. The theory is, if you're good enough to show your work, you're able to recognize superior work. When a name appears on two-thirds of the ballots, that nominee becomes a guild member. The honor mainly conveys status among one's peers, and exempts the guild member from technical screening at the next show, but it may also saddle him with the duty of being on one of the two juries. It sounds cumbersome, but works well. —J.K.

Two-Board Chairs

Plans and methods from a Swiss woodworker

by Drew Langsner

The craftsmen of southern Germany, Austria and Switzerland have long been known for their fine sense of design and their excellent craftsmanship. From woodcarving to the magnificent log-and-timber-frame farmhouses, examples of their skill can be found throughout the Alps. This is also the region of the famous fairy-tale chair with the cut-out scrollwork back, painted or chipcarved with hearts, flowers, initials and dates. The chair is called a *Bretstuhl* (board chair) in Germany, or a *Stabelle* in the Swiss-German dialect, Berne Deutch. In English it is sometimes known as a two-board chair or fiddle-back. It ranks with the Windsor and the ladderback post-and-rung chair as a great example of folk furniture.

The construction is almost identical in chairs made throughout the region; individuality is emphasized in the contour and carving of the chair back. Most prominently defining a two-board chair is the beautifully simple manner in which the back and seat are joined—by two through mortise-and-tenon joints secured with tusk tenons under the seat. The backboard tenons pass through mortises not only in the seat board, but in battens in the seat bottom. These battens, which receive the leg tenons, are sliding dovetails, held in place by the backboard tenons. The battens are thicker than the seat board, but set back from the front of the seat to maintain

the overall appearance of lightness and simplicity. Their thickness allows the straight-tapered octagonal legs to be mounted free of stretchers.

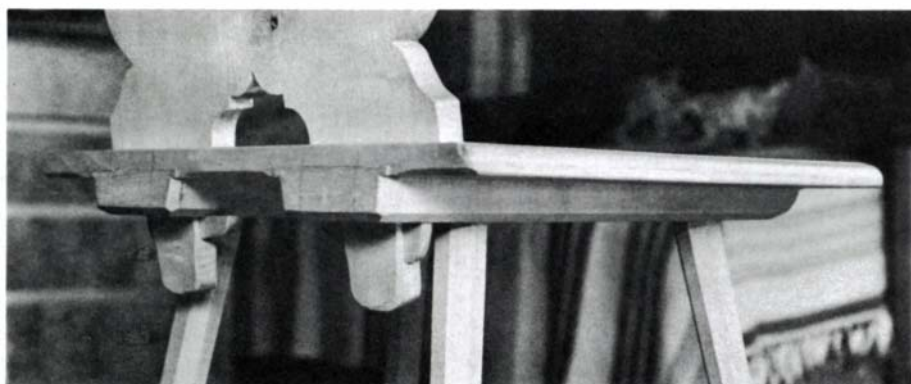
These chairs can be knocked down for storage or shipping. The backboard comes loose by removing the two tusk tenons. The sliding-dovetail battens and legs can then be driven out of the tapered housings in the seat bottom, and the disassembled package measures 18 in. by 20 in. by 8 in.

My introduction to the two-board chair was in Switzerland, where I've twice had the pleasure of working with Rudolf Kohler, a cooper who also makes a fair number of these chairs each year. In the fall of 1980, Kohler and I took a break from coopering to build a chair together. Kohler gets the credit for the more difficult work, as he wanted to be certain that the *Stabelle* going to America would be a good one. The chair dimensions given in this article are in inches, and vary slightly from Kohler's metric measurements. Exact equivalents would be awkward, and they are not necessary. As chairmaker John Alexander says, "Chairmaking is an approximate craft." There can be considerable variation from one chair to another, even in a matching set.

Kohler's two-board chair is made from ten pieces of wood: The seat, the back, four legs, two sliding-dovetail battens and two tenon tusks. In the

Alps, two-board chairs are usually made from hard maple. Ash is sometimes used for the legs and sliding dovetails.

Kohler buys his chairwood in the form of plainsawn slabs from a local mill. He never buys edged boards, as every bit of wood is used. The slabs are stickered to air-dry in a drafty loft for at least two years. The wood we used had seasoned for eight years. Several weeks before starting a chair, Kohler moves his wood to the overhead racks in his shop. No moisture-content measurements are taken, but the shop is usually very dry. Most of Kohler's chair work is done during the long winter, when his shop woodstove burns every day. The warm shop acts as a kiln. Cold, dry air infil-



Like many other highly evolved crafts, the two-board chair looks simple, but demands considerable woodworking skill and attention to detail during construction. Its tusk-tenoned back and sliding-dovetail battens to receive the legs, above, make it a sturdy, yet light, knock-down design.



trates from outside. As the air warms inside the shop, it picks up moisture from the wood and then leaks out, letting in more cold, dry air. The relative humidity in the shop remains low.

Although the *Bretstuhl* design has been around for generations, the introduction of power tools has affected the actual construction methods. The most prominent machine in Kohler's tiny shop is a massive combination planer/jointer/shaper. Kohler also uses a bandsaw, a sabersaw and a router where a turning saw (a bowsaw with a narrow blade whose orientation can be varied) and planes were traditionally used. Leg tenons are turned on the lathe.

As is usual, the first step is milling the rough lumber. The planer is large enough to handle the 16¼-in. wide seat blanks and the backboards, both dressed to ⅞ in. The sliding-dovetail battens are planed to 1⅜ in. Kohler used to make these battens only ⅞ in. thick. In those older chairs the leg tenons were mortised through both the sliding-dovetail battens and the seat board. The tenon ends were then

wedged from above. Kohler says that the thicker battens, which house stopped mortises, allow the seat board to move freely with moisture variation. Also, the end grain of the tenons is encased, making them less responsive to changes in humidity. After dressing both faces of the sliding-dovetail stock, Kohler joints one side. Using a bandsaw he rips the second side so that the width tapers from 3⅜ in. to 2⅞ in., then joints this resawn side to a finished width tapering from 3¼ in. to 2¾ in.

Dressing the leg blanks begins with planing all four sides to a 1⅜-in. square. To make the taper Kohler runs the legs through his planer on a wooden tray with a tapered bottom board that inversely matches the taper of the leg. The final dimensions taper from 1¼ in. to 1 in. square. Kohler turns the leg tenons 1⅞ in. long with a diameter of 1⅜ in. He chamfers the end and the tenon shoulder at 45° for ⅜ in. To size the diameter Kohler uses a test hole bored in a ¾-in. hardwood board. He likes a very snug (but not extremely tight) fit so the tenon squeaks when it is

twisted in the hole. The legs are finished by hand-planing to an octagonal section, with proportions judged by eye.

Outlines for the bottom and backboards are transferred from cardboard patterns. Kohler has used the same patterns for over 30 years, with just one variation—the addition of three small curls to the C cutouts on the sides of the backboard. The outlines are traced with a pencil and sawn on the bandsaw. Small details of the back are shaped with an electric sabersaw. The scrollwork is dressed with flat and half-round rasps, then sanded smooth. The front edge of the upper section of the seat back is rounded, nowadays with a router, formerly by spokeshaving and sanding. The remaining scrollwork is dressed square to the faces. Edges are then softened about ⅓ in. with a piece of sandpaper. The tapered mortises through the seat-back tenons are made after the sliding-dovetail battens are fitted to the seat bottom.

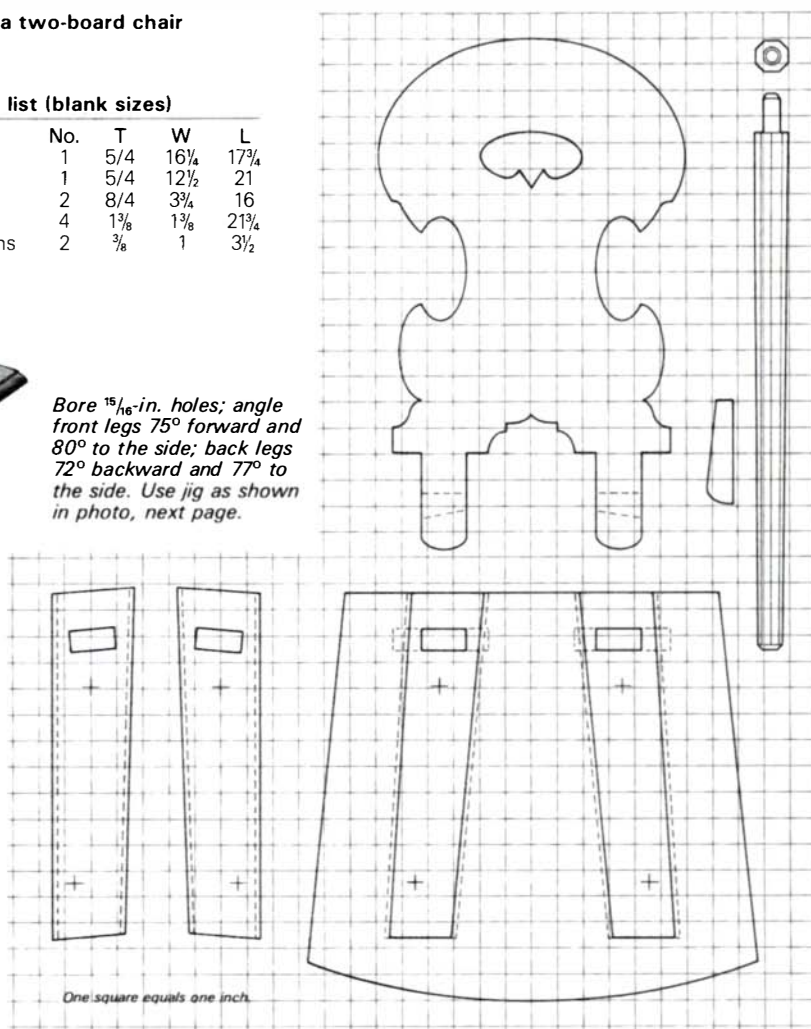
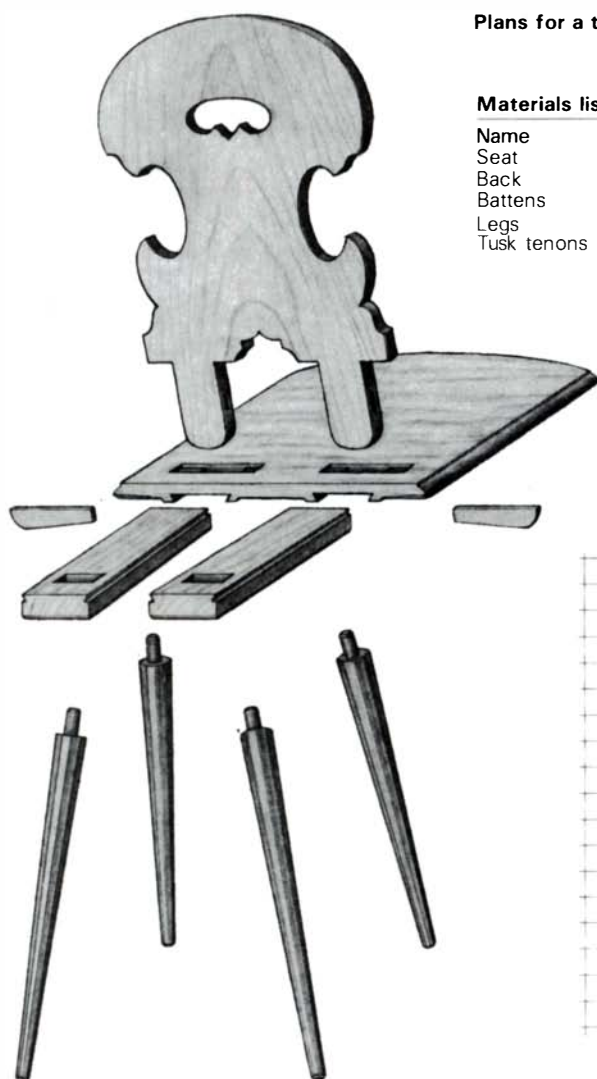
The tapered housings for the sliding-dovetail battens are laid out parallel to the sides of the seat bottom after the

Plans for a two-board chair

Materials list (blank sizes)

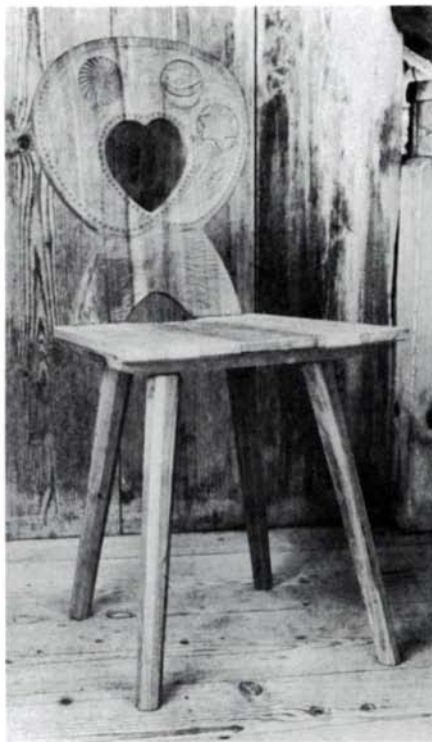
Name	No.	T	W	L
Seat	1	5/4	16¼	17¾
Back	1	5/4	12½	21
Battens	2	8/4	3¾	16
Legs	4	1⅞	1⅞	21¾
Tusk tenons	2	⅜	1	3½

Bore 1⅞-in. holes; angle front legs 75° forward and 80° to the side; back legs 72° backward and 77° to the side. Use jig as shown in photo, next page.





Kohler uses a wooden box with slots in boards across the top to jig his brace and bit to the proper angle for boring the leg mortises.



Design variations on the two-board chair include a slatted back, right, and battens running the width instead of the length of the seat, left. Note that the decorative cutout in the back serves also as a handhold. Photos: Armin Erb.



sides and back of the blank have been jointed, and the curved front dressed with a spokeshave. The outside edges of the housings should be $2\frac{1}{2}$ in. from the sides. To excavate the housings, Kohler starts by chiseling out the last 2 in. before the front stop. He then uses a backsaw to cut the side kerfs at an 80° angle, $\frac{1}{16}$ in. into the board, and cleans out the cavity using an electric router and a dovetail bit. The whole cavity could be excavated with the router and a fence, but instead Kohler uses his router freehand, and the saw kerfs are useful boundaries.

The tapered sliding-dovetail battens are individually fitted to the finished housings. Kohler cuts the side angles using a router with a dovetail bit. A dovetail hand plane can also be used. The front of the dovetail tongue is cut back so that the end of the batten overlaps the chiseled stop in the housing. A simpler batten with beveled sides instead of a dovetail tongue is sometimes used on plainer chairs. This version doesn't require using a router or dovetail plane; the stock can be cut on a tilting-arbor saw or planed to shape.

Mortises through the seat board and battens are chiseled at an angle of 80° . They are cut a little wider than the tenons, to allow for expansion and contraction of the backboard, which runs cross grain to the seat board. In addition to

the through mortises, Kohler chisels a $\frac{1}{8}$ -in. deep housing for the shoulders of the backboard tenons. This conceals any gap between mortise and tenon. The backboard tenons are fitted, and the baselines for the tusk-tenon mortises are marked flush with the bottom face of the battens. The back is removed, and the tapered mortises are chiseled in the backboard tenons $\frac{1}{16}$ in. inside the line scribed when the back was in place. Kohler makes these mortises $\frac{1}{4}$ in. wide, tapering from $\frac{7}{8}$ in. to $\frac{3}{8}$ in. The tenon tusks are $3\frac{1}{2}$ in. long.

While the chair is apart (the sliding-dovetail battens are also removed), Kohler dresses the upper and lower edges of the seat board. He routs the upper edge with a beading bit. The lower edges of the front and sides are deeply chamfered with a plane, which adds to the visual lightness of the piece. The chamfers on the back of the seat are carefully shaped with a drawknife. All four lower edges of the sliding-dovetail battens are relieved by routing with the quarter-round bit.

Kohler bores the mortises for the leg tenons with the dovetail battens back in place. The front legs cant forward at 75° and to the sides 80° . The rear legs angle back 72° and to the sides 77° . For accuracy, Kohler uses a homemade boring jig (photo, above). The jig is a wooden box about 16 in. by 16 in. by 6 in. The

bottom of the box has a large trapezoidal opening that fits snugly over the mounted battens, and the top of the box has a central opening and four angled slots $\frac{3}{8}$ in. in width. Kohler punches predetermined centers on the battens, the jig is fitted into place and correct angles are bored by holding the auger at the end of the slots. Kohler doesn't use a depth control, but he aims to stop just at the base of the battens.

Just before the final assembly, the separate chair parts are given a careful sanding. Fitting the legs is simply a matter of dabbing a little white glue on the tenons, then pounding the legs in place. After assembly, the legs are trimmed. On Kohler's standard chair the upper front edge of the seat is $18\frac{5}{8}$ in. high. The seat angles downward slightly so that the upper rear edge is $18\frac{3}{8}$ in. from the floor.

The next stage is decorating the back. Kohler is an excellent chipcarver, but that's a skill for someone else to write about. The *Stabelle* for America was finished, and we picked up where we'd left off with our coopering. □

Drew Langsner is director/instructor at Country Workshops, Rt. 3, Box 221, Marshall, N.C. 28753. Workshops include white oak basketry, July 20-24; country woodcraft, Aug. 3-7, and post-and-rung chairmaking, Aug. 17-21.

Wooden-Drum Stroke Sander

Shop-built machine saves space and money

by A.W. Marlow

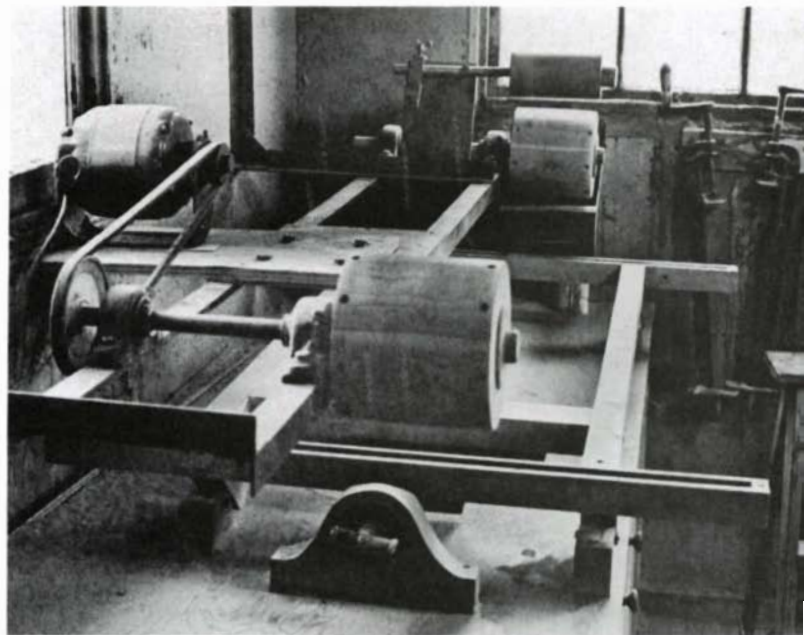
Surely every woodworker, amateur as well as professional, needs a stroke sander to relieve him of the tedious, time-consuming hand-sanding of large flat surfaces. Everything about my contraption is crude and inexpensive. I built it when we were just crawling out of the Depression. Nothing was bought that could be homemade. After hand-sanding one or two tabletops, I discovered that if I wanted to eat regularly, a stroke sander was in order. So I had to match its design requirements with the money and space available.

A stroke sander is not a complicated machine. The upper part consists of an electric motor, two main drums, a tensioning/tracking idler drum and a metal framework to hold these components in the proper working relation to one another. The lower part of the machine is a table for holding the workpiece. This table is raised or lowered, depending on the thickness of the stock being sanded, and travels front to back beneath the moving sanding belt.

To operate the machine, the workpiece is laid on the table, which is elevated until the belt is about $\frac{1}{4}$ in. above the surface to be sanded. With the power on, one hand moves the table in and out below the moving belt, while the other hand presses down, moving forward and back, on the smooth side of the belt with a wooden platen. The amount of pressure on the platen and its movement must be coordinated with the in-and-out movement of the table. Sanding with this machine is like trying to pat your head and rub your belly at

the same time, but once you get the hang of it, work proceeds quickly, and all that's left prior to finishing is a light and easy hand-sanding with a finer grit.

I had to have a machine that would handle stock up to 7 ft. long, but one that would occupy minimal space in my shop. So I decided to place it in a corner, where I could suspend the upper parts of the machine from the wall and support the sanding table on the top of a storage cabinet. Instead of starting with a preconceived design and buying all the hardware initially, I let the thing evolve, meeting each technical problem as it showed its ugly face and buying metal materials as I learned what was needed. The bill of materials for the ma-



A stroke sander makes short work of smoothing large flat surfaces. Marlow built the machine below about 40 years ago, and used no factory-made drums or other hard-to-find materials. To make the most of shop space, he mounted the sanding table on top of a storage cabinet. End view of stroke sander, right, shows the relative positions of drive system and tensioning/tracking idler assembly. Arched block in foreground houses acme-thread screw that raises and lowers the sanding table. Photos, except where noted: Andy Marlow.

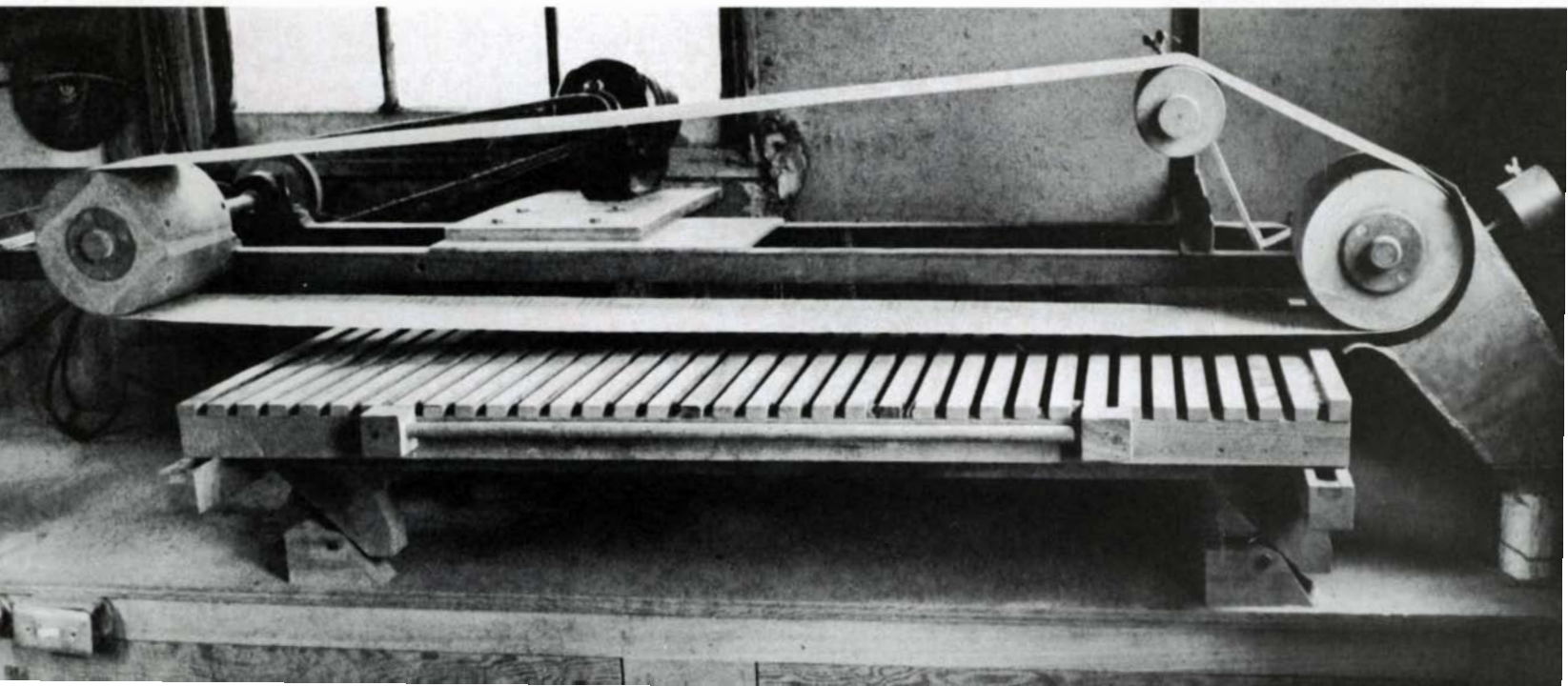
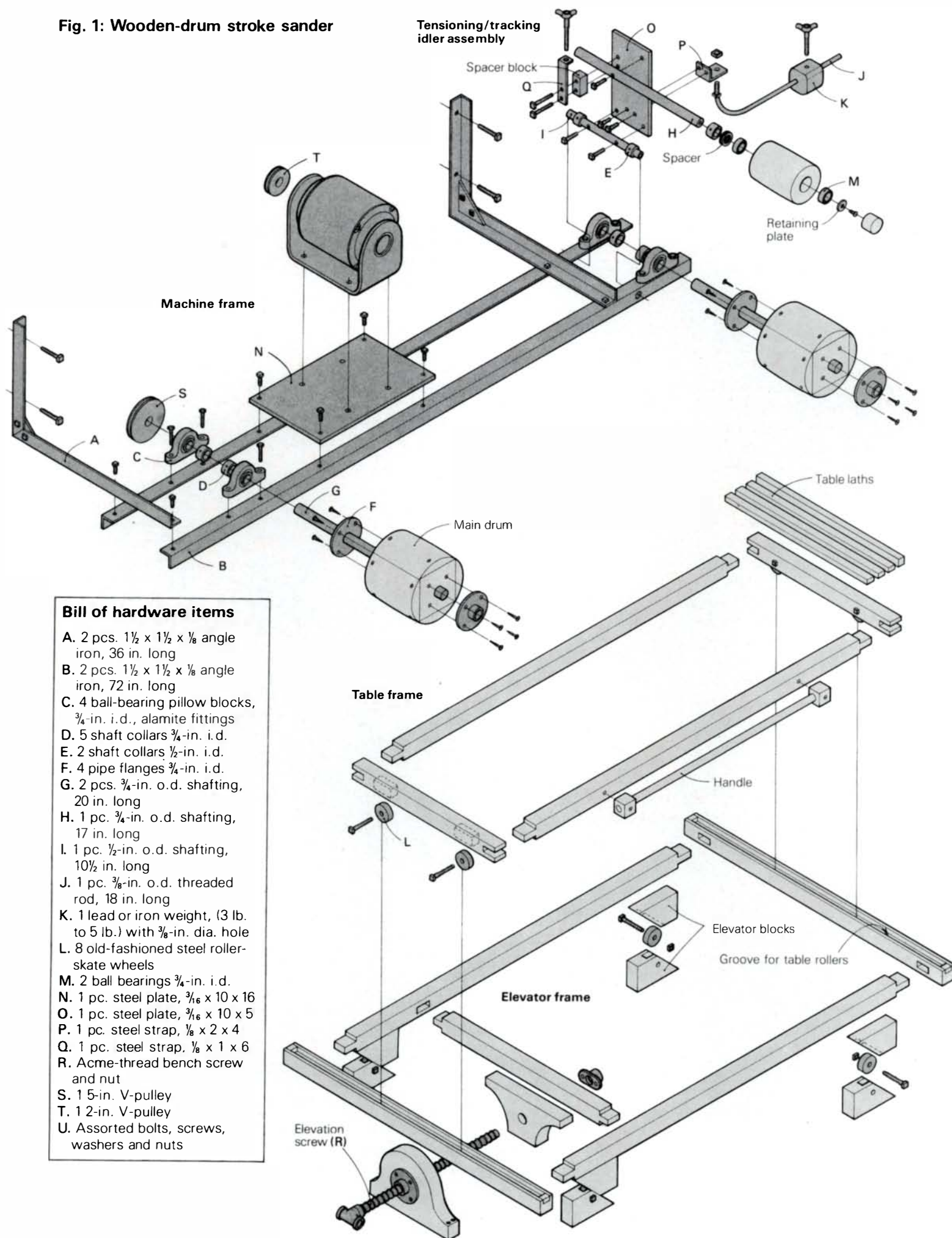


Fig. 1: Wooden-drum stroke sander



Bill of hardware items

- A. 2 pcs. $1\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{8}$ angle iron, 36 in. long
- B. 2 pcs. $1\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{8}$ angle iron, 72 in. long
- C. 4 ball-bearing pillow blocks, $\frac{3}{4}$ -in. i.d., alomite fittings
- D. 5 shaft collars $\frac{3}{4}$ -in. i.d.
- E. 2 shaft collars $\frac{1}{2}$ -in. i.d.
- F. 4 pipe flanges $\frac{3}{4}$ -in. i.d.
- G. 2 pcs. $\frac{3}{4}$ -in. o.d. shafting, 20 in. long
- H. 1 pc. $\frac{3}{4}$ -in. o.d. shafting, 17 in. long
- I. 1 pc. $\frac{1}{2}$ -in. o.d. shafting, 10½ in. long
- J. 1 pc. $\frac{3}{8}$ -in. o.d. threaded rod, 18 in. long
- K. 1 lead or iron weight, (3 lb. to 5 lb.) with $\frac{3}{8}$ -in. dia. hole
- L. 8 old-fashioned steel roller-skate wheels
- M. 2 ball bearings $\frac{3}{4}$ -in. i.d.
- N. 1 pc. steel plate, $\frac{3}{16} \times 10 \times 16$
- O. 1 pc. steel plate, $\frac{3}{16} \times 10 \times 5$
- P. 1 pc. steel strap, $\frac{1}{8} \times 2 \times 4$
- Q. 1 pc. steel strap, $\frac{1}{8} \times 1 \times 6$
- R. Acme-thread bench screw and nut
- S. 1 5-in. V-pulley
- T. 1 2-in. V-pulley
- U. Assorted bolts, screws, washers and nuts

chine (opposite page) includes only items that were truly needed and could be scavenged or purchased from local ironmongers and hardware dealers.

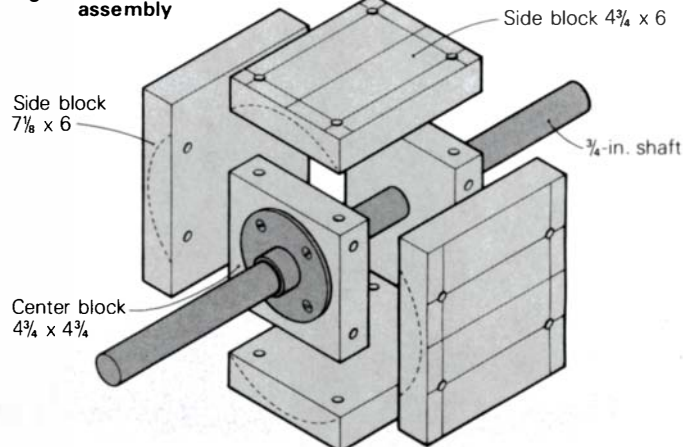
The machine frame—Begin construction by fabricating the angle-iron machine frame (figure 1) for supporting the motor and drums. Use the two 36-in. lengths of angle iron for making the wall brackets. Cut in each a 90° notch 14 in. from the end, and bend the pieces to form a right angle (with flanges to the inside, you need a right-hand bracket and left-hand bracket). Strengthen the resulting miter joint with either a weld or a strap bolted across the angle. Drill two $\frac{1}{4}$ -in. holes in each vertical (14-in.) arm; then two $\frac{1}{4}$ -in. holes in each horizontal arm for attaching the 6-ft. rails. These holes should be drilled on $8\frac{3}{4}$ -in. centers, with the first hole $\frac{3}{4}$ in. from the end of the bracket. Now you can mount the brackets to the wall. Position them 42 in. above the floor and about 62 in. apart. This distance can be exact on a masonry wall where you must bore for expanding lead inserts, but it will vary on a framed wall where you must screw the brackets directly to the studs.

After mounting the support brackets to the wall, temporarily clamp the 6-ft. rails in place and mark them for matching bolt holes. If all is correct, the right-hand ends of these rails should overshoot the right bracket about 10 in. to make room for the tracking/tensioning assembly and the pillow blocks for the right-hand drum. Also drill four $\frac{1}{4}$ -in. holes in the 10-in. by 16-in. steel plate needed for mounting the motor. This mounting plate should be attached to the rails about 20 in. from the left end, so clamp it in place here and mark for holes in the rails. Now bore two $\frac{1}{2}$ -in. holes in the vertical flanges of the angle iron about 7 in. from the right-hand ends. These holes will accommodate the tension/tracking-plate pivot shaft.

The only holes remaining to be drilled in the long rails are those for mounting the pillow blocks. Alignment of these is crucial for belt tracking. So rather than mark for these holes when you first clamp the rails to the brackets, it is advisable to bolt the long rails to the brackets as for permanent attachment, even though you will have to remove them later to drill the holes. Using a carpenter's framing square, scribe a centerline across both front and back rail irons about 1 in. from the right end and 11 in. from the left end. Determine the distance between the two mounting holes in each pillow block and lay out matching holes on the irons. After drilling these, bolt the frame assembly together into one unit.

The main drums—The next step is to make the main drums. Figure 2 shows the number and dimensions of the parts required for each. Buy enough No. 2 white pine to make both drums. All pieces must measure exactly $1\frac{3}{16}$ in. thick. First, saw the four end pieces $4\frac{3}{4}$ in. by $4\frac{3}{4}$ in. Next, mark the exact center on two of these squares. Clamp one of the marked squares on top of an unmarked one, and with a drill press, accurately bore a $\frac{3}{4}$ -in. hole through both at once. Repeat this operation with the other pair. Now cut the four narrow side pieces $4\frac{3}{4}$ in. by 6 in. (precisely the same width as the squares). Then cut the wide side pieces $7\frac{1}{8}$ in. by 6 in. long. Draw centerlines down the length of all eight pieces, and measure out $1\frac{1}{8}$ in. on both sides of the line and about $\frac{3}{8}$ in. in from each end. This will give two bore centers on each end of all eight pieces. Counterbore on these centers $\frac{1}{2}$ -in. holes

Fig. 2: Main drum assembly



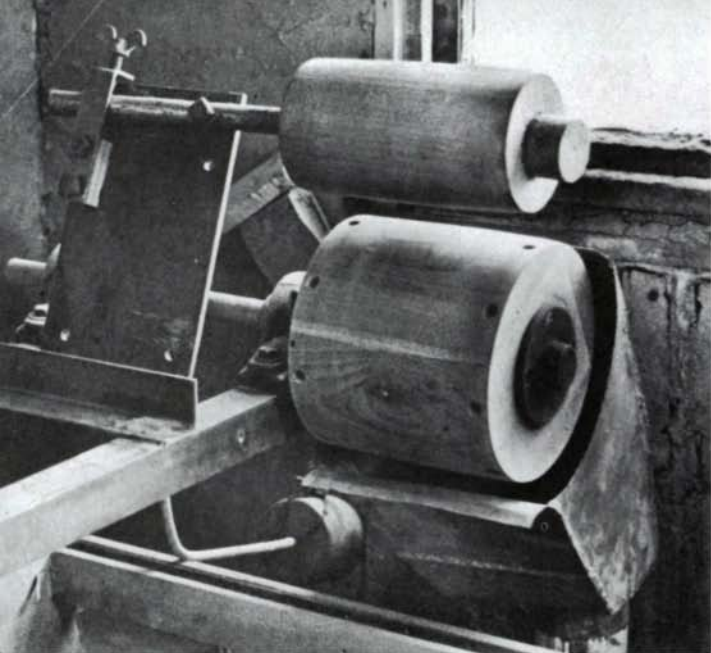
Assemble the parts of the drum blank with the two end blocks held in alignment by the shaft. Remove finished blank from shaft and bandsaw it to a rough cylinder. Replace blank on shaft and mount it in machine frame, which becomes a makeshift lathe. Turn the drum true, leaving a $\frac{1}{8}$ -in. crown in the center.

to a depth of $\frac{3}{8}$ in. Bore $\frac{1}{64}$ -in. clearance holes through the remaining wood thickness.

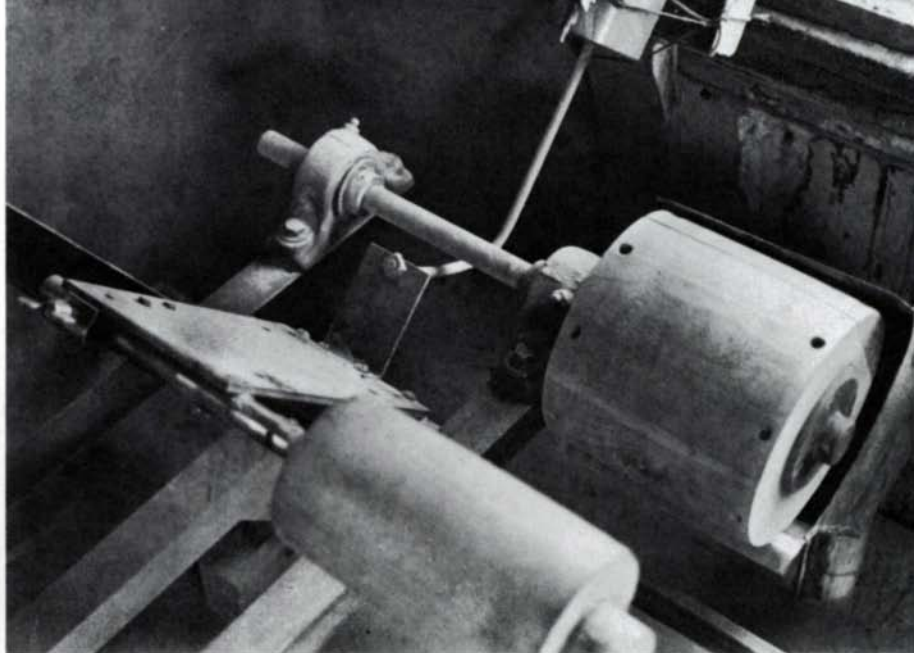
To keep the parts of the ends of the drum blank in alignment as you assemble them, take one of the 20-in. shafts and slide it through the holes in two of the squares. Spread the squares 6 in. apart, and be sure the grain runs from top to bottom on both blocks. Apply some yellow glue to the end grain of one of the squares, place one of the narrow side pieces flush with the end and even on both sides and screw it down tightly using $1\frac{1}{4}$ -in. #8 woodscrews. Now shift the other square into proper alignment, and glue and screw it in place. If necessary, bore small pilot holes to start the screws. Turn the unit 180° and fasten the other narrow side piece. Next, attach the two wider side pieces in the same manner. You can at this point (if your bandsaw is big enough) mark out a 7-in. dia. circle on the end of each turning blank and rough-cut the circle. This will save time when turning the blanks into cylinders.

The drums are secured to the shafts with $\frac{3}{4}$ -in. I.D. pipe flanges. Prepare the flanges by boring out the threads with a $\frac{3}{4}$ -in. drill or by removing enough of the threads with a round file to allow the shaft to slide through. Next bore a $\frac{7}{32}$ -in. hole in each hub, and thread each hole with a $\frac{1}{4}$ -20 tap for receiving a setscrew. Now secure the drums, flanked by two flanges, on their shafts and slide one of the shafts into the left-hand pillow-block bearings. With the shaft collars in place, spread so they just touch the inside of the blocks, tighten all the setscrews. Bolt your motor ($\frac{1}{3}$ HP, 1,725 RPM) on its mounting plate and tighten a $2\frac{1}{2}$ -in. dia. V-pulley on the shaft. I recently installed another motor on my sander and its rotation is opposite from the original, so I installed the plywood outrigger shown in the photos. Slide a 4-in. V-pulley on the main shaft, position it in line with the motor pulley and tighten the setscrew. You now have a makeshift lathe for truing up the diameters of the drums.

A tool rest for turning must now be devised. The simplest is a steel bar or pipe supported at each end in some manner. Even with a good rest the RPM is so low that it would make a good turner cry, but the wood is soft and there are only two to do. Close to a 7-in. dia. is what to strive for, but more important is that there be about a $\frac{1}{8}$ -in. crown in the center. Do not allow the center to be flat or concave; that would mean



Tensioning/tracking idler assembly pivots on a ½-in. shaft in the frame to tension the belt. The idler drum rotates on a ¾-in. shaft that pivots on a bolt across the axis of the shaft. Photo: Staff.



Pivoted to its extreme left-hand position, the tension/tracking assembly can be seen in its entirety. The tensioning weight (here tied to a brick) fits onto a bent rod, which is attached to the pivoting plate by means of a flange. The thumbscrew adjustment at the top of the plate is used to control belt tracking. Photo: Staff.

trouble in tracking. Sand the turning with 60-grit paper, using calipers to be sure the ends are both the same diameter. Remove the drum and install the other to turn in like manner.

The tensioning/tracking assembly—First study the photos on this page and figure 1 (p. 48). Assuming that you've bored two ½-in. holes in the long rails to house the tensioning/tracking shaft, proceed to prepare the plate for bolting to the pivot shaft and for mounting the idler-drum shaft and tracking-adjustment screw. Drill two 1⅜-in. holes along the 5-in. edge of the plate as shown in figure 1. Lay this plate on top of the ½-in. shaft, which should extend equally on both sides. Mark the shaft for boring 1¼-in. holes, and drill and tap these for ⅜-in. by ½-in. bolts. That will take care of the hinged bottom edge.

Along the top edge of the plate will be mounted the ¾-in. by 17-in. idler shaft. This shaft pivots on a ¼-in. by 1-in. hinge bolt to track the sanding belt. Bore a ⅞-in. hole for the bolt 1 in. down from the top and 1 in. in from the right edge; then tap the hole for ¼-20 threads. Now bore a ¼-in. hole through the shaft 5 in. from one end.

Next prepare the ⅝-in. by 1-in. by 6-in. strap for installing on the plate. Before bending the strap, drill a ⅞-in. hole ½ in. from one end, and tap this hole for insertion of the ½-in. dia. tracking-adjustment screw. At the other end, bore two 1⅜-in. holes for mounting the bracket to the plate. Now you can bend the strap 90° to produce a 1-in. flange on the threaded end. Provide a wooden spacer block (½ in. thicker than ¾ in. so the shaft can move freely) for mounting the strap. Bore this block for clearance holes and insert the bolts through the strap and the block. Then take the assembly over to the plate and position it in the upper left-hand corner, straddling the idler shaft. Pivot the idler shaft until it is precisely parallel with the top edge of the plate; then shift the strap and block up or down to equalize the space between the flange and the block. Mark and bore two ⅞-in. holes and tap them for ¼-20 threads.

The photo above right shows a flanged 2-in. by 4-in. plate bolted to the bottom of the tensioning/tracking plate. This smaller plate is for mounting the tension bar and weight. The bar is best made from a ¾-in. threaded rod about 18 in. long;

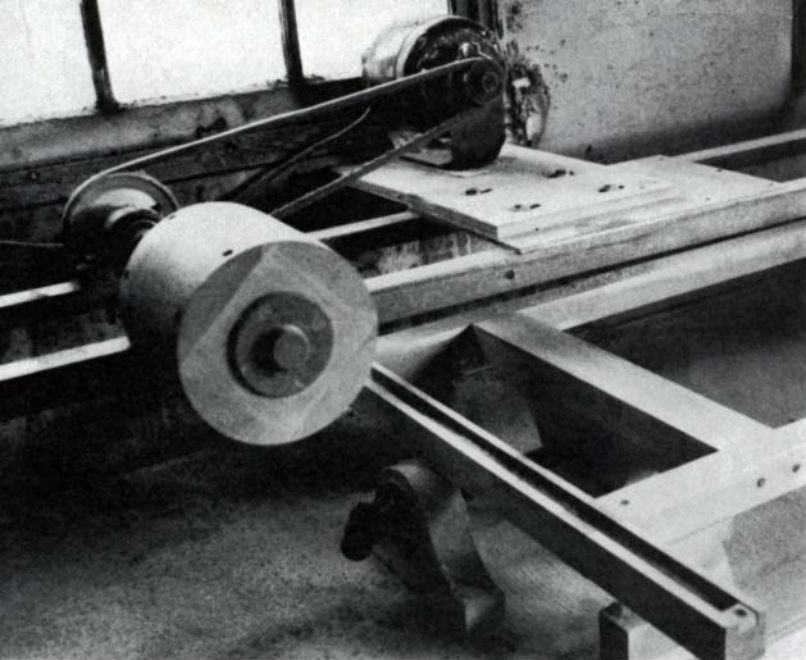
it is equipped with a 3-lb. to 5-lb. weight (more if necessary), which slides up and down the rod and is fixed at the proper place with a thumbscrew. Bore one end of the plate to receive the rod, and bore two ¼-in. holes in the other end for mounting bolts. Bend the plate 90° to produce a 1½-in. flange on the end with the two holes. Then center the small plate on the tensioning/tracking plate so the mounting holes are about 1 in. above the pivot shaft. Mark and bore two ⅞-in. holes for attaching the weight plate; tap them and then bolt the small plate in place.

Now slide a shaft collar onto each end of the pivot shaft, and insert the shaft in the two ½-in. holes in the long rails, taking care to center the plate between the rails and to spread the collars so they just touch the inside edges of the angle iron. Tighten the setscrews to secure the collars.

Now turn to making the idler drum. Dimension two pieces of wood 7 in. by 4½ in. by 2 in. thick. Down the center of each piece, plow a groove ¾ in. wide by ⅜ in. deep. When the two halves are glued together, these channels should align to make a ¾-in. square hole through the drum blank for accommodating the shaft. Having glued up the halves and left them in the clamps overnight, cut the blank to a finished length of 6 in., making sure the ends are square. Now make a pair of tapered plugs, each ¾ in. long, 1⅛ in. square at one end and 1⅜ in. square at the other. Seat them solidly in the ¾-in. square holes, and mark their centers for turning.

Mount the blank between centers in a lathe and turn as you did the belt drums, leaving a ⅝-in. crown in the middle. Measure accurately the O.D. of the ball-bearing race, and turn a snug-fitting recess for it ¼ in. deeper than the width of the bearing race, leaving enough wood to keep the center intact. Remove and flip the piece end for end, carefully find the centers and turn a recess in the other end. After turning, the remaining wood can be bored out on the drill press. Insert bearings, slide the pulley on the shaft and if (for any reason) it does not run true, it can be placed on the main left-hand shaft temporarily and turned true, using a flange for driving. This idler must run true to keep vibration at a minimum.

The front end of the shaft should have a tapped hole in its center for a ⅜-in. R.H. machine screw to hold a retaining plate for the bearing. The plate can be a washer with an



Grooved track in the side member of the elevation frame accommodates skate wheels on the bottom of the traveling sanding table. Blocks glued in grooves stop the table travel. Anchor block beneath cross-member in frame holds nut for elevation screw.

O.D. larger than $\frac{3}{4}$ in. On the shaft at the rear bearing, a number of washers or a short sleeve will be needed to fill the space between bearing and collar. When a wing or thumb bolt is turned into the tapped $\frac{1}{4}$ -in. hole for tracking adjustment, this unit should be operable.

The elevator frame and carriage track—To make the most efficient use of space beneath the machine, begin by constructing a storage cupboard; its top should be 29 in. high. This completed, start work on the elevator frame and carriage track (photo above). Made of softwood, the track bars are $1\frac{3}{4}$ in. square and 36 in. long. Plow grooves down their lengths, $\frac{1}{4}$ in. deep and $\frac{1}{16}$ in. wider than the skate wheels. Stop the grooves front and rear by gluing in little blocks. The front and rear frame members, also $1\frac{3}{4}$ in. square, are 48 in. long. These are positioned 22 in. apart and tenoned into the track bars. A crossmember, to which you will later attach the elevator-screw anchor block, is tenoned into the frame members 8 in. in from the left-hand track.

The elevator frame is raised and lowered on four pairs of blocks, their mating surfaces inclined at 45° . The bottom ones (bearing blocks) are $1\frac{3}{4}$ in. thick, $2\frac{3}{4}$ in. high and $5\frac{1}{2}$ in. long and are fitted with steel roller-skate wheels. The top angled corners must be mortised out sufficiently to allow the skate wheels to revolve freely when placed so the wheel's radius extends $\frac{3}{8}$ in. above the wood. The upper blocks (elevation blocks) are grooved along their inclined surfaces $\frac{1}{16}$ in. wider than the skate wheels and $\frac{1}{4}$ in. deep. All blocks are drilled and counterbored for attaching to frame and cabinet top with screws.

Fasten the elevation blocks to the frame, and place four shims under the frame at each corner, holding it off the cabinet top just enough to clear the bottom of the elevation blocks. Now center the frame front-to-back under the belt and position it end-to-end about 3 in. in from the extreme right of the long angle-iron rails. Apply glue to the bottoms of the bearing blocks and slide them into place under the elevation blocks. Allow the glue to set overnight; then lift off the frame and seat the necessary wood screws.

Shown in figure 1 is the elevation-screw anchor block. It's about 3 in. wide and 8 in. long and should be bored to re-

ceive the nut for the acme-thread bench screw. After the nut is installed, screw the block to the bottom of the cross-member. The position of the fixed block will depend on the length of the screw you use.

The traveling table—The sanding table consists of a carriage frame, which is fitted with skate wheels, and a slatted top for holding the workpiece. Using open mortise-and-tenon joints, make the carriage frame 22 in. wide and 48 in. long from $1\frac{3}{4}$ -in. square stock. About 3 in. in from the front and rear, cut mortises for the skate wheels. Then bore the sides of the mortises for axle holes, which will allow the wheels to extend $\frac{3}{8}$ in. below the frame. The carriage frame must travel back and forth freely in the tracks.

Now cut a bunch of laths about $\frac{3}{8}$ in. thick, 1 in. wide and 22 in. long. The far right-hand strip should be $\frac{3}{8}$ in. thicker than the rest, as it will act as a stop for the workpiece. Space them about $\frac{1}{2}$ in. apart and fasten them to the carriage frame with glue and countersunk screws or nails.

Now fashion a handle for getting a comfortable hold on the table. I find a long, $\frac{3}{4}$ -in. dowel held at each end by blocks to be good enough. All that remains is to make a platen from soft pine. It ought to be about 5 in. wide and 7 in. long and slightly beveled at the ends. Attach a handle that pleases you and when in use rub the contacting surface occasionally with a cake of beeswax.

Because this machine generates a lot of dust, I recommend that you hook it up to a dust-collection system of some kind. I have made an inexpensive dust-collection head from downspouting and scrap pieces of sheet metal, and connected the head via a flexible hose to an old blower that I scavenged from an oil burner.

Sanding belts—I use Norton Adalox 60-grit production paper, which can be purchased in 6-in. wide rolls from most industrial-supply stores and is cheaper than cloth belting. To determine the length of the belt, prop up the tracking idler and measure the distance around the pulleys and the idler with a steel tape. Add 2 in. to this and you've got the length of your belt. Now splice the ends together. Both of the ends should be cut at complementary 60° angles, using a sharp knife; these angles must be exact or the belt will not run true. Dimension two clamping blocks ($2\frac{1}{2}$ in. by 9 in. by $\frac{3}{4}$ in. thick) and, to pad the clamping blocks, cut 20 pieces of newspaper the same size.

With the smooth side up, bring the two ends of the belt together, and place one of the clamping blocks evenly under the joint, having first covered the block with one piece of newspaper. Using two short, thin brads, tack the belt onto the block. Then carefully butt the other end to the first and brad it in place.

Tightly woven linen makes the best splicing material. Cut two strips of the cloth 9 in. long, one 1 in. wide, the other 2 in. wide. Spread a thin coat of white glue on the narrow strip and lay it evenly across the joint; coat the wider strip with glue and lay it evenly over the narrow one. Center the pad of newspaper over the splice, and clamp the second block on top of the pad. Allow this to sit overnight, and then remove the clamps, carefully lift the belt from the brads and trim off the excess cloth. □

Andy Marlow is a consulting editor to this magazine.

Five Basic Spindle Laminations

Glued-up turnings produce various patterns

by Ted Pack

Ernest Hemingway used to argue there were only four plots in American novels. If you want to turn out a lamp, rolling pin, inkstand, candlestick or weed pot instead of a novel, your range is increased; I count five basic spindle laminations: the sandwich, the stack, the multiple sandwich, the checkerboard and the chevron.

The sandwich (figure 1) is the easiest lamination. You face-glue a series of boards together, let the glue dry overnight, trim the block and turn. The outer layers follow and accent the piece's curves, making a bull's-eye effect on the front and back; the sides look striped. Making the outer layers thinner than the inner ones will emphasize the bull's-eye effect; making the inner layers thinner emphasizes the striped sides. You can use a range of wood colors, from front to back or from the center slab out, and you can alternate thick slabs of dark wood with thin slabs of light—it's still a sandwich.

Turn a sandwich on its side and you get a stack (figure 2). It's made of short pieces of wood face-glued to one another, with the grain direction alternated for strength. This means your cutting tool will jump from end grain to side grain all along the piece, making this one more difficult to work on. Keep a firm grip and a sharp tool. You can vary the colors and thicknesses of the laminations on this one, too, just like the sandwich. It's a good way to use up ends of boards too short to join and too pretty to throw out.

The multiple sandwich (figure 3) has the bull's-eye effect on all sides, and no striped sides. There are a number of ways to build up the multiple sandwich. I usually turn lamp bases out of them, and so start with a 6-in. by 6-in. core. This can be a solid piece or a glued-up block trimmed square. I laminate to it a thin layer of contrasting wood on each side, then

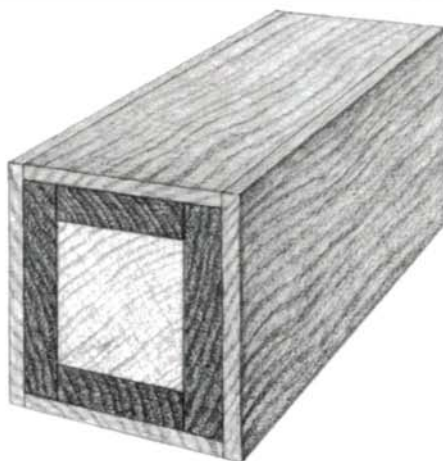
add a thin layer of the core wood on top of that. This is a good way to use up thin pieces of figured wood. I do not overlap the laminations at the corners, and thus the largest diameter that the finished turning can be is slightly less than the diagonal of the core. This method produces equal-size bull's-eyes on four sides without having to miter the corners of the laminations, which is another way of building up a multiple sandwich. Mitered corners are trickier to cut and glue, but they give you more possibilities for the thickness of the laminations and their proportion to the size of the core. Three, six and eight-sided sandwiches are possible, but the more sides you have, the closer your polygon comes to a circle, and the thinner the laminations will be after turning.

The checkerboard (figure 4) is the most exacting of the five designs. To make a block with, say, five strips per side, start with 25 strips planed exactly as wide as they are to be in the final block, and $\frac{1}{4}$ in. thicker than they are wide. Glue them across the width to make five striped boards, two with a dark strip in the center and three with a light. When the boards are dry, plane down the extra $\frac{1}{4}$ in. in thickness, to make each board as thick as the strips are wide. Now glue the five boards into a block, being sure the ends make a checkerboard pattern. Apply clamping pressure slowly and evenly; I usually put a light clamp at each end and then apply the clamps from the center of the piece out to both ends. (For an alternate way of making checkerboard patterns, see *Methods of Work*, *FWW* #22, May '80.)

The procedure is the same for any number of squares, but if you pick an even number the center will be in the joint, not the center strip. You can vary the checkerboard design by making the outer layer on all four sides a solid board, the

The Overlapping Multiple Sandwich

Paul Darnell of Phoenix, Ariz., sent us yet another method of gluing up the multiple sandwich, the third of Ted Pack's five basic spindle laminations. Darnell begins with a square core and laminates first only two opposite sides of it. When the glue has dried, he planes the glueline faces and laminates these, overlapping the edges of the first laminations. This process can be repeated until he reaches the limit of his lathe's swing. It produces different-size bull's-eyes on the four "corners" of the turning, as shown in the sample of his work at right. □



Paul Darnell

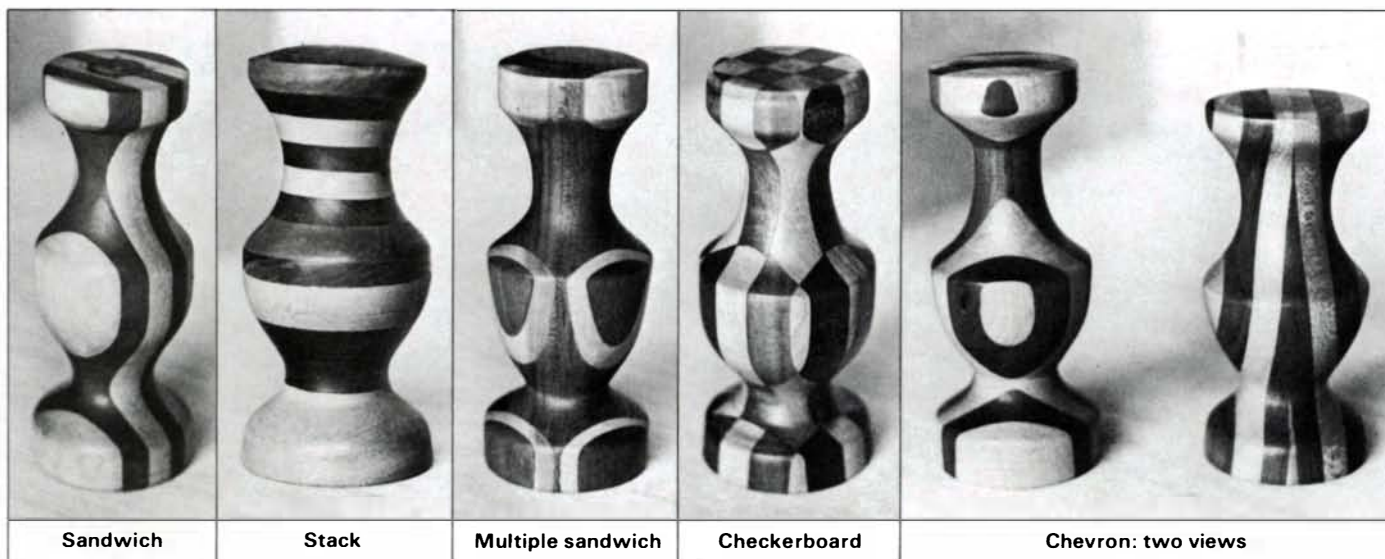


Fig. 1: Sandwich

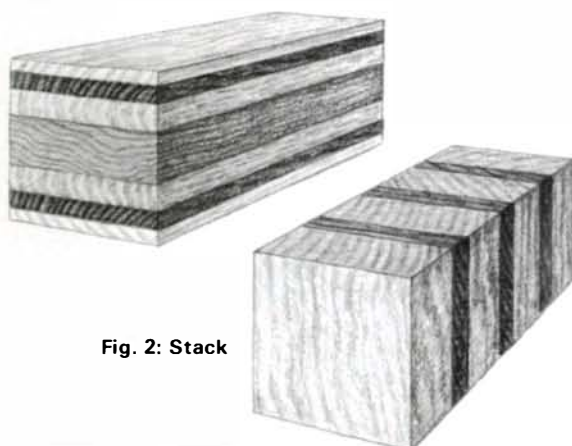
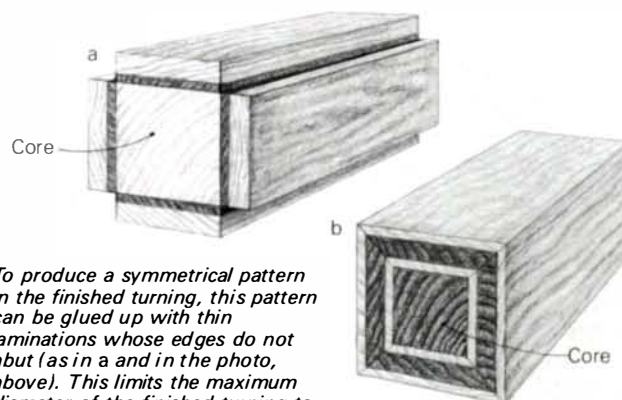


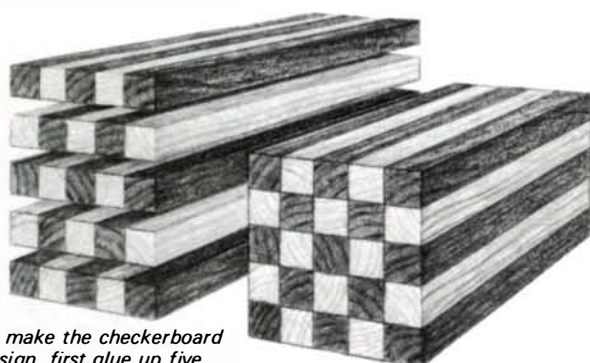
Fig. 2: Stack

Fig. 3: Multiple sandwich



To produce a symmetrical pattern in the finished turning, this pattern can be glued up with thin laminations whose edges do not abut (as in a and in the photo, above). This limits the maximum diameter of the finished turning to a little less than the diagonal of the core. Alternatively, the laminations can be mitered (b)

Fig. 4: Checkerboard



To make the checkerboard design, first glue up five striped boards. . . then glue these into a block.

To vary this pattern enclose the checkerboard with solid boards. This produces accents at the smaller diameters of the finished turning.

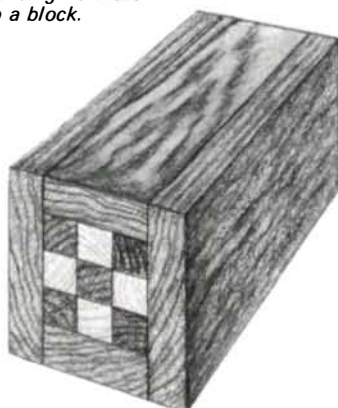
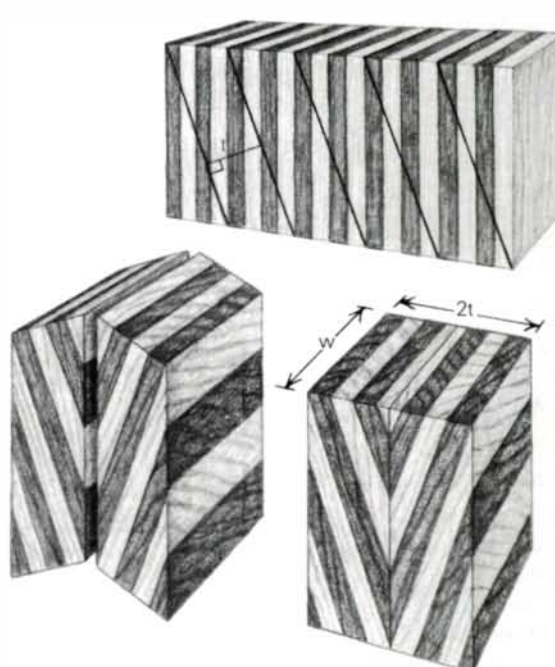


Fig. 5: Chevron



For this pattern, make the angled cut through the slab so it passes through an even number of laminations. Otherwise the contrasting laminations of the half-blocks will not align when reversed and glued up. To produce a square turning block, the thickness (t) of the half-blocks should equal half the width (w) of your laminations.

result being that the interior checkerboard will produce minor accents as it is revealed in turning.

The chevron (figure 5, preceding page) is easier to glue up than the checkerboard, but it takes more time and planning. Face-glue a number of thin slats into a slab, then cut the slab at an angle to make thick slices. Reverse every other slice and glue them into turning blocks two by two. If you've ever made a herringbone cheeseboard you'll recognize the technique.

There are several things to mull over with pencil and paper before you start making noise and sawdust. First, the triangular pieces at the ends are waste, no matter how many turning blocks you get from the middle. For economy, consider making at least two blocks from each slab. Second, to have the light and dark laminations meet in your turning block, you have to cut each half-block so it contains an even number of laminations; the half-blocks in the models and the drawing are four laminations wide.

Look at the sketch again. The true thickness of each half-block will be the altitude of a parallelogram—the line marked *t* in figure 5. This will be less than the thickness of four slats because of the angle, and the steeper the angle, the more pronounced the difference. The true thickness of two half-blocks should be close to the width of the slats you begin with, to end up with roughly square turning blocks.

After planning your blocks out on a piece of paper, cut the slats and glue up the slab. Let it dry, then plane the top and bottom flat and square with the ends. Now cut the half-blocks, using a bandsaw if possible. Be sure to start and end each cut on a slat of the same color. Plane the sides of each half-block, flip and glue. If you didn't get the bottom quite square, or the bandsaw was a little out of true, the blocks will not match in front and back; at this stage the best you can do is make a perfect chevron in the front and keep the back of the finished piece turned to a wall. Wait for the second application of glue to dry overnight, trim the ends of each block square, and turn.

You can vary the thickness and color of the laminations in this configuration, but you have to do so carefully. If you use very thin slats of maple alternated with thick slats of cherry, for example, you still must have an even number of slats in each half-block. If you use three woods you must maintain the same sequence throughout the slab, and you must have a multiple of three slats in each half-block. The same holds for four, five or more woods.

All of the patterns are easier to do if you have, or have access to, a thickness planer. The checkerboard, in particular, is almost impossible to do without one. If you don't have one, and can't see spending \$1,500 to get one, consider signing up for woodshop at your local junior college or night school. School shops usually have a planer, a bandsaw and a lathe. The cost is minimal—I've paid from \$3 for an entire semester to \$20 for 10 nights—and the teachers do not confine your choice of projects or tool use, once you've demonstrated a reasonable familiarity with basic shop safety.

The best glue joints are produced between freshly planed surfaces and between woods of similar density. Maple, cherry, walnut and koa work well together, as do pine and redwood. I've always thought the pattern, not the wood, was the focus in a laminated turning, so I usually use plain, unfigured wood, and let the lamination speak for itself. □

Ted Pack lives in Riverbank, Calif.

Geometric Turnings

The work of John Barklow

by Nick Engler

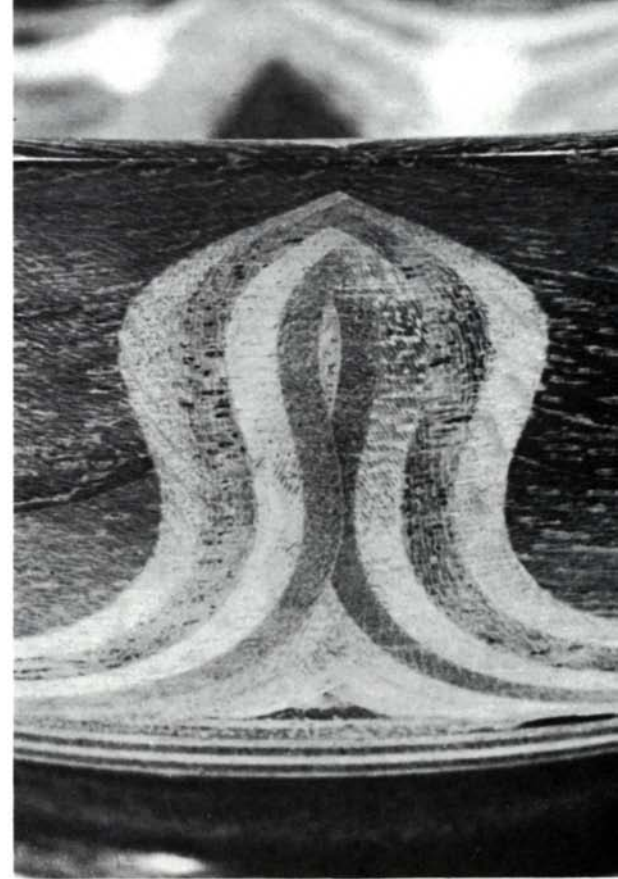
The principle is as simple as it is fascinating: Intersect a cylinder with a plane and you get an arc—all sorts of different arcs, depending on the angle of the intersection. Now carry this principle one step further: Intersect a cylinder with several planes, and the arcs form a pattern. John Barklow of Dayton, Ohio, understands this geometry and brings it to life in his lathe work. The cylinder becomes a turned cup or bowl. The planes are slices of veneer laminated between thicker sections of contrasting woods. The turned results are beautiful, intriguing—and unpredictable. "I can never tell what a piece is going to look like until I turn it," says Barklow. "I just glue it up and wade in with a chisel to see what I've got."

Actually, it's not that easy. To get from a simple geometric axiom to an intricate turning, Barklow has developed a precise technique. He starts by cutting his own turning stock in a nephew's woodlot. The Ohio forests offer more than a hundred different hardwoods, and Barklow ignores nothing. He goes after variety, not quantity, and often harvests a single branch. He works with an 89-year-old sawyer who doesn't mind cutting up short bolts. Those trunks and branches that are too small to be sawn on a sawmill, he drags back to his tiny 10-ft. by 10-ft. workshop, sands them flat on one side, and slices them on a bandsaw.

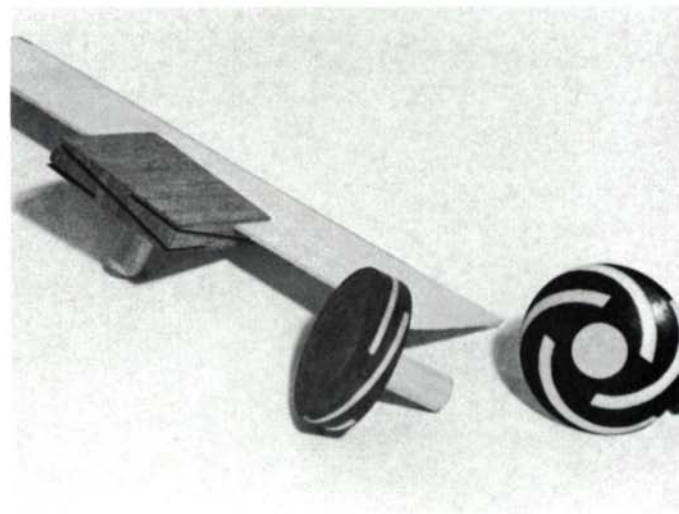
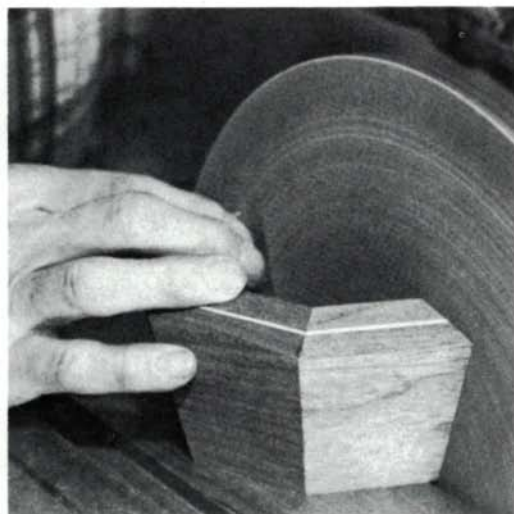
When this wood is properly seasoned, he resaws it to the desired thickness and drum-sands the surface smooth and true to make his own veneers. He then laminates these veneers between boards of a contrasting color or figure. He usually chooses a light-colored veneer such as basswood or maple to sandwich between two darker $\frac{3}{8}$ -in. thick boards of, say, walnut. Much care is taken to get a thin, uniform glue bond (he uses Titebond) between layers.

Later, this sandwich of contrasting woods is sliced into smaller pieces on a bandsaw. Each piece is cut with either a simple or compound miter so that it will form part of an octagonal cylinder or cone. To ensure that the pieces are of uniform size and their angles precise, he carefully marks them out in pencil on the laminated stock, then cuts wide of his lines. Later, the pieces are disc-sanded, tilting the table and fence as necessary. "I know that I've got them sized just right," says Barklow, "when the sander just begins to take off the pencil line."

He then glues these pieces up, four at a time, into half-cylinders and half-cones. He uses no clamps, just momentary hand pressure until the yellow glue takes hold. For larger turnings it's safer to use a clamping jig (see *FWW* #27, May '81, pp. 78-83). Barklow never glues all eight segments at once, "because even if I'm just half a degree off when I set my angles, that would make the eighth piece four degrees off by the time I glue it to the seventh, and that would make a sloppy joint." So when the half-cylinders and half-cones have set, they are disc-sanded on the flat side and matched exactly. This extra step in the gluing-up process enables Barklow to



Barklow's geometric turnings begin as wood-and-veneer sandwiches that are segmented and glued up into octagonal turning blanks. Woods in the collection of turnings above are mainly walnut, basswood and maple. Detail of nut bowl is shown at right.



After gluing up a stack-board of wood and veneer, Barklow saws it into compound-angled segments, left. These are machined to precise angles on the disc sander, then rub-joined into turning-blank halves. He machines one of the halves before final assembly, center. Barklow also makes cufflinks and pendants, applying the principles of the turned veneer sandwich to little scraps of wood, right.

make perfectly jointed octagonal shapes. And every joint must be perfect, he says. "Otherwise, the lathe will just tear it to pieces."

Barklow mounts a single cone or cylinder to a 4-screw faceplate, turns the inside, glues the next onto it, turns just the inside again, and so on. He glues up right on the lathe, clamping the pieces between the headstock and tailstock. He finds it easier to build up a cup or bowl in this manner, turning the insides as he goes, instead of reaching down the throat of a cylinder when it's all glued up. He does, however, wait until the last minute to turn the outside of his projects. And here is where that geometric principle makes all of Barklow's work—from the harvesting of the wood to the tedious glue-up procedure—blossom. He touches the chisel to the spinning walnut and a thin strip of basswood comes to light. A little deeper, and that strip seems to arch out, forming the graceful petals of a flower. Round-over here, gouge out there; the design develops according to the whim of the craftsman. But no matter what he does, it always retains a perfect,

absolute symmetry—because of the principle involved, and the care in gluing up.

Cups and bowls aren't the only pieces in which Barklow has applied this geometry. Often, he will take a tiny piece of scrap wood, say, 1 in. by 1 in. by ¼ in., and cut a bandsaw kerf in each of four sides at a 5° angle. These kerfs are just wide enough to snugly hold a piece of veneer. He glues this veneer in place, trims off the excess and mounts the scrap on a dowel. The dowel is grasped in the chuck of a hand drill. He "turns" this scrap by spinning it against a disc sander, grinding away stock to form a cufflink or a pendant. As the tiny turning takes shape, the veneer forms a flower, a pinwheel, a spiral nebula.

The final design of each of Barklow's turnings is unpredictable and exciting. Understanding how he does it only opens another consideration: What other high-school geometry lessons might be put to such an imaginative use? □

Nick Engler is editor of the Shopsmith magazine, Hands On!

Inlaid Turnings

Decorating with plugs

by Fran William Hall

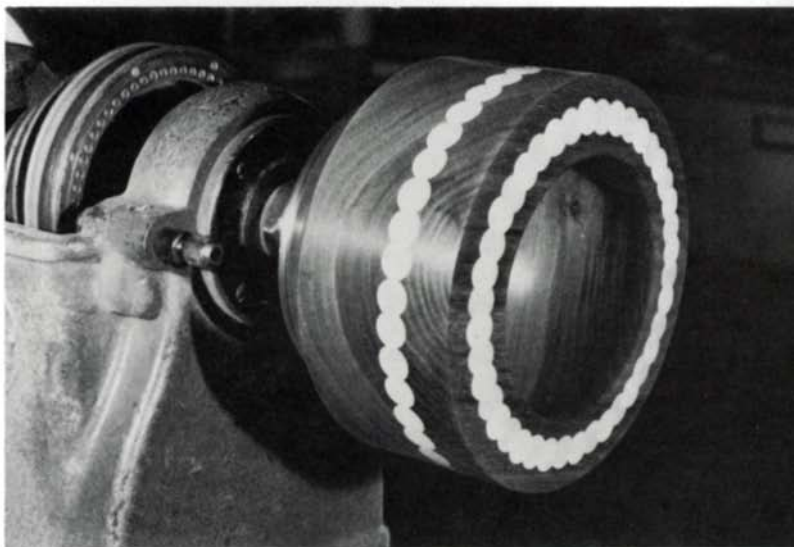
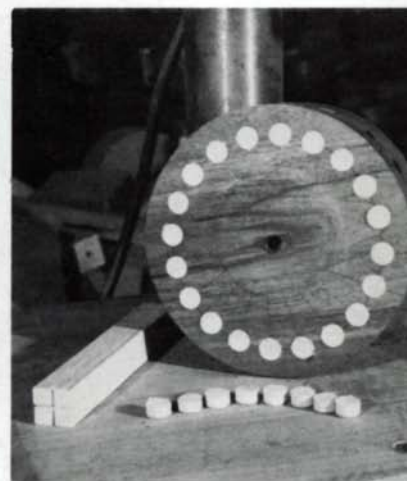
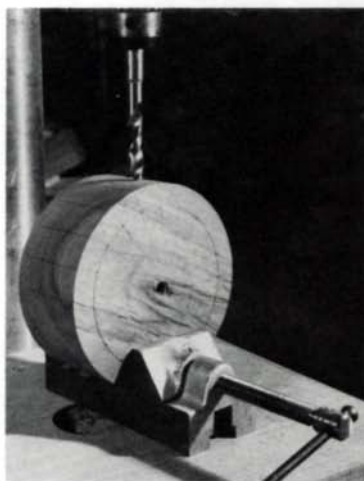
Several years ago the harvesters came through my section of southern Minnesota looking for black walnut veneer logs. They scoured the woods, buying trees and then taking only the straight bole for shipment to Germany, where, I am told, they cut veneer half again as thin as we do in America. After removing the bores, they left the rest of the trees to rot in the woods. I got permission from the farmers, most of whom I had known most of my life, to go in and remove whatever was usable. In several weeks time I had chainsawn more than 200 chunks of this lovely wood. I waxed the ends with paraffin and stored them in a shed to dry. At the end of two years I cut circle blanks from each good chunk and again waxed the perimeters to prevent checking.

I've made many bowls from this wood. The pieces that are highly figured I let do their own talking. Those that are plain I usually decorate. I first turn the bowl to a rough shape, then lay out a pattern using the indexing head of the lathe. A simple pattern, for instance, would consist of a single line of plugs all around the bowl. If the pattern is to be complicated, I must do one set of dots at a time, gluing in the plugs and then waiting for the glue to set before turning them down with a very sharp tool and the lathe running at a high speed.

To bore the plug holes, I first mark the bowl surface with a sharp punch to keep the drill from wandering. I clamp the work in a machinist's vise on the drill-press table and use multi-spur machine bits, running them at high speed. The hole must be clean and crisp its full depth, or turning will reveal ragged edges. I usually drill the holes about ¼ in. deep, but this depends on the thickness of the bowl-to-be and on what the wood looks like.

For the plugs, instead of using a plug cutter, I turn dowels. If the dowel is to be of small diameter, I use short lengths to minimize whipping, which can produce an oval section. I turn the dowel slightly oversize, then sand it with a wide piece of sandpaper (80 grit) to minimize irregularities, and gauge it to make sure its diameter is exact. Dowels must fit their holes perfectly. I never smooth-sand the dowels because a rougher surface makes a better glue joint. I use yellow glue. I cut the plugs on a bandsaw, holding them in a V-trough if they are small. I cut plugs approximately the depth of the drilled holes and, with a disc sander, put a slight bevel on each plug to facilitate entry into the hole. To prevent splitting, it is important that the plugs not be so long that they stick out any distance from the bowl. Cut them the right length and tap them in so they are level with the bowl wood or flush them off after assembly by sanding. Once again, run the lathe at high speed, use a sharp tool and take a light cut. If the plugs have been fitted properly, you should feel no crack when you rub your fingers over the finished design. □

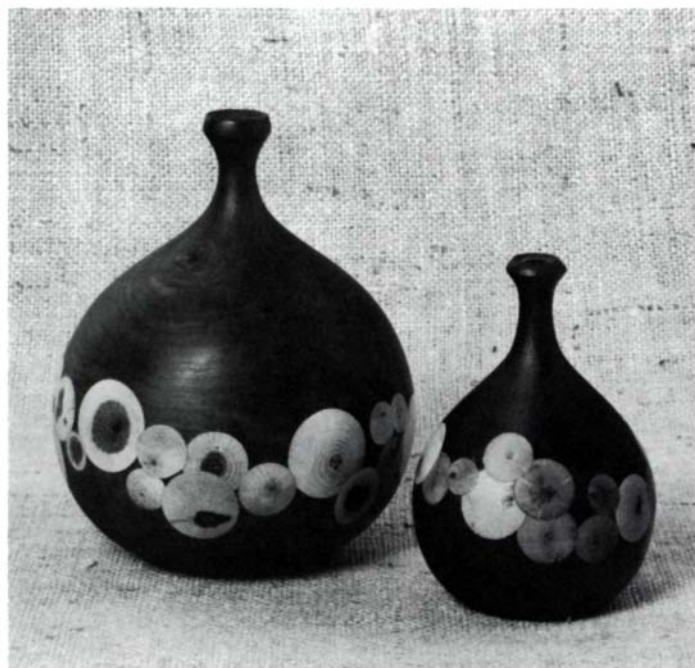
Fran Hall is a travel lecturer whose home and home shop are in Northfield, Minn.



Inlaying decorative plugs begins with marking the bowl blank for bore centers on the lathe, using the indexing plate, top. The hole locations are center-punched and the holes are drilled with a spur bit at high speed, the blank held in a machinist's vise, center left. Center right, the holes are filled with plugs cut from lathe-turned dowels. It is important that the plugs be flush with the surface of the bowl blank, or they will split during turning. Above and right, completed bowls display the flawless surface that a sharp tool taking a light cut at high speed can produce. The bowls are of walnut, decorated with holly and blackwood.



More Inlaid Turnings



Decorative plugs need not be made from sawn stock and inlaid symmetrically. The plugs in these walnut weed pots, left, were turned from oak branches, displaying heartwood, sapwood, ring and ray patterns in an irregular, overlapping band around the turning. The photo and method are from Dale Nish's new book, *Artistic Woodturning* (Brigham Young University Press, 205 UPB, Provo, Utah 84602, 1980. \$15.95, paperback; 255 pp.). The book is a good source of step-by-step instruction for all sorts of turning ideas, including laminated turnings, segmented forms, mosaic assemblages and turnings from wormy, rotten wood.

Decorative plugs can also be elaborate marquetry inlays. The calendar bowl, below, is the second of a series by Giles Gilson, of Schenectady, N.Y., inspired by the picture writing of primitive and modern cultures. It's based on symbols used by the American Indians to tell the twelve cycles of the moon. Gilson assembled the bowl blank in layers, beginning with its padauk base and adding alternating staved assemblies of various woods, including ash, ebony, holly and amaranth, with rings of mahogany. The central band is twelve staves of curly maple, originally 1½ in. thick and bored entirely through with an industrial hole saw to receive the inlay plug. The construction of the plugs varied. Some were cut on the bandsaw, stacking figure and background together and tilting the table to eliminate the kerf between them. Others were jigsawn after they were inserted in the stave, allowing the contrasting wood lines to be fit in kerfs that extended beyond the borders of the plug. Each plug was turned on a Unimat and measured with a micrometer to fit the hole in the stave. By the time the bowl blank was assembled, Gilson had invested three months in the project, and turning went "a little like diamond cutting."



Bob Barrett

Sanding and Finishing on the Lathe

by David Ward

The first step to a good finish is a good sanding job: beginning with a coarse grit and not skipping grits. Sanding lathe work involves unique problems because it is impossible to sand with the grain while the lathe is running. Consequently, a lot of time is spent removing cross-grain scratches.

This problem can be solved on convex surfaces by using an orbital sander. With a sander, the grit does not remain in one place long enough to create scratches. Another advantage of an or-

bital sander is that it won't dip into soft spots in the grain the way hand-held sandpaper will. The technique works so well that in sanding decayed wood, the edge of a void can become too sharp and need softening by hand, with 320 grit or so. Areas of the turning not accessible with the sander can be reached with strips of sandpaper reinforced with clear Mylar packing tape.

I don't have any magic answers for sanding inside surfaces, but the process can be made less painful by spraying

sheets of sandpaper with pressure-sensitive adhesive (3M's #75) and sticking them together back to back. Tear off pieces, and the grit on one side keeps the sandpaper from slipping off the finger while the other side sands.

Another technique that I find essential in achieving a good sanding job is something I call flip-flopping—spinning the piece in one direction and then in the other while sanding. Wood fibers tend to bend over rather than being cut off, especially on end grain. Reversing the lathe (see *Methods of Work, FWW* #16, May '79) bends them back and forth until they are cut off. Be sure the faceplate is tightened securely before trying this.

Once the piece is adequately sanded I use a finishing process that is a takeoff on French polishing. The ingredients are similar and so are the results, but the method of application is much different. The turning is first soaked with raw linseed oil. This brings out the color of wood better than any other oil or mixture I've tried. After a few minutes, wipe off the excess oil and apply liberally a mixture of about 25 parts orange or white shellac and 1 part raw linseed oil. The oil lubricates the finish when it is being buffed. Too little oil will cause the surface to drag, while too much will not permit the shellac to heat up enough. The proportions may need adjusting for a specific application.

After the shellac-and-oil mixture has dried for two to ten minutes, depending on how porous the wood is, run the lathe at a fairly high speed. Step to one side before doing so, however, to avoid a shower. Then hold a pad of folded soft cotton cloth firmly against the turning. Most of the excess shellac will be quickly removed, leaving a clear surface on the work. The surface must be burnished with increasing pressure until the finish ceases to migrate, as observed in the glare of a light. At this point any shellac remaining on the wood has been driven into the wood by heat and pressure.

I usually apply a final coat of clear shoe wax for extra luster and durability. The end result is a hard surface finish that does not coat the wood with plastic—a penetrating finish that will not dull with time and takes minutes rather than hours to complete. This finish works well on most hardwoods. □

David Ward is a turner in Glenwood Springs, Colo.



Author sands turning with orbital sander, above, which eliminates cross-grain scratches and does not dip into soft areas of grain, as does hand-held sandpaper. A thin strip of sandpaper backed with Mylar tape, above right, reaches places where the sander will not go. Turnings can be 'French polished,' right, by applying a shellac-and-oil mixture and rubbing it out with the lathe at high speed until the mixture has been driven into the wood.



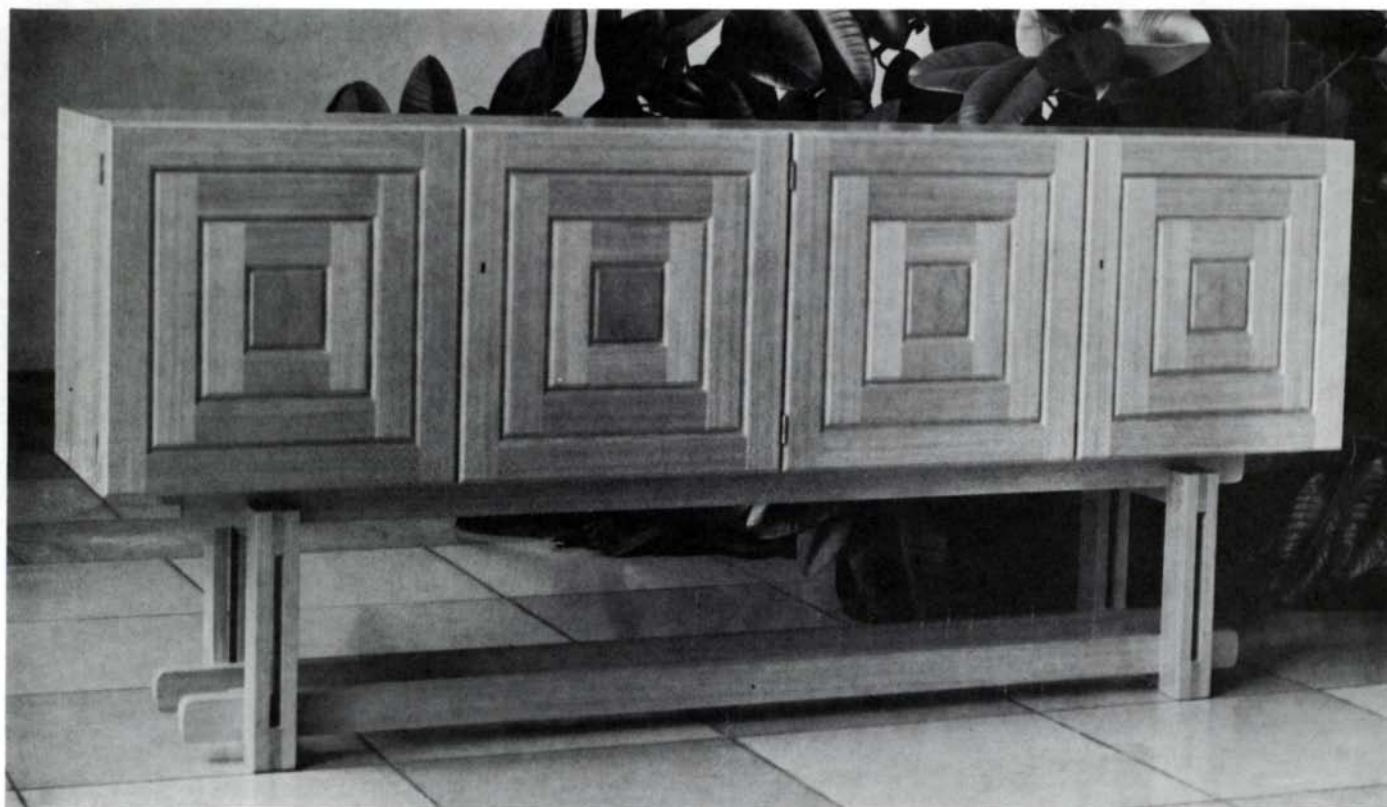
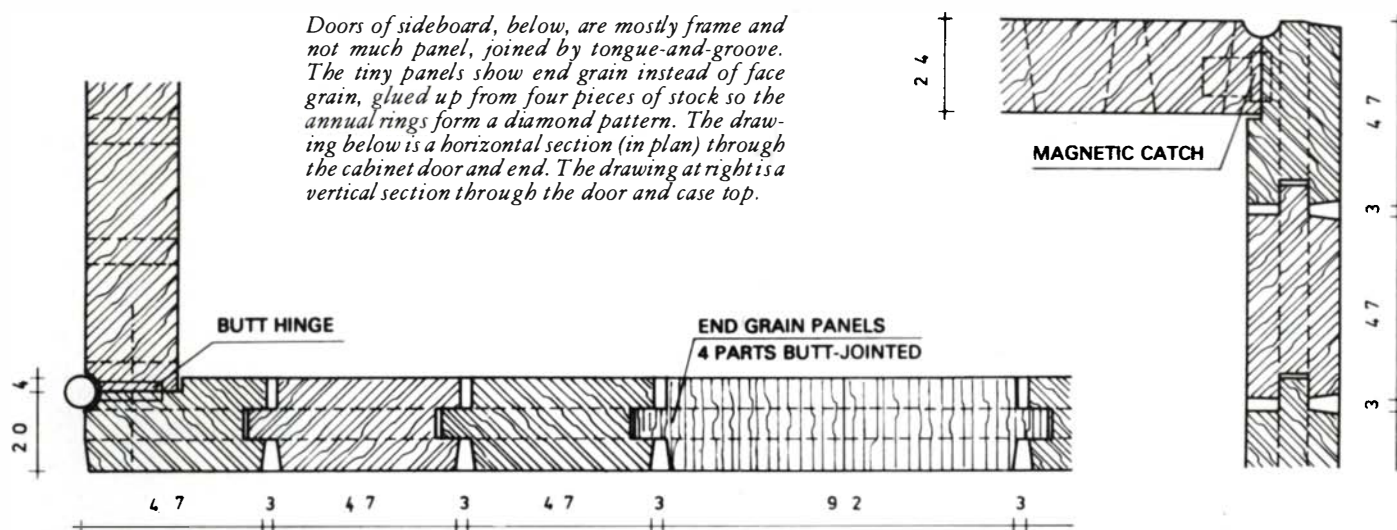
Variations on the Frame and Panel

New designs for machine woodworking

EDITOR'S NOTE: Franz Karg's new book, *Modern Cabinet-making in Solid Wood*, is a rich source of fresh designs of particular interest to the small-shop craftsman. The many pieces of furniture illustrated in the book were made by Karg's students at the Technical Training College for Joiners and Carvers at Garmisch-Partenkirchen in Bavaria, and the pieces were designed to combine the efficient and artful use of both hand and machine tools in their manufacture. Especially appealing is Karg's experimental treatment of panels for doors and case sides. Instead of following the shop-worn conventions of raising panels or letting flat panels into grooved frames, he has

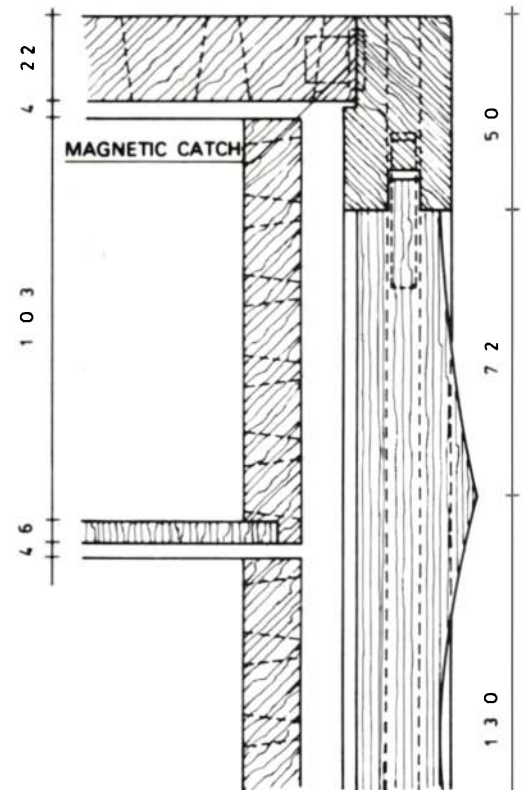
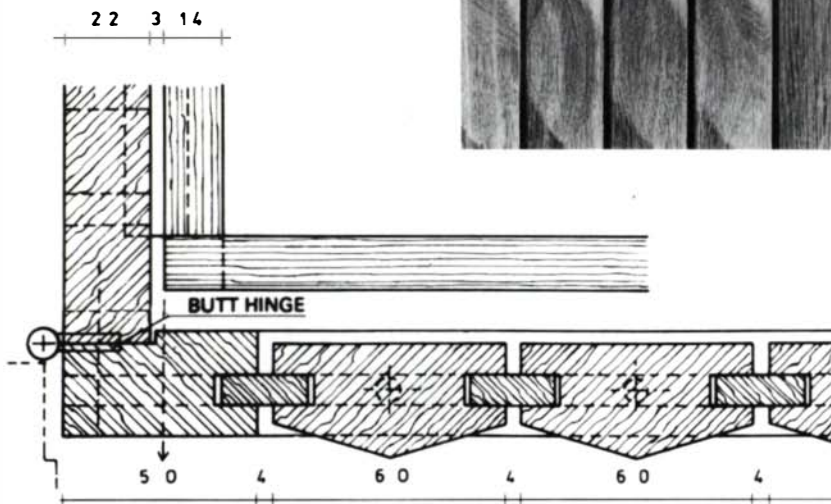
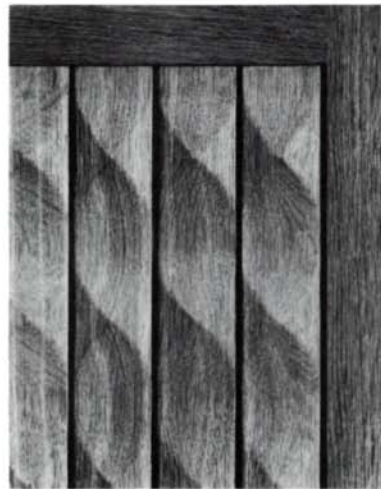
created composite panels, each one made of a few or many separate pieces, and solid panels that have been sculpted by machine operations. Yet Karg's furniture has a strong affinity for traditional designs and techniques, for it is "unwise and presumptuous," he says, "to totally disregard the past."

The photographs and drawings (all measurements in millimeters) that follow have been excerpted from Karg's book, and show how the author has blended the disparate elements of modern industrial design with traditional excellence in craftsmanship. The book is published by Hastings House (10 E. 40th St., New York, N.Y. 10016) and sells for \$29.95.

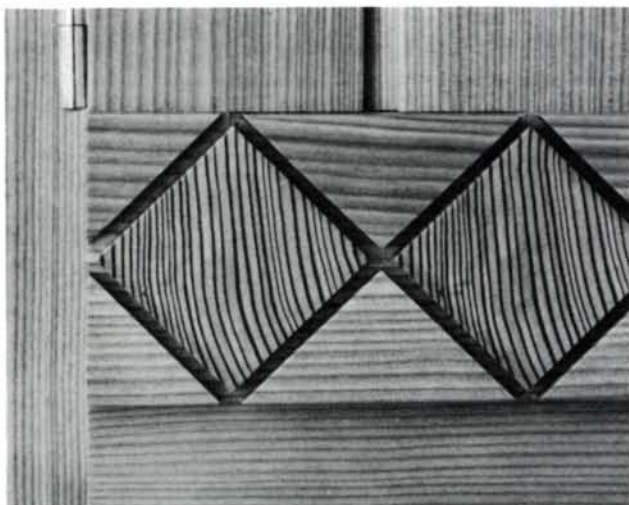




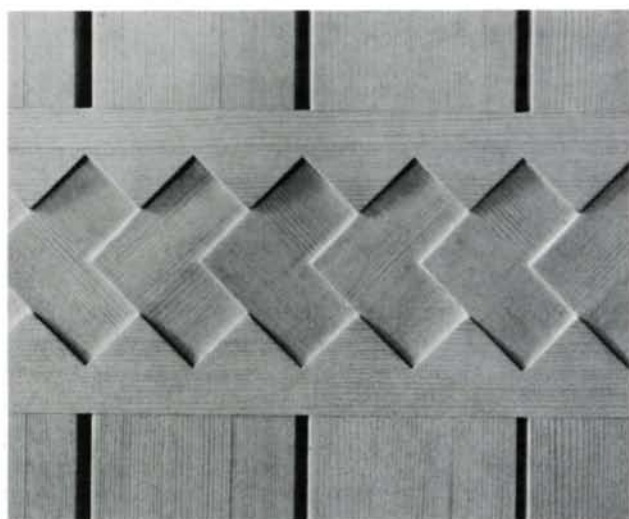
Wall-hung cabinet, above, is fumed oak. Stock for the slats that form the door panels (detail, right) have been coved cross-grain, then ripped, then beveled on the long edges.



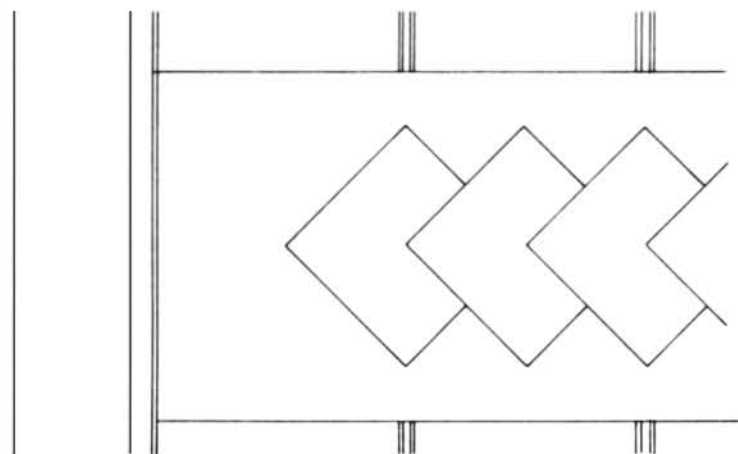
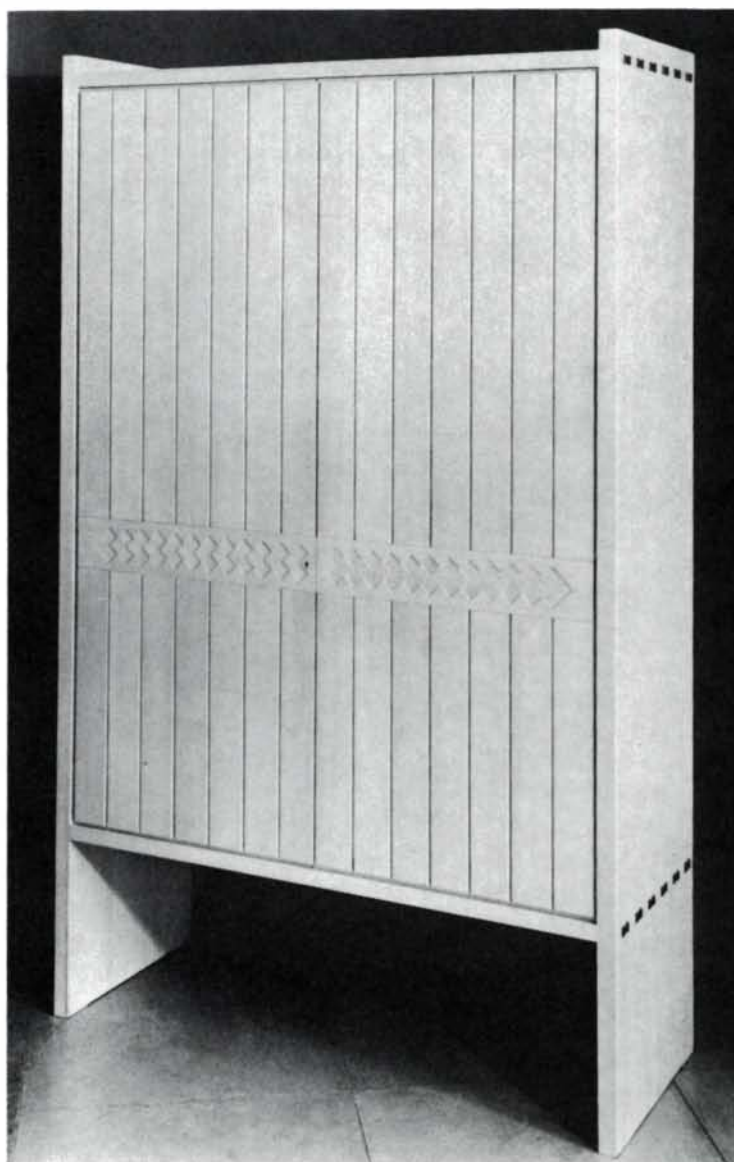
Two sideboards (half of each) of similar size and construction, with two different panel treatments. Left, square panels entirely raised, with no flat center field. Right, the grain of the small panels at top and bottom goes across, while that of the larger center panel runs vertically.



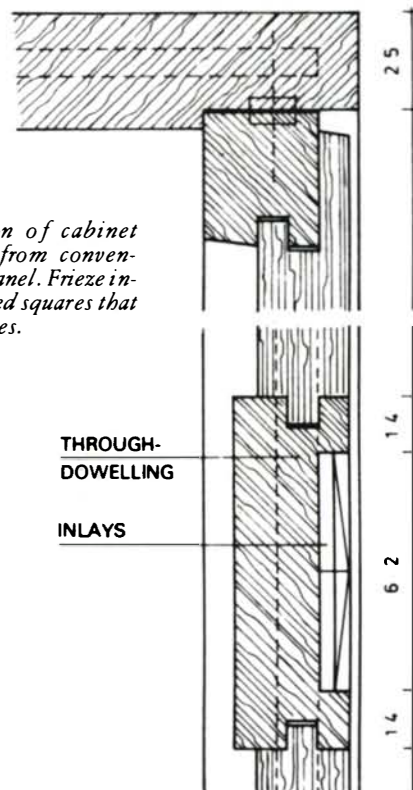
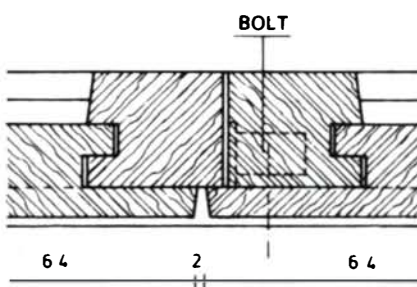
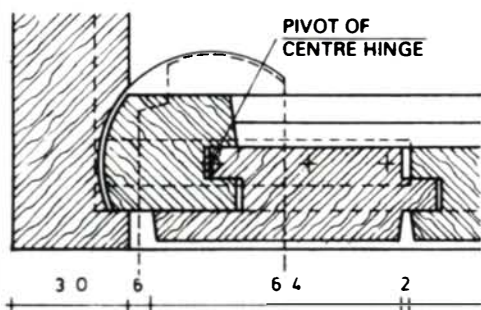
Above, rail detail from wall cabinet (not shown) is routed out to receive end-grain squares.

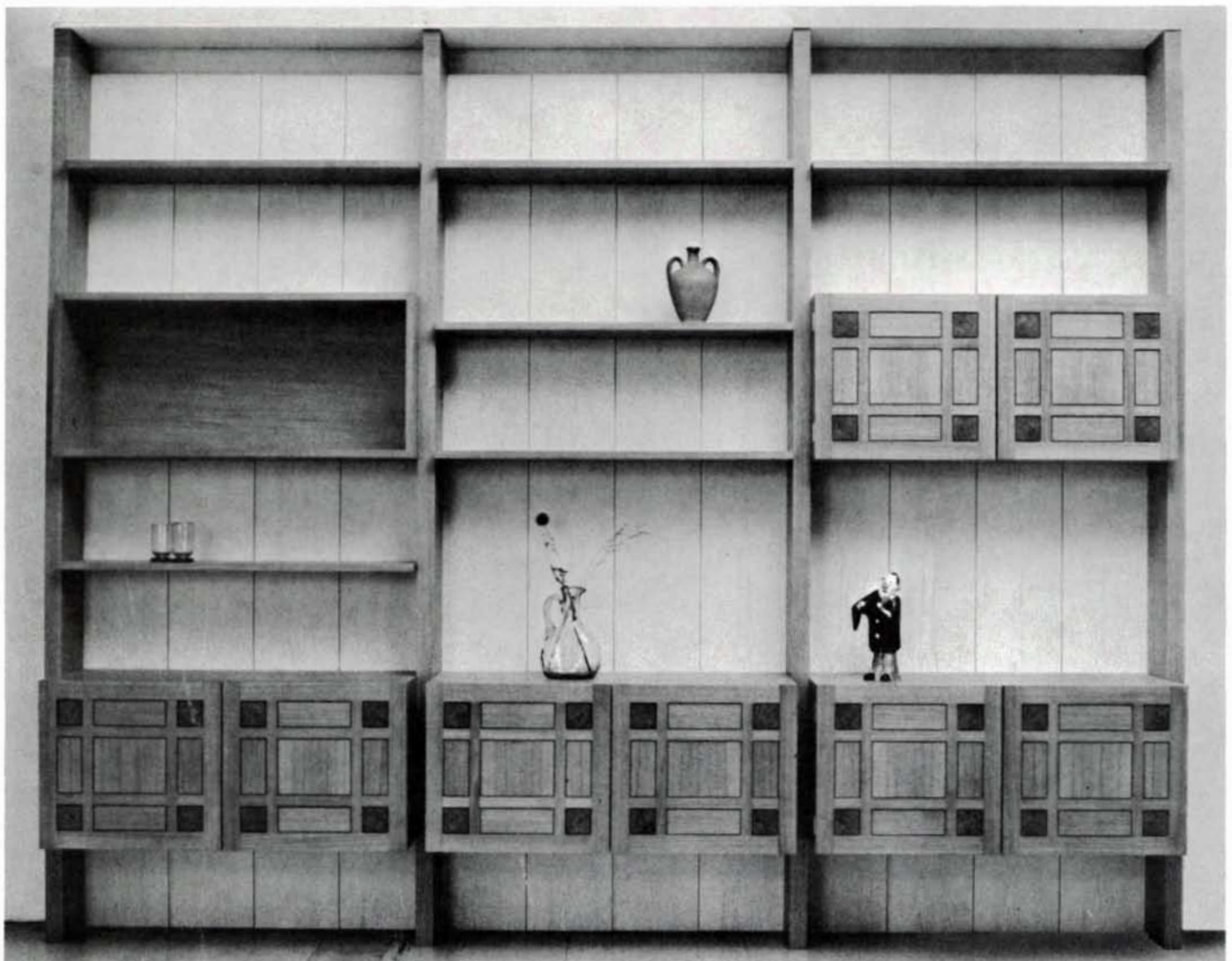
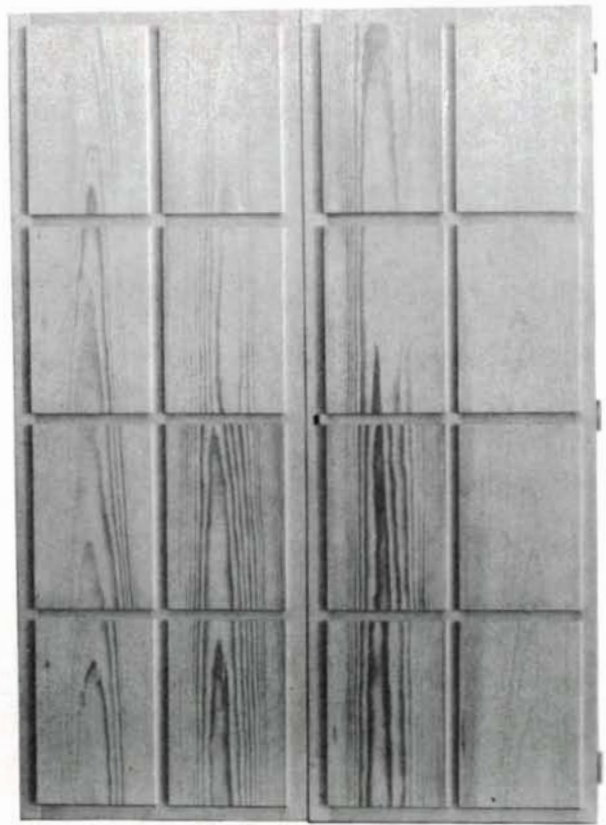
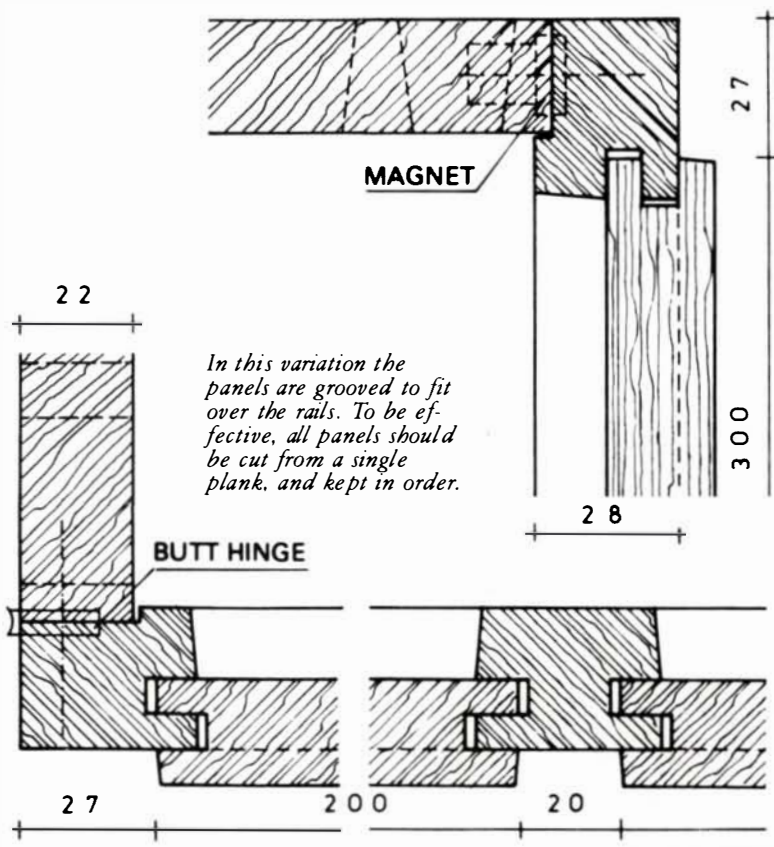


The focal point of cupboard, right, is the central frieze. Surface textures like these are best revealed in the play of light and shade on light-colored softwoods, such as larch or fir.



Door construction of cabinet above is derived from conventional frame and panel. Frieze inlays are face-beveled squares that overlap like shingles.





Wall unit's paneled doors rely on long grain, cross grain and end grain (corner squares) for color variation and visual effect.

The Pin Router

Basic setups for this versatile machine

by Dennis R. Wilson

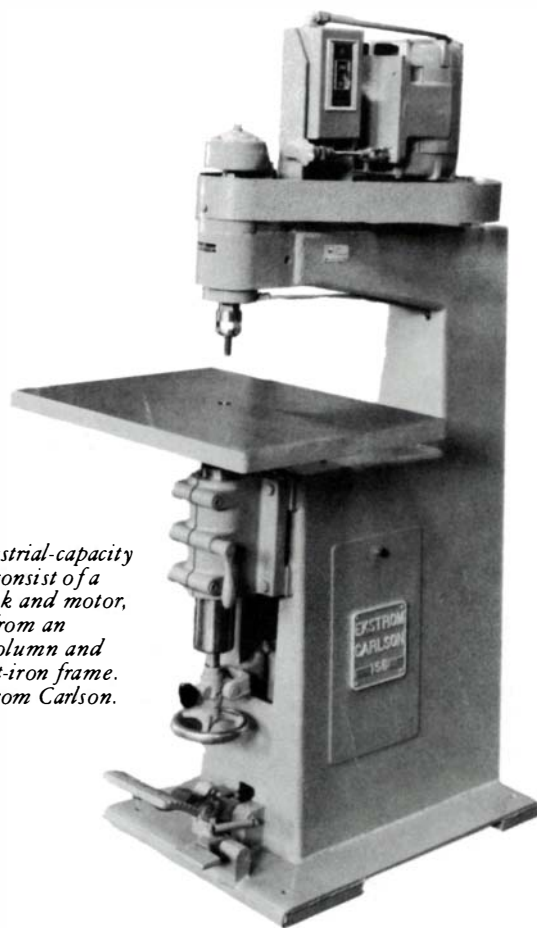
The overarm router is basically a shaper with the cutting tool above the table. Not only can it shape and mold the outside edge of stock, but it can plunge-cut, groove, bore and excavate for inlay. The overarm router can also cut mortises, tenons and rabbets. It is especially valuable as a production machine for making identical parts, using jigs and templates.

The basic machine (right) consists of a C-shaped frame, a top-mounted spindle chuck and motor, and a movable table that can be raised and lowered by a treadle. Located directly beneath the centerline of the cutter spindle is a vertically adjustable guide pin. This is what gives the pin router its versatility as well as its name.

Modes of operation—There are six basic ways to operate the pin router. The first is freehand. This is similar to using a portable router freehand, except that you move the stock instead of the router, and there is the advantage of being able to see the work. Also, the table-elevating mechanism makes starting and stopping cuts within the perimeters of the stock easier.

The second mode uses a straight fence for straight-line shaping. Adjustable factory fences are satisfactory, or you can make your own from a dense hardwood or cabinet-grade plywood. If the fence is divided into two sections, the entire surface of the stock can be routed by offsetting the outfeed fence by the amount of stock being removed. This is similar to jointing. For shaping less than the whole edge, use a single fence and set it up as follows: Bring the table up so the cutter just touches the top of the fence, and align the fence with the deepest contour of the cutter. Then, with the router running, raise the table so the cutter plunges into the fence until you reach the depth of cut you desire. This will give the stock full

Typical industrial-capacity pin routers consist of a spindle chuck and motor, suspended from an adjustable column and arm or a cast-iron frame. Photo: Ekstrom Carlson.



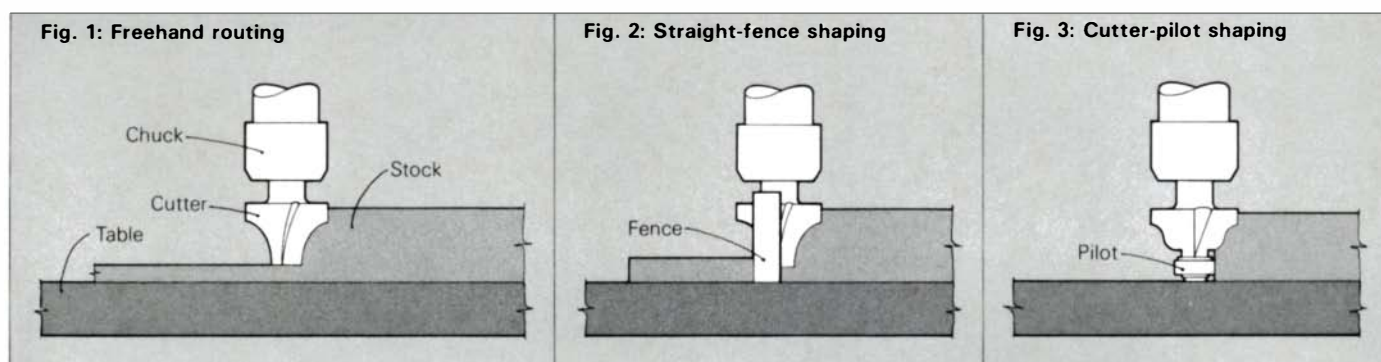
support as it is being routed. The fence should be cut open behind the cutter for chip clearance. Chips that are carried through to jam between the cutter and the work will dent the surface and show up as blotches in finishing. Evacuating the chips with a vacuum helps.

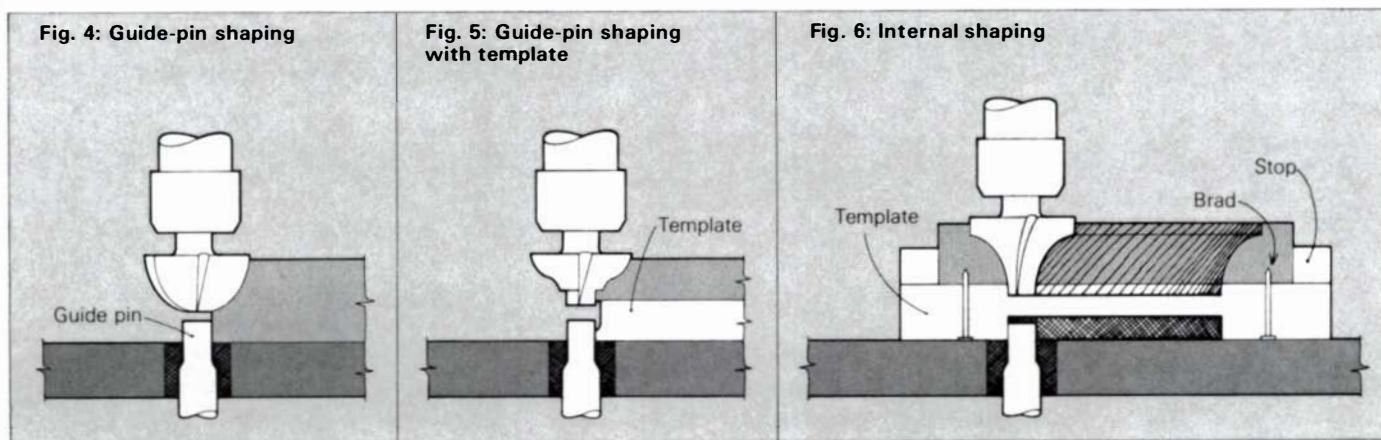
The third mode is shaping with the workpiece pressed against a pilot on the cutting tool. The workpiece can be straight or any irregular shape. This method works best with ball-bearing pilots, since solid pilots often score and burn the wood. In order to start the cut safely, a pivot block of hardwood with about a 1/4-in. diameter tip can be clamped to the table about 1 in. from the cutter.

In mode four, the stock is pressed against the guide pin. This method, as method three, requires that a part of the stock edge is not cut, and the final shape of the piece must be finished smoothly before shaping the edge. The diameter of the guide pin and the height of the table determine the depth of cut. Stock can be routed straight or curved, and you can rout inside or outside edges, but use a starting block.

Mode five is basically the same as mode four, except the workpiece is set on top of a pattern or jig. The pattern is

EDITOR'S NOTE: Manufacturers of pin routers include Ekstrom Carlson, 1400 Railroad Ave., Rockford, Ill. 61110; Rockwell, 400 N. Lexington Ave., Pittsburg, Pa. 15208; Porter, 522 Plymouth NE, Grand Rapids, Mich. 49505; Onsrud, 2100 S. Laramie Ave., Chicago, Ill. 60650, and Westflex, Box 5227, Westport, Conn., 06880. They are usually not difficult to find at used-machinery dealers or tool auctions for companies going out of business. Three ideas for fashioning your own pin router appear on page 65.





pushed against the guide pin, and thus the entire edge of the workpiece can be shaped. The workpiece can be held in place by screws, double-sided tape, brads or stop blocks. Normally the pattern is exactly the same size as the routed workpiece, but the pattern can sometimes be offset.

Mode six is for internal shaping, scroll cutting and flat-relief carving. The workpiece is fastened to a template whose underside has been routed out to follow the guide pin. The amount of stock removed is determined by the diameter of the pin, the diameter of the cutter, the size of the cutout and the height of the table. As in any shaping operation using guide pins or shaper collars, the precise shape of the cutout depends upon the pin radius and the cutter radius.

Mode six is good for routing multiple recesses for inlays. Place the inlay upside down on the template bottom and scribe a line around the inlay. Rout or cut this recess out precisely to the scribed line; the accuracy of the inlay fit depends on the accuracy of the recess in the template. Locate the workpiece on the top of the template. By using a $\frac{1}{4}$ -in. diameter guide pin and a $\frac{1}{4}$ -in. diameter straight end mill or router bit, the cutter will exactly duplicate the template recess.

Modes five and six are normally used where duplicates are being made or where the piece being routed would otherwise be difficult to handle safely. In production runs, quick-release clamps, such as the lever type made by De-Sta-Co (350 Midland Ave., Detroit, Mich. 48203), can be used to hold the workpiece down, and handles or grips can be added for better control when routing. Templates should be made of a material that is warp-free and hard enough to withstand pressure against the guide pin. Hard maple, plywood, tempered Masonite and aluminum work well. Any imperfection in the guide edge of the template will be duplicated in the work-

piece; wax the template and router table for smoother travel.

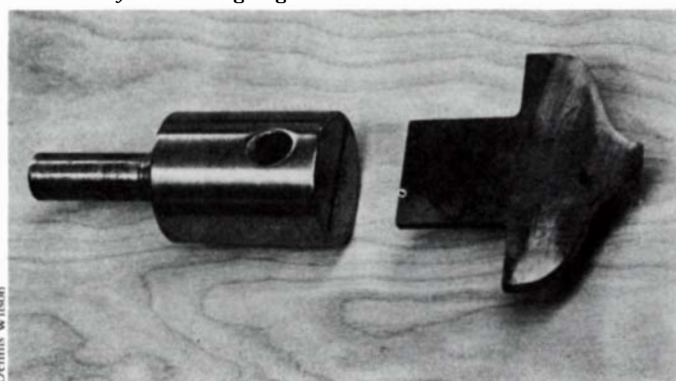
In all routing and shaping operations, safety and efficiency come first. Make sure no cutouts in the edge to be routed are smaller than the guide-pin diameter, and take care where abrupt changes in edge direction could catch and throw the workpiece. Either allow extra length for the workpiece or add a small starter block which can be cut off later. Shape profiles that require considerable stock removal with multiple passes, taking a light cut in each. Check the security of guides and clamps before turning on the router.

Cutters—Standard $\frac{1}{4}$ -in. shank diameter router bits can be used as well as $\frac{1}{4}$ -in. to $\frac{1}{2}$ -in. shank diameter end mills (two flutes provide the best chip removal and the cleanest cut). Special shaper arbors with collars can also be used. Some heavy-duty machines (including Ekstrom Carlson and Onsrud) can be fit with a rosette chuck which takes flat steel cutters (available from Woodworkers Tool Works, 222 S. Jefferson St., Chicago, Ill. 60606). The chuck has a $\frac{3}{8}$ -in. slot and an allen screw to lock in the cutter—a single knife made from an oil-hardening tool-steel blank with a cutting area $1\frac{1}{2}$ in. to 3 in. wide and $1\frac{1}{4}$ in. high (photo below left). It is different from the cutter used on a standard shaper spindle though many of the grinding techniques and uses are the same (see "Shaper Cutter and Fences," *FWW* #20, January '80; "Furniture from Photographs," *FWW* #17, July '79; and "Making Shaper Knives," *FWW* #5, Winter '76). The important advantage of the rosette chuck is that the cutter is positioned only $\frac{1}{16}$ in. off the diameter of the spindle, so the profile of the routed piece will differ little from that of the cutter. These cutters are ground to shape on both ends, but one end is relieved, so only the opposite end does the cutting.

The typical spindle speeds used in routing are 10,000 RPM or 20,000 RPM. My pin router is set up for 10,500 RPM because I use cutters up to 3 in. in diameter; I prefer the rosette chuck and blades that I have ground. With end mills or standard router bits less than $1\frac{1}{4}$ in. in diameter, 20,000 RPM could be used. Shaper collars used on the router should not run faster than 10,000 RPM and should be designed for overarm routers.

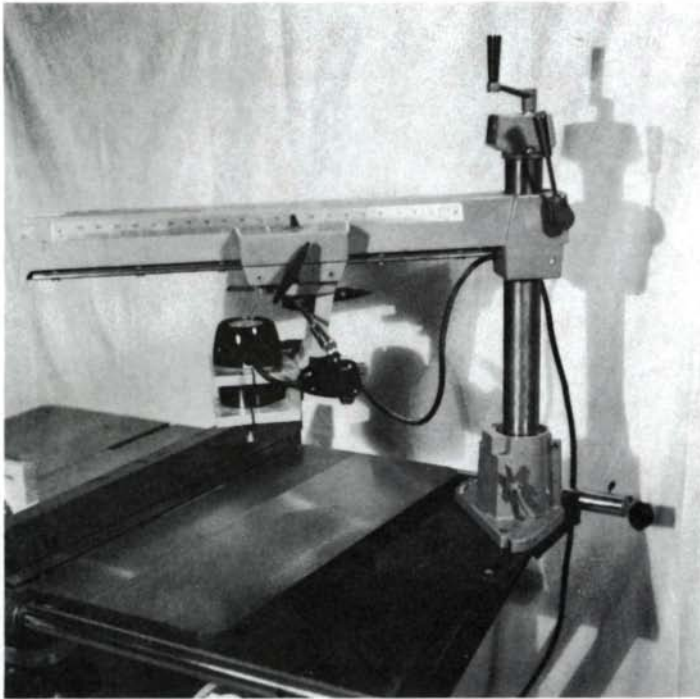
The methods illustrated here could be used on vertical milling machines, drill presses or on homemade rigs with a router. However, you should not use a rosette chuck here, since the router and drill press are not designed for the radial thrust loads these operations place on the equipment. □

Rolette chuck and T-blank, ground on both sides, but relieved so there is only one cutting edge.



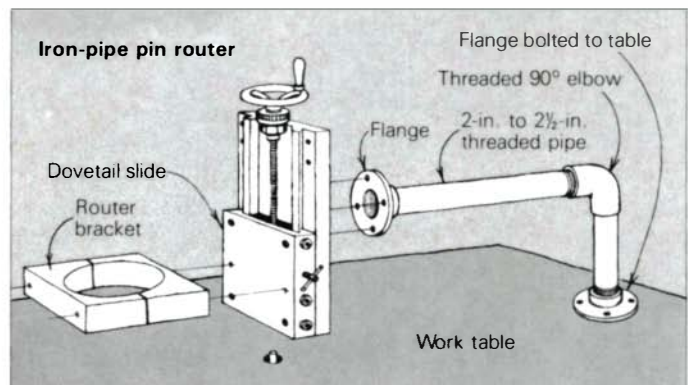
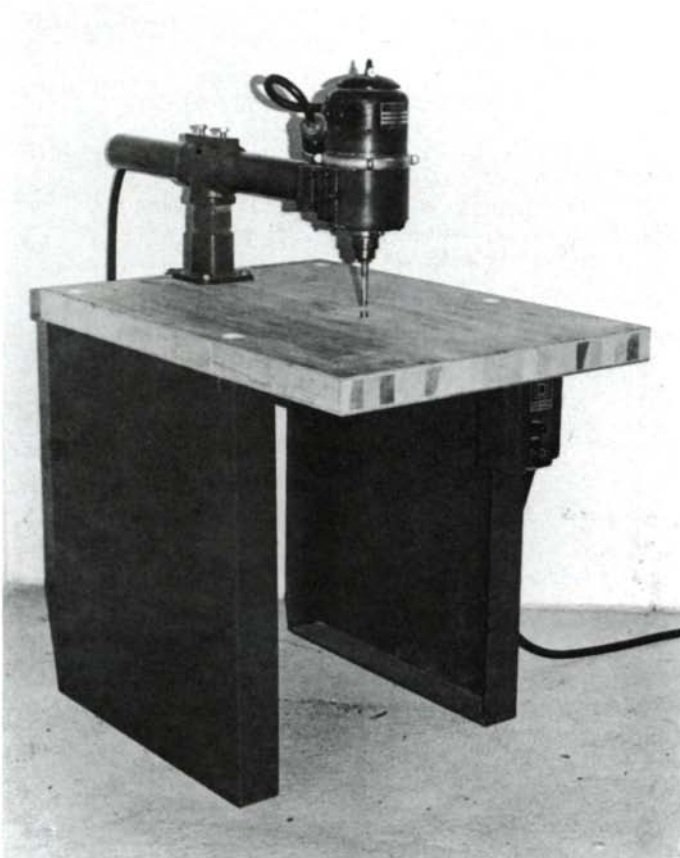
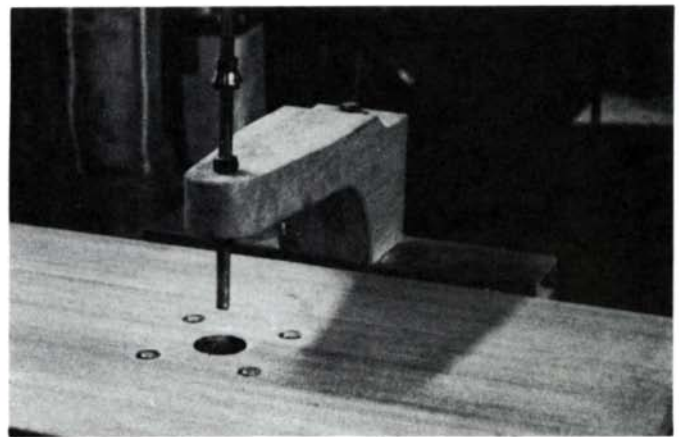
Dennis Wilson, of Wynne, Ark., is a mechanical engineer who also operates his own woodworking business.

Homemade overhead and pin routers



This home-brewed overhead router (left), made by Larry Churchill of Mayville, Wis., is not actually a pin router in that it doesn't have a guide pin, though it could. Instead, Churchill uses the fence and miter gauge of his table saw to guide the work. It was these features, the flat table and the need to save space that brought his table saw together with his router and the transport mechanism of a radial-arm saw. (HIT Distributors, 2867 Long Beach Rd., Oceanside, N.Y. 11572 has adapters that fit together most routers and radial-arm saws; Shopsmith, 750 Center Dr., Vandalia, Ohio 45377, has a router arm for converting a router into an overarm router.) Churchill's setup allows the router to be moved in relation to the work—for plunge cuts, straight-line routing, routing arcs and routing freehand without a router base to obscure the work. For this design, Churchill recommends a saw mechanism with the elevation crank overhead. Mount the base plate so the router moves parallel to the table. To rout arcs, remove the saw-arm miter stops. In designing the router bracket (Churchill used aluminum), make sure the bit will reach the table when the arm is lowered all the way. Photo: Larry Churchill.

When Laszlo Gigacz, of Jordan, N.Y., needed a pin router, he added to his router table an oak arm to position a steel shaft with stop collar directly over the router chuck (right). The upside-down pin router has advantages: The router is more rigid when mounted to a table rather than to an arm, and you can see the pin as it follows the template. If you have a router table already, this method couldn't be easier. The arm swings out of the way when you want your router table back. Photo: Staff.



Doug Wahl's pin router is basically 2½-in. black pipe and fittings. Wahl, of Washingtonville, N.Y., is a supervisor in a metal-working house. He machined the inside diameter of the T for a slip fit of the horizontal pipe, and welded the plate on top for tapping in the two bolts that secure the pipe. He machined the router bracket too, though Stanley sells brackets for their routers, and there's always the alternative of making a bracket from hardwood. The pin in the table is a socket-head cap screw with its head machined to the diameter of the router bit. It's secured through the top of the table by a nut and washer. The router can be elevated in fixed increments by substituting pipes of different lengths for the column. Fine adjustment is accomplished by means of the spiral groove in the router body (it's a Stanley R2-L, discontinued in 1951) and a key in the bracket, just like the adjusting arrangement between the router and its portable base. For routers that are not spirally grooved, Wahl suggests attaching the router bracket to a dovetail slide with crank screw (fashionable in hardwood or available in steel from Setco Industries, 5880 Hillside Ave., Cincinnati, Ohio 45233). The drawing above shows this alternative in a design simpler than the one in the photograph. It calls for standard pipe fittings and does not require welding. Photo: Doug Wahl.

Grinding

Use your tool rest only as a fence

by Frank Klausz

Grinding is the first step in shaping the bevel on a cutting tool. It makes the edge straight and square and puts the bevel at the proper angle. It is not necessary to regrind every time you sharpen; a properly ground edge can be honed many times. I grind damaged tools and new tools that have been incorrectly ground. I also regrind tools after repeated sharpening has flattened the hollow grind; it's easier to hone a hollow grind. In my apprentice years, we did not use a motorized grinding wheel. We had a flat, rough whetstone about 8 in. by 4 in. by 3 in. that sat in a wooden basin with a couple of inches of water. I spent many hours at that stone, and every week the worst job in the shop was to change the water and clean out the wooden basin so you could see the bottom. Flat grinding on such a waterstone and honing on a fine, grey stone produces the best edge, and it holds up longer than a hollow-ground edge, but if you have to remove a lot of metal, it takes a long time to do and a lot of sweat.

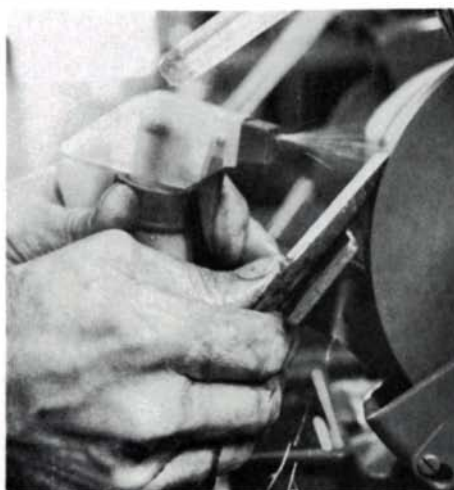
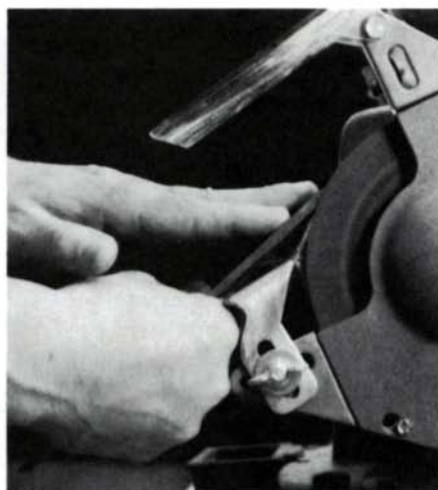
For faster, easier grinding, use an electric grinder with a 60-grit aluminum-oxide wheel, rotating toward you at 3,000 RPM. I prefer a 1-in. or wider wheel at least 6 in. in diameter. Wheels smaller than 4 in. in diameter give too deep a hollow grind. I keep the wheel clean and dressed with a carborundum block; a glazed stone will not cut well, and can overheat the tool. My grinder has a cover around the back of the wheel and a transparent shield on top. I get gooseflesh when I see a grindstone spinning freely with no cover and no safety glass for the operator. Protect your eyes.

My grinder also has a standard tool rest whose angle and closeness to the wheel are adjustable. But I never change it. The only part of the tool rest I use is the lower edge, as a guide for my right index finger. The tool need not lay flat

against the surface of the tool rest. If it did, you'd have to adjust it for each tool, depending on the steel and the work. Less dense woods require more acute angles, and hard steel can hold its edge ground to such smaller angles. Chisel and plane blades should be ground to 25° or 30°. To determine these angles, compare the width of the bevel with the thickness of the blade. The face of a 30° bevel is twice as wide as the thickness of the blade; a 25° bevel is two and one-third times as wide as the thickness of the blade. By the time you get the tool-rest angle right, you can have finished grinding, if you use the tool rest only as a one-point guide.

Hold the blade in your right hand between your index finger and thumb, about in the middle of the blade. Lay the tool on the tool rest and bring the edge toward the wheel until your index finger touches the back edge of the tool rest. If the wheel touches only the tip of the blade, move your finger down a bit. If the wheel touches the blade before your finger touches the tool rest, move your finger up a bit. Once you've found the right place, keep your finger there and use it as a stop to slide against the tool rest. Move the blade right and left, applying light pressure on the blade with the fingers of your left hand. There are only two supports for the blade—the index finger at the bottom edge of the tool rest and the wheel itself. This ensures that the hollow grind will be even. Keep the blade moving back and forth across the wheel and dip the edge often in water. When the beads of water on the tool evaporate, dip again. Don't get any blue mark on the chisel because that means you have raised its temperature to where it has lost its temper and however sharp an edge you get, it will dull easily. As the grind nears the edge of the tool, the danger of burning increases because the thin metal heats up fast. This metal will be your cutting edge and its temper is critical. You should get sure enough of the position of the blade in your right hand to be able to free your left hand to spray the edge with water from a spray bottle as you grind. It takes practice, but no jig will provide the feelings you will learn to recognize when you are grinding properly. □

Frank Klausz builds and restores furniture in Bedminster, N.J. For more on his methods, including his sharpening techniques, see FWW #18, Sept. '79.



The proper position for the index finger of the right hand, which rides against the bottom of the tool rest, will produce an initial grind mark about in the middle of the bevel, left. If the grind mark is too high, lower your finger; if the mark is too low, raise your finger. While grinding, second photo from left, the blade does not necessarily rest on the

flat of the tool rest; the position of the index finger determines the bevel angle. As the grind nears the edge of the blade, it becomes easy to overheat it. Learn to control the tool with only your right hand, freeing your left to spray the edge with water as you grind, second photo from right. At right, the hollow-ground bevel directly off the grinder.

How to Sharpen

A keen edge makes all the difference

by Ian J. Kirby

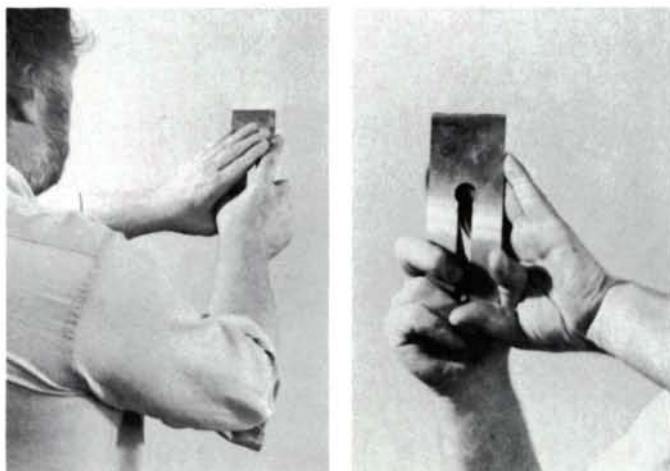
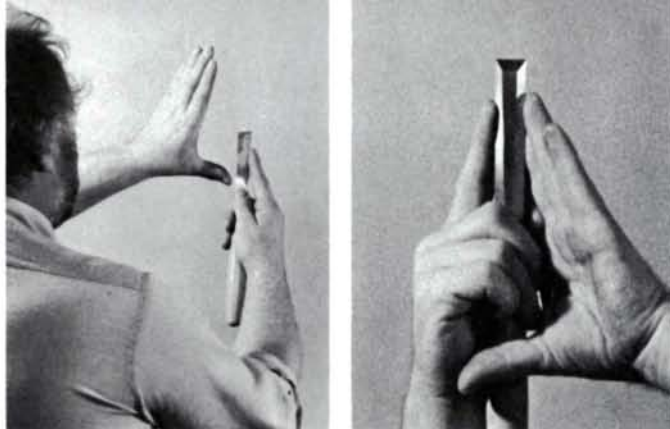
Putting the cutting edge on a chisel or plane iron causes confusion, doubt and fear in many beginning woodworkers. Yet once the tool's edge has been ground (to the appropriate angle and square to its long edges), sharpening takes only about one minute. A sharp tool is the difference between despair and delight—you need to sharpen often and without any fuss. After sharpening, a plane not only feels different as it cuts, it also sounds different—when it's blunt it cuts with a dull and heavy tone, but when it's sharp it sings.

What is it we have to do by sharpening? The diagram below shows a magnified section through a blade. The rounded

edge at A is blunt; B, with the surfaces meeting at a straight line, is sharp. If we remove metal in the shaded area (C), we will have a sharp edge. But if we first grind the tool to a 25° angle and then sharpen to a 35° angle, we can accomplish the same thing more efficiently by removing a very tiny amount of metal (D). The grind can be hollow or flat; it matters little. What does matter is the 35° sharpening angle. The amount of metal we have to remove is measured in angstroms—at most, a few thousandths of an inch. In order to sharpen the blade, there is really very little work to do.

The important considerations in learning how to sharpen are how to hold the tool, how and where to stand, and how to use your body to move the tool over the stone. The photos at right give these answers. One of the things we have to achieve is controlled pressure across the cutting edge; the other necessary control is maintaining the constant angle between blade and stone. The grip shown in the photos provides both of these controls. With either chisel or plane iron, the index fingers of both hands are on top of the tool. Pressure can be exerted uniformly, or on one side of the blade or on the other side—whatever the tool requires. Angular control also comes from this two-hand grip, from the wrists, and subsequently from the shoulders, but the key to it is the thumb of the left hand. It acts as a fulcrum or back rest, and with the hand spread this way it is easy to keep the left thumb solidly locked in position. You find the angle in the first place by feeling for the grinding bevel, or by checking against a block of wood cut to 35°. Then, the left hand becomes a very sensitive jig.

What kind of stone is best? The type of stone you use is a matter of preference. You really need only two stones, a medium and a fine, provided you have some other way of grinding the edge (and if not, a coarse stone and some elbow grease will do it). They can be either oilstones or waterstones, although it's unwise to have one of each. The function of the



For chisels or plane irons, the sharpening grip is the same. Grasp the blade in the right hand, far enough forward to plant the index finger atop the edge (above left). This hand holds the iron and provides both power and pressure. Then make an L of the left hand, place the fingers atop the blade, and the thumb underneath (above right). This hand holds the angle, and also provides controlled pressure. This grip thus allows you to maintain and control both angle and pressure. Most left-handers find they can adopt this grip without reversing hands. Stand with your feet apart, parallel to the edge of the sharpening bench but far enough away to throw your shoulders forward, knees flexed slightly (photo below). Lock your wrists to maintain the sharpening angle as you move the iron forward and back on the stone. A wooden angle block, shown on table, can be used to check your position.



The main difference between sharpening a chisel and a plane iron is the pressure applied to the tool. The hand position, as shown in the two photos at right, is basically the same. Bear down hard on the wide iron, varying the pressure from left to right every few strokes, to round the edge slightly. Maintain constant, light pressure on a narrow tool. Here, Kirby uses a Japanese waterstone, kept wet by squirts from a plant sprayer.



lubricant is to keep the edge of the tool cool, to smooth the sharpening action, and to float away metal and stone debris, thereby helping to prevent plugging or glazing of the stone's abrasive surface. If you have oilstones, the type of oil is also a matter of preference. A light machine oil such as 3-in-1 is good. Motor oil cut with kerosene is popular, and straight kerosene is suitable on a fine stone.

The bench or shelf on which you keep your sharpening stones is a vital element of the workshop. It should be sturdy and built for the job. The surface should be easy to clean—Formica is ideal. There should be a cover over the whole thing or else covers for the individual stones, to protect them from dust, which clogs them and destroys their cutting action. Choose a bench height to suit your own body—34 in. is a good place to start. The stones should be mounted with their long ends at right angles to the front of the bench, and held firmly in place between small blocks fastened to the bench. When planning the bench, don't forget that you need about 10 in. to the right of each stone to clear the tool handle when backing off. Keeping stones in a toolbox is not good practice because sharpening is too important and too frequent an operation to be hindered by having to dig them out and set up some temporary work station. It's also bad to spill dirty water or oil on your workbench.

How much pressure to exert? The pressure varies with the blade you are sharpening—the wider the iron, the more pressure. With a 2 $\frac{3}{8}$ -in. plane iron, apply almost as much pressure as you can deliver, while still being able to move. With a $\frac{1}{4}$ -in. chisel, apply very little pressure. The $\frac{1}{4}$ -in. chisel is probably the most difficult tool to sharpen while retaining the right-angularity of the edge, and the usual fault is too much pressure. With narrow tools, you must take care to move around on the surface of the stone as you sharpen, to keep from wearing a groove in it. Some people avoid this problem by turning the stone on its edge.

Should the tool be held askew to the long edges of the stone? If the blade is narrower than the stone, you should keep the edge at right angles to the edge of the stone and to its direction of travel. In this way you will have to consider and practice a uniform grip and stance, and you will be more likely to get uniform results. Wear on the stone will be more even, and sharpening time will be minimized. When sharpening a plane iron that is wider than the stone, it's common to sharpen aslant, so the whole edge is on the stone. However, because plane irons are usually sharpened with a very slight

curve, more pressure is exerted on the left side of the iron for a half-dozen strokes, then on the right for a half-dozen strokes.

How long a stroke do I take? Learn to use the whole length of the stone, reversing direction an inch or so from each end. This keeps the stone flatter and speeds the process along. Maintain the pressure in both directions, forward and back.

How do I know when to stop? If you visualize what you are trying to do, you'll realize that once you've removed the face of metal that includes the rounded portion, then the edge is sharp. However, you can't know when this has been achieved, so you go a bit beyond. The effect is that the unsupported metal at the very tip of the edge collapses and bends over—a burr or wire edge forms. When you can feel the burr by running your thumb off the flat side (back) of the blade, it's time to stop. Now, turn the blade over flat on the stone and remove the burr by "backing off." No matter what, keep the back of the tool flat on the stone. If you lift the tool to an angle to remove the burr, you've changed the sharpening angle. Correcting the fault wastes both time and metal.

Backing off should be done only on the fine stone. The sequence of events, if all goes well, is this: Sharpen on a medium stone at a 35° angle until you just detect the burr, go to the fine stone and sharpen at 35° until you have polished out the scratches left by the medium stone, turn the blade over and back off. Don't back off on the medium stone before going to the fine stone, it's an unnecessary step. The back of the chisel or plane iron should touch only your finest stone.

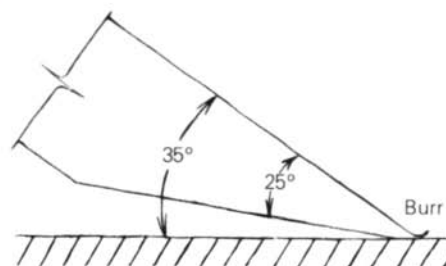
There is no need to raise a huge burr, although it's possible to sharpen to the point where, as you back off, a visible wire of metal detaches itself. This may look impressive but actually you've removed about five sharpenings worth of metal, shortening the life of the grinding angle. You should expect to get 20 or 25 sharpenings between grindings, the first taking the fewest strokes, the second a few more, and so on.

What if, after backing off, the burr is now on the beveled (face) side? It frequently happens that way, and you simply turn the tool over, take a few light strokes, then back off again. You must persevere until, when running the thumb off either side of the blade, no burr can be felt.

How do I know the blade is sharp? There are two simple ways. A 10-power or 15-power hand-lens should be part of every woodworker's tool kit. A look through the lens at this stage is dramatic. What you thought to be a smooth surface turns out to be something like the surface of a worn phonograph record. With $\times 15$ magnification you'll be able to see



Sharpen at a 35° angle (right) until you detect a burr. Turn the tool over and back off on a fine stone. When backing off, the iron must lie flat on the stone (as shown at left and above). Use the fingers of both hands to press it down evenly.



whether the edge is a clear intersection between the sharpening angle and the back side of the blade. The other way to check is to feel that there is no burr on either side of the blade, then to offer the tool very carefully and gently to your thumbnail, as shown in the photograph below. The lower the angle you can achieve between thumbnail and sharpened edge, the sharper it is. This may seem dangerous but it has plenty of historic precedent: Silversmiths and engravers use the method to check the edge on gravers, and metal-lathe operators frequently employ it too. If you're still uneasy about pointing a sharp edge at your cuticle, set your thumbnail vertically on the bench and approach from the knuckle side.

If you are shopping for stones, I'd suggest a medium India (a man-made stone) from a reputable firm like Norton or Carborundum. For the fine stone, a soft or hard Arkansas (*FWW* #12, Sept. '78, p. 68-71). It's best if both stones are the same size and not too small—9 in. by 2½ in. is ample. If a large Arkansas is too expensive, get the largest you can afford. These two stones will last the rest of your life.

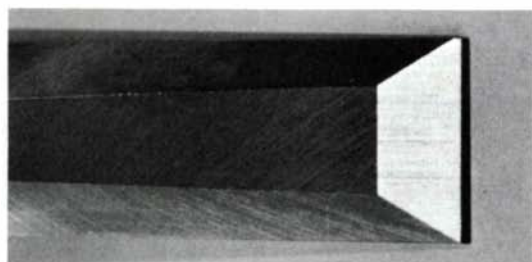
Japanese waterstones are gaining popularity. Although the edge produced by an Arkansas oilstone has long been a standard of sharpness, I find the waterstone to be even bet-

ter—another level of quality that's really quite extraordinary. Japanese waterstones come with instructions for care and maintenance; they're used the same way as oilstones, and again, a medium and a fine stone are all you require.

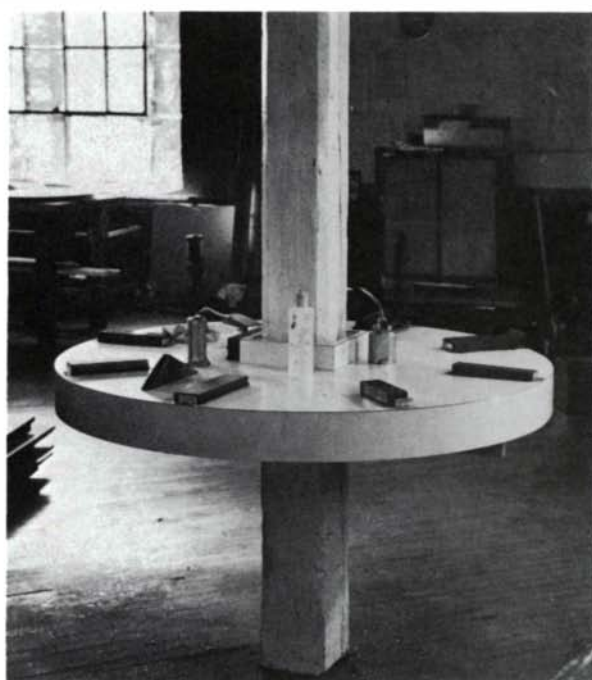
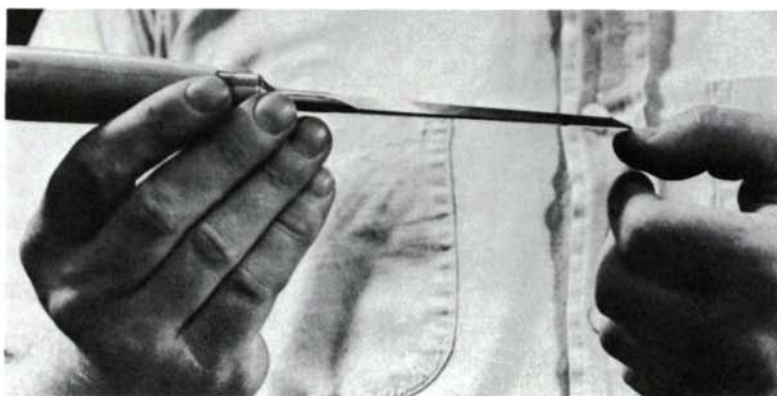
Whatever the stone, unless it's kept flat in its length and its width, it's of little use. To check, clean and dry the stone by pressing it into a paper towel, then hold it to the light against a straightedge, just as you would check a piece of wood. If the length shows a hollow of ⅓ in. or more, or if you see any hollowing in the width, it's time to flatten.

Flattening a waterstone is simple. Place a piece of plate glass about 20 in. square on a flat surface. On it put a piece of 220-grit wet/dry sandpaper. Flood the paper and the stone with water, and grind the stone on the paper using as much of the paper's area as you can. Wash the stone and paper often by dipping them into a bucket of water, and dry the stone before you check it with a straightedge.

To flatten an oilstone, use a different piece of plate glass in a similar way. Sprinkle about ¼ cup of 80-grit carborundum powder (available from lapidary shops) onto the center of the glass, and pour about ¼ cup of water into the grit. Grind the stone in a circular motion, using as much of the glass area as



At left, the sharp edge. Find out how sharp by gently offering the blade to your thumbnail, below. The lower the angle at which it will catch, the sharper it is. At right, the sharpening bench in Kirby's shop is sturdy and easy to clean.



you can. Keep heavy pressure on the stone as you grind. It's easiest to flatten your coarser stone first, while the grit is cutting fastest; a fine Arkansas can take a long time to flatten, especially if it's been allowed to become much hollowed. To check the stone, scrape off the grit slurry, wash the stone, dry by pressing into a paper towel and test with a straightedge. After flattening a dozen stones, you'll probably notice the glass becoming hollow. Get a new piece of glass.

Problem tools. The spokeshave is awkward to sharpen because of its short blade. You can do it by holding it in your fingers but a better way is to make a wooden block about 5 in. by 2 in. by $\frac{3}{4}$ in. Saw a kerf in the end so that the spokeshave blade can be inserted about an inch into the block. You'll be able to exert ample pressure and still keep good control.

Carving tools can be sorted into three types: flat chisels, gouges and veining tools. Flat chisels are sharpened like bench chisels but on both sides. Thus to keep the same 35° angle you'd have to shoot for 17°30' on each side, practically impossible. Since carving is such a variable process, just sharpen on one side until a burr is raised and then sharpen from the other side. A carving chisel usually has to be sharpened more often than a bench chisel.

The carving gouge is held the same way as a bench chisel but people often move it in a figure eight across the stone, rolling it as they go, to sharpen each part of the edge. A disadvantage of this method is that wear in the center of the stone is double, and it's soon hollowed. I find it better to work in a straight line along one edge of the stone, or with the stone turned up on edge, rolling the gouge to reach its whole edge. Once a burr has been raised on the inside, you'll need a slipstone to deal with it. Slipstones are usually small and handheld, not mounted. They're made in a variety of shapes, from flat like a miniature oilstone to cylindrical to conical with a conical hollow on the back side. The conical sort is most common, but cylinders are more useful, although you'll need a variety of cylinders to fit a variety of gouges. Most carvers collect them over the years, the same way they collect gouges. Choose a slip of smaller radius than the gouge, and work it flat on the inside face of the gouge to remove the burr.

An in-cannel gouge is a special problem calling for a cylindrical stone of its exact radius. Brace the butt of the gouge on the bench and work the slip in and out, rotating it at the same time, and maintaining the 35° angle with the tool's back. Then backing off can be done on a normal flat stone.

V-tools and veiners are similar to flat chisels, and most of the trouble comes on the inside, where the two faces meet. First sharpen both outside faces on a flat stone in the usual way, but then to remove the burr from the inside you'll need a stone shaped to an angle that will reach the bottom of the V. Usually a small slip can be ground to the necessary angle.

Many carvers avoid the problem by buffing their tools on a cloth wheel charged with rouge or tripoli. This will produce an extremely sharp edge, but it's haphazard and offers little control of angle. It's also difficult to shape a wheel so it will fit inside a gouge or V-tool. This lack of control usually does not matter to the carver, but the cabinetmaker needs precise angular control and an absolutely flat back, and for these reasons I advise against buffing. It's cheaper, easier and better to learn how to sharpen on flat stones. □

Ian Kirby teaches woodworking and furniture design at Kirby Studios, North Bennington, Vt.

Japanese Blades

Traditional sharpening methods

by Toshio Odate

Although most woodworking apprentices begin training at the age of 13 or 14 years, I was 16 when my parents decided I should apprentice to a *tategu-shi*, the craftsman who makes doors, *shoji* (screens) and room-dividing panels. My starting master was my stepfather, which was unusual. It was common to be sent to apprentice with another craftsman for at least the first two to three years for spiritual as well as technical training. My stepfather was very strict and believed a father could not teach his own son. The first day he said to me, "From this day on we are total strangers. I will treat you like a common apprentice, maybe harder. You should call me master, not father." He did as he said.

A *tategu-shi* apprenticeship lasts five years. Two additional years, the first and last, are done as a service to the master, extending the relationship to seven years. The first year is spent working in the household and studio doing errands and assisting the master's wife. At this time you are beginning to learn the manners and attitudes of a craftsman through observation. The seventh year is spent working as a craftsman without salary to show appreciation to your master.

An experience in my third year that is still important to me helps to illustrate the relationship a craftsman has with his tools. I had saved a little pocket money given to me by my master and other craftsmen for doing errands. But as my daily needs were taken care of by the master, there was little reason to have or spend money. On the first and fifteenth day of the month we would take a half day off, but only after the master's tools and my tools were taken care of and the shop was cleaned. I was finally free around two o'clock. You can imagine just how precious those hours were to me. One afternoon I took the train to a store that was well known for its fine tools. There I purchased a plane that had been made by a famous blacksmith. At the time I did not know his name or the fine quality of his tools. All I knew was that the plane was expensive. On the train I was so overjoyed I unwrapped the plane and held and looked at it all the way home. I knew I couldn't show the plane to anyone because people would laugh at me—I was still a novice. I couldn't even keep it in my toolbox for fear someone would see it. I enjoyed the plane every evening while in my room. After the lights were turned out, I kept the plane by my bedside.

One day it was raining, and everyone was fixing tools. I don't remember why—it wasn't a day off—but my plane was now in my toolbox. I was pretending to fix my tools but was really looking at my plane. All of a sudden my master was standing behind me. It was too late. He asked, and I had to tell him I had bought it. He took the plane and showed it to the other craftsmen. They, too, thought it was a wonderful tool but teased me because I still did not know how to appreciate its greatness. They took the blade out of the block and examined it carefully. They talked about it for a long time, then gave it back to my master. My master came to me

holding the plane in his hand and told me simply that the plane was too good for me. He took it away, and I never saw it again. I had expected that to happen.

Tools are made to be used, and great tools have to be used by great craftsmen. The plane was not for me and should not have been mine only to keep in a cabinet. I should have had greater respect for the tool and the craftsman who made it. It was a very painful and expensive lesson, but I learned.

Sharpening Japanese blades—Most Japanese woodworking tool blades are made by laminating steel (figure 1). High-quality Western blades also used to be made this way. The edge of the blade is thin and extremely hard and is supported by a thick, soft steel. The center of the back of the blade is hollowed-out to facilitate keeping the back completely flat. Most blades are beveled on one side, except for ax-like tools, which are beveled on both sides with hard steel laminated in the center. Plane blades, chisels and knives are made in the same manner, and the methods for sharpening them are similar. Once you have learned the techniques of sharpening plane blades, which are the most complicated, you will be able to sharpen any flat blade.

A new plane is usually ready to use, but most Japanese craftsmen will recondition it to suit their own preference. The optimal bevel angle depends on the quality of the blade and on the kind of work you are doing. Until you know otherwise, it is best to maintain the original bevel angle of the blade.

If the edge of the blade is not finished when purchased or is badly chipped, a grinder can be used to start the sharpening process. When I worked in Japan I did not have a grinder and always used a coarse stone, as was the custom. Mechanical tools were generally not used. Today a wide variety of machines and tools is available to make dressing or redressing a blade faster and more accurate, but sharpening itself, honing the final edge, has to be done by hand.

There are oilstones and there are waterstones; in Japan we used only waterstones. Many Japanese craftsmen prefer natural stone, but it is difficult to find large stones that have an even consistency. Today, manufactured stones are readily available at an affordable price. Three stones (coarse, medium and fine) are needed. When sharpening (and not redressing) a blade, only the medium and finishing stones are used.

When using a waterstone, water must be added constantly, or the pores of the stone will clog. Keeping the surface of the stone clean gives a faster grind. Japanese craftsmen keep a bucket of water next to the stone, or they have a sink-like wooden box beneath the stone (figure 2).

In sharpening, be sure to wipe the blade before changing to a finer grade stone to keep from transferring coarse particles. Before changing stones you should allow the stone you're on to dry during the last few strokes. This results in a smooth transition to the next stone. As the stone dries, the pores of the stone clog slightly, thus acting as an intermediate grit.

How the blade is held during sharpening is important. The plane blade is held in the palm of the right hand with the index finger extended (photos, right). Place the first two or three fingers (depending upon the size of the blade) of your left hand in the space created by the right thumb and index finger. Your fingers will maintain pressure on the blade so as to steady the bevel. The left thumb, placed under the blade, will provide support for the back.

The angle of the blade on the stone has to be constant

Fig. 1: Blade structure

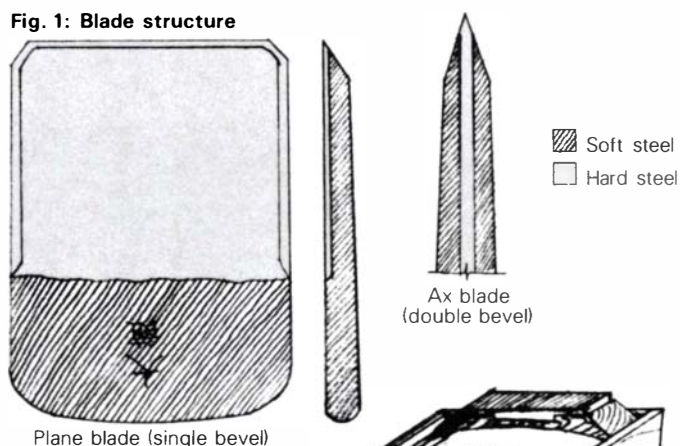
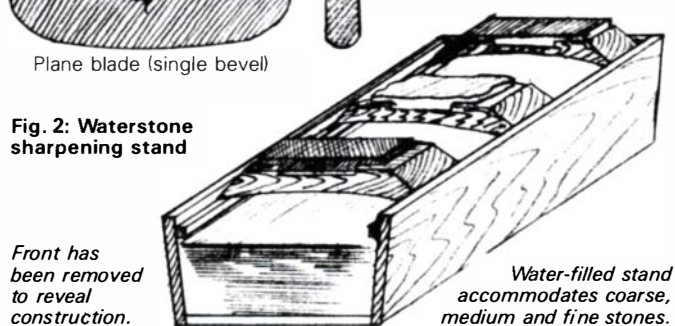


Fig. 2: Waterstone sharpening stand



To sharpen the bevel, hold the blade in the right hand, index finger extended to press in back of the bevel. The fingers of the left hand fit between the index finger and thumb of the right hand, also pressing in back of the bevel. Position the thumb of the left hand to support the blade at the back. Keep the angle of the blade on the stone constant while rubbing back and forth.

Fig. 3: Bevels

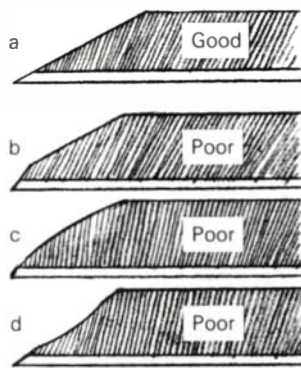


Fig. 4: Plane-blade bevel



A plane blade must be sharpened flat from the edge to the top of the bevel but slightly convex across its width, to keep the corners from digging in. Roughing-plane blades should be more convex than smoothing-plane blades. The convexity shown is exaggerated for illustration.



When a burr has been raised on the flat side of the blade from sharpening the bevel on the medium and fine stones, flip the blade over and hold it with the fingers of the right hand around the back and the thumb extended to press on top of the bevel. Lay the blade flat on the fine stone and bring the thumb and fingers of your left hand to bear on the corners of the bevel. Rub hard back and forth until the burr has been bent back to the bevel side. Continue to rub the blade alternately on the bevel and the flat side until the wire edge falls off.

while sharpening; the surface from the edge of the blade to the top of the bevel must be perfectly flat (figure 3a). This is particularly important for chisels, which are sometimes used like planes, with the bevel riding on the wood—the flatness and smoothness of the bevel help to control the cut and also contribute to the strength of the edge. A double bevel or a convex bevel (figures 3b and 3c) will cause plane blades to skip when cutting hard grain or knots. If the beveled surface is slightly concave (figure 3d), maximum control and also support for the fragile hard-steel edge are sacrificed. Hollow-ground bevels are easier to hone, but there are disadvantages: They do not produce the strongest edge, and they are especially bad for laminated blades.

While the bevel must be perfectly flat from the edge to the top, plane blades require additional shaping: The edge must be slightly convex (figure 4) to prevent the corners of the blade from cutting into the planed surface. The shape is produced by subtly varying the pressure on the blade from side to side during the stroke. The convexity of the edge of a roughing-plane blade should be more pronounced than that of a smoothing-plane blade.

Japanese craftsmen sharpen not on a bench, but with their stone, or their stone stand, on the floor. The squatting position allows you to bring your weight to bear on the work. The orientation of the blade on the stone depends on the size of the blade and the training of the craftsman. Some craftsmen

are taught to sharpen with the edge of the blade always perpendicular to the stroke. This probably produces the strongest edge, but it requires keeping the elbows in close to the body, not their most natural position. I usually sharpen with the blade angled at about 30° to the stroke. This allows me to lock my hands and wrists and still move freely from the upper arms. Another advantage of this position is that it provides greater support for the bevel on the stone to steady the angle during the stroke. The greatest support comes from holding the blade parallel to the direction of the stroke; then there's little chance of rocking the bevel. To hold the blade this way, the stone must be at bench height, and you stand alongside the stone, rather than behind it. I use this position for very thin blades and also for gouges.

The blade should be sharpened on the coarse or medium stone, rubbing back and forth until a burr appears across the edge. To detect the burr, rub the back of the blade gently with your finger; it should not be quite visible. Switching to the finishing stone, sharpen in the same manner until the whole bevel is mirror-smooth. Turn the blade over and hold it with the fingers of your right hand around the back and your thumb extended to press on the top of the bevel. Bridge this thumb with the fingers and thumb of the left hand, pressing on the corners of the blade (photo, left). Rub 15 to 20 times with the back flat on the stone until you can feel the burr bent back to the bevel side. It is important not to sharpen the back of the blade until this time, and only on the finishing stone. Repeat the finishing process back and front until the burr falls off. Resist the temptation to peel the burr off as this will leave a raw edge. Sharpening is now complete.

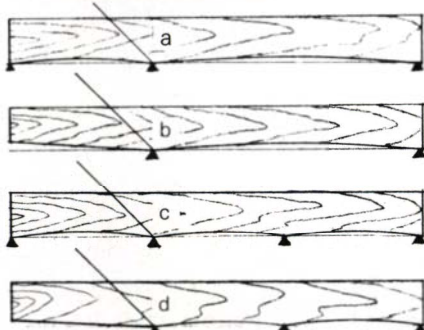
Maintaining the flat back—The back surface of Japanese blades is unique in that the flat between the hollow grind and the blade edge is extremely narrow. It is common knowledge among Japanese craftsmen that the blade performs best just when this flat is narrowest. After repeated sharpenings finally make the flat disappear, a new flat has to be created. If the blade is wider than $\frac{3}{8}$ in., Japanese craftsmen usually strike the edge of the soft steel with the corner of a small hammer on the bevel side of the back so as to bend the steel down slightly. It requires considerable skill to do this right because the hard steel of the back of the blade can crack from the slightest vibration of a misdirected blow. Most Japanese craftsmen have had this experience, including myself. I can remember hiding a blade from my master. If one wants to acquire the skill, one must take the chance and practice. I prefer using the corner of a hard wooden block, but some use the corner of an anvil. Either way, place the back of the blade on the corner, making contact $\frac{1}{4}$ in. to $\frac{3}{8}$ in. down from the edge in the middle of the blade, exactly opposite where you will strike with your hammer. Tap lightly and repeatedly along the center two-thirds of the width of the blade (photos, opposite page), moving the blade between taps to position the corner underneath the hammer. Depending on the thickness of the blade, 15 to 25 taps should push out the hollow in the back enough to produce a flat at the edge after grinding.

Grinding is accomplished with a flat steel plate 2 in. by 8 in. by $\frac{1}{4}$ in. (stones are not flat enough), a pinch of carborundum powder (silicone carbide grain, grit #46) and a few drops of water. Mix the carborundum and water on the steel plate and rub the back of the blade, giving little pressure at the beginning, keeping the carborundum paste under the



Left, after repeated sharpenings, the narrow flat at the edge of the hollow grind on the back of the blade is worn away, and the hollow grind must be tapped out to provide enough metal to produce another flat. Back the blade on the corner of a wooden or steel block and tap lightly and repeatedly with the corner of a small hammer in the center of the bevel. Be sure the blade is supported directly behind where the hammer strikes; vibration can easily crack the blade. Below, when enough of the hollow grind has been tapped out, the back must be flattened on a steel plate sprinkled with carborundum and water. Use a length of wood to back up the blade and to provide leverage for gradually increasing the pressure on the blade as you rub it vigorously back and forth. As the carborundum and water become a fine paste, your whole weight is brought to bear. The result is a narrow, mirror-smooth flat at the edge of the blade. You can then sharpen the bevel and the flat on stones.

Fig. 5: Plane-sole contours



For truing (a), the sole is relieved so the plane contacts the work only at the front, the blade and the back. For roughing and smoothing (b), the whole back is relieved so the plane contacts the work only at the front and the blade. Both of these basic contours can be modified (c and d) to include more than one contact point in front of the blade. Exaggerated for illustration.



blade. Then slowly increase the pressure. Keep the surface of the plate moist, and maintain even pressure on the blade with both hands. For leverage place a piece of wood about three times the length of the blade over it and grip the wood and the blade together. Use the wood as a handle and rub hard for a few minutes, then wipe the carborundum paste off the blade to examine the back. If it's even but dull and rough, and you have a flat at the middle of the edge about $\frac{1}{16}$ in. wide, then gather the carborundum paste at the center of the plate and add a few more drops of water. This time press and rub as hard as you can until the paste is completely dry. Here's where working on the floor allows you to get your whole weight on top of the blade (photo, above). Look once again and if the back, all of it except for the hollow grind, is flat and shiny as a mirror, the work is done. If it is not, repeat the process. This is important because the more shine the edge has the sharper it will be. Western flat-back blades should be ground this way as well, so that the blade will keep its edge longer.

For a very narrow chisel (less than $\frac{1}{4}$ in.), it is not necessary to strike with a hammer. Use the carborundum powder and the steel plate. Obviously, the hollow grind will be shallower, but it will do the job.

Next, the corners of the blade are ground to an angle in order to prevent shavings from jamming in the plane body. Then the beveled edge is sharpened as described earlier. The

dimples left in the beveled surface from tapping out the hollow grind will disappear within two or three sharpenings.

Plane preparation—Sharpening is only part of the story; the plane body too must be prepared. The article by Ted Chase (*FWW* #20, Jan. '80) gives some good information. To it I should add that there are two basic contours for the sole of the Japanese plane—one for truing and one for roughing or smoothing. For truing, the sole is relieved so the plane contacts the work at the front, at the blade and at the back (figure 5a). This contour planes a perfectly flat surface because it removes only the high spots of the work, its depth of cut being limited both in front and in back of the blade.

For both roughing and smoothing planes, the whole sole behind the blade is relieved (figure 5b). Thus the plane contacts the work at only two points: at the front and at the blade. This configuration can take much larger shavings. In smoothing planes, the same contour allows the plane to follow the surface exactly, leaving a consistent shine to the wood. Both these configurations can be modified according to the requirements of the craftsman to include more than one contact point in front of the blade (figures 5c and 5d). □

Toshio Odate, of Woodbury, Conn., is a wood sculptor who teaches art at Pratt Institute in New York City. This article was prepared with the help of his wife, Audrey Grossman.

Pole-and-Wire Joinery

The quick way to build

by Len Brackett

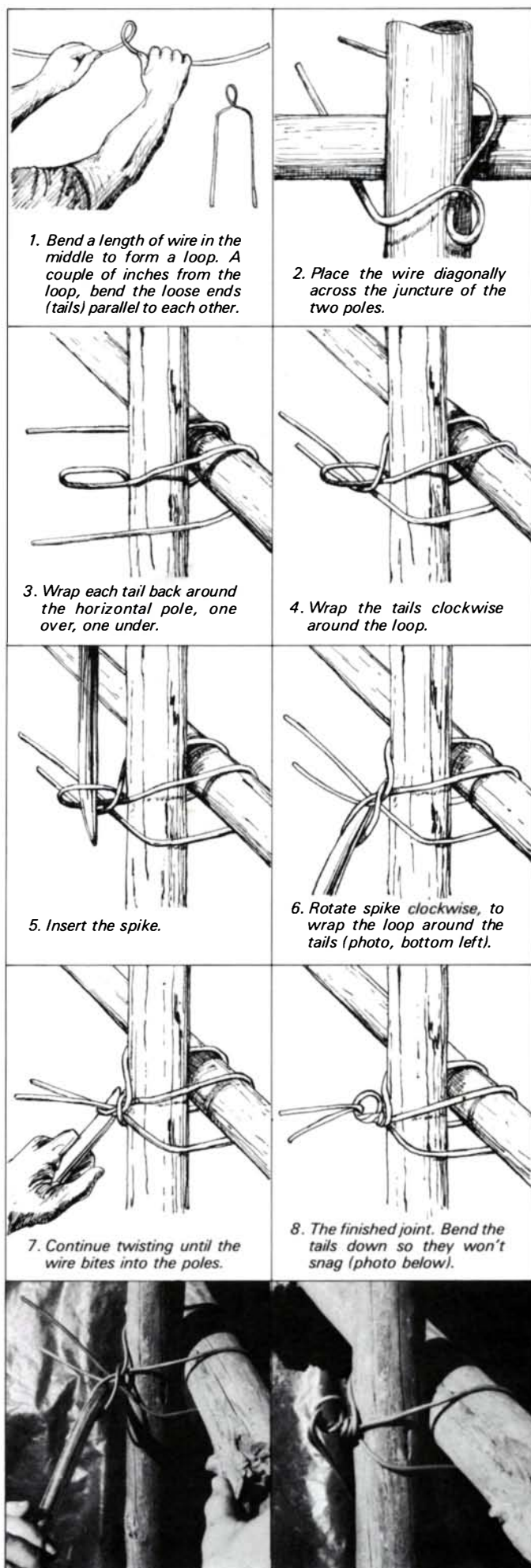
Almost everyone at some time needs a temporary building or shelter, but most structures on the market are both expensive and time-consuming to erect, plus awkward to store once their purpose has been served. As a carpenter's apprentice in Japan, I encountered a method that is simplicity itself—lashing poles together with wire into a scaffolding that can support a roof. Because joints can be lashed easily and quickly anywhere along the poles, structures can be adapted to any site, even to rough terrain where prefabricated buildings cannot be used. In Japan the technique is used primarily for scaffolding, but also for wood-drying sheds, tool storage, and even for enclosing an entire temple while it is being worked on. I built my own 40-ft. by 60-ft. workshop this way; other applications are craft-fair booths, lean-tos, covered woodpiles and trellises, to name but a few.

Materials—Japan is blessed with some of the richest forests in the world, and wood has always been the traditional building material. Straw rope used to be the traditional binding for pole construction, but #9 annealed iron wire (not common baling wire), which neither rots nor frays and is stronger and faster to wrap than straw rope, is the material of choice today. You can buy it at most hardware stores or at building and agricultural-supply outfits. Enough wire to make one joint (about 3 ft. to join 5-in. dia. poles) will cost about 3¢. Be sure to get annealed black wire; galvanized wire is too highly tempered, too brittle and too stiff to work.

As for poles, straight ones with little taper work best. They are lighter in proportion to their strength and easier to store, transport and position than ones with a lot of taper. Almost any species will work. We like to use Douglas fir or ponderosa pine because they are straight, strong and locally available. Poles larger than 8 in. in diameter are heavy and awkward. A butt diameter of 4 in. to 5 in. is best. All poles must be peeled. Bark holds moisture inside the poles, which fosters fungus growth and insect infestation (boring beetles especially), both of which can dangerously weaken a pole. Beware of rot, knots or other weaknesses, particularly if the pole is to bear horizontal loads. Poles should be stored in a dry place, vertically for maximum ventilation if stored outside.

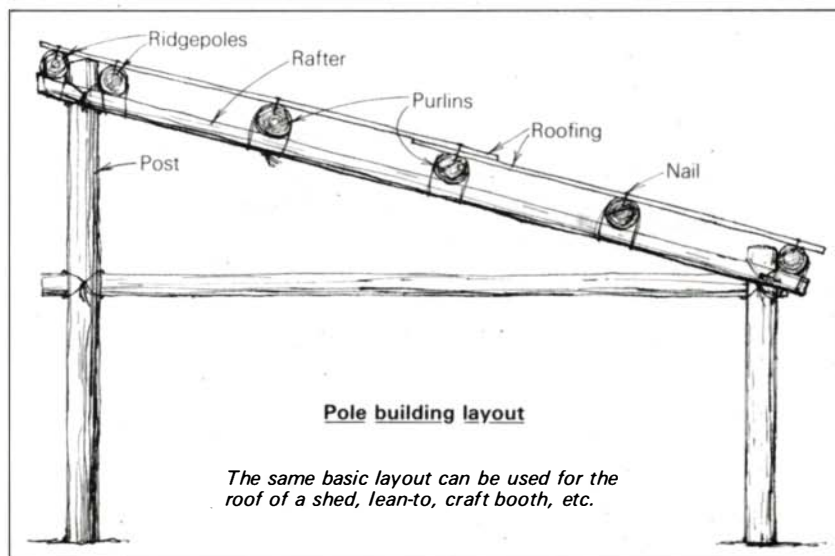
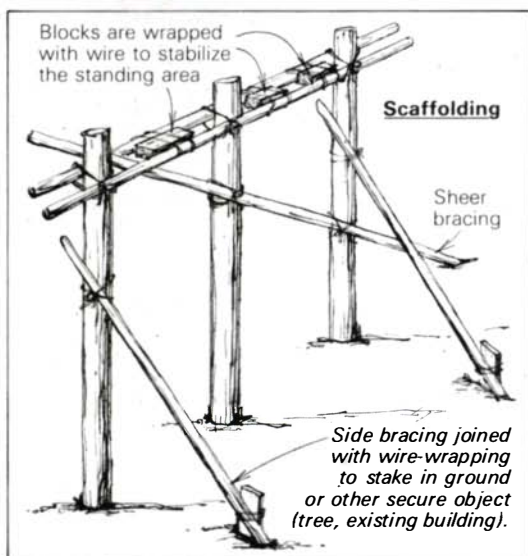
The only tools you will need are a wire cutter (preferably the kind easily used with one hand) and a sturdy tapered spike for twisting the loops of wire. You could use an ironworker's spud wrench, a large machinist's punch or even a very large nail.

The photos and sequence of drawings at right show how to wrap a joint and secure the wire knot. Practice a few times before you attempt to put up some structure—be sure you understand how the loop wraps around the tails, not vice-versa, or else the wire might fatigue and break off. Tighten the knot until the wire bites into the wood, then stop. Too much twisting will also weaken or break the wire. When





Brackett's pole-and-wire shop is spacious and well ventilated; detail, left, shows cross-bracing at central post.



The same basic layout can be used for the roof of a shed, lean-to, craft booth, etc.

done, bend the ends of the wire down to the wood, so they can't snag clothing or flesh.

With practice, you can make a joint in just a few seconds, especially if the wire is pre-cut and hanging in your belt. The joints tend to self-tighten, but it's wise to check them periodically, especially if the poles are green or are exposed to humidity extremes. Poles shrink in dry weather, loosening the joint. You cannot tighten wire simply by pulling on a loose end, so wrap it tightly to start, as if it were wallpaper, smoothing out the wrinkles from the middle toward the ends. And of course, you should take the shortest and most direct route around the poles.

Building—Once you have mastered the way to twist the wire, you are ready to design a building. The following suggestions should help you get started. Pole-building layouts look a bit goofy, but are really quite rational, even if the rafters do hang from the purlins, ridgepole and top plates. Improvisation is the key. The structure must be kept rigid. Be sure to fix the poles to a stake in the ground or to some solid object to keep them from falling over as you build. Later they can be shear-braced with diagonal poles.

Pole-and-wire joinery is a very fast way to make scaffolding. Begin by fastening two horizontal poles at the required height, one on either side of the verticals. Jam spacer blocks of wood between the horizontal poles at 6-ft. intervals, then

lash the horizontal poles tightly together, as shown in the drawing above left.

Pole buildings usually have corrugated steel roofing running parallel to the rafters. In this case, the purlins must be placed on top of the rafters and midspan between the top plates and the ridgepole (drawing above), and at the correct intervals for nailing the steel roofing to them. Rafters are fastened to the posts below and up against the top plate. The ridgepole can be placed on top of the central post for a gable roof; better yet, two ridgepoles can be fastened, one on either side of the central posts and high enough so the posts won't protrude through the roofing material. Put in the shear bracing, nail on the roofing and the roof is complete.

My own 2,400-sq. ft. shop was put together by three men in 2½ days, not including the time it took to peel the poles. It ought to last 15 to 20 years, and it cost about \$600 for wire and roofing in 1976. Building inspectors have nightmares about such buildings, which are out of keeping with a heavily industrialized, consumer economy. But they do go together fast to make a variety of structures, they disassemble quickly and the materials remain available, unimpaired, for future use. In today's throw-away society, the ingenuity, simplicity and economy of pole buildings have great appeal. □

Len Brackett, 34, of Nevada City, Calif., apprenticed for five years with temple builders in Kyoto.

Man-Made Boards

Working with particleboard and fiberboard

by Simon Watts

However solid wood is used to make furniture, its fibers, the actual strands of ligno-cellulose, remain arranged much as they were in the living tree. If the wood is sliced into sheets and then glued together so that the grain of adjacent layers runs at right angles to one another, we get plywood, a composite material with some of the properties of the original wood plus some new ones—it won't split easily and it's more stable. In spite of this, it is easily recognizable as wood, and the fibers in each veneer are still aligned almost as they were in the tree.

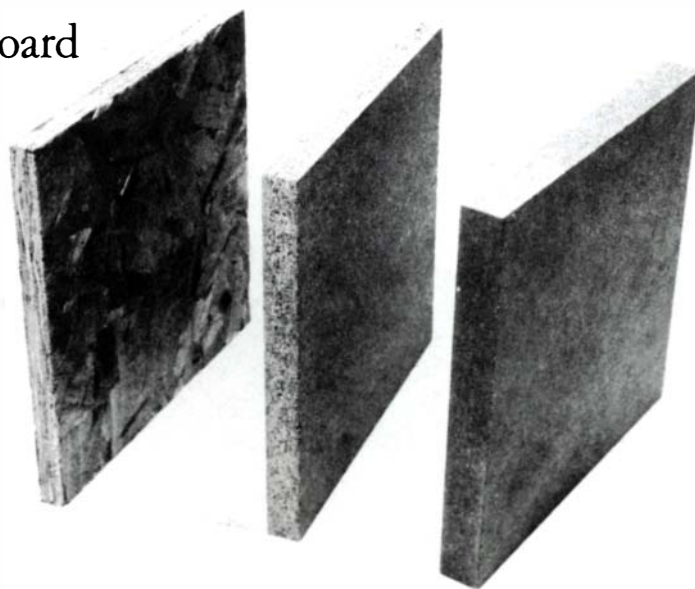
Instead of making plywood, suppose we grind the original piece of wood into flakes, chips or sawdust, coat the particles with glue and press the result into sheets. We have a new material—particleboard—with properties somewhat different from both plywood and solid wood. It is equally strong in both directions, for example. Although particleboard is barely recognizable as a wood product, if we inspect it under a hand lens we can see the individual elements still organized as they were in the tree.

We could go one step further and reduce the wood to its component fibers by steaming or with solvents. This technique opens up a new range of possibilities. Fibers can be mixed with water to form a slurry, which is deposited on moving, porous belts to make paper, or they can be dried, blown into forming machines and then pressed into fiberboard. Whatever the final result—tissue paper, cardboard, soft insulation board or hardboard—these products all have one thing in common. The arrangement of the individual fibers is now random, and has no relation to how they grew in the tree. Its fibers have been reorganized.

These processes of modifying the structure of wood do not end with fiberboard. The cellulose portion can be liquefied by solvents and used to make such new materials as rayon, cellulose lacquer and cellophane. But furniture-makers have not yet turned to cellophane, and plywood has been around long enough to be well understood. Particleboard and fiberboard, on the other hand, have developed so rapidly that the techniques of working with them and designing for them have not yet caught up.

It is time to take a fresh look at the new generation of sheet materials and to stop thinking of them as substitutes for solid wood. After manufacturing out of the tree all the irregularities that make it a unique material, it seems perverse to then reconstitute it to look like old barn boards or wormy chestnut. This practice only encourages people to think that man-made board and solid wood have a lot in common. Although they can be worked with the same tools, the fact is that they don't have much in common. Man-made board has large, smooth surfaces; although generally weaker, it is uniform and dimensionally stable, compared to solid wood, moving minimally and predictably in response to humidity changes.

Even woodworkers excited by these new materials have dif-



Three man-made boards: left, waferboard, used only in construction; center, furniture-grade particleboard, showing characteristic layered structure (fine particles for the faces, coarse particles for the interior); and right, medium-density fiberboard, with uniformly dense edges. Photo: Forest Products Laboratory.

ficulty making the switch. This is because there is such a weight of accumulated experience where solid wood is concerned—much of which has to be discarded when working with man-made board. It is structurally incongruous, for instance, to use particleboard for frame-and-floating-panel construction, a design developed to allow for the seasonal movement of a solid-wood panel.

Solid wood, for practical reasons of weight and drying, has traditionally been worked in thicknesses under 2 in. But using man-made boards, it is possible to choose your own thickness by means other than lamination—hollow-core construction, for instance. The dimensional stability of man-made board makes it possible to organize the architecture of the piece—the interplay of solids and voids—in ways that are simply not possible in solid wood. Also, the large, smooth surfaces invite the use of color and texture in coverings that can produce a wide range of visual effects. These may have little or nothing to do with the underlying structure.

Particleboard, the oldest of the new man-made boards, first appeared in Europe after World War II. The forests had been depleted, and after the widespread destruction of the war there was a desperate need for building materials. Particleboard utilized low-grade raw materials—trees too small or crooked to be sawn into lumber, as well as sawdust and shavings. Particleboard panels were soon being produced in quantity, but America, with its vast timber resources, was slower to adopt its manufacture. In the past ten years this situation has changed dramatically—America produced 3.3 billion square feet in 1979, enough to cover 80,000 acres.

Particleboard can be made from almost any species of wood, hard or soft, from large trees or planer shavings. The wood does not have to be new, and even old railroad ties have been used experimentally. Starting with round logs, the first step is to remove the bark. The wood is then reduced to $\frac{3}{4}$ -in. to 2-in. chips and fed into a ring-flaker, which yields thick shavings. It's then dried, graded by size and blown into large

storage bins. As needed, the particles are sprayed with glue and shaped into mats in vacuum-forming machines where they are deposited, like snowflakes, on moving metal plates. These mats then enter a precompressor, which reduces them to a height of 10 in. or less. Next they are trimmed and sent to the main press for a 1,600-PSI squeeze.

After pressing, the panels must be immediately cooled or else the glue bond deteriorates. They are slowly pivoted on one edge, like the leaves of a giant book, trimmed again, then fed through a series of drum sanders to remove about $\frac{1}{32}$ in. from each side, reducing them to uniform thickness.

Virtually all particleboard sold, both construction and furniture-grade, is made by pressing like this, but it can also be made by extrusion. Extruded particleboard begins with dry wood, which is splintered by grinding or hammer-milling and then sprayed with glue as before. The glue/particle mix is squeezed through a heated die and emerges as a continuous ribbon, like toothpaste. By changing the shape of the die, different sections can be made, and some experimenters have made 2x4s and even I-beams.

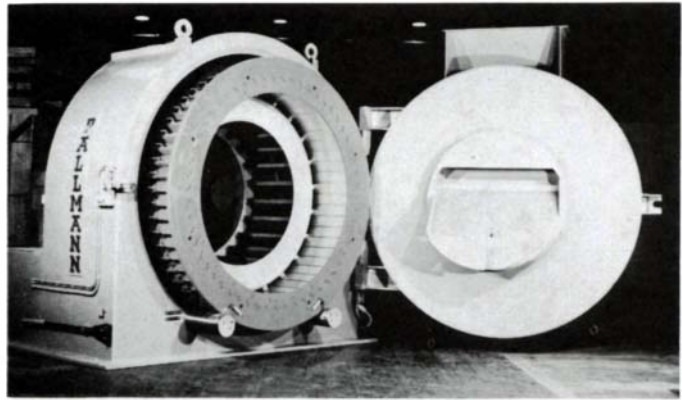
Extrusion is the cheaper process because no forming press is involved. But it cannot produce "layered boards" having a surface composition different from the interior. Particleboard intended for the furniture industry is different from construction-grade particleboard commonly sold in building-supply stores and used for sheathing and floor underlayment. It has this layered composition: fine particles on the surfaces and coarser ones in between. A board composed entirely of fine particles would be heavy and wasteful of glue; one made only of large particles would soon lose its smoothness as the surface absorbed moisture with changes in humidity. For this reason trying to cover construction-grade particleboard with wood veneer is a lost cause. The coarse surface particles will swell and soon show through the veneer until the surface has the texture of oatmeal.

Most furniture-grade particleboard goes directly, in large quantities, to furniture factories. It is therefore difficult to obtain at retail, though some of the larger outlets are beginning to stock it. It's easily recognized by its size: 4 ft. 1 in. by 8 ft. 1 in., instead of the standard 4x8 sheets used in the building trade. If your local lumber dealer doesn't carry it, ask him to order it for you from his wholesaler.

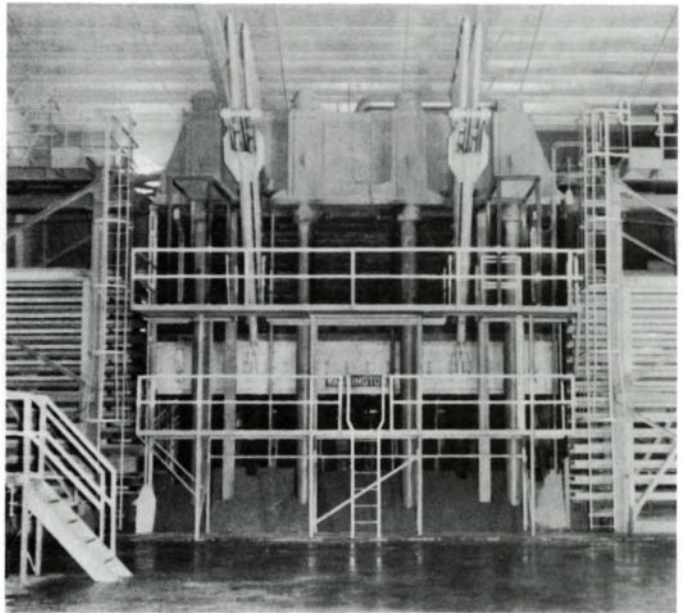
Fiberboard is not layered but still retains its smooth surface in spite of changes in humidity. The manufacturing process begins by softening and loosening the wood fibers. Raw sawmill wastes are first fed into large boilers, where they are subjected to intense steam pressure for several minutes. When the pressure is suddenly released, the particles explode into a pulpy mass. This thick batter is then forced through a ring-refiner where the shearing action between two rotating discs tears the particles to fibers. From here it goes to flash-tube driers where, in less than three seconds, its moisture content is reduced to 2% or 3%. Then it is sprayed with a fine mist of glue and stored in large bins until needed. The glue is activated under the heat and pressure of pressing.

This process is similar to making particleboard except that the fiberboard material is much fluffier, and a mat 23 in. high will squeeze down to make a $\frac{3}{4}$ -in. board. After pressing and cooling, boards are sanded and cut to order on a variety of computer-controlled equipment.

A typical fiberboard plant uses 300 tons of sawmill wastes—sawdust and shavings—each day, and 30 tons of



A knife-ring flaker reduces wood to chips on its way to becoming particleboard. Raw material enters the chute and is thrown against the rotating knives by centrifugal force. This machine is about 10 ft. high and contains 56 knives, each 2 ft. long. Photo: Pallmann Pulverizer Co.

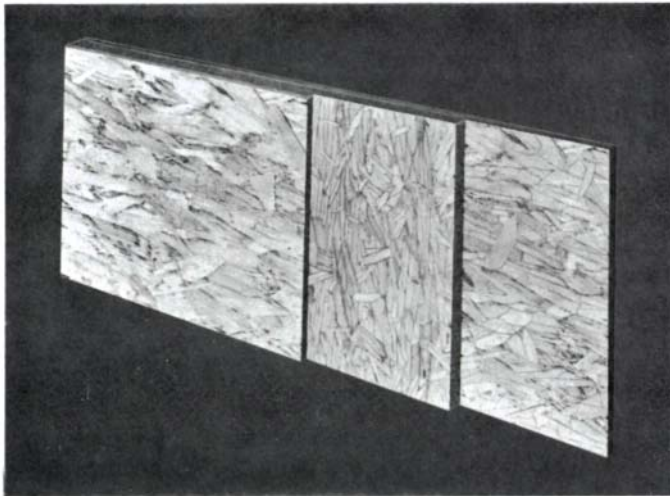


A typical particleboard press. The largest of these presses, in Brazil, can produce 26 4x8 panels every six minutes—more than a million square feet per day. Photo: Washington Iron Works.

urea-formaldehyde glue. One of the striking features of such a plant is that it not only feeds on waste but also produces practically none itself. Offcuts prior to final pressing go back to the storage bins, subsequent trimmings fire the flash driers, and dust from the sanders is collected to heat the boilers.

Depending principally on the amount of pressure applied and the thickness of the original mat, the product of a fiberboard plant may be a lightweight insulation board, with a density of 15 lb. to 20 lb. per cubic foot; medium-density fiberboard (MDF) 44 lb. to 55 lb.; or a high-density fiberboard (HDF) weighing approximately 60 lb. per cubic foot. Known as hardboard or Masonite, high-density board can be toughened (tempered) and made weather resistant by hot-rolling with oil.

For making furniture, fiberboard is superior to particleboard in every respect except availability. It has a better surface quality that stays smooth regardless of changes in humidity, which makes it an excellent substrate for veneers. Its edges are tighter, making them easier to mill, mold and finish, and somewhat better able to hold fasteners. It is easier to glue because there are no voids. Its lower glue content makes it less abrasive to tools and, very likely, less of a health hazard to the woodworker. As its advantages become more



The newest type of man-made board is OSB (oriented-strand board), in which the face strands are aligned with the length of the board, while the interior strands run the width. Experiments are being conducted to produce boards with surfaces smooth enough to be used in furniture. Photo: Elmendorf Corp.

widely known, fiberboard could eventually supersede particleboard altogether. Again, the most likely way to obtain it at present is to ask your local retailer to order it for you from his wholesaler.

Oriented-strand board (OSB) has a layered construction, like furniture-grade particleboard, but the particles are not placed at random. It has a distinct "grain" because the fibers in the top and bottom surfaces are aligned lengthwise while the middle layer runs across the width of the board like plywood. Unlike plywood, however, it does not require scarce and expensive veneer logs but can be made from low-grade cordwood. The first U.S. manufacturer, Elmendorf Board Corp., has started production in Claremont, N.H.

Working with man-made boards—All these new sheet materials depend on glue, fiberboards less than particleboards because the interweaving of the fibers gives strength and also because the lignin remaining from the tree acts somewhat as a natural adhesive. The two common glues are urea and phenol formaldehyde, which release formaldehyde vapor both before and after manufacture.

When a Seattle research team exposed laboratory rats to this vapor at residual levels often found in mobile homes, whose interiors are sealed tight with man-made boards, the animals developed an abnormally high rate of nasal cancer. It is known also that with heat, as generated when machining man-made boards, these glues decompose, releasing formaldehyde. Without further research it is impossible to know what the health hazards of living and working with products made from these glues really are. The Federal Consumer Products Safety Commission has proposed a ban on urea-formaldehyde foam insulation (which also releases vapor), and industry is looking into alternative adhesives. In the meantime it seems prudent to work with these materials in well-ventilated areas, to wear a respirator with an organic-vapor cartridge when machining them, and to seal raw surfaces to reduce vapor emission in finished products.

Formaldehyde glues are highly abrasive and soon take the edge off even a high-quality steel blade. Particleboard is worse than fiberboard in this respect because of its higher glue content. Carbide-tipped sawblades are now used almost exclusively, and special tooth configurations have been developed (see *FWW* #23, July '80, p. 72). The features that everyone wants in a blade are long tool life, clean cutting and minimum tear-out. However, these requirements conflict, and no single tooth form or combination entirely satisfies them.

The common rip tooth (or flat-top) is not recommended for cutting particleboard because it takes such a big bite that

Structural properties of some man-made boards

This table compares the structural properties of ¾-in. particleboards and fiberboards typically used for furniture. As one would expect, the denser the material the stronger it is and the better able to hold fasteners. Expansion and contraction as a result of

changes in humidity, although small, cannot always be disregarded. An 8-ft. panel of MDF, for example, would increase about ¼ in. in length as the relative humidity rose from 50% to 90%. Change in thickness due to changes in humidity depends too much

on the species, size and geometry of the particles to be listed, but it is roughly ten times the linear expansion. Thickness movement is of little consequence, except that surface particles swell unevenly and produce an "orange peel" surface.

	Modulus of rupture (min. avg.) PSI	Modulus of elasticity (min. avg.) 10 ⁶ PSI	Internal bond (min. avg.) PSI	Linear expansion (max. avg.) Percent	Screw holding (min. avg.) lb. Face Edge
¾-in. particleboard, interior grade					
Low density (37 lb./cu. ft. and under)	800	0.15	20	0.30	125 —
Medium density (37 to 50 lb./cu. ft.)	1,600	0.25	70	0.35	225 160
High density (50 lb./cu. ft. and over)	2,400	0.35	200	0.55	450 —
¾-in. fiberboard, medium density (48 lb./cu. ft.)	4,000	0.40	100	0.35	350 275
Eastern white pine (<i>Pinus strobus</i>)	8,600	1.24			
White oak (<i>Quercus alba</i>)	15,200	1.78			

Modulus of rupture: the load necessary to break a panel.
Modulus of elasticity: a measure of the resistance to deflection.
Internal bond: the force two faces of a panel will withstand before pulling apart.
Linear expansion: the change in length that occurs when relative humidity of surrounding air rises from 50% to 90%.
Screw holding: the force required to extract a 1-in. #10 type A or AB sheet-metal screw.

Data adapted from the National Bureau of Standards' Commercial Standard CS 236-66 and literature from the Plum Creek Lumber Co., Columbia Falls, Mont.

the large cutting pressures tear out the fibers at the point of exit. It also has a tendency to choke on its own waste, generating heat and requiring more power. The alternating-top-bevel tooth (ATB), often used for crosscutting, makes a smoother cut with minimum tear-out, but its sharp tips are vulnerable to shock loads and will wear quickly. If quality of cut is not crucial, the triple-chip design is the best to buy. But if you want a smooth cut and plan to use particleboard extensively, buy a blade specifically designed for man-made boards. Such blades usually combine an alternating face bevel with ATBs and sometimes beveled lead teeth as well. These are expensive blades—both to purchase and to maintain. (Winchester Carbide Saw, 2635 Papermill Rd., Winchester, Va. 22601 is one supplier.)

Other factors that affect the cutting of particleboard are hook angles, clearance angles, the thickness of the saw body and tooth approach angles. The first three of these are built into the saw but the last one can be changed by altering the height of the saw above the table, as shown at right.

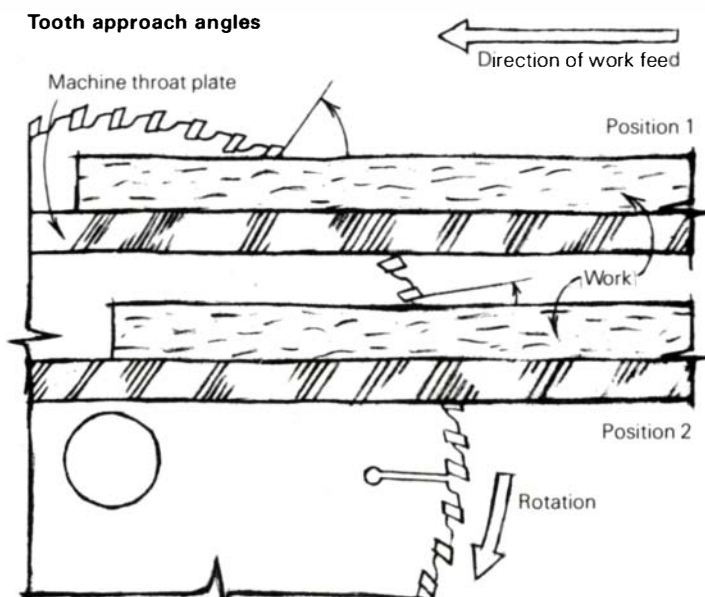
With hard, abrasive materials like particleboard, cutting edges can dull quickly. For this reason a relatively large chip load, achieved by feeding the stock fast, is best. For the same reason, bandsaw blades for cutting $\frac{3}{4}$ -in. particleboard should not have more than three teeth per inch. Carbide-tipped router bits are more effective because high-speed steel bits soon dull, overheat and become useless.

Fiberboard has a tendency to flow back, which means that the material recovers slightly after its fibers are compressed by, say, a drilling or routing operation. This can result in a smaller hole than intended, sometimes an advantage when doweling or splining.

Joining man-made boards—Man-made board is weaker than solid wood in every respect except possibly resistance to splitting. Because of this inherent weakness it is seldom used in small sections, and most joining is of one surface to another. The trick is not to weaken the material further by using the wrong joint. Avoid shouldered tenons and continuous slots. This is particularly important when using furniture-grade particleboard because of the material's hard, dense surface and relatively weak interior. Cutting through the skin exposes the more loosely connected interior particles, which have little resistance to shearing forces. Both particleboard and fiberboard are too weak to be dovetailed, and corners must be joined in other ways. Various methods, including methods for lipping, are illustrated on the next page.

A joining system rapidly gaining popularity in this country is the Lamello. Invented in Europe about 20 years ago, it uses a machine that looks like a small router. It cuts a curved slot in the two surfaces or edges to be joined. Into this slot is glued a lens-shaped beech spline cut on the bias. Each spline is compressed in manufacture so it swells on contact with glue and produces internal pressure on the glue line. This ensures a strong joint. It can join boards edge to edge, edge to surface and also can be used in miters. It works equally well for particleboard, fiberboard (MDF) and solid wood. For further information, write The Wood and Tool Store, 24041 W. Capitol Dr., Pewaukee, Wis. 53072.

Another method for joining particleboard and fiberboard is to use knock-down (KD) fittings. A wide variety is available, as well as hinges and hardware specially designed for use in man-made boards. Generally they involve letting a plate or



One of the factors determining smoothness of cut, particularly significant in cutting man-made boards, is the height of the blade in the work. Thin stock should be cut with the blade barely projecting above the work (position 1). Although it takes more power to cut this way, the uncut material acts as a backing and minimizes tear-out. Position 2, with the saw raised almost to its arbor, has the smallest approach angle, and blunt tooth forms like the triple chip work best this way because they can exert maximum shear. However, because the tooth makes its exit almost at right angles to the work, it tends to chip out the bottom surface.



Typical particleboard fasteners, clockwise from top left, include face-joining Christmas-tree fasteners, butt-joining inserts, right-angle-joining inserts, twin-start screws and hi-lo screws.

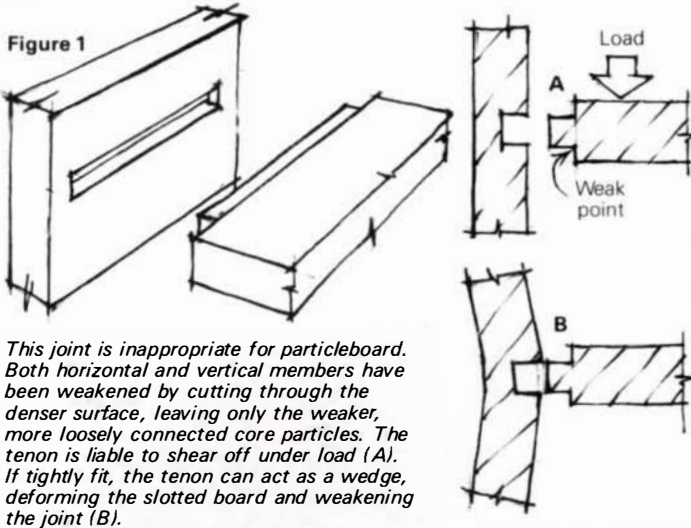
cylinder into the board to increase the surface area of the attachment. Some of the more useful designs are shown in the photo above, and suppliers include Furntek Corp., PO Box 26792, Charlotte, N.C. 28213, and Fastex, 195 Algonquin Rd., Des Plaines, Ill. 60016.

No hardware is any better than its attachments. Screws and other fastenings used with man-made boards have to be selected with care. When joining panels face to face, all the fastenings used for wood will work for particleboard and fiberboard. Fastening into the edge is the problem because there the material is weak. Smooth nails are useless, and barbed ones not much better. Machine-driven staples coated with epoxy resin are popular. They are driven at such speed that the friction melts the epoxy and creates a glue line. When attaching particleboard face to edge, use 2-in. staples with a $\frac{3}{8}$ -in. bridge. They hold well with virtually no splitting.

When screwing conventional hinges or other load-bearing hardware to the edge of particleboard, it is good practice first to rout for and then glue in a wood insert. Sheet-metal screws

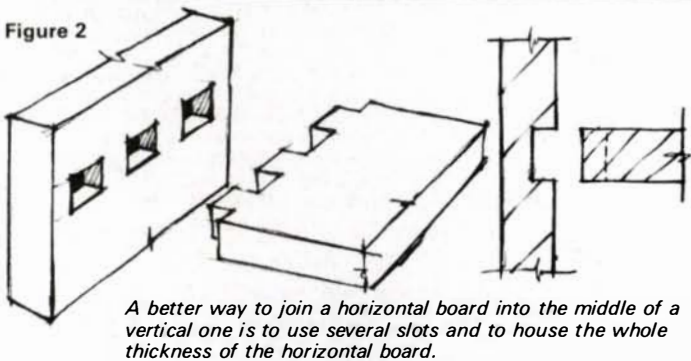
Joining man-made boards

Figure 1



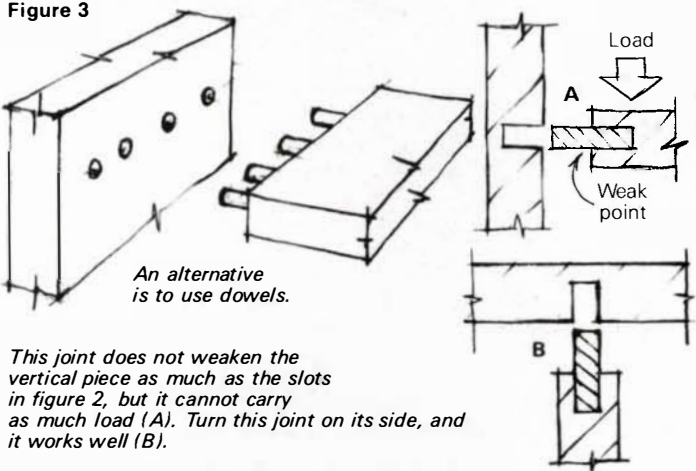
This joint is inappropriate for particleboard. Both horizontal and vertical members have been weakened by cutting through the denser surface, leaving only the weaker, more loosely connected core particles. The tenon is liable to shear off under load (A). If tightly fit, the tenon can act as a wedge, deforming the slotted board and weakening the joint (B).

Figure 2



A better way to join a horizontal board into the middle of a vertical one is to use several slots and to house the whole thickness of the horizontal board.

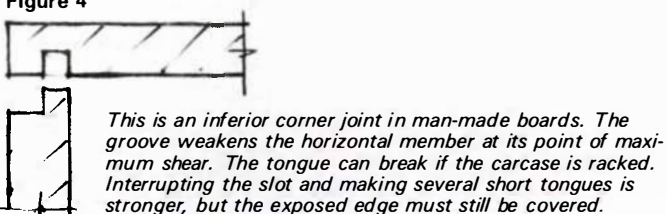
Figure 3



An alternative is to use dowels.

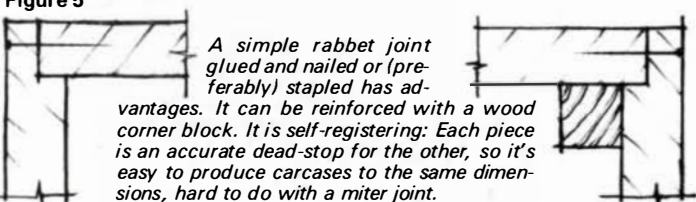
This joint does not weaken the vertical piece as much as the slots in figure 2, but it cannot carry as much load (A). Turn this joint on its side, and it works well (B).

Figure 4



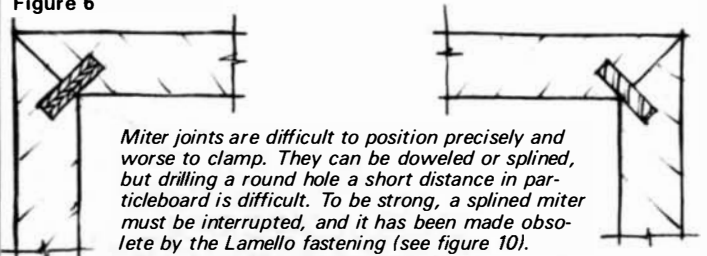
This is an inferior corner joint in man-made boards. The groove weakens the horizontal member at its point of maximum shear. The tongue can break if the carcass is racked. Interrupting the slot and making several short tongues is stronger, but the exposed edge must still be covered.

Figure 5



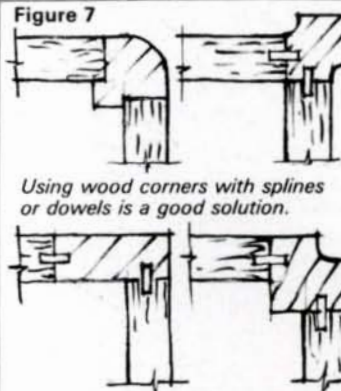
A simple rabbet joint glued and nailed or (preferably) stapled has advantages. It can be reinforced with a wood corner block. It is self-registering: Each piece is an accurate dead-stop for the other, so it's easy to produce carcasses to the same dimensions, hard to do with a miter joint.

Figure 6



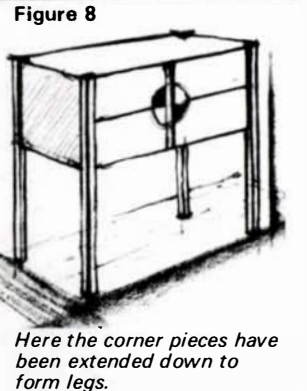
Miter joints are difficult to position precisely and worse to clamp. They can be doweled or splined, but drilling a round hole a short distance in particleboard is difficult. To be strong, a splined miter must be interrupted, and it has been made obsolete by the Lamello fastening (see figure 10).

Figure 7



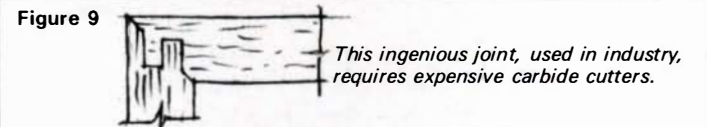
Using wood corners with splines or dowels is a good solution.

Figure 8



Here the corner pieces have been extended down to form legs.

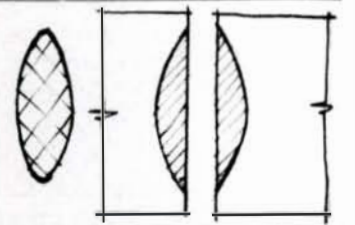
Figure 9



This ingenious joint, used in industry, requires expensive carbide cutters.

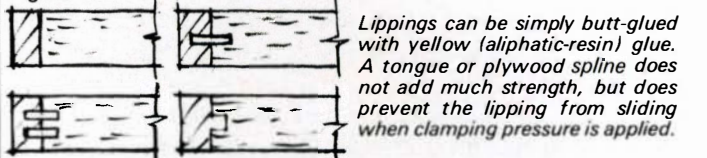
Figure 10

Beech inserts are glued into curved pockets made by the blade for a Lamello machine. For maximum strength they should be placed 5 in. on center.



Lippings for man-made boards

Figure 11



Lippings can be simply butt-glued with yellow (aliphatic-resin) glue. A tongue or plywood spline does not add much strength, but does prevent the lipping from sliding when clamping pressure is applied.

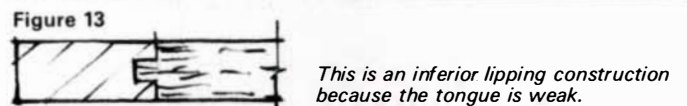
Figure 12

A lipping wider than is needed can be attached and then ripped down after gluing.



Rip here.

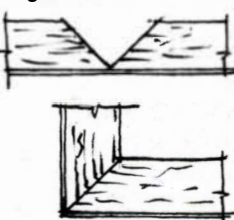
Figure 13



This is an inferior lipping construction because the tongue is weak.

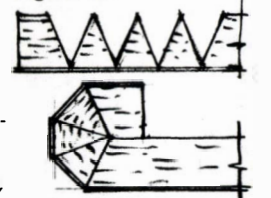
Using flexible films as structural members

Figure 14



This joint is made by first covering the particleboard with vinyl or Mylar, then V-grooving, folding and gluing the edge. The flexible film acts as a hinge.

Figure 15



Industry uses carbide cutters to make ingenious folds like this.

have more holding power than regular wood screws, but better still are twin-start, bugle-headed dry-wall screws (available from Equality Screw Co., PO Box 292, El Cajon, Calif. 94022) or the hi-lo screws (available from Shakeproof, St. Charles Rd., Elgin, Ill. 60120). Both these styles have two sets of threads, the hi-lo style with one major and one minor set. This combination severs rather than compresses the stock and increases the holding power of the screw. The twin-start screws were designed for power driving, and are sharp and slender enough to be driven without pilot holes.

Covering man-made boards—Furniture manufacturers often cover particleboard with sheets of printed vinyl, embossed and even “distressed” to give the appearance and texture of actual wood. This only encourages the erroneous notion that these panel products are suitable substitutes for traditional wood. A better approach is to consider them simply as structural vehicles to carry other materials. There is nothing wrong about covering one material with another—leather, gold leaf, mosaic—it’s been done at least since Egyptian times. Wood veneers were used in the 18th century to achieve decorative effects that simply could not have been accomplished with solid wood.

The fault lies in the attempt to deceive. When we see a piece of painted furniture, we know very well that it is not made of paint. When we look at the same piece covered in plastic which has the grain and texture of wood, we are confused as to its real nature. Our eyes tell us one thing, our hands another and our noses a third. Slate floors are often only $\frac{1}{4}$ in. thick. What is underneath them does not matter. The surface of the floor looks like stone, it is cold to the touch and no glass survives a fall. There is a world of difference between this and even the finest imitation.

Both particleboard and MDF make excellent substrates for wood veneers. If you are using furniture-grade particleboard with a well-sanded surface (composed entirely of fine particles) it is not necessary to use an underlayment or base veneer. However, for thin veneers using a base veneer will produce a better final surface, helping to prevent telegraphing through of the particles underneath. The base veneer should be about the same color as the face veneer or it will show at the edges.

A recent development is paper underlayment instead of wood. Yorkite, available from the N.V.F. Co., Box 38, Yorklyn, Del. 19736, is one such product. It is very tough and is made in several thicknesses and colors to match the lippings and face veneers. If underlayment is used on one side it must also be used on the other side, to keep the panel in balance.

The easiest and usually the cheapest finish for man-made boards is paint. Fiberboard, with its smooth, stable surface, can be painted directly. Particleboard should first be filled by priming it thoroughly. Latex paint works well but should be allowed to cure for three or four days and then sanded. If the surface is still not smooth, repeat the process. Once the surface is primed, it can be painted in any of the usual ways—brushed, rolled, sprayed or silk-screened. You can save yourself work by buying the board factory-primed.

For indoor signs and posters, you can seal the raw surface with polyurethane and then stencil or silk-screen directly on it. This is one way the basically bland color of the board can be used as a background.

There are several types of flexible film. The thin, vinyl

sheets that industry prints with wood-grain patterns to disguise man-made boards can also function as structural members. The panel can be grooved, folded on itself and glued, using the vinyl as a hinge. Intricate shapes are possible, but the process requires complex machinery carefully adjusted since the particleboard must be cut right through while leaving the vinyl film intact. This technique can be adapted for small shops by using a plastic tape such as Mylar. The tape can be applied either before or after cutting the board. The edges are then glued, the board folded and the tape removed after the glue cures.

Another flexible film is polyvinyl chloride, of which Naugahyde is best known. You can buy it in a variety of colors and textures and get it either unsupported (not reinforced), or with a woven or knitted back. The latter may be glued to the substrate, but the former is only for thermoplastic welding. One common variety of PVC has a thin layer of foam between the film and the cloth back to give it a better feel (known in the trade as “handle”). The PVCs with a backing of cotton cloth glue better than those with synthetic backing. In either case, use white glue, and apply it to the substrate with a roller. Then lay the PVC on and rub over it with a rounded block or rolled-up cloth (not with your hands).

You can also cover man-made board with leather. It too is applied with white glue, which is spread over the board. The leather is then covered with heavy brown wrapping paper, shiny side down, and pressed flat on the board with a warm iron. Don’t use the soft kind of paper. It will draw moisture from the leather and stick to it.

There is also cloth. Thicker cloth can be glued on, but there is no need to press it hard like leather. If you do, the glue will be forced into the fibers and spoil the texture. You can often just stretch cloth over the board and staple the edges, using no glue at all.

Semi-rigid materials suitable for small-shop application include Formica and metals such as copper, aluminum and stainless steel. These can be purchased from most building-supply outlets in large sheets and as stamped tiles about 4 in. by 4 in. Visually pleasing, these tiles are easy to apply. They have a lot of technical advantages such as resistance to chemicals and physical abrasion as well as to wet heat, dry heat and pressure. Stainless-steel tile bends easily around corners and comes in a variety of patterns and textures. You can also apply metals in the form of foils. These come backed with adhesive or can be put on with contact cement. Formica is best applied with urea-formaldehyde glue and a veneer press. It can also be put on with contact cement.

Rigid materials include opaque or colored glass, slate, stone and ceramic tile. These are attached to the panel by a special adhesive. There is a large variety of these adhesives available today for gluing almost any material to any other—wood to concrete, for example, or leather to glass. These special adhesives can be ordered through building-supply retailers, if you know what you want. For a listing of the various products made, with a description of their use and working properties, write Gulf Adhesives and Resins Consumer Products, PO Box 10911, Overland Park, Kans. 66210. All-purpose panel adhesives are stocked in most hardware stores, but don’t choose these if you can get a formulation specially suited for the materials you’re using. □

Simon Watts is contributing editor of this magazine.

THE APPRENTICESHIP A renaissance in traditional boatbuilding

Crossing the bridge into the old ship-building city of Bath, Maine, travelers are astounded by the Bath Iron Works, where giantships are built under the shadow of a crane that could just about lift a destroyer from the water. The Apprenticeship is only a mile upriver, but it appears a century upstream in time. Under its weathered roof, young men and women build and repair wooden boats, learning the old handcraft and preparing to teach it to others. The Apprenticeship is a working boatshop that sells its boats to pay the bills. It is a living museum, associated with the Maine Maritime Museum, where the public can watch shipwrights at work. With its sister institution, the Restorationshop, also in Bath, it is a source of practical information about a craft that seemed to be dying.

Woodworkers accustomed to straight lines might wonder at the fascinating shapes wood is persuaded to take in a boat. There are rabbets and butt joints that follow complex curves and fit perfectly over long sweeps, lap joints and splices fastened with copper rivets, screws and clenched nails, and bolted laminates sealed with caulking. There are corners reinforced with "knees," wooden brackets sawn from curved tree sections. The challenge of building a durable and efficient vessel has made this craft the epitome of form evolving from function. Wooden boats are lovely things, even to the shorebound.

"Nature doesn't waste much time on outrageous designs; it whittles away what isn't needed," explained senior apprentice Steve Ellis, 23. "It's the same with boats. After a while you develop an eye to see a fair curve, almost like you're imagining yourself as water slipping around it. The water tells you what to whittle away and what to keep."

Ellis was working on his last boat as an apprentice, a 25-ft. sponge boat known as a Key West smackee. He's also made furniture but has found that boatbuilding offers broader challenges. "Cabinetmaking is scratching the surface of what wood can do. In boatbuilding you push the wood to its limits, you use every bit of potential the wood has got, every strand, every fiber."

Apprenticeship's founder and director, Lance Lee, has two passions: boats and education. According to Lee, "The confusion in this country's educational

system has led us further and further from manual dexterity. Skill and craftsmanship have been ignored in our enthusiasm for words and cerebral entertainment. We've neglected one of the finest routes to learning: using our brains and hands together."

Lee thinks of boats as special vessels whose contents are most treasured. "You are your brother's keeper. You build a boat and your brother goes to float on the water. If you care about his getting back, you've got to build it right. That isn't true of building most other things."

Lee's vision was to preserve the tradition of wooden boatbuilding, particularly small (10-ft. to 35-ft.) workboats. The Apprenticeship opened in 1972. Seven years later the program was doubled in size by the addition of the Restorationshop, a separate building with a large workspace and a whole floor for displaying old boats of classic design. The twin programs accommodate 16 apprentices.

Lee had the vision and energy to start the program. To keep it afloat he needed an experienced boatbuilder who shared his approach to teaching, and that turned out to be Dave Foster. After 20 years of building fine boats of wood, the increasing use of fiberglass had almost driven Foster from the field. As Lee puts it, Foster "doesn't teach too much and he doesn't teach too little. If he were constantly teaching, telling people all the solutions, they wouldn't be learning." Master Builder Foster is the fount of technical know-how here; his presence is low-key but pervasive.

Apprenticeship is an intense, demanding two-year experience. Besides building and repairing boats and doing nitty-gritty shop chores, apprentices accept the responsibility of educating others. During summers, they take turns interpreting boatbuilding to thousands of visitors. They also help with programs for local high-school students and for adults. Advanced apprentices help with the shop's own internship program and share their skills with newcomers. Apprentices live just outside town in a small group of rustic buildings. They do their own cooking and tend a common garden. They pay no tuition, but each needs about \$2,000 to survive for two years. Living cooperatively and close to the land binds the

apprentices into a tight community.

Internship is a six-week program with a tuition of \$600. The shop accepts two interns at a time, assigning each to an apprentice. An intern first carves a half-model of a hull to learn how to develop a complex shape from drawings, then practices basic techniques by working on a small rowing skiff known as a Susan. One or two Susans are always under construction, giving an intern a chance at every building step.

Volunteers at the Apprenticeship also work in six-week stints. They do not build boats, but help with such chores as constructing a lumber-drying shed, collecting firewood or sailing on the shop's small cargo boat, a 35-ft. Tancook whaler, that augments the shop's income by delivering firewood to coastal islands. Interns and volunteers provide their own food and lodging.

The community changes slowly but regularly, as an apprentice graduates about every third month, an intern every third week. New apprentices come from those who have been interns or volunteers. There are far fewer positions than applicants; what counts most is the ability to work well with others and the willingness to learn the craft. Woodworking experience is helpful but not essential.

In nine years the Apprenticeship and Restorationshop have graduated more than 40 apprentices. Many have found work in boat construction and repair. Some build houses or furniture, and others teach in school shops, marine museums, or in boatbuilding programs modeled on the Apprenticeship. A vital institution, its success can be measured by the paths its graduates have followed, by the commitment of its participants, and by the enthusiasm of its visitors. Lee believes the shop/museum/apprenticeship concept could be adapted to nourish other crafts. It is an appealing prospect. □

For more about becoming an apprentice, intern or volunteer, write Lance Lee at the Apprenticeship, Maine Maritime Museum, 375 Front St., Bath, Maine 04530. The Apprenticeship also has boat plans and publications for sale. For more about constructing wooden boats, see the bimonthly magazine Wooden Boat (\$15/year from Box 78, Brooklin, Maine 04616).



Apprenticeshop



Below, Master Builder Dave Foster (center), apprentice Brian Sabbath and intern Missy Hatch consider the construction of a Susan, a flat-bottom skiff of cedar. The boat is a staple production item for the shop. Above, apprentice Beth Lindroth bevels a plank with a hatchet, a trick brought to the shop by a Norwegian boatbuilder who can build an entire boat with this tool alone. Lindroth will finish the bevel with a drawknife, a spokeshave and a plane. Top left, apprentice Abe Baggins cuts a rabbet for a Key West smackee with an adze whose handle is shaped to tuck in behind his elbow so the tool works at one with his forearm. The large forms at right are softwood molds that will be set in place on the keel to guide the shaping of the boat's bentwood ribs. Left, assistant director Steve McAllister transfers the contours of a half-model of a Tancook whaler with a simple jig. Interns at the Apprenticeshop carve half-models of hulls to learn how to develop a complex, three-dimensional shape from drawings. Years ago the models served as the designer-builder's drawing board and plans, and full-size ships were scaled up from them. Photo: David King. Below left, Steve Ellis and Dave Foster clamp steam-bent oak frames to ribbands, temporary longitudinal strips attached to vertical molds around which the boat is built. Photo: Steve McAllister.





The Pipe Organ Reborn

Organ building used to be a craft of Europe's past, but this 12-stop, 14-ft. high pipe organ was built in Eugene, Ore., and installed only last May at Oberlin College in Ohio. The builders are John Brombaugh & Associates, one of the few small, relatively new firms in this country specializing in making mechanical-action instruments called "tracker" organs. A system of levers and linkages connects the keyboard and pedals to the valves that control the flow of air into the pipes. Essentially the same system that still operates in organs dating back to the late Middle Ages, it is musically more responsive and more dependable than the electrical systems that have become common in this century. Consequently there has been a renaissance, in Europe, Japan and the U.S., in building instruments that Bach would have found familiar.

Brombaugh, formerly an electrical engineer, has built about 40 organs since his apprenticeship in the mid-1960s. This particular instrument is based on concepts from the North German Baroque period, around 1630, and has cabinet details in that style, including pipe doors, an unusual feature in organs. Although Brombaugh makes all the metal parts, including the lead-tin alloy that is formed and soldered into pipes, organ building, he says, is primarily complex woodworking. The meticulous hand work results in an instrument that requires very little maintenance and whose lifetime can be measured in centuries.



Photo: Warren Morgan