August 1990, No.83
U.S. $4.95, Canada $5.95, U.K. £2.95

Fine WoodWorking

Building a Cupboard

Hollow-Chisel Mortising

Veneered Game Cabinet

Making a Cradle

Carving a Dough Bowl

Woodworking in Hawaii

08
0 73361 64797 9

©1988 Black & Decker (U.S.) Inc.

Elu Belt Sanders are designed to provide maximum precision. Each one is available with not only an attachable sanding frame to prevent gouging and rocking, but a compatible inversion stand or bevel fence for sanding from any position. And on our electronic model, variable speed selection gives you an even greater degree of control.

The only one of its kind in the U.S., the Elu Jointer/Spliner has a motor that swivels, so plate cutting from any position is easy. What's more, it makes grooves for flat dowels and splines, and is even a precision trim saw. Making it by far the most flexible tool you can own.

Solid and powerful, all Elu Plunge Routers provide perfect 90 degree entry and exit from the workpiece. Plus, on two models, electronic controlled variable speed is perfect for matching cutters to all different materials to assure the finest finish. And each Router is available with a variety of attachments to give you total versatility and control.

Our Universal Planer has the power and durability needed for a wide variety of materials. Its cast aluminum shoes are precision machined after assembly so they're parallel to the planing surface and rabbeting edge. And it gives you a satin-like finish every time.

The Elu System. A tradition of painstaking craftsmanship and modern technology combined to create the benchmark for woodworking accuracy.

Every tool we build has ball and roller bearing motors, heavy-duty housings and the latest power transmission systems. Plus innovative accessories that allow you to meet even the most grueling shop standards. With flawless performance every time. Raising woodworking to a whole new level of perfection. Elu.™ From Black & Decker.®

Elu™ WOODWORKING TOOLS BY BLACK & DECKER

ANYTHING LESS WON'T CUT IT.

READER SERVICE NO. 14

Hollow-chisel mortisers are neat and quick. After roughing out the mortise, the waste is removed with successive passes of the square cutter (article on p. 52). Cover: Peter Naramore, Maui, Hawaii, carves a pineapple on a koa bedpost (article on p. 84).

Editor Dick Burrows
Art Director Kathleen Rushton
Associate Editors Sandor Nagyszalanczy, Jim Boesel
Assistant Editors Charley Robinson, Gary Weisenburger
Copy Editor Carolyn Kovachik
Editorial Secretary Claire Warner
Contributing Editors Tage Frid, R. Bruce Hoadley, Christian Becksvoort, Michael Dresdner
Consulting Editors George Frank, Richard E. Preiss, Norman Vandal
Methods of Work Jim Richey
Indexer Harriet Hodges

Publisher John Lively
Marketing Manager James P. Chiavelli
Circulation Assistant Brenda Hamilton
Copy/Production Editor Christy McCormick
Public Relations Manager Donna Pierpont
Administrative Secretary Susan M. Clark
Marketing Secretary Sherry Duhigg

Advertising Sales Manager Dick West
National Accounts Manager Don Schroder
Associate Accounts Manager Barney Barrett
Senior Sales Coordinator Carole Weckesser
Advertising Coordinator Kathryn Mournian Simonds
Advertising Secretary Jennifer Dunbar
Tel. (800) 243-7252 Fax. (203) 426-3434

Fine Woodworking is a reader-written magazine. We welcome proposals, manuscripts, photographs and ideas from our readers, amateur or professional. We'll acknowledge all submissions and return those we can't publish. Send your contributions to *Fine Woodworking*, Box 5506, Newtown, Conn. 06470-5506.

Title to the copyrights in the contributions appearing in *Fine Woodworking* magazine remains in the authors, photographers and artists, unless otherwise indicated. They have granted publication rights to *Fine Woodworking*.

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 1989 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, $22 for one year, $40 for two years; Canada and other countries, $26 for one year, $48 for two years (in U.S. dollars, please). Single copy, $4.95. Single copies outside U.S. and possessions: U.K., £2.95; other countries and possessions, $5.95. Send to Subscription Dept., The Taunton Press, PO Box 5506, Newtown, CT 06470-5506. Address all correspondence to the appropriate department (Subscription, Editorial, or Advertising), The Taunton Press, 63 South Main Street, PO Box 5506, Newtown, CT 06470-5506. U.S. newsstand distribution by Eastern News Distributors, Inc., 1130 Cleveland Road, Sandusky, OH 44870.

DEPARTMENTS

4 ***Letters***

14 ***Methods of Work***
Benchdog; sanding stepped edges; grooving a dowel

24 ***Questions & Answers***
Mixing dyes; shaping raised-panel doors; color-matching teak

98 ***Follow-up***
Cleaning chisels; more woodworking schools; building projects

100 ***Events***

106 ***Notes and Comment***
Product reviews; confessions of a pack rat; Women in the Woods

ARTICLES

38 **Building a Tinware Cupboard** by Christian Becksvoort
Flush panels modify a Shaker design

41 **Hanging flush cabinet doors**

43 **Edgebanding** by Jack Gavin
Tools and materials for hiding a panel's edges

46 **Multiple-Segment Turnings** by Janelle Lenser
Designing with structure and color

48 **Building a Cradle** by Jacques Berger
Slab construction and heart-shaped dovetails

51 **The dovetail revisited**

52 **Hollow-Chisel Mortising** by Ben Erickson
Boring square holes on the drill press

55 **A pedal feed for a drill press** by J. Kirkham Jenner

57 **Veneering with Birch Bark** by Dick Sellew
A natural way to add a decorative touch

59 **Making a display table**

60 **Creating a Decorative Filled Finish** by George Frank
Treating wood's pores for color and contrast

62 **String Inlay** by Irving Gerber
Using dental burrs for cutting grooves

65 **Tagua: The Vegetable Ivory Substitute** by Fred J. Hunger
Clead Christiansen turns palm nuts into translucent vessels

68 **Making a Veneered Game Cabinet** by Norbert Heinold
A journeyman's exam piece to test your skill

72 **Dust and the Woodworker** by Kirk Kundtz, M.D.
Examining the respiratory hazards

73 **Getting out of the dust** by Theodore J. Fink, M.D.

76 **Carving a Dough Bowl** by Wille Sundqvist
Using ax, adze, knife and gouge

77 **Dough-bowl design**

80 **Making a Walnut Occasional Table** by Richard Kapuaala
A simple project from a single plank

84 **Furnituremaking in Hawaii** by Jim Boesel
Where East meets West and koa is king

87 **Hawaiian Furniture and Hawaii's Cabinetmakers 1820-1940**

Postmaster: Send address changes to The Taunton Press, Inc., PO Box 5506, Newtown, CT 06470-5506.

Clarification on methylene chloride—We enjoyed reading the article in *Fine Woodworking* #80 by Theodore J. Fink entitled "Chemical Hazards of Woodworking." We were, however, concerned about several statements made by the author that we felt were misleading.

The author contends that "methylene chloride was recently shown to cause cancer." This statement could mistakenly lead your readers to believe that methylene chloride causes cancer in humans, when, in fact, human studies of industrial workers show no increased cancer risk attributable to methylene chloride exposure.

In an animal study where laboratory mice and rats were exposed to very high levels of methylene chloride over their lifetimes, the mice showed an increase in spontaneously occurring malignant and benign tumors. The rats did *not* show an increase in cancerous tumors. Based on these results, however, the Consumer Product Safety Commission (CPSC) now requires products that contain methylene chloride to carry a cancer warning label that reads: "Methylene chloride has been shown to cause cancer in certain laboratory animals. Risk to your health depends on level and duration of exposure."

Several other studies of laboratory animals and methylene chloride did not produce a carcinogenic response. There is also significant data to suggest that the mouse may not be an appropriate model for predicting carcinogenic effects in humans.

Consumers, like your readers, who may prefer to use methylene-chloride-base paint strippers because they are quick and effective, can minimize their exposure to the chemical by following a few important safety rules. These include providing adequate ventilation and wearing protective clothing. Consumers can also obtain the brochure *Stripping Paint From Wood*, which was developed by the Halogenated Solvents Industry Alliance (HSIA) and the National Paint and Coatings Association (NPCA) in cooperation with the CPSC, and which describes these safety procedures in detail. It is distributed to consumers through manufacturers and retailers, or it can be obtained by writing to S. James, Consumer Information Center-N, Box 100, Pueblo, Col. 81002; item #558-W.

In another section, the author referred to TLVs as a measure of toxicity. In the introduction to its *Threshold Limit Values and Biological Exposure Indices for 1989-1990*, the American Conference of Governmental Industrial Hygienists (ACGIH) states that "these limits are not fine lines between safe and dangerous concentration *nor are they a relative index of toxicity*."

Similarly, methylene chloride is not "known to cause heart attacks," as stated by the author. Proper use of methylene-chloride-containing products by healthy individuals is not likely to result in an increased risk of heart disease. An individual with a pre-existing heart condition, however, might be wise to consult a physician before using methylene chloride, due to its ability to metabolize to carbon monoxide.

At Dow Chemical, we are strongly committed to ensuring that all our products are used properly and safely, and we make every effort to ensure that our customers understand proper handling procedures. To that end, we regularly hold customer seminars throughout the United States and we are constantly working with trade publications, placing articles on handling and safety. Copies of Dow's product information can be obtained from distributors or by writing The Dow Chemical Co., 2020 Building, Midland, Mich. 48678.

—Susan Hearn, Environmental Specialist
Dow Chemical, Midland, Mich.

More on chemical hazards—I felt that the article by T.J. Fink ("Chemical Hazards . . .") did your readers a very big disservice. The thrust of the article was to invite readers to try more exotic solvents rather than accept known problems. The most common solvents (water, acetone, methylene chloride, hexane, naphtha and ethanol) are fairly safe substances, which is why they're used in the first place. Far from avoiding them, one should seek to use them instead of more exotic solvents and thereby know the risks. Basic woodworking safety practices will be sufficient for protection. Wear gloves to protect your hands, glasses to protect your eyes and a mask to protect your lungs, and work in a room with proper ventilation.

—Steve Stoessel, Ph.D., Schenectady, N.Y.

Machine work is not inferior—A fine magazine, *Fine Woodworking* rightly concerns itself with craftsmanship and with displaying a good balance of hand-tool and machine work. Occasionally, though, "purist" readers suggest machine work is inferior to hand-tool work. The simple truth is, both are acceptable and produce work of equal quality. The missed points are also simple. First, both sides of the craft employ tools, but of different sorts. Second (and this is where the argument probably stems from), machine workers often lack sensitivity, designing pieces around particular machines, instead of finding ways to use machines creatively.

Sure, it gives the professional some satisfaction to tap at a joint and say to a customer, "There—real mortise and tenon." "Real" usually meaning hand cut. However, as long as the joints are necessary for the job, properly proportioned and well fit, all that matters is the quality of workmanship, and not how it was achieved.

Some workers buy machines to get around a lack of basic skill. Still, if they genuinely feel that using machines is the only way they can get along, okay. They discover soon enough that a machine is only as good as its operator, and they either give up or persevere to become craftsmen, acquiring skills of a different sort. At least they're still working with wood.

In the end, the machine vs. hand argument is redundant, for both approaches count as *craftsmanship*. For purists everywhere, there are few truly handmade objects around—hand-molded pottery and snowballs come to mind! So how many of us use hand-felled, hand-converted timber? Not many I'll wager.

—John Walker, Birmingham, England

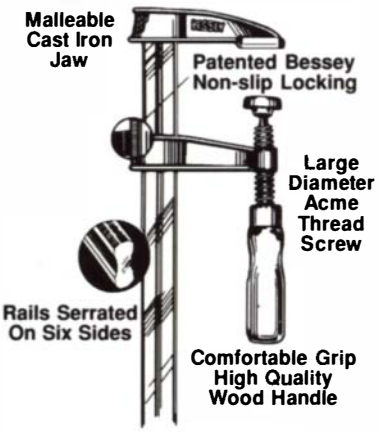
Craftsmen must care about environment—After having just read the letter from L.R. Pastukiw in *FWW* #81, in which he com-

TAUNTON PUBLICATIONS
...by fellow enthusiasts

The Taunton Press: Paul Roman, *president*; Janice A. Roman, *vice president*; Roger Barnes, *design director*. **Accounting:** Wayne Reynolds, *controller*; Patrick Lamontagne, *manager*; Jeffrey Sherman, *financial analyst*; Mary Sullivan, *accountant*; Carol Diehm, Diana D'Onofrio, Paula Kauer, Lydia Krikorian, Elaine Yamin. **Books/Videos:** John Kelsey, *publisher*; Marcie Seigel, *administrative secretary*; Deborah Cannarella, *editor*; Deborah Fillion, *book designer*; Christine Timmons, *senior editor*; Andrew Schultz, *assistant editor*; Maria Angione, *secretary*; Videos: Craig Umanoff, James Hall, *associate producers*; Thomas Menard, *assistant producer*; Art/Production: Robert Olah, *manager*; Steven Hunter, Henry Roth, *associate art directors*; Cathy Cassidy, Jodie Delohery, *assistant art directors*; Iliana Koehler, *production assistant*; Copy/Production: Ruth Dobsevage, *manager*; Peter Chapman, Pamela Purrone, *copy/production editors*; Marketing: Jon Miller, *director*; Andrea Ondak, *manager*; Philip Allard, *senior copywriter*; Barbara Buckalew, Eileen Hanson, *marketing assistants*. **Corporate Marketing:** Dale Brown, *corporate sales director*; Diane Patterson, *executive secretary*. **Data Processing:** Drew Salisbury, *manager*; Brendan Bowe, Roger Seliga, *senior programmers/analysts*; Susan Morehouse, *programmer*; Ellen Wolf, *PC coordinator*. **Fulfillment & Operations:** Tom Luxeder, *director*; Jane Torrence, *secretary*; Circulation: Karen Cheh, *coordinator*; Mary Ann Colbert, Patricia Williamson, *circulation assistants*; Customer Service (Subscriber): Patricia Malouff, *manager*; Nancy Schoch, *senior customer service rep*; Jane Bojnowski, Diane Hurvul, Barbara Lowe, Joyce McWilliam, Marylou Thompson; Customer Service (Trade): Gloria Carson, *supervisor*; Christine Cosacchi, *coordinator*; Peggy LeBlanc, Denise Pascal, *data entry*; Distribution: Grace Aumuller, David Blasko, Michael Capalbo, James Chappuis, Linnea Ingram, Mary Ann Costagliola, Fred Monnes, Alice Saxton, Astor Taylor, Robert Weinstein; Purchasing & Facilities: William Schappert, *manager*; Lois Beck, *office-services supervisor*; John Zor, *mail services*; Chuck Hollis, *maintenance foreman*; Mark Cole, *assistant*; Christopher Myers, *buyer/expediter*; Debra Brown, *chef/manager*; Kathleen Costello, Norma-Jean Taylor, *cafeteria assistants*; Subscription: Carole Ando, *manager*; Patricia Aziere, Connie Barczak, Donna Baxter, Patricia Beardsley, Dorothy Dreher, Marie Pato, Andrea Shorrock. **Manufacturing:** Kathleen Davis, *director*; Austin E. Starbird, *prepress manager*; Robert Marsala, *graphic arts supervisor*; Susan Kahn, *staff photographer*; Peggy Dutton, *production manager/books*; Philip VanKirk, *production manager/magazines*; Diane Flanagan, *print buyer*; Mary Beth Cleary, Thomas Greco, *print production assistants*; Ellen Olmsted, *production coordinator*; Rosemary Pagel, *assistant production coordinator*; Sherrill Kolakowski, *secretary*; Nancy Atkinson, Chansam Thammavongsa, *production assistants*; Richard Booth, Deborah Cooper, Mark Coleman, *scanner operators*; William Godfrey, Laurene Jakab, *color proofing operators*; Dinah George, *composition systems manager*; Margot Knorr, *application publications specialist*; Nancy Knapp, *composition production coordinator*; Monica Bulson, *assistant PC applications specialist*; Lisa Carlson, Valerie Lutters, *systems operators*. **Personnel:** Carol Marotti, *manager*; Linda Ballerini, Chris Lincoln, *personnel assistants*.

BESSEY

TGJ SERIES WOODWORKING FAST ACTION HAND CLAMPS



TGJ Series available in 6 models with 2-1/2" throat depth Max. Opening 6" thru 36"

ACC *American Clamping Corporation*

P.O. Box 399, Batavia, N.Y. 14020
1-800-828-1004 N.Y. Residents 1-800-462-1068
P.O. Box 490, Cambridge, Ont. N1R 5V5
1-800-265-8678

READER SERVICE NO. 114

The Maple Ridge Tool Chest

• NOW AVAILABLE IN KIT FORM •

Drawers lock automatically when lid is closed

All parts ore solid kiln-dried Red Oak or Block Ash (except for mahogany plywood bottoms).

All parts accurately cut to size, all machining done, and ready to assemble.

Kit comes complete with all hardware and felt drawer linings.

Screwdriver assembly of drawers, with pre-drilled holes.

KITS - $149.95 • FULLY ASSEMBLED - $249.95

VISA - MASTERCARD accepted

$1.00 FOR BROCHURE

1-800-545-6190 MAPLE RIDGE 2020 11th Avenue HIBBING, MN 55746

READER SERVICE NO. 151

WHITECHAPEL BRASSES LTD.

FINEST HARDWARE

P.O. BOX 136 • 3650 W. HIGHWAY 22
WILSON, WYOMING 83014
(307) 739-9478

LOCKS • HANDLES • DRAWN HINGES • ETC

PROMPT SERVICE

CATALOG $2.00

READER SERVICE NO. 207

NEW

AMERICAN MADE, HEAVY DUTY!

DRUM SANDER

Sand boards, frames, doors, veneer, knots, wild grain perfectly flat and smooth **every** time!

Reduce sanding time from hours to minutes!

Delivers sanding precision equal to large wide belt sanders at an affordable price!

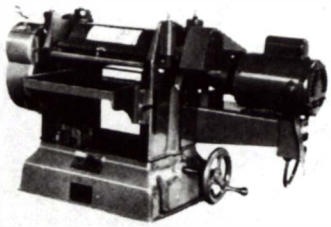
This is the best drum sander in the world. It has quality features not found on other brands. Let us prove it to you.

☐ PLEASE SEND ME A FREE BROCHURE
Telephone orders (417) 223-4031
Ross Industries Dept. FA-14
100 North Highway W, Box 637
Pineville, MO 64856

ROSS INDUSTRIES INC.

READER SERVICE NO. 77

PARKS!



REPAIR PARTS ARE NOW AVAILABLE FOR ALL SIZE PARKS AND CRAFTSMAN PLANERS AND BAND SAWS.

ORDER FROM: Parks Repair Parts, Inc.
201 Johnson St., Covington, Ky 41011
(606)581-7511 FAX (606)581-9642

UNION GRADUATE LATHES

The bowl turner's choice

Save space and increase capacity with the Startrite "Union Graduate Short Bed." This space saving model is ideal for bowl turning and has the capacity to turn short pieces between centers. The lathe's heavy cast iron construction (420 lbs) quarantees you vibration free turning. Available with a 1 hp motor in either 110 or 220 volt electrics. Standard accessories include tee rests and centers. Other "Union Graduate" lathes available with 30", 42" and 54" centers.

For your nearest dealer contact:

600 GROUP EQUIPMENT LTD.
5220 General Rd. • Mississauga • Ontario L4W 1G8
TELEPHONE (416) 625-9611 FAX (416) 625-4098

Dealer Inquiries Welcome

In the U.K. Contact: Startrite Machine Tool Company (0634) 281281

READER SERVICE NO. 102

PROUDLY MADE IN THE U.S.A.

PRO-SAND PROFIT MAKER

SINGLE PHASE OPTION 15 H.P. MAX.

Manufactured By:
Haney Industries, Inc.
6111 Crater Lake Hwy.
Central Point, OR 97502 • (503) 826-7533

- **10 TIMES FASTER THAN HAND SANDING!**
- **FAR SUPERIOR FINISH QUALITY!**
- **SANDING CAPACITY 24" TO 73" WITH 5 TO 75 H.P.**

OUR CUSTOMERS OVERWHELMINGLY TELL US THEY RECLAIM THE TIME & COST OF NINE OUT OF EVERY TEN HOURS SPENT HAND SANDING WITH A SMOOTHER, FLATTER FINISH.

- Great for finish sanding, face frames, butcher blocks, raised panel doors, table tops and fine joining work.
- Quickly dimension sand all types of wood. From wedge & cupped shaped lumber to full width oak butcher block.
- Sands even synthetics, fiberglass & other resin products.
- Quickly & consistently sands & dimensions to within a few thousandths of an inch to flat.
- **Starrett** stock removal indicator.
- Confidently guaranteed.
- Production duty sanding capacity 24", 36", 49" & 73" wide. 5-75 h.p.
- Variable speed conveyor feed eliminates "snipe", "chipping", and "tear-out".
- Finest name brand parts: **GE, Baldor, Goodyear, Browning, Starrett** and **Reynolds.**

36+" 3 ph; 2 head **$4895**

Freight $269 or less to any U.S. cities!

49+" 3 ph; 2 head **$10,950**

READER SERVICE NO. 107

plains that you are wasting space publishing letters on ecological issues, I must disagree.

It is important that craftsmen become aware of the effects of their choice of materials on the environment. Far from knowing "fully well about the travesty and rape of our planet," most Americans need to learn much more about where particular woods come from, how they are harvested, and whether the species or its ecosystem is genuinely threatened. A good example of this is Jon Arno's reply (in issue #80) to a reader's concern about the destruction of teak forests: he states that teak is now grown largely on plantations. Of course, huge tree plantations are not the ecological equivalent of native rain forests, but they are certainly preferable to the sometimes irreversible deforestation of tropical land.

In short, I feel *Fine Woodworking* is a valuable forum for discussing these questions, and I hope many different viewpoints will continue to be represented. I am sure many readers would even appreciate seeing articles from time to time on such topics as whether the use of particular wood species seriously threatens the ecosystems where they are found.

—Paul C. Gillis, Falls Church, Va.

Earth Day and woodworkers—I have enjoyed *Fine Woodworking* since I started subscribing several months ago. I am writing in reaction to some recent letters that would place the burden of responsibility for saving scarce hardwoods and for preserving the environment on woodworkers. We have just recently experienced another "Earth Day," which no doubt has left some of your readers with feelings of guilt about their craft.

I suggest that we enjoy the woods that are available to us, without apology. The argument that we are individually responsible for saving scarce varieties of wood or that we should feel responsible for the preservation of the rain forest is faulty logic.

As for the depletion of rare species of wood, the law of supply and demand will determine the outcome. When the price becomes excessive, we will find substitutes without having to be admonished to do so by environmentalists. As for the depletion of the rain forest, that is the result of clearing land for cultivation.

Let us enjoy our craft, and if we feel justified in paying the price for scarce hardwoods, then we should do so without suffering feelings of guilt.

—R.J. Wilson, Tipton, Mich.

Oven cleaner as stain—I have found that mahogany can be stained easily and very effectively with ordinary oven cleaner. The foam aerosol type is inexpensive, readily available and easier to apply than other forms of strong alkali, such as ammonia fumes. This method seems to be superior to conventional staining because streaking or uneven application is eliminated. And since the alkali reacts with the natural pigments in the wood, the wood itself is colored rather than simply "painted over."

After sanding the work smooth, I apply a thin layer of foam, let it stand for three to four minutes, and then wipe off the excess with a dry rag. In addition to darkening the wood, this effectively raises the grain, which can then be sanded smooth with 400-grit paper. Since the oven cleaner is a caustic material, gloves and eye protection are, of course, essential.

After the work is thoroughly dry, polyurethane varnish can be used in the normal manner with no apparent alteration of drying time or quality of finish.

—Dr. Dave Tuel, Mobile, Ala.

Cross-grain gluing problems?—I read John Moore's "Student Desks," *FWW* #81, with interest. His end result is very hand-

EDGE BANDING MADE EASY!

Virutex AG-98
- very versatile
- edge-bands flat surfaces and inside/outside curves
- 2" maximum tape width
- two temp. settings - 525° &1000°

$279.00 DELIVERED IN 48 STATES

Freud EB100- aslo available $279.00 dlvd. in 48 states

Rudolf Bass, inc. 800-526-3003 In NJ: 201-433-3800

makita Call 1-800-262-5482 For Low Prices On Largest Assortment
Visa • Mastercard • Discover
COD • Check • Money Order

2012
12" Planer w/double sided blades
List Price $930 SALE $488

BO4550
Dustless Palm Sander
List Price $86
SALE $52

2708W
8 1/4" Table Saw w/Carbide Blade
List Price $490 SALE $258

3612BR
3HP Plunge Router
List Price $350
SALE $194

4301BV Var Spd Orb Jig Saw $149
4302C Var Spd Orb Jig Saw $158
9207SPC 7" Elc Spd Ctrl Snd Pl $148
6302 New 5.2 Amp ½" Drl $118
1900BW 3¼" Planer w/Case $112
4390DW 9.6V Cdls Recip Saw $126
5090DW 9.6 3 3/8" Cdls Sw Kt $138
DA390D New 9.6V Cdls Ang Drl $88
6093DW 9.6 Var 2 Spd Crdl Drl $128
6092D 9.6V Var 2 Spd Crdl Drl $66

6012HD 9.6V 2 Spd Crdls Drl $66
9.6V Battery #632007-4 $29
9820-2 Blade Sharpener $205
9401 4"x24" Dstls Blt Sndr $166
5007NB 7¼" Cr Sw w/Crb Bld $112
5077B 7¼" Hypoid Saw 3HP $138
JR3000V Var Spd Rec Saw w/cs $128
LS1020 10" Miter Saw $244
6510LVR 3/8" Rev Drl $75
6073D Var 2 Spd Crdls w/Clch $66
6071D 7.2V Var Spd Crdls Drl $49

HOME LUMBER CO.
Same Day Service! • FREE FREIGHT • 449 WHITEWATER ST., WHITEWATER, WI 53190
READER SERVICE NO. 205

#3380 JOINTER/SPLINER SPECIAL $259
Limited Offer
Reg. $485.00

Precision engineered, for plate-jointery, grooving, parallel scribing, trimming and cutting material to size. Ideal for furniture manufacturing, cabinetry, and custom remodeling work. Complete with metal kit box, rip and mitre fences, 12-tooth carbide blade and saw insert.

Elu™ WOODWORKING TOOLS BY BLACK & DECKER

#3375 3-1/8" UNI-PLANER SPECIAL $159
Limited Offer
Reg. $280.00

Compact, powerful, and accurate. Ideal for planing, chamfering, rabbeting, butt jointing, cutting tenons and squaring edges. It's full length machined shoe ensures an accurate cut up to 1/4" on a single pass, and rabbets up to 7/8".

HARPER HARDWARE CO.
1712 E. Broad Street (18th & Broad)
Richmond, VA 23223 • In Historic Shockoe Vallley
"Serving the Craftsman since 1898 with Specialty Tools and Supplies"
804-643-9007 FAX: 804-643-9009
READER SERVICE NO. 161

One Stop Wood Shop

Hardwood plywood, 30 species in stock (exotics made to order), hardwood lumber and marine plywood all under one roof. Custom cutting services to your exact specifications with little or no waste and at competitive prices! And, we specialize in bundling and shipping.

Call (617) 666-1340 today for catalog and quotations.

Boulter Plywood Corp.
24-FW Broadway, Somerville, MA 02145
READER SERVICE NO. 5

FREE

FOR ANY. ORDER, GET A FREE PLASTIC STEEL CALIPERS:FOR DEPTH, EXTERNAL, INTERNAL & STEP MEASUREMENT FOR WOODWORKING ENVIRONMENT. (QUANTITY DISCOUNT AVAILABLE)

$3.99

FOR ORDER OVER $60.00 GET A FREE 5PC WOODWORKING KIT

1. AUTO CENTER PUNCH
2. SCRIBER W/MAGNETIC PICK UP
3. STEEL RAFTER & CARPENTER SQUARE
4. PLASTIC STEEL CALIPERS
5. 6" 3 WAY HAND SAW

$24.99 (DEALER PRICES AVAILABLE)

FOR ORDER OVER $125 GET A FREE

ROUTER RPM CONTROLLER
* BEST QUALITY
* COMPATIBLE UP TO 3HP ROUTER
* 115V 15AMP
* ADJUSTABLE FROM O-FULL SPEED
* RETAIL VALUE $159

PLUS A PLASTIC STEEL CALIPER

CARBIDE TIPPED ROUTER BITS AND SHAPER CUTTERS, INDUSTRIAL QUALITY AT DISCOUNT PRICE

NEW COMPLETE RANGE FREE CATALOG AVAILABLE ON REQUEST

CUTTER	ORDER#	CUT DIA	CUT L	SH DIA	PRICE $
STRAIGHT	ST206	1/4	3/4	1/4	5.50
	ST210	3/8	1	1/4	5.50
	ST213	1/2	1	1/4	5.50
	ST413E	1/2	2	1/2	14.00
	ST216	5/8	1	1/4	5.90
	ST219	3/4	1	1/4	8.50
	ST425	1	1 3/16	1/2	8.80
FLUSH TRIM	FT210	3/8	1	1/4	6.50
	FT213	1/2	1	1/4	6.50
	FT413	1/2	1 3/16	1/2	6.50
DOVETAIL	DV210	3/8	3/8	1/4	4.60
	DV213	1/2	1/2	1/4	4.60
	DV413	1/2	1/2	1/2	4.60
	DV419	3/4	7/8	1/2	6.50
	DV425	1	7/8	1/2	7.50
CORE BOX	CB206	1/4	1/4	1/4	8.00
	CB210	3/8	5/16	1/4	9.00
	CB213	1/2	3/8	1/4	11.00
	CB219	3/4	1/2	1/4	14.00
	CB425	1	5/8	1/2	16.00
45° CHAMFER	CH216	1 3/8	5/8	1/4	13.00
	CH422	1 7/8	7/8	1/2	18.00

CUTTER	ORDER#	R	CUT L	SH DIA	PRICE $
ROUNDING OVER	CR203	1/8	3/8	1/4	10.00
	CR205	3/16	7/16	1/4	10.00
	CR206	1/4	1/2	1/4	12.00
	CR210	3/8	5/8	1/4	14.00
	CR213	1/2	3/4	1/4	16.00
	CR419	3/4	1	1/2	20.00
	CR425	1	1 1/4	1/2	32.00
ROMAN OGEE	RO204	5/32	15/32	1/4	15.00
	RO206	1/4	3/4	1/4	16.00
	RO406	1/4	3/4	1/2	16.00
COVE	CV203	1/8	3/8	1/4	11.00
	CV206	1/4	1/2	1/4	11.00
	CV210	3/8	9/16	1/4	12.00
	CV213	1/2	5/8	1/4	13.00
	CV419	3/4	3/4	1/2	25.00
CLASSICAL	CS206	1/4	5/8	1/4	19.00
	CS406	1/4	5/8	1/2	19.00

RABBET	ORDER#	CUT DIA	CUT L	SH DIA	PRICE
	RB232	1 1/4	1/2	1/4	12.00
	RB432	1 1/4	1/2	1/2	12.00

ORDER #C985
$49.00
PANEL RAISER

*** 3 WING SHAPER CUTTERS MORE THAN 50 ITEMS**

16" SCROLL SAW

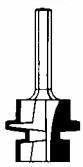
ORDER #SS-16 $99.00

*RETAIL VALUE $209.00

* CAST IRON BASE AND TABLE
* LIGHT LOAD, CUTTING WITHOUT BLADE BREAKAGE
* 1725 STROKES / MIN
* CUTTING CAPACITY 2" DEPTH AT 90° AND 1" DEPTH AT 45°

ORDER #FJ463 $53.00

FINGER JOINTER

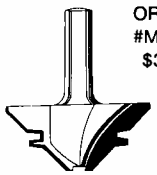


ORDER #TG230 $29.00 #TG444 $29.00

TONGUE & GROOVE

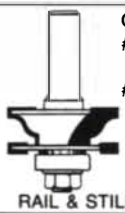
ORDER #MM454 $39.00

MULTI-MOULDING



ORDER #ML470 $34.00

LOCK MITRE



ORDER #RS248 $37.00 #RS448 $37.00

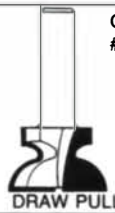
RAIL & STILE

ORDER #OF466 $24.00

OGEE FILET

ORDER #KH210 $7.00

KEY HOLE



ORDER #DP435 $29.00

DRAW PULL

NICHOLSON®

TOP OF THE LINE 6½"-10" 20T – 60T

10" x 60T
ORDER #
NIC 80838
$39.99

RETAIL VALUE
$60.09

AmMax

TO ORDER BY MASTER CHARGE OR VISA CALL TOLL FREE

1-800-78 26629 (1-800-78 AMMAX)

7AM-5PM PACIFIC TIME MONDAY-FRIDAY, OR SEND CHECK TO

AMMAX TOOLS CO.

12655 DANIELSON COURT SUITE 310. POWAY CA92064

SAME DAY SHIPPING

READER SERVICE NO. 82

some; however, one design technique is questionable. His method of gluing desk sides with cross-grain members over the entirety is a future problem waiting to happen. Mr. Moore indicates that his wood is always well dried, but that only means it is in equilibrium with the environment it is stored in. It may be adequate if the desk is never moved more than 50 miles from where it was built; however, many people move pieces farther than that in this country. For example, I have had desks moved from Pennsylvania to Colorado to Texas and back to Colorado. The desks needed adjustment after each move because of the local humidity change. This was also true for a desk built in the summer in Pennsylvania that was moved to a steam-heated unhumidified office in Philadelphia. Any glued cross-grain joints would have simply self-destructed.

–Kenneth L. Baumert, Emmaus, Pa.

More safety fixtures–I think "Tablesaw Safety Devices," *FWW* #81 by Charley Robinson, was interesting, but missed a very important point. Tablesaws are inherently unsafe when you rip without a runout table or conveyor regardless of the guard, hold-down device or push-stick design. While I have tried all types of schemes over 35 years, I have never felt comfortable using the tablesaw until I installed a conveyor runout attached to it. Once I install the runout, the problems of kickback, binding, etc. no longer plague me. I discovered that the safety problem with a tablesaw is that too many things are happening at the same time. A runout table eliminates the stock from moving unpredictably and makes the process of using a tablesaw considerably safer. I highly recommend that tablesaw users install an adequate runout table or conveyor as a first priority. After this, simple push sticks should handle most other situations, assuming that the push stick avoids contact with the blade. Also eye protection is a must.

–Theodore W. Coffey, Green Spring, W.V.

Praise for Moore chairs–I am writing to express my appreciation for presenting the work of Terry Moore in *FWW* #81. I felt his chairs were quite beautiful and the plans very helpful.

I would encourage you to also publish an article on Mr. Moore's table, as shown in the photo on p. 40 in that issue. I think this would make a complementary article to his chairs.

–Michael Schultz, Kernersville, N.C.

Keeping rust off–Anyone owning a piece of equipment with a cast-iron top understands the problem of keeping the rust on top of the table under control. There are many ways to remove the rust, but here is one way to keep the rust to a minimum.

After the surface has been cleaned thoroughly, sprinkle an ample amount of baby powder on top of it. Rub in the powder just as you would an oil finish on a piece of furniture. Once you're satisfied that the entire surface is covered, wipe off the excess with a rag.

Baby powder displaces much of the moisture that may come into contact with the tabletop. And baby powder will not leave any residue on the workpiece. It also serves as a good lubricant between the workpiece and tabletop.

Routine maintenance every month or when those rusty fingerprints appear will keep tabletops clean and smooth.

–Ronald Capodagli, The Colony, Tex.

Wooden hygrometers are ancient–The wooden hygrometer article in issue #81 is a good example of the unique little tidbits

BRIDGEWOOD®
WOODWORKING MACHINERY

YOU BUY DIRECT
NO MIDDLEMAN

PRICES F.O.B., YORK, PA
SUBJECT TO CHANGE
WITHOUT NOTICE

Get Your MONEY'S WORTH in Professional Quality Woodworking Machinery! Get BRIDGEWOOD!

BW-2S
SHAPER $895.
Large 20" x 24⅜" table. Dovetail miter gauge slot. ½" and ¾" interchangeable spindles. 2 HP motor, forward/reverse switch. Seven other model sizes available.

BW-16PV
PLANER $2,495.
Planes 16" wide by 7" thick. Exclusive stock feed disconnect. 3 HP US Motor, variable feed rate. Other models from 12" to 24" wide.

BWJ-872
JOINTER $1,795.
Planes 8" wide and up to ½" deep. Four knife cutter head. 2 HP US motor. Other models from 6" to 16" wide.

PBS-740
BANDSAW $2,495.
Designed and made in Europe. 28" throat opening. 19½" depth. Table tilts 45°. Miter gauge slot. Rip fence. Other models from 14" to 20" available.

There are over 60 outstanding, professional woodworking machinery values in our New, **52-PAGE BRIDGEWOOD MACHINERY CATALOG.** To get your copy, send $1.00 to:
WILKE MACHINERY COMPANY
3230 Susquehanna Trail, North, York, PA 17402.
VISIT OUR NEW SHOWPLACE
1 block west of Exit 11, Interstate 83 north of York, PA.

WILKE
MACHINERY COMPANY
One of America's
Most Respected Names
in Woodworking Machinery.

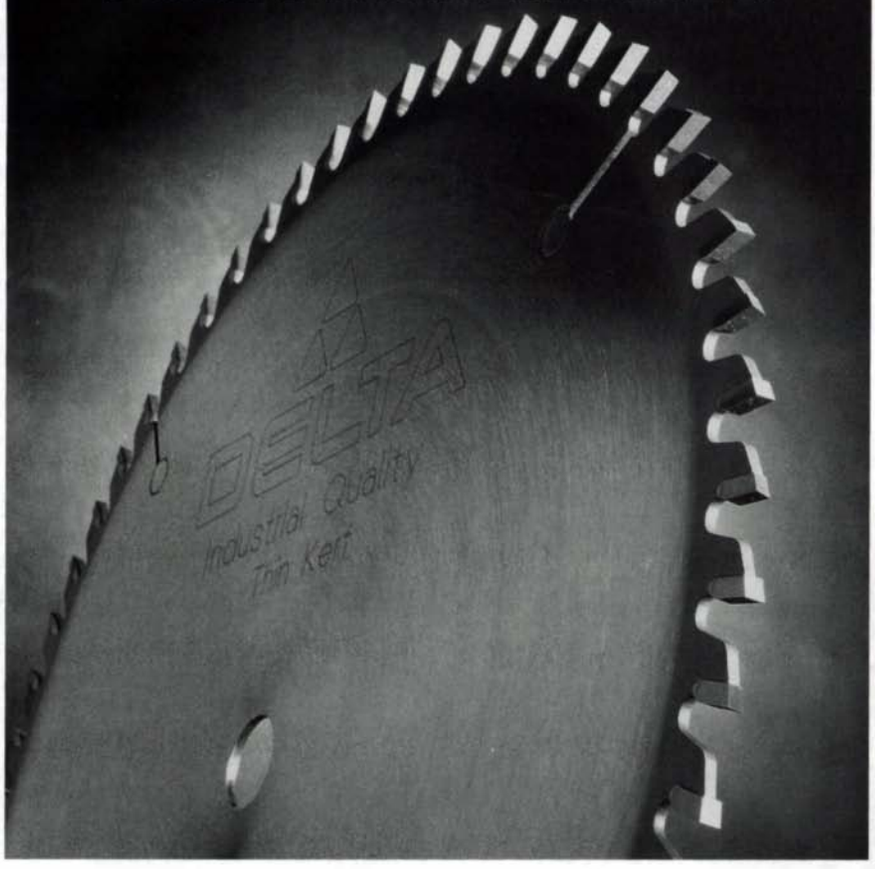
OFFICES AND SHOWROOM:
3230 Susquehanna Trail, North, York, PA 17402
Phone: (717) 764-5000 Fax: (717) 764-3778
IN CANADA: Brettwood Machinery Works, Ltd.
Madoc, Ontario 613-373-4920

90H1

READER SERVICE NO. 156

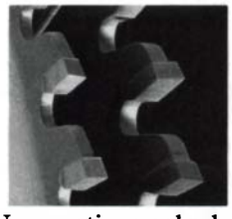
ADDING TO THE TRADITION

DELTA INTRODUCES LESS BLADE FOR YOUR MONEY.



Less blade, less kerf, less waste, less drag on your lower horsepower saws. Less of everything, except quality.

The new Delta thin kerf, industrial carbide-tipped saw blade.



These new blades are 28% thinner than conventional blades with harder bodies and finer carbide than any blade in their class. So stockfeeding is smoother and easier. Less strain on both you and your machine.

Put a Delta thin kerf blade on your saw and if it doesn't perform as well as any you've tried, we'll replace it or refund your money. No questions asked.

Blades come in 8", 10" and 12" diameters. In our popular ATB tooth configuration. Everything you'd expect from Delta.

To learn more about what you can do with less, call toll free for the name of your Delta Distributor: Delta International Machinery Corp., 800/438-2486.

Building On Tradition

DELTA

A Pentair Company

READER SERVICE NO. 120

BOSCH Power Tools

VAR. SPEED PLUNGE ROUTER

only $238.00

3½ hp
Model 1611EVS

30% off all Bosch Router Bits

SAWS

1582VS	Orbit. Action Nob Hdle Jig Saw	123.00
1582VS	"Clic", Orbital Nob Handle Jig Saw	133.00
1582DVS	"Clic", Dustless Orbital Jig Saw	159.00
3238VS	Unv. Shank Mult. Orbit. Jig Saw	109.00
1651	7 1/4" Cir. Saw, 13 amp	99.00
1654	7 1/4" Pivoting Circ. Saw	99.00
1632VSK	Panther Recp. Saw	128.00
1581VS	Jig Saw	129.00
1581DVS	Dustless Jig Saw	159.00

DRILLS

3050VSRK	"New" 3/8" 9.6V Cordless Drill w/Clutch. Case & 2 batteries.	129.00
3000VSRK	9.6 Cordless Drill	119.00
1158VSR	3/8" Var. Spd. Rev. Drill	69.00
9166VSR	1/2" VSR Mighty Midget Drill	109.00
9164VSR	3/8" Mighty Midget Drill	99.00
1198VSR	1/2" VSR 2 spd. Hammer Drill	129.00

ROUTERS

1601	1 hp Router	99.00
1602	1 1/2 hp Router	119.00
1604	1 3/4 hp Router	119.00
1606	D-Handle, 1 3/4 hp Router	138.00
90300	Fixed Base Router, 3 3/4 hp	309.00
90300M	Fixe Base Router	280.00
1608	Trim Router	87.00
1608LX	Laminate Trimmer	95.00
1609K	Installers Kit	168.00
1611	Plunge Router, 3 hp	195.00
1611	Plunge Router, 3½ hp, 220 Volt	257.00

SANDERS

1273 DVS	4"x24" Variable Speed Belt Sander	185.00
1273 DVS	Sanding Frame	98.00
3270D	3"x21" Dustless Belt Sander	135.00
1272	3"x24" Belt Sander	159.00
1272D	3"x24" Belt Sander w/Dust Collector	165.00
1273	4"x24" Belt Sander	168.00
1273D	4"x24" Belt Sander w/Dust Collector	175.00
1290D	Finishing Sander, 1/2 sheet dustless	119.00
3258	3 1/4" Power Planer	125.00
3283DVS	Rendom Orbit 5" Disc Sander	129.00

HITACHI

C8FB	Compound Miter Saw	465.00
CB75F	Resaw Bandsaw	1620.00
F1000A	Planer/Jointer	1520.00
C15FB	15" Miter Saw	380.00
TR-12	3 hp Plunge Router	178.00

PORTER CABLE

No. 555	Plate Jointer w/case	160.00

AEG

HBSE75S	3"x21" VS Belt Sander	153.00
	Sanding Frame	95.00
OFS50	1 hp Plunge Router	168.00
EZ502	Cordless Screwdriver	65.00

FREE FREIGHT

Denver — (303) 355-2391

CALL TOLL FREE
1-800-748-1945

VISA and MASTERCARD ACCEPTED

AVIATION/INDUSTRIAL SUPPLY
P.O. Box 38159 • Denver, CO 80238

READER SERVICE NO. 54

of information that make *Fine Woodworking* so interesting to read. However, in the interest of historical facts, it should be noted that this device has been around for quite sometime—at least since the days of Thomas Jefferson. In the book, *The Woodwrights Workbook*, you will find a reference to this device on pp. 141-143. Here its invention is credited to David Rittenhouse, and its description is presented in the form of a letter with diagrams by Thomas Jefferson to Benjamin Vaughan.

—Timothy J. Dale, Deal Island, Md.

Dehumidifier wood kiln—After reading *FWW on Wood and How to Dry it*, I decided to build a dry kiln for 500 bd. ft. I love to select my own trees in the woods and then make them into finished projects.

I made my dryer very simply. After constructing a box with an inside diameter of 4x4x11 ft., I insulated it well and built a side loading door into it. Then I set a household dehumidifier in one end and two small squirrel cage fans for circulation under the lumber.

When in operation, the temperature goes to between 108°F and 110°F. This keeps the chamber filled with steam, and the 2-gal. tank has to be emptied twice a day. I am about to build a second one and will add a drain hole into the ground to eliminate the chore of emptying the tank.

I have dried green lumber (walnut, ash, red oak and cherry) to 8% to 9% in three weeks, and the quality of the lumber was good and there was no end checking. My stripping is done with 1x1 lumber with the stack 8 in. off the floor. The mechanics of this dryer are very simple and something more people should build. You should try one.

—Bert H. Winger, Ottertail, Minn.

Need for quality tools—In response to Woody Pistrich's letter about antique tools becoming unavailable or prohibitively priced because they have become "collectibles" (*FWW* #82), woodworking is not the only craft that is being handicapped.

In addition to my interest in woodworking with hand tools, I am a hand bookbinder and restorer. The price of a used nipping press, not to mention the more esoteric items, has gone out of sight. Even sets of gilding tools are being dispersed, destroying their usefulness.

Then, too, many old bookbinding tools languish forgotten in libraries, either left over from years ago when in-house repairs were made, or having been donated by the families of deceased bookbinders as memorials and/or tax deductions.

What we all need is a cooperative of talented iron and brass founders, machinists, engravers and woodwrights who will work with each other and who believe in quality. It might help if they didn't mind being poor! *—F.E. Warner, Belfast, Maine*

Call for metrics—I'd like to put in another plea for adopting the metric system in woodworking. I read all your fine articles about how to build something, but I find all the dimensions are in those awkward fractions of an inch. Let me rehearse a few of the arguments for metric once again.

The United States and one or two most backward countries are the only ones still using the archaic English system. We are not in the main swim at all. Our automobiles, even in this country, are largely built in metric. Our liquor is supplied in liter bottles. There are even some signs on the highways with both English and metric mileage indications, and I believe most speedometers today carry both measures of velocity, although I suspect few of us depend on the metric to test

WOODWORKER'S CATALOG

There are over 4,000 money-saving reasons why woodworkers rely on Constantine.

4,000 woodwork items for fine woodworking and finest results. Everything important to people who like to Build-Restore-Repair-Refinish — and like to save money doing it. Cabinet or furniture wood? Choose from over 200 sizes and kinds. Beat up surface to cover? Choose from 150 richly-grained veneers. Plus 500 plans . . . cabinet hardware . . . 96 How-To Books . . . 118 carving tools and chisels . . . 76 inlay designs . . . and lots more for One-Stop, Right-Price Shopping without leaving home!

116 Page Catalog—Only $1.00

CONSTANTINE Est. 1812

2065G Eastchester Road, Bronx, NY 10461

READER SERVICE NO. 164

DELMHORST MODEL J-88

Pocket-size Wood Moisture Tester

LED display-type meter indicates ten ranges of wood moisture content between 6 and 20 percent. Ideal for a woodworking shop or serious craftsman.

Limited 3-Year Warranty. Shipped complete with carrying case, batteries and pins.

ORDER ONE TODAY!
1-800-222-0638
NJ-201-334-2557

DELMHORST Instrument Company
P.O. Box 68, Dept. 908
Towaco, NJ 07082

READER SERVICE NO. 53

WORKBENCH TOOL CO.

2833 Perry St., Madison, WI 53713

Powermatic Specials

#66	3 hp 1 phase w/ #50 Beisemeyer fence	$1,599.00
NEW ★	5 hp, 1 phase saw w/ #50 Beisemeyer fence	1,723.00
#26	Shaper, 3 hp, 1 phase	1,475.00
#100	12" Planer, 3 hp, 1 phase	2,106.00
#60	8" Jointer 1½ hp, 1 phase	1,375.00
#180	18" Planer 5 hp, 1 phase	4,395.00
#1150A	15" V.S. Drill Press ¾ hp, 1 phase	1,300.00
#225	24" Planer, 15 hp, 3 phase	10,260.00

FOB MADISON OR MC MINNVILLE

POWERMATIC

1-800-533-9282
608-273-0148

READER SERVICE NO. 50

"THIN" STOCK HARDWOOD LUMBER

• FAS Cabinet Grade • Kiln Dried • Surface 2 sides

THICKNESS	14"	38"	12"
Red Oak	4.00	4.59	6.40
Qtr Sawn Red Oak	4.95	6.45	7.75
Honduras Mahogany	4.55	5.35	6.75
Bird's Eye Maple	6.00	7.45	8.75
Cherry	4.00	4.75	6.60
Walnut	5.45	6.50	7.80
Poplar	2.90	3.20	3.50
Teak	6.50	9.50	14.00

* ⅛" Premium Baltic Birch Plywood (ideal for crafts) $1.00 per sq. ft.

Northland Woodworking Supply

* "FREE" pint of Behlen Danish oil with $50 purchase.

$20. min. please

65 Wurz Ave.
Utica, NY 13502
315-724-1299

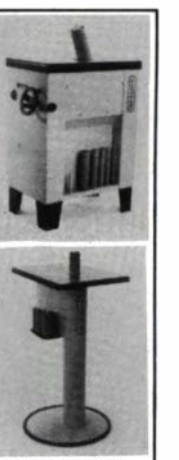
• Prices are per piece, 6-7 in. wide by 4 ft. long.
• Other thicknesses and sizes available

READER SERVICE NO. 206

Clayton Oscillating Spindle Sanders.

For large or small shops. Ideal for contour sanding. Quick change drums. ½" to 4". Satisfaction guaranteed. Covered by 1 yr. warrantee. 4 models to choose from. For more information write:

Clayton Enterprises
2505 W. Dewey Rd.
Owosso, MI 48867



Made In U.S.A.

READER SERVICE NO. 21

"Custom furniture fits your lifestyle. Safe & Simple™ finishes fit mine. I can concentrate 100% on the job because there are no solvent vapors and no smells. All year round, without even thinking about it, I can get fast drying finishes; tough, clear and non-yellowing."

Terry Horan
New England Workshop
Rumford, Rhode Island

Proud Sponsor of
"This Old House" &
"The New Yankee Workshop"

Safe & Simple™ Environmentally Responsible Finishes

- **No toxic vapors, nonflammable, odorless.**
- **Dries in 30 minutes to a hard, crystal clear finish that never yellows.**
- **Easy water clean up.**

$5 per gallon **Introductory Rebate Offer Carver Tripp Super Poly** **$5 per gallo**

Complete this coupon and mail, together with cash register receipt (with Carver Tripp Super Poly circled) and the UPC code from the bac label, to Parks Corporation, P.O. Box 3102, Lowell, MA 01853-3102. Please allow 6 to 8 weeks for payment.

Name _____

Address _____

City _____ **State** _____ **Zip** _____

Offer expires 12/31/90. Limited to one rebate per individual or household.

Parks Corporation, Somerset, MA 02726, 1-800-225-8543

READER SERVICE NO. 115

whether we are over the speed limit. A speed of 100 kilometers per hour is 62 mph. That's neat because it divides the speeders from the conservatives right at the 100 mark in metric! Metric is inevitable.

In the woodworking field, there are already several changes. One that we have all noticed is that ¼ plywood is really not ¼ in., but is 6mm—some even 5mm—because so much of it is not made in the United States. And the panels are really 122mm by 244mm, not 4 ft. by 8 ft. The wood screw is still made in inches, but the designation of length is metric in Europe.

Perhaps the most telling advantage of using metric measurements to me as a woodworker is that I can work to a slightly greater accuracy. At my age and with the degree of refraction I enjoy, 1/32 in. is a little difficult to resolve. And 1/16 in. is a bit coarse. A millimeter is 1/25 in. I can read a millimeter easily. So I work more closely than I would in inches. Furthermore, it is a great deal easier to remember as you cross the shop from one place to another such numbers as 235 and 416 rather than 9¼ in. and 16⅜ in.

But even more, when laying things out and computing the spacing between two points or adding the total thickness of several pieces of wood together—even computing the center point of a chair leg or tabletop—the old metric system with a simple hand calculator sings with simplicity.

Our suppliers can have great influence in this matter. I find it difficult, for example, to find a new metric tape measure. Usually I carry a "bilingual" tape, on which the metric measure is along one side. I use the other edge to speak with the natives. Some suppliers do manufacture metric scales, but they are not usually stocked in the hardware stores because no one buys them. *Fine Woodworking* can help by offering the great drawings you publish with alternate metric dimensions, or better yet, why not publish at least one such project per month with only metric dimensions? Maybe some of us would be encouraged to try it.

—Joseph Chapline, Newbury, N.H.

Centering biscuit joints—In *Fine Woodworking* #81, Randall Grace suggests that plates used in the joinery of tabletops be set below center to avoid what he called "biscuit draw" in the finished product.

I suggest that the plates be kept in the center of the work, just the same as dowels, for structural reasons, and that the craftsperson wait for the wood to stabilize before sanding.

The moisture from Mr. Grace's glue raised the grain and he sanded the top while the grain was raised. Then he removed material so that when the cells of the wood returned to normal moisture content and shrunk, the location of the plates was then observable. The glueline of each board was probably also depressed, which is common if the work is finished too quickly.

—Rod Goettelmann, Southampton Township, N.J.

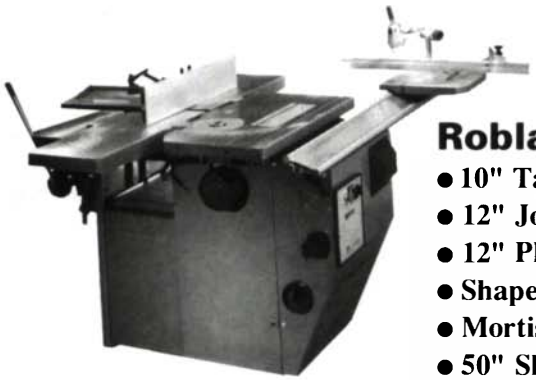
About your safety:
Working wood is inherently dangerous. Using hand or power tools improperly or neglecting standard safety practices can lead to permanent injury or death. So don't try to perform operations you learn about here (or elsewhere) *until you're certain that they are safe for you and your shop situation.* We want you to enjoy your craft and to find satisfaction in the doing, as well as in the finished work. So please keep safety foremost in your mind whenever you're in the shop.

—John Lively, publisher

ROBLAND

The Intelligent One Man Shop

Robland XSD
- 12" Jointer
- 12" Planer
- 550 LBS.
- 3 HP. motor
- Mortiser Optional



Robland X31
- 10" Table Saw
- 12" Jointer
- 12" Planer
- Shaper
- Mortiser
- 50" Sliding Table
- 3 motors 3 HP. ea.

Laguna Tools Sliding Table
will attach to almost any table saw

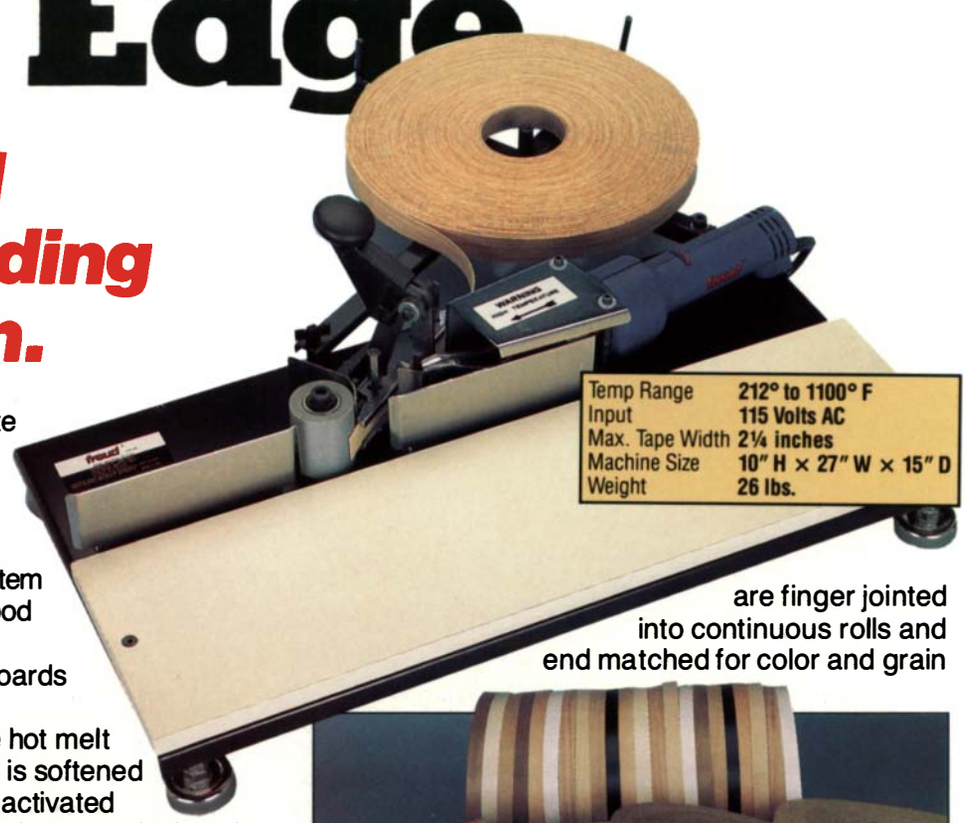
Video: Send $6 (refundable) or call us with your credit card number, to receive a 60 min. video presentation on our tools.

For information and your nearest dealer call
LAGUNA TOOLS
2081 Laguna Canyon Rd., Laguna Beach, CA 92651
1-(800) 234-1976

READER SERVICE NO. 155

The New Performance Edge

Freud Edge Banding System.

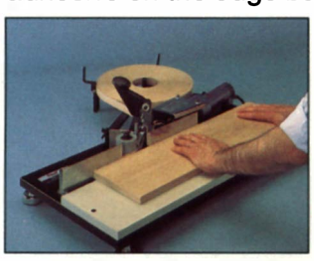


Temp Range	212° to 1100° F
Input	115 Volts AC
Max. Tape Width	2¼ inches
Machine Size	10" H × 27" W × 15" D
Weight	26 lbs.

Freud introduces the ultimate in edge banding and banding tapes. No more expensive machines or awkward, unsafe hot iron applicators.

The Freud Edge Banding System (EB100) allows you to apply wood and polyester edge finishes to veneered or plastic laminate boards quickly and easily.

The principle is **simple**! The hot melt adhesive on the edge banding is softened and activated when it passes the hot air of the heat gun. A pinch roller then presses the edge banding against the veneered or laminated board. The adhesive creates a permanent bond in seconds. **Quick, easy, and affordable!**



The Freud Banding System is great for the small shop or as an addition to larger shops where set-up time is critical.

To assure a perfect job, Freud Edge Banding has been designed to give you maximum results when used with the Freud System. The genuine wood veneers are finger jointed into continuous rolls and end matched for color and grain

continuity. It is bonded to a fleece backer, sanded and coated with high quality hot melt adhesive.

The polyester edge banding is available in the most popular colors. The decorative papers are impregnated with polyester resins and laminated to a .010 inch thick backer sheet. It is then coated with the same high quality hot melt adhesive.

The Freud Banding and the Freud Edge Banding System. Together, they give you the performance you need at a cost you can afford! Call for the name of your local distributor.

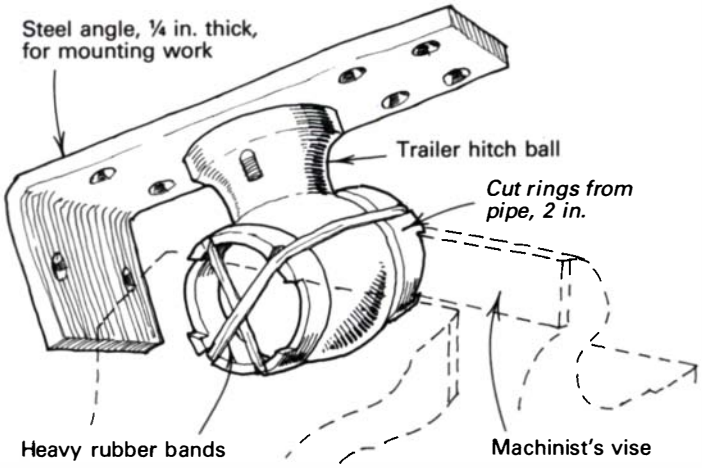
freud®

Precisely what you need.

High Point, NC • (919) 434-3171

READER SERVICE NO. 153

Shop-built universal vise



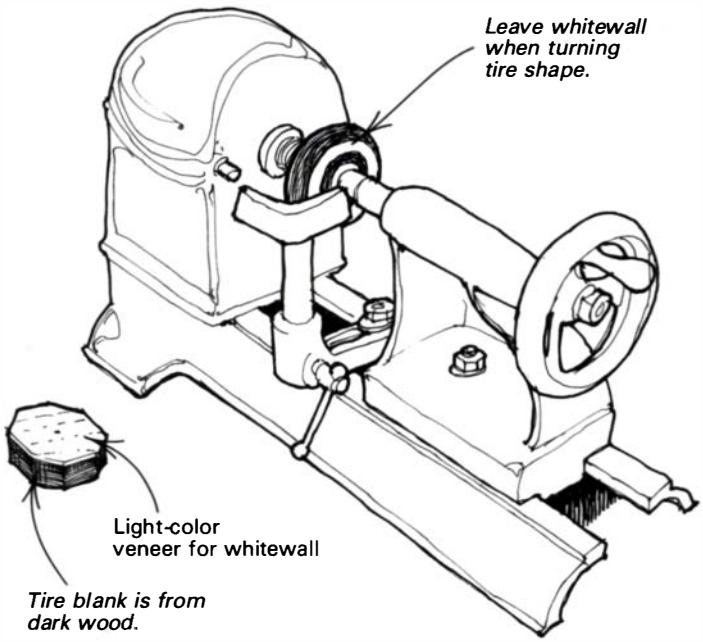
This simple homemade vise adaptor is made from an old trailer hitch, two 1-in.-long sections of 2-in. pipe and a chunk of ¼-in.-thick steel angle. It allows the workpiece to be set at any angle for wood sculpting and decoy making. And it is massive enough and grips tightly enough to withstand the heavy blows of a large mallet without slipping out of position. The only limiting conditions are the size, strength and rigidity of the machinist's vise and the bench it's attached to.

To make the device, cut the stud off the trailer ball, and then drill and tap two or three holes in the ball's flange to fasten it to the steel angle. Chamfer the inside diameter of the pipe rings where they hit the ball, and grind or file a channel in each ring to fit over your vise jaws. This keeps the rings from slipping out of place when you loosen the vise. In addition, file or grind shallow notches in the rings for heavy rubber bands to hold the assembly together snugly while mounting it in the vise or for storage.

—E. Kawecki, Franklin, Mich.

Quick tip: When the blade slot on my radial-arm saw table gets too wide, I fill it in with a paste made from talcum powder and epoxy glue. When this tough filler has cured, I block-sand it flush and make a fresh cut. *—Richard Rubasch, Viroqua, Wisc.*

Turning whitewall tires for toy cars



Here is a fast, easy way to make small whitewall tires for toy cars. Start by choosing a dark wood, like mahogany or walnut. Plane the stock to the final thickness of the wheel, and then rip and crosscut as many square wheel blanks from the stock as you will need. Next, glue a piece of light-color veneer to the face of each blank. The veneer will later become the whitewall on the tire, and so it should contrast with the darker wood. After the glue has set, trim the corners off each blank to form a rough octagon, and drill a ⅛-in. or smaller hole through the center of each blank to locate the lathe's centers. Bore this hole with a drill press or drill guide to ensure that the hole is perpendicular to the wheel's face.

Mount a blank between lathe centers, veneer-side out, and turn the wheel in a conventional manner. As you shape the tire, you will expose the darker wood and leave the white veneer on the fattest part of the tire and in the middle. Work carefully—it's easy to make the whitewall too narrow. I usually turn only the outside face because in most cases, the other side doesn't show. The live center marks on the back will be hidden, and the ring left by the dead center on the front doesn't hurt the design's effect.

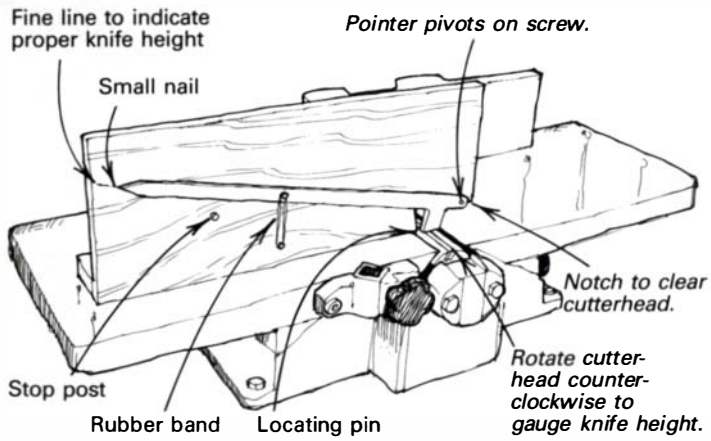
To give the effect of a tire tread, apply a metal-lathe knurling tool to the edge of the wheel after sanding and while the lathe is running at a slow speed. When the wheel is finished, redrill the alignment hole to the size needed for the axle.

—E.D. Groves, Starkville, Miss.

Quick tip: Boric acid powder is an excellent dry lubricant for sticky drawers, saw tables, jigs and the like. Simply sprinkle the powder right on the surface. Boric acid is a common non-prescription anti-bacterial agent, available in any drug store.

—Bill Hayman, Annapolis, Md.

Installing jointer knives accurately

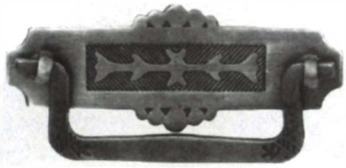


I finally got fed up with spending one hour carefully installing jointer knives and still having one knife get dull before the others because it was set higher. So I made the gadget shown in the drawing above to help. It's basically a simple gauge that, once calibrated to proper knife height, can be used to quickly and accurately set the knives.

Join two pieces of plywood at right angles so the wider board will stand on edge on the jointer's outfeed table. Notch the lower right end of this construction where it overhangs the cutterhead. Then insert a small dowel or screw in the bottom edge of the upright just behind this notch to act as a locating pin. This pin registers the position of the gauge against the end of the outfeed table. Screw the pointer to the lower right corner of the upright board, above the notch, so it will pivot when the knife to be set pushes up on the short lever that extends down from the attached end of the pointer. Use Plexiglas or hardwood for the pointer's lever, and insert a small nail in the other end for a more precise reading. The longer the pointer, the more the vertical movement of the knives is amplified; a 20-in.-long pointer will magnify the movement about 40 times.

To calibrate the gauge, you must first establish the proper

ANTIQUE reproduction furniture HARDWARE



HORTON BRASSES
Nooks Hill Rd., PO Box 120F
Cromwell, CT 06416
203-635-4400
send $3.00 for a catalog

READER SERVICE NO. 302

Study the Classics.

In a comprehensive two-year program designed to teach the techniques of quality custom furniture construction. For further information contact Lonnie Bird at

1-614-245-5353

WOODWORKING TECHNOLOGY
UNIVERSITY OF RIO GRANDE
Rio Grande, OH 45674

3 Things you need for great dovetails:

1. **Ten minutes**
2. **Your router**
3. **Keller Dovetail System.**

You'll be amazed at how easy it is.

"In a class by itself." — *WOOD Magazine*

"Easy to use. Ruggedly constructed." — *FINE WOODWORKING*

"An absolute minimum of set-up fiddling — less than any other jig tested. The jig is simplicity itself." — *AMERICAN WOODWORKER*

Fast set-up. No test cuts. Unlimited widths. Precision joinery. Classic and variable spacing. Compound angles. Box joints. 20-year warranty. Made in USA since 1976.

To find out more, contact your Dealer or
KELLER & CO.
1327 T St., Dept. F70
Petaluma, CA 94952
(707) 763-9336

Keller Dovetail System
Simply the best.

READER SERVICE NO. 97

Woodworkers!

Free Catalog Subscription

Call for yours today! Our new 120 page, full-color catalog is packed with over 4,000 new and best-selling woodworking tools, supplies, kits & books.

Our advice is free, too! Got a question about the right tool for the job? About sharpening? Need help with a project? Our expert technical reps are just a free phone call away! It's all part of Woodcraft's service.

Call free **1-800-225-1153** Or write to:

WOODCRAFT
Dept FW70, Wood County Park #210
P.O. Box 1686, Parkersburg, WV 26101

READER SERVICE NO. 34

QUALITY UNFINISHED DOORS AND DRAWER FRONTS

TRADITIONAL AND CONTEMPORARY STYLING

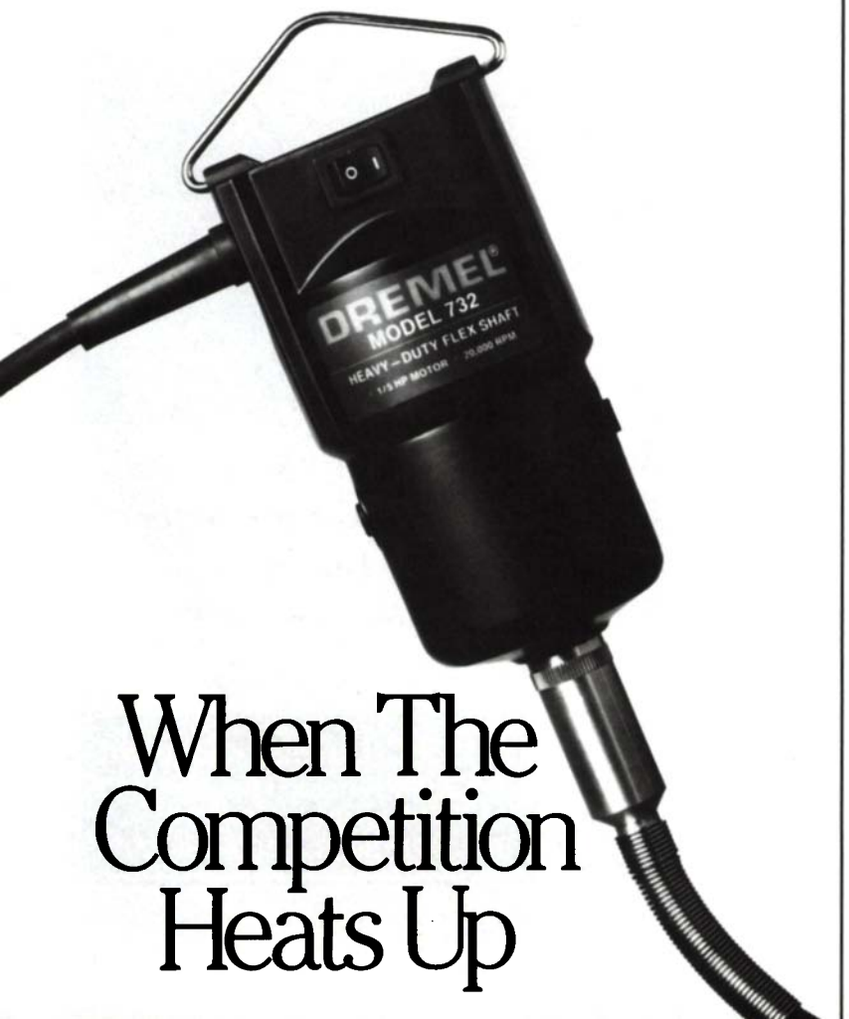
- Red Oak
- Cherry
- Soft Maple
- White Birch

Custom Orders From 2 To 2000

Send $1.00 For Our Brochure.

MICHAEL FARR
CUSTOM WOODWORKING, INC.
R. D. #2, Box 150, Millville, PA 17846 • (717) 458-4295

READER SERVICE NO. 152



When The Competition Heats Up

Dremel Keeps Its Cool.

Introducing the revolutionary new Dremel Heavy Duty Flex-Shaft. A tool that gives you more power and less heat.

On the left, 1/5 horsepower, 20,000 RPM's and 50% more torque than other brands.

On the right, handpieces designed to run smoother and keep hands cooler through hours of tough work.

Get your hands on one and do more work, with no sweat.

READER SERVICE NO. 31

© 1990 Dremel, Racine, Wisconsin

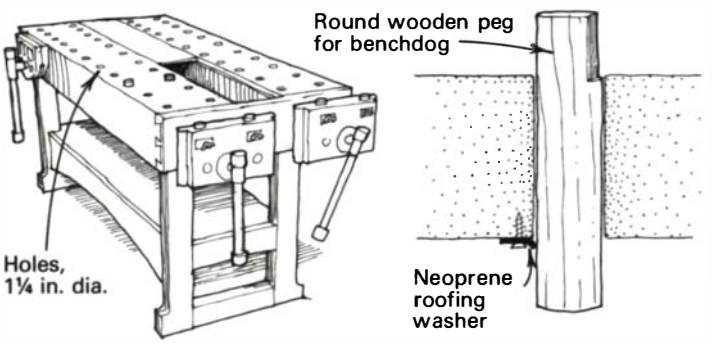
DREMEL®
Gets the job done bit by bit.

height for the knives. To do so, place a wooden straightedge on the outfeed table and raise one end of one of the knives until it grabs and moves the straightedge horizontally about ⅛ in. to 3/16 in. when the cutterhead is rotated clockwise.

Next, record this knife height by standing the gauge in position on the outfeed table with its lever over the knife you just set, as shown in the drawing on the previous page. Rotate the cutterhead counterclockwise and mark a fine line on the gauge's backboard at the highest spot the pointer reaches. Set the other knives by raising or lowering them until the pointer hits the same high spot when the cutterhead is turned counterclockwise.

–David Marshall, Gwynedd, Wales, Great Britain

Improved benchdog



The European rectangular benchdog has two faults. First, it loses friction as the tapered spring is compressed, making the dog drop flush with the benchtop just when you would like it to remain up. Second, it can't be rotated for curved work.

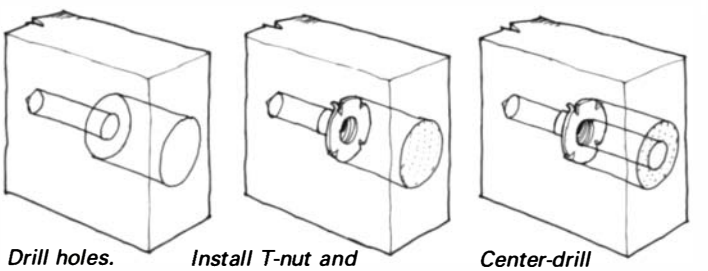
My round benchdogs solve both these problems. To accommodate the dogs, drill a series of 1¼-in.-dia. holes in your benchtop. Then, flip the bench over and screw a neoprene roofing washer alongside each hole so that the washer overlaps the hole a little; the more overlap the firmer the dog. Now, turn a length of dowel to a scant 1¼ in. dia. and crosscut it into suitable lengths for pegs. Sand or file a small flat on one end of each peg and presto–you have a peg that holds firm and rotates 360°.

–Jonathan Davies, Maleny, Queensland, Australia

Quick tip: After changing jointer or planer knives, write the date on a piece of masking tape and stick it to the base of the machine as a reminder to regularly attend to this necessary job.

–Robert Vaughan, Roanoke, Va.

Another captured nut technique



Drill holes. *Install T-nut and plug hole with dowel.* *Center-drill dowel.*

Here's another method for installing a captured nut in a wood member for knock-down furniture. First, drill a flat-bottom hole in the end of the member with a Forstner bit, which has a diameter slightly larger than a T-nut flange. Drill a second hole centered in

ANYTIME
ANYWHERE
ANYWOOD

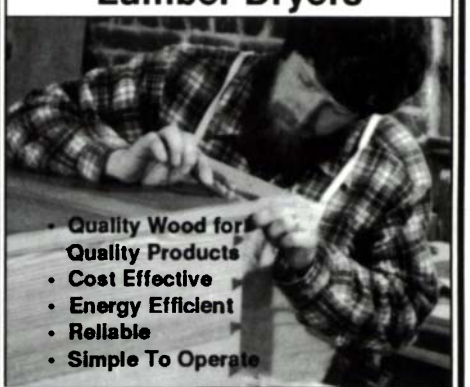
W&H Molder-Planer & Lathe

Professionals and hobbyists alike know the strengths of our products!
The W&H Molder-Planer converts from planing to molding in only two minutes, and duplicates moldings from ¾" deep to 7" wide.
Our 12" Lathe, with its cast iron headstock/tailstock and solid steel ways, has four-speed versatility and 46" between centers!
Superior made-in-USA construction, exceptional warranties, and free 30 day trials are your assurance of long life and total satisfaction.

Mail this ad or call us toll-free today.
1-800-258-1380 In NH 603-654-6828
Williams & Hussey
P.O. Box 1149, Dept. 130GM
Wilton, NH 03086
YES! Send your free information kit today!
Name
Address
City State Zip

READER SERVICE NO. 30

Ebac
Lumber Dryers



Now You can Kiln Dry your own lumber. Let Ebac show you how.

Call us today.

Ebac Lumber Dryers
106 John Jefferson Rd., Ste. 102
Williamsburg, VA 23185
(804) 229-3038 1-800-433-9011

READER SERVICE NO. 37

SmartLevel®—

the new, electronic hand tool that accurately measures every angle, not just level and plumb

Your old bubble level is a thing of the past, because now you can own SmartLevel.® More than just a level, SmartLevel is a digital inclinometer that electronically measures *every angle* easily, reliably and accurately—*every time!*

With the push of a button, SmartLevel measures and displays:

- Level or Plumb
- Rise Over Foot of Run (Pitch)
- Degree of Slope
- Percent of Slope

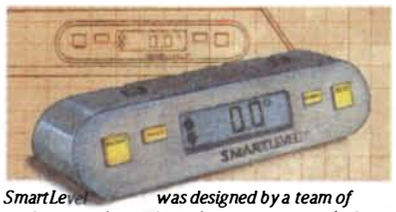
So you can quickly measure roof pitch; drainage, landscape or deck slopes; stairway rise; level and plumb. Plus, because SmartLevel displays *direct measurements,* you *don't have to do any other calculations* to figure pitch or slope.

SmartLevel helps reduce costly re-work

SmartLevel helps you avoid re-work because—unlike a bubble level—you can always be sure your SmartLevel measures true. Just press the "Reset" button and your SmartLevel is easily recalibrated to reliable accuracy.

Just press the Mode button to directly measure rise over run (pitch) Δ, degree of slope °, percent of slope %, or level and plumb with, if you prefer, a simulated bubble (: III). Arrow shows direction to true level/plumb.

Plus, SmartLevel provides an exact digital display of the measurements you make, so there's no guessing. The display



SmartLevel was designed by a team of engineers and experienced carpenters to make it easy to use and to last a long time.

can be read from as far away as 10 feet, overhead or below-shoulder level, in bright or dim light. The display even "flips over" so you can still *read it when it's upside-down.*

Made of sturdy, high-quality materials for durability

The heart and brains of SmartLevel is a rugged, solid-state sensor sealed inside a weather-resistant polycarbonate module. You can use it alone as a torpedo level or lock it quickly into the hand-holds in our 2-, 4-, or 6-foot rails.

The hand-crafted rails are made of strong, aircraft-grade aluminum, through-bolted to solid teak centers that absorb shock and resist warping. The triangular shape provides a low center of gravity to make SmartLevel more stable than I-beam levels.

100% guaranteed

Every SmartLevel is backed by a 100% satisfaction guarantee. If for any reason you are not happy with your SmartLevel, you may return it within 30 days for a full refund. But we're sure you'll want to keep it—and it's backed by a one-year warranty against defects in materials and workmanship.

So order yours today. Then you can stop second-guessing your old bubble level or replacing it year after year. Because you'll have SmartLevel—the most accurate, versatile and durable "carpenter's level" you'll ever own.

Order by mail, or phone toll-free 1-800-SMARTLEVEL

1-800 762-7853
Please mention Code GOFW
Mon.-Fri.: 7:30 AM-5 PM Pacific Time

WEDGE INNOVATIONS

In some areas, SmartLevel is available at select stores. Call Wedge Innovations for the name of the authorized SmartLevel dealer nearest you.

SmartLevel Order Form

Mail to: Wedge Innovations, 532 Mercury Dr., Sunnyvale, CA 94086

Description	Item #	Qty.	Price	Total
Sensor Module (fits in any rail)	SM		$89.95	
2 ft. Rail (without module)	TR2		$30.00	
4 ft. Rail (without module)	TR4		$60.00	
6 ft. Rail (without module)	TR6		$90.00	

Sub total: _____

Calif. residents add local sales tax: _____

Shipping (add $6.50 for each rail ordered; Alaska & Hawaii $10 per rail): _____*

Total: _____

Payment method: ☐ Check ☐ VISA ☐ MasterCard

Card #: _____ Exp. Date:

Authorized card signature

Ship to: (No P.O. boxes please.)
Name

Address

City/State/Zip

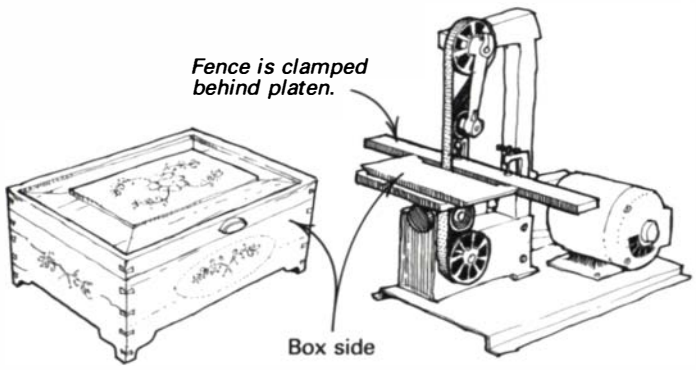
Daytime phone ( )

*Mail orders, please allow 3 weeks for delivery. For faster service, credit card orders may be placed by phone. For overnight or second-day delivery service, call Wedge Innovations for delivery charge quote. Foreign orders please write, or FAX to 1-408-739-3353. GOFW

One sensor module will fit interchangeably into any of the 2-, 4-, & 6-ft. rails. The sensor module can also be used alone as a torpedo level.

the first using a bit the same size as the T-nut barrel. The second hole must be deep enough for the end of the bolt that will extend beyond the nut when the joint is tightened. After driving the T-nut firmly into the larger hole, plug the hole with a glued-in dowel. Be sure the dowel butts hard on the nut, and don't use any more glue than necessary because excess glue will be forced into the threads of the nut. When the glue has set, center-drill the dowel with the smaller bit you used before and stop when you reach the T-nut. Go slow near the end so you will feel when your bit just touches the T-nut. *–John Burns, Pensacola, Fla.*

Sanding stepped edges



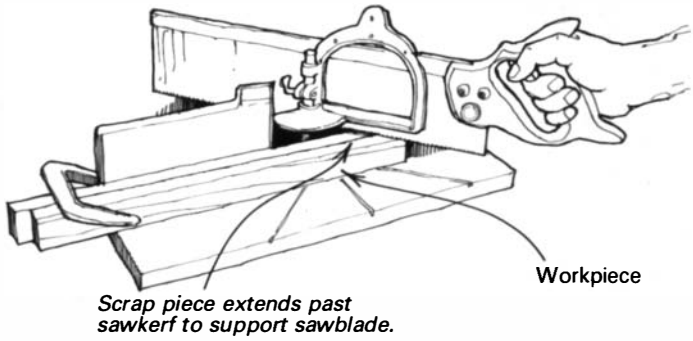
A while back, I ran into a problem while building a small jewelry chest. My design called for feet that were cut with a jigsaw right from the sides of the box. But no matter how carefully I sawed the straight part between the box's feet, the inevitable waverings ruined the look of what should have been a perfectly straight edge.

I solved the problem by clamping a wood fence on the table of my 1-in. belt sander behind the platen. I left about 1/16 in. when I cut the bottom profile on the box sides, and I sanded the straight section of the edge by pressing it against the belt and moving the piece back and forth until the feet touched the fence. With the fence clamped at just the right distance behind the sanding belt and parallel to the platen, the result is a nicely sanded straight line that needs only to be cleaned up with 220-grit paper.

–John M. Colombini, Pittsburgh, Pa.

Quick tip: I got a couple of adjustable folding ironing boards at a flea market. When topped with laminate-covered plywood, they make great adjustable outfeed tables and also double as large folding sawhorses. *–James Fielding, Shawnigan Lake, B.C., Canada*

Trimming in a miter box



In order to achieve an extremely close fit with pieces of trim, I make the first cut a bit long and then trim the piece to perfect

Professional Quality Woodworking Machines
From PENN STATE INDUSTRIES

Super 125 Planer
Portable with "Power Feed" • Shipped assembled • Retail value over $600.00
On Sale ... **$349.95**

Add $15 UPS Freight

This machine will pay for itself time and again by planing your own lumber. At 65 lbs, you can carry this Planer to a job site or mount it permanently in your workshop like any stationary machine. **You'll spend hundreds of dollars less** for this 12-1/2" power feed Planer than for a traditional stationary model of a similar capacity - with comparable results.

SPECIFICATIONS:
- **Knives**.... 2ea, 12-1/2" wide, HSS
- **Motor** - 16 Amp, 115V, 8000 RPM
- **Auto Feed rate** ..... 26.2 FPM
- **Cutting speed** ..... 16000 Cuts/min
- **Thickness of stock** ..... 3/16" to 6"
- **Size** ... 15-1/2"H X 22"W X 21" Bed
- **Max Depth of cut** ..... 1/8"
- **Machine Weight** ..... 65 Lbs

Free plans for roller stand with purchase of rollers

Planer & Accessories Price List
Super 125 Planer - complete and assembled #PLA ..... **$349.95** ($15 UPS)
Extra Set of 2 Knives - High speed steel, 12-12" #PKN ..... **$25.00/set** (•)
Dust chute - for vacuum takeoff of wood chips #PDS, **On Sale** ..... **$15.00** ($3 UPS)
Planer stand - Heavy duty, 27-1/2" high #PST ..reg. $44.00, **On Sale**..... **$39.00** ($6 UPS)
Ball Bearing Rollers - (Minimum purchase 2 rollers) Build roller stand, infeed/outfeed table etc. w/these 13"x2" Heavy Duty rollers. Includes FREE plans for building roller stand shown above. #BBR ..... **$6.50/ea** ($3 UPS/per order)
(•) No freight chg if ordered w/Planer, otherwise add $3 UPS

DC-1 Dust Collector
On Sale ... **$189.95**

Add $20 UPS Freight

Keep your shop clean and safe from sawdust with our large capacity, commercial style system. This collector has up **to 10 times more air flow** than a Shop Vac and runs **much quieter.**

SPECIFICATIONS:
- **1hp, 110/220V (pre wired 110V)**
- **610 CFM air flow**
- **6990 FPM air speed • 2 Bags 15"dia X 22" • 20 gallon bag**
- **4" inlet • Casters on base • Weight 75 lbs • Size - 26"x15"x57"H**

FREE
with Purchase of DC-1
- *Duct Hose*
- *4" To 3" Rigid Adaptor*
- *4" To 2" Flex Adaptor*
- *Plans For 2 Stage Setup*
- *Piping & Fittings Sources*

Free $15 Value

We unconditionally guarantee your satisfaction with our fine machines. All of our machines carry a Thirty day Money Back Guarantee and One year Warranty for Parts and Labor .

PENN STATE INDUSTRIES - F
2850 Comly Road • Phila, Pa 19154
Order Toll Free 1-800-288-7297 (Ext 90)
For information 1-215-676-7609 (Ext 15)
Visa, Master, & Discover Card accepted
Pennsylvania residents add 6% Sales Tax
Add UPS Shipping Charges as noted
Continental U.S. only (Call for shipping charges to other locations)

READER SERVICE NO. 67

Also from the publishers of *Fine Woodworking*...

Fine Homebuilding

Straight talk about building and remodeling houses...

from people who know.

The only home-building magazine where professional builders *and* active homeowners get together. *Fine Homebuilding* covers the whole field of residential construction.

- Fundamental frame carpentry
- Trim and finish carpentry
- Floors and walls
- **Concrete and masonry construction**
- Tools and materials
- Houses on a budget
- Environmental impact concerns
- Energy-efficient designs
- Historic home preservation

Fine Homebuilding brings its readers the kind of in-depth, technical information they'll find nowhere else. In addition to six regular bimonthly issues, each

Spring we bring you our annual issue on unique homes, HOUSES. *Fine Homebuilding* gives you the information you'll need to get the job done right.

Try a risk-free subscription to *Fine Homebuilding*. It may just be your most useful tool. A full year (seven issues) is just $26.00. Fill out the attached card right now. Or call our customer service number 1-800-888-8286. We guarantee satisfaction, so you have nothing to lose.

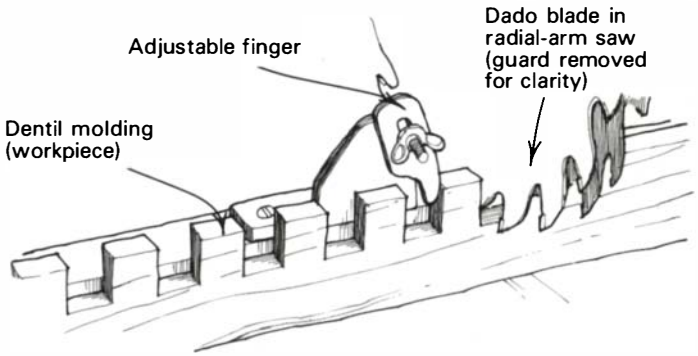
The Taunton Press
63 South Main Street
Box 5506
Newtown, CT 06470-5506

TAUNTON MAGAZINES
...by fellow enthusiasts

size with repeated fine cuts in my miter box. However, when trimming less than a kerf's width, the sawblade will almost always deflect off the trim line. This problem can be eliminated by backing the piece being trimmed with a scrap of about the same dimensions. Clamp both pieces to the miter box with the scrap piece extending well past the sawkerf to support the blade behind the cut. This will ensure a perfect, no-deflection cut on the workpiece.
—Joseph Franchina, Coventry, R.I.

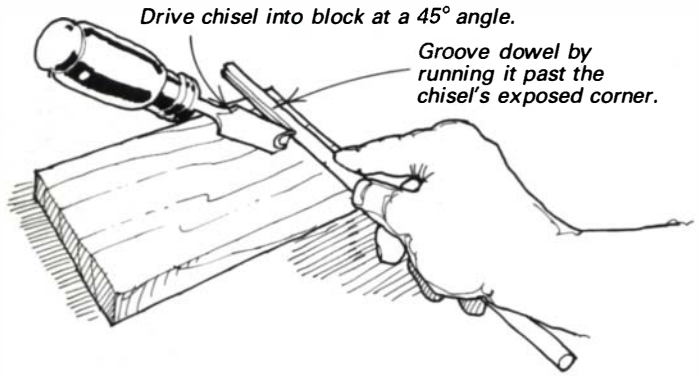
Quick tip: The filtering capabilities of a dust-collector bag can be easily improved by spraying the inside of the bag with no-stick cooking spray. This treatment will stop the finer dust with no loss in system efficiency. *—Robert Brandt, Ft. Worth, Tex.*

Making dentil molding on a radial-arm saw



I needed several sticks of dentil molding for some bookcases I was building. My first inclination was to measure and mark each dentil and make the cuts freehand on the tablesaw, but this would be time-consuming with no guarantee of accuracy. By using a dado blade on my radial-arm saw with an indexing finger attached to the fence, as shown below, left, I found I could cut the molding quickly and accurately. Adjusting the dado blade up or down determines the depth of the cutout, and the location of the adjustable finger determines the cutout's width. In the drawing, the blade guard has been removed for clarity, but don't attempt this operation without replacing the guard. *—Jack F. Sewert, Marion, N.Y.*

Grooving a dowel



Grooved dowels are superior for doweled glue joints because they allow the glue to escape back along the sides of the dowel as it's inserted. An ungrooved dowel will push most of the glue into the bottom of the hole. Grooved dowels are commercially available, but here's a tip I often use to groove my own. Tap a ¾-in. chisel into a block of wood at a 45° angle as shown above. The upper corner of the chisel should hit the centerline of the dowel. Now,

DELTA

34-782	10" 3 HP UNISAW W/ UNIFENCE
34-783	10" 5 HP 3 PH W/ UNIFENCE
43-375	3 HP 1 PH HD Shaper
37-350	8" DJ-20 Joiner W/STAND
31-730	6" Belt 12" Disc
33-890	12" RADIAL ARM SAW
40-601	18" VS SCROLL SAW
33-990	10" RADIAL ARM SAW
22-661	DC 33 13" PLANER
50-179	3/4 HP DUST COLLECTOR
50-180	1 HP DUST COLLECTOR
50-181	2 HP DUST COLLECTOR
34-985	1 PH STOCK FEEDER 110V
34-994	1 PH STOCK FEEDER 230V
34-995	3 PH STOCK FEEDER 230V
33-150	8-1/4" SAW BUCK
34-444	10" CONTR. SAW COMPLETE
31-380	4" X 132" EDGE SANDER
34-670	10" MOTORIZED SAW
40-150	15" SCROLL SAW
31-050	1" X 30" SANDER
23-700	WET DRY GRINDER
31-460	4" BELT 6" DISC
17-900	16-1/2" DRILL PRESS
34-897	DELTA UNIFENCE

EMGLO

AM39-HC4V3/4 HP TWIN TANK	$268
AM78-HC4V1-1/2 HP TWIN TANK	298

BOSCH

1611	3 HP PLUNGE ROUTER	$195
1611EVF	3HP V-SPD PLUNGE ROUTER	234
1604	1-3/4 HP ROUTER	119
1604K	1-3/4 HP ROUTER KIT	159
1606	1-3/4 HP D-HANDLE ROUTER	140
1608	5.6 AMP. LAM. TRIMMER	88
1609K	3 IN 1 TRIMMER KIT	163
3270D	3 X 21 SANDER W/BAG	126
1272	3 X 24 SANDER	163
1272D	3 X 24 SANDER W/BAG	168
1273DVS	4 X 24 VARIABLE SPEED SANDER W/BAG	188
3050VSRK	9.6V CORDLESS W/CLUTCH	133
91066	1/2" MIGHTY MIDGET VSR	108
1347	4-1/2" MINI-GRINDER	84
1654	7-1/4" SAW W/CT BLADE	98
1581VS	TOP HANDLE JIG SAW	129
1632VSK	VS RECIP. SAW W/CASE	135

HITACHI

C-8FB	8-1/2" COMPOUND MITER SAW	$465
C-15FB	15" MITER SAW	389
TR-12	3HP PLUNGE ROUTER W/ACCES. VALUE AT $60	169

MAKITA

5402A	16-5/16" CIRC. SAW	329
5201NA	10-1/4" CIRC. SAW	299
5077B	7-1/4" HYPOID CIRC. SAW	139
5007NB	7-1/4" CIRC. SAW	114
5007NBA	7-1/4" CIRC. SAW W/ELEC. BRAKE	124
1900BW	3-1/4" PLANER W/CASE	113
1100	3-1/4" PLANER HD W/CASE	210
2708W	8-1/4" TABLE SAW	257
3612BR	3 HP PLUNGE ROUTER	199
3601B	1-3/8" HP D-HANDLE ROUTER	137
9030	1-1/8" X 21" BELT SANDER	135
9900B	3" X 21" BELT SANDER W/BAG	145
9924B	3" X 24" BELT SANDER	139
9924DB	3" X 24" BELT SANDER W/BAG	148
9401	4" X 24" BELT SANDER W/BAG	167
JR3000V	RECIPRO SAW W/CASE	121
6510LVR	3/8" VSR DRILL	85
6093DW	3/8" CORDLESS KIT 2SP VSR	127
EXTRA	9.6 VOLT BATTERY W/PURCHASE	26
B04510	4-3/8" X 4" FINISH SANDER	48

FREUD

JS-100	PLATE JOINER W/CASE	$159
EC-900	DOOR SYSTEM SHAPER SET	278
94-100	DOOR SYSTEM ROUTER SET	158
FB-107	7 PC. FORSTNER BIT SET	49
FB-100	16 PC. FORSTNER BIT SET	149
FT2000	ROUTER	185

SAW BLADES
5/8" BORE, INDUSTRIAL GRADE, CARBIDE TIPPPED

LU72M010	Gen. Purp. A.T.B.	10"	40	58	39
LU81M010	Gen. Purp.	10"	40	45	43
LU82M010	Cut-off	10"	50	77	45
LU84M011	Combination	10"	50	55	42
LU85M010	Super Cut-off	10"	80	95	57
LM72M010	Ripping	10"	24	57	38
LU73M010	Cut off	10"	60	70	44
LU87M010	Thin kerf	10"	24	68	39
LU88M010	Thin kerf	10"	60	74	44
LU98M010	Ultimate	10"	80	107	79
LU89M010	Non-ferrous metal	10"	72	87	59
PS203	Plywood	7-1/4"	40	36	25
PS303	Gen'l Purp.	7-1/4"	24	25	19
DS306	6" Dado - Carbide			184	105
DS308	8" Dado - Carbide			196	109
F0	1-3/4"x1/8" Biscuits 1000 Qty			32	27
710	2-1/8"x3/8" Biscuits 1000 Qty			32	27
F20	2-3/8"x1" Biscuits 1000 Qty			34	27
FA	Assorts Biscuits 1000 Qty			34	27
WC104	4 pc. chisel set w/cse. 1/4"-1"			54	39
WC106	6 pc. chisel set w/cse. 1/4"-1"			73	52
WC110	10 pc. chisel set w/cse. 1/4"-1-1/2"			119	79
FB100	16 pc. forstner bit set 1/4"-2-1/4"			284	149
94-100	5 pc. router bit door system			230	155
JS100	Biscuit Jointer w/cse.			300	153

ALL ROUTER BITS 35% OFF!!

LEIGH DOVETAIL JIGS
D1258-12—List 314.00—Sale 268.00
D1258-24—List 375.00—Sale 303.00
LEIGH INSTRUCTIONAL VIDEO—SALE 29.00!!

PORTER—CABLE

330	SPEED BLOC SANDER	$55
351	3 X 21 SANDER	125
352	3 X 21 SANDER W/BAG	128
360	3 X 24 SANDER W/BAG	175
361	3 X 24 SANDER	169
362	4 X 24 SANDER W/BAG	185
363	4 X 24 SANDER	181
617	7-1/4" SAW 13 AMP	114
315	7-1/4" SAW 13 AMP	114
314	4-1/2" TRIM SAW	124
690	1-1/2 HP ROUTER	121
9118	PORTA PLANE KIT	185
555	PLATE JOINER W/CASE	159
505	1/2 SHEET PAD SANDER	109
7334	RANDOM ORBIT SANDER	118

POWERMATIC
Model 66 Table Saw

50" Biesemeyer Rip Fence, 3HP 1PH or 5HP, 3 PH motor

F.O.B. Our Warehouse

Model 180 18" Planer
7 1/2 HP, 3 PH OR 5 HP, 1 PH motor
Knife Grinder, Sectional Roll and Chipbreaker.

Call For Our Low Prices!
We carry the entire Powermatic line at very attractive prices. Please call for our prices on the Model 66 and other Powermatic machies. You'll be glad you did!

TARHEEL FILING CO., INC.
CALL TOLL FREE 1-800-322-6641
LOCAL 919-231-3323
FAX 919-231-9980
MAIL CHECK OR MONEY ORDER TO TARHEEL FILING
3400 LAKE WOODARD DR., RALEIGH, NC 27604

PLEASE MENTION THIS AD WHEN YOU CALL!
ORDERS PLACED BY VISA, MASTERCARD, CASHIER CHECKS OR MONEY ORDERS WILL BE SHIPPED THE SAME DAY. ALLOW 2-3 WEEKS FOR PERSONAL OR COMPANY CHECKS.
FREE FREIGHT ON PORTABLES (CONT. U.S.A. ONLY).
NO COD'S PLEASE. ERRORS SUBJECT TO CORRECTION

ORDER 1-800-328-0457 - MAIL ORDER HOURS 7:00-5:30 C.S.T. MONDAY-FRIDAY

DELTA BENCH TDP TOOLS

Model		List	Sale
23-700	Wet/dry grinder	201	159
23-680	6" bench grinder 1/4 H.P.	81	75
23-880	8" bench grinder 1/2 H.P.	136	115
23-980	10" bench grinder 1 H.P.	246	235
11-950	8" drill press	164	135
14-040	14" drill press	313	309
40-150	15" hobby scroll saw	178	139
28-160	10" hobby band saw	189	144
31-050	1" belt sander 2.0 amp.	93	78
31-460	4" belt/disc sander	178	139
31-340	NEW 1" belt/8" disc sander	226	175

NEW TOOLS BY DELTA

40-560	16" 2 spd scroll saw	266	185
23-580	5" Bench grinder 1/5HP	60	54
11-990	12" Bench Drill Press	266	185

DELTA STATIONARY

34-761	10" unisaw 1-1/2 H.P.	1715	1399
34-740	Super 10" mtrzd. tbl. saw	690	399
28-560	16" Band Saw	503	399
33-990	10" radial arm saw	727	569
11-072	32" radial drill press	487	409
37-280	6" motorized jointer	440	379
50-179	3/4 H.P.2 stg. dust coll.	435	339
50-180	1 H.P. dust collector	535	439
50-181	2 H.P. dust collector	760	599
22-667	13" planer w/2 HP motor, w/stand & ext. wings	1750	1089
33-050	NEW 8-1/4" Sawbuck	742	545
34-330	NEW 8-1/4" Tbl Saw 13A	321	209
34-670	10" mtrzd table saw	437	365
34-985	1/6 H.P. stock feeder	698	599
32-100	NEW station plate joint.	645	459
36-040	NEW 8-1/4 cmpd mitre	216	155
34-897	50" Delta unifence	500	338

MILWAUKEE TOOLS

0399-1	NEW 12V cdlss var/spd drill w/batt., charger & case	280	159
0395-1	9.6V cdlss. drill w/cse	264	149
0219-1	9.6V cdlss. drill w/cse	277	165
0385-1	7.2V cdlss. drill w/cse	174	105
0224-1	3/8" drill 4.5A magnum	189	114
0234-1	1/2" drill 4.5A mag 0-850rpm	199	110
0244-1	1/2" drill 4.5A mag 0-600rpm	199	110
0222-1	3/8" drill 3.5A 0-1000 rpm	174	99
0228-1	3/8" drill 3.5A 0-1000 rpm	164	97
0375-1	3/8" close quarter drill	208	119
0379-1	1/2" close quarter drill	243	149
6539-1	Cdls. scrdrv. 190 rpm	113	69
6540-1	Cdls. scrdrv. w/bits&cse.	154	88
6546-1	Cdls. scrdrv. 200&400rpm	120	75
3102-1	Plmbrs rt angle drill kit	330	189
3002-1	Electricians rt angle drill	320	185
5399	1/2" D-hdle ham drill kit	304	175
1676-1	H.D. Hole Hawg w/cs	415	229
6511	2 sp SawZall w/case	214	125
6405	8-1/4" circle saw	219	129
6750-1	Drywall gun 0-4000 4.5A	154	95
6507	TSC SawZall w/case	229	129
6170	14" chop saw	430	259
6012	Orb.sand 3-5/8"x7-3/8	189	115
6014	Orb.sand 4.5" x 9.25"	199	118
6305	6-1/4" cdls. circle saw	299	175
8977	Var. temp heat gun	114	75
5397-1	3/8" v/sp ham. drill kit	232	137
5371-1	1/2" v/sp ham. drill kit	318	185
3107-1	1/2" v/sp rt angle drill kit	340	195
6754-1	Drywall gun 0-4000 4.5A	179	119
6747-1	Drywall driver-0-2500	154	99
0230-1	3/8" drill 0-1700 rpm	179	105
3300-1	1/2" v/sp mag rt angle kt	299	179
5620	Router 1 H.P.	289	175
5660	Router 1-1/2 H.P.-10A	299	185
5680	Router 2 H.P.-12A	350	225
5455	7/8" polisher 1750rpm	209	129
6215	16" chain saw	280	169
8975	Heat gun	89	59
6365	7-1/4" circular saw	195	114
6366	7-1/4" circ.saw w/fnc&bld	204	119
6368	7-1/4" circ.saw w/fence blade & case	233	129
0216-1	2 sp cdls drill Hi-torque	222	129
0235-1	1/2" drill kyls. chuck mag	209	119
6016	1/4 sheet pad sander	79	49
6145	4.5" grinder 10,000 rpm	154	95
6142	6145 w/cse & access	192	119
6749-1	Drywall gun 0-2500 4.5A	189	125
6377	7-1/4" worm drive saw	295	169
6378	8-1/2" worm drive saw	316	189

DAVIO WHITE Instruments

LP6-20	Level Package	300	198
LT8-300	Level-Transit	640	465
LT8300P	Level-Trans.w/opt. plum	755	509
LT6-900	Level-Transit	380	239

BOSTITCH AIR NAILERS

Model		List	Sale
N80C-1	Utility coil nailer	795	399
N80S-1	Stick nailer	795	399
T36-50	Sheath & decking stapler	595	334
N12B-1	Coil roofing nailer	795	399
N60FN-2	Finishing nailer	625	335
T31	Brad nailer	245	149

PANASONIC CORDLESS

Model		List	Sale
EY6205B	NEW v/spd. 12 volt drill w/15 minute charger	390	219
EY6200B	NEW 2 spd. 12 volt drill d-hdle w/15 minute charger	350	195
EY6281B	NEW v/spd. 9.6 volt drill w/15 minute charger	350	198
EY571B	V/spd. 9.6 volt drill	239	135

MAKITA CORDLESS

Model		List	Sale
6070DW	3/8" v/sp rev. drill. 7.2v	130	78
6071DWK	3/8" v/sp rev. drill w/removable batt, 7.2v	199	115
5090DW	3-3/8" saw kit, 9.6v	256	139
6010DWK	3/8" cdls drill kit, 7.2v	164	95
6010SDW	3/8" cdls drill, 7.2v	99	65
OA3000DW	3/8" angle drill, 7.2v	251	139
8400DW	Hammer drill kit, 9.6v	272	149
4390DW	9.6v cdls. recip saw kit	230	128
4300DW	Jig saw kit comp., 9.6v	232	129
6012HOW	2 spd. driver drill w/clutch & cse 9.6v	236	119
6092DW	V/sp drill, kit comp	250	125
6093DW	V/sp drill w/clutch-comp.	261	127
6891DW	Drywall gun 0-1400 9.6v	237	135
632007-4	9.6 volt battery	48	30
632002-4	7.2 volt battery	40	28
5007NBA	7-1/4" saw w/elec. brake	233	128
5008NBA	8-1/4" saw w/elec. brake	284	158
BD4510	1/4 sheet pad sander	85	54
9900B	3"x21" belt sander w/bag	268	148
9924DB	3"x24" belt sander w/bag	282	149
9045N	1/2 sht fin. sand. w/bag	231	129
4200N	4-3/8" circ. saw 7.5A	225	127
4301BV	Orb. v/sp jig saw 3.5A	289	155
JR3000V	Vs. recip saw w/cse	227	129
LS1020	New 10" miter saw	463	245
9820-2	Blade sharpener	373	199
1900BW	3-3/4" planer w/cse	209	115
1911B	4-3/8" planer 7.5A	240	139
1100	3-1/4" planer w/case	401	219
9207SPC	7" sander-polisher	276	155
3601B	1-3/8 H.P. router	255	139
3700B	1/2 H.P. trimmer	190	109
9501BZ	4" grinder, 3.5 amp	126	75
BD4530	6" round sander	101	59
BD4550	1/4 sht pad sand w/bag	86	55
OA3000R	3/8" angle drill	270	148
6302	3/8" v/sp 5.2Amp drill	209	119
HP2010N	3/4" v/sp hmr. drill w/cs	300	165
2708W	8-1/4" table saw	504	259
2711	10" table saw w/brake	841	489
2030N	12" planer/jointer	3120	1775
2040	15-5/8" planer	2595	1475
1805B	6-1/8" planer kit /case	679	359
5005BA	5-1/2" circular saw	223	135
6404	3/8" drill 0-2100 rpm 2A	104	65
6510LVR	3/8" drill rev. 0-1050 rpm	145	79
6013BR	1/2" drill rev. 6Amp	241	139
5402A	16" circular saw-12Amp	636	349
3612BR	3 H.P. plunge router	377	189
9401	4"x24" belt sander w/bg	318	169
3620	1-1/4 H.P. plunge router	192	109
4302C	V spd. orb. jig saw	302	159
5077B	7-1/4" Hypoid saw	252	145
LS1440	14" Miter saw	721	435
2414	14" cut-off saw AC/DC	351	199
5007NB	7-1/4" circ saw 13A	209	114
3612B	3 HP plunge rout sq/bs	377	189

SENCO AIR NAILERS

Model		List	Sale
SFN1	Finishing nailer 1"-2"	377	269
SFN2	Fin. nailer 1.5"-2.5"	571	395
SN325	Nailer 1-7/8"-3-1/4"	665	445
M2	Gen'l purpose 1-3/8"-2"	475	345
SN4	Gen'l purpose 2"-3-1/2"	685	469
LS2	Pinner 5/8"-1"	351	249
SKS	Stapler 5/8"-1-1/2"	351	249
LS5	Pinner 1"-1-1/2"	399	285

SKIL SIZZLERS

Model		List	Sale
6850-02	NEW 1/2" EMH hammer drill w/case 4 amp	255	129
5510	(551)5-1/2" circ saw	112	105
5625	(552)6-1/2" circ saw	175	129
5656	(553)7-1/4" circ saw	132	125
5750	(807)7-1/4" circ-dr ft	198	145
5790	(810)10-1/4" circ - dr ft	400	275
5825	(367)6-1/2" worm saw	229	155
5865	(825)8-1/4" worm saw	250	164
4580	Vari - orbit jig saw w/cse	144	105
3810	10" Miter saw	263	225
3810S	3810 w/60 tooth carb bld.		239
7575	1/4" palm sander	52	49
77	7-1/4" worm drive saw	230	145
5350	2-1/3 HP circ. saw	80.99	77
5250	2-1/4 HP circ. saw	68.99	66
2735-04	12v v/spd cordless drill complete w/cse. & 2 batt.	210	144

LEIGH DOVETAIL JIGS

D1258R-12-List 314.00-Sale 269.00
D1258R-24-List 375.00-Sale 305.00
LEIGH INSTRUCTIONAL VIDEO-SALE 29.00!!

MMT 500NEW	24" multiple mortise & tenon jig	509	399
MMT	12" multiple mort. & tenon attachment for D1258-12	269	219
MMT	24" multiple mort. & tenon attachment for D1258-24	299	239

HITACHI TOOLS

Model		List	Sale
TR8	Plunge router, 1-1/2 H.P.	219	119
M12V	NEW 3H.P. v/sp router	437	249
TR12	Plunge router, 3 H.P.	354	178
C10FA	10" dlxe. mitre saw	490	275
C12FA	NEW 12" mitre saw	586	339
C8FB	8-1/2" slide cmpd saw	859	469
FREUO LU91M008	8.5"c/bld 48 tooth	58	49
C15FB	15" miter saw	745	409
FREUO LU85M015	15"c/bld 108 tooth	181	115

1990 TOOL CATALOG AVAILABLE
Call Toll-Free 1-800-328-0457—In Minnesota Call (612) 224-4859
FAX: (612) 224-8263
CHECK • MONEY ORDER • VISA • MASTERCARD • DISCOVER
SEVEN CORNERS ACE HDW. Inc.
216 West 7th St. • St. Paul, MN 55102 • Est. 1933

TOOLS ON SALE™
AMERICA'S LOWEST PRICED TOOLS
FREE FREIGHT TO THE
48 CONTINENTAL STATES ON EVERY ITEM.
PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

DELTA TOOLS

34-444 Table Saw Complete w/1-1/2 H.P. motor & stand 619.00

34-445—34-444 Table Saw complete w/30" Unilence 799.00

37-154 DJ15 6" Jointer w/3/4 H.P. motor 1029.00

28-28314" Band Saw w/enclosed stand 3/4 H.P. motor 699.00

70-200 NEW 20" Drill Press 709.00

17-90016-1/2" Floor Drill Press 385.00

40-601 18" Scroll Saw w/stand and blades 699.00

DELTA #34-080 10" MITER BOX XTRA SPECIAL 199.00 List 289.00

PIRANHA By Black & Decker CARBIDE TOOTH SAW BLADE

Model #	Dia.	#Teeth	List	Sale
73-716	6-1/2	18	13.70	7.35
73-756	6-1/2	36	30.45	16.85
73-717	7-1/4	18	13.90	7.99
73-737	7-1/4	24	17.20	9.29
73-757	7-1/4	40	31.30	16.79
73-758	8	40	43.80	24.85
73-759	8-1/4	40	44.65	24.99
73-719	8-1/4	22	19.65	11.95
73-739	9	30	32.35	16.79
73-769	9	60	68.35	35.99
73-715	5-1/2	16	13.70	7.99
73-704	7-1/4	18	20.20	12.85

THE SPECIAL BLACK AND DECKER PIRANHA BLADE PRICES ARE BACK!!!

Model#	Dia.#	Teeth	List	Sale
73-740	10	32	33.20	15.95
73-770	10	60	61.46	29.95
73-711	10	50	65.08	29.95

JORGENSEN STEEL I-BAR CLAMPS

Model	Size	List	Sale
7224	24"	27.11	17.55
7236	36"	29.10	18.65
7248	48"	31.96	19.75
7260	60"	35.60	23.55
7272	72"	37.30	25.29

ADJUSTABLE HANDSCREWS BY JORGENSEN

Item#	Jaw Length	Open Cap	List	Sale	Box of 6
#3/0	6"	3"	15.57	8.89	49.98
#2/0	7"	3-1/2"	16.74	9.95	53.55
#0	8"	4-1/2"	18.63	11.95	62.95
#1	10"	6"	21.30	12.99	71.49
#2	12"	8-1/2"	24.45	15.95	81.89
#3	14"	10"	31.01	18.95	104.95
#4	16"	12"	40.30	24.89	146.85

STYLE "J" ADJUSTABLE HANDSCREW KITS

Model	Jaw Length	List	Sale	Lots of 6
J06	6"	8.50	5.49	31.29
J08	8"	9.50	6.09	34.69
J10	10"	11.10	8.89	50.55
J12	12"	13.79	9.99	54.95

STYLE 37 2-1/2" Throat 1/4"x3/4" JORGENSEN

Item#	Jaw Length	List	Sale	Box of 6
3706	6"	9.30	6.29	35.65
3712	12"	10.30	6.79	38.59
3718	18"	11.37	7.35	41.69
3724	24"	12.42	7.99	45.25
3730	30"	13.85	9.05	51.19
3736	36"	15.15	9.95	56.65

PONY SPRING CLAMPS

Model	Size	List	Sale	Lots of 25
3201HT	1"	2.25	1.35	31.99
3202HT	2"	3.39	1.85	43.95
3203HT	3"	6.45	4.04	89.00
3204HT	4"	10.75	6.99	159.00

PONY CLAMP FIXTURES

Model		List	Sale	Lots of 12
50	3/4" black pipe clamps	13.10	7.89	83.99
52	1/2" black pipe clamps	10.93	6.30	68.25

BOSCH

Model		List	Sale
1581VS	Top hdle. jig saw	239	133
1582VSC	NEW CLIC Barrell jig saw	245	133
1582VS	Barrell grip jig saw	225	124
	Bosch metal case for above jig saws	34	30
	Bosch blade assortment for jig saws 30 of Bosch's best selling blades		25.99
1942	Heat gun 650°-900°	99	75
1272D	3"x24" belt sander w/bag	299	175
1273D	4"x24" belt sander w/bag	315	182
11-212VSR	Bulldog 3/4" SDS rtry. drill	339	195
1198VSR	1/2" v/sp hammer drill	229	135
1608	5.6A lam trimmer	140	89
1608L	Same/above w/trim gd	145	92
1609	5.6A offset base trimmer	205	122
1609K	Lam installers kit w/1609	295	169
1601	1 HP Router	165	105
1602	1-1/2 HP Router	199	125
1603	1/2 HP D hndl router	223	139
1604	1-3/4 HP 2 hdle router	219	122
1604K	Same/above w/cs&acc.	269	166
1606	1-3/4 HP D hdle. Router	243	149
3258	3-1/4" planer w/blde grd	210	129
3270D	3"x21" belt sand.w/bag	225	135
1273DVS	V/sp 4x24 belt sander	339	189
1611	3 H.P. plunge router	349	205
1611EVS	3 H.P. V/sp router	410	234
1651	7-1/4" circ.saw drop ft	179	109
1654	7-1/4" circ. saw pvt base	179	109
1632VSRK	Recip saw 8.4A orb-v/sp.	225	135
3050 VSRK	NEW 9.6V v/sp cdls.drill w/case & 2 batteries	235	135
3283DVS	NEW 5" Random orbit disc sander 2.3 Amp	159	119

HEGNER SCROLL SAWS

Model		List	Sale
Multi Max II	w/stand	699	625
Multi Max 14	var./spd. w/stand	799	695
Multi Max 18	var./spd. w/stand	999	819

ELU BY BLACK & DECKER

Model	Description	List	Sale
3338	2.25 HPv/sp plunge rout.	387	255
3337	2.25 HP plunge router	356	238
3304	1 HP v/sp plunge router.	261	178
3375	3-1/8" univ. planer 7.2A	280	188
3380	Biscuit jointer w/case	485	318
4024	3x21 v/sp belt sander	289	195
3303	1 H.P. plunge router	210	159
4023	3x21" belt sander 5.2A	261	185
4029	4x24" belt sander 9.2A	469	319

BLACK & DECKER

Model		List	Sale
1166	3/8" drill 0-2500rpm 4A	96	59
2600	3/8" drill 0-1200rpm 4.5A	125	85
1707	8.5" crosscut miter saw	813	449
1703	10" miter saw w/73-770 bld	313	179
3157	Orbital v/sp jig saw	203	125
3153	Variable speed jig saw	195	120
3047-09	7-1/4" super saw cat w/br	282	169
3048-09	8-1/4" super saw cat w/br.	297	185

BIESEMEYER FENCES

	50" commer. saw fence	329	285
	52" homeshop saw fence	249	225

JET TOOLS

Model	Description	List	Sale
JBS-14MW	14" band saw 1 HP	482	385
JTS-10	10" tbl saw w/std 1.5 HP	554	459
JTS-12	12" tbl saw w/std 1.5 HP	630	509
JWS-18	1/2" shaper w/std 1 HP	479	375
JJ-4	4" jointer, 1/2 H.P.	310	285
JJ-6	6" jointer, 3/4 H.P.	465	385
JWP12	12.5" bench plnr 2 H.P.	569	375
JWP12D	Dust chute for JWP12	45	22
JSG-6	6 x 48 belt & 12" disc sander, 1-1/2 H.P.	634	465
OR1458	14" bnch drll prs .5 HP	279	259
OR1758	17" bnch drll prs.5 HP	319	279
OR1458F	14" flr drll press 3/4 HP	369	325
OR1758F	17" flr drll press 3/4 HP	395	339
OR2501F	20.5" flr drill press1 HP	655	519

RYOBI SPECIALS

Model	Description	List	Sale
R500	2-1/4 HP plunge router	326	155
TS25IU	10" miter saw	392	185
TS25IUS	10" miter w/acc. kit & B&D 73-770 carb bld	435	225
AP10	10" surface planer 13A.	820	358
RA200	8-1/4" radial arm saw	515	249
RE600	3 H.P. plunge router	398	215
R150K	1 HP plunge router w/cs	206	105
BE321	3x21" v/sp belt sander	259	135
JP-155	6-1/8" jointer-planer	602	315

PORTER CABLE

690	1.5 HP router 8A	225	128
691	1.5 HP router D hdle	245	137
536	1.5 HP speedmatic router	310	195
518	3 HP 5 speed router	560	338
520	3 HP 15A router	510	315
695	1.5 HP router/shaper	310	198
696	H.D. shaper table	170	119
351	3"x21" belt sand w/o bag	225	128
352	3"x21" belt sand w/bag	235	133
360	3"x24" belt sand w/bag	310	175
361	3"x24" belt sand w/o bag	290	169
362	4"x24" belt sand w/bag	325	185
363	4"x24" belt sand w/o bag	310	179
315-1	7-1/4" top hdle circ saw	195	115
9315-1	315-1 comp w/cs&carb bld.	225	129
617	7-1/4" pushhandle saw	195	115
9617	617 comp. w/cs & carb bld.	225	129
314	4-1/2" trim saw 4.5A	215	128
9548	X HD bayonet saw w/cs	290	192
9629	Recip saw v/sp 8A	235	137
9627	Recip saw 2 spd 8A	225	128
666	3/8" HD vsp drill 0-1200rpm	185	122
621	3/8" HD vsp 0-1000rpm	155	95
320	Abrasive plane 3Amp	160	109
9118	Porta plane kit 7Amp	335	185
7545	0-2500 drywall gun 5.2A	169	104
7540	0-4000 drywall gun 5.2A	165	102
505	1/2 sheet pad sander	195	109
7511	3/8" v/sp drill 5.2Amp	185	112
7514	1/2" v/sp drill 0-750rpm	195	119
537	1.5 HP D hdle router	325	203
7548	Top hdl jig saw 4.8A	230	129
7648	Barrel grip jig saw 4.8A	225	139
330	Speed block sand 1/4 sht	97	55
555	Plate biscuit jointer w/cs	299	165
345	6" saw boss 9Amp	170	99
9345	345 comp. w/cs&carb bld.	220	129
5060	"Stair Ease" stair templet	194	129
100	7/8 H.P. router	165	105
5008	Dovetail template kit	99.50	79
5009	Mortise & Tenon jig	54.95	49
5116	Omni-Jig	395	265
9647	TIGER CUB recip saw	195	119
9850	12v cordless drill w/cse.	230	135
8500	Extra 12v battery	48	35
	NEW Tools By Porter Cable!		
9637	Full v/sp recip saw 8 A	240	135
7538	3-1/4 HP plunge router	399	249
7399	5.6A drywall cutout unit	120	75
7310	5.6A lam trimmer	145	89
7312	5.6A offset base lam trim.	209	119
7319	5.6 A tilt base lam trimmer	165	105
97310	Lam Trim Kit w/std. Base, Tilt Base, Offset Base, Slitter Base, Guide & Cs	330	185
7334	5" random orbit sander	205	119
693	1.5 H.P. plunge router	280	165
6931	Plunge router base	120	75

7334K Kit includes: 7334 Sander 44350 case, w/1 roll of 100X & 150X discs
SUPER SPECIAL 149.95

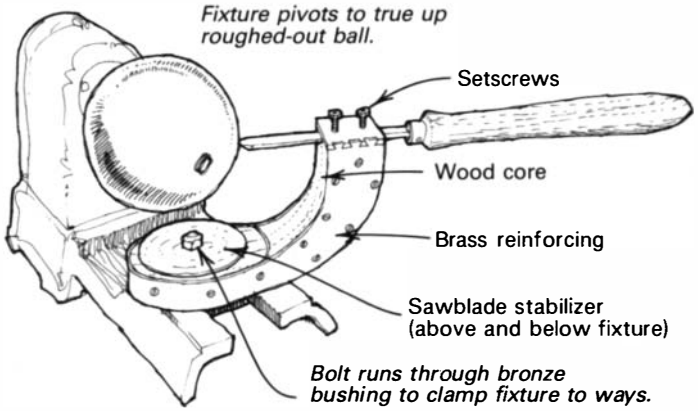
FREE FREIGHT TO THE 48 CONTINENTAL STATES ON EVERY ITEM•GIFT CERTIFICATES NOW AVAILABLE

READER SERVICE NO. 57

draw the dowel past the corner to form a series of grooves.
—John A. Graydon, Islington, Ont., Canada

Quick tip: A simple adjustment mechanism for benchdogs is to staple a 1-in.-wide strip of inner tube to the underside of your bench so that the rubber covers one-half of the benchdog hole. The rubber holds the dog at any height and allows the dog to be replaced quickly. *—Barrie Graham, Arundel, Que., Canada*

Sphere-turning lathe attachment



In 1946, a friend described a ball-turning device his machinist had made to fit an Atlas lathe. Unfortunately, I never got a chance to look at it. I've tried to design and make an attachment ever since, and recently I succeeded. Although the machinist had made the fixture entirely of metal, I used wood for the fixture's core and reinforced it on the sides with sheet brass.

The fixture bolts to the lathe's bed and holds a gouge at a height that's on line with the lathe's centers. Then, with the lathe running, the fixture is pivoted to make the final cleanup passes on a previously roughed-out ball. The final diameter of the sphere is determined by the projection of the gouge's tip from the block.

To make the fixture, I bandsawed the wooden core from an old bridge beam and machined the top and bottom of the base flat with a rotary planer in a drill press. Then, I drilled a ⅝-in.-dia. hole through the base to take a bronze bushing. The bushing's length is critical; it must extend from the tool-rest attachment bracket below the ways that I use for bolting the fixture to the lathe bed, up through the base of the fixture and 1/64 in. above the upper steel plate. If the bushing is shorter, the fixture will be clamped tightly to the lathe and won't rotate; any longer and there will be too much slop as the fixture pivots. The steel plates are actually sawblade stabilizers from Sears (part no. 94952). They have a ⅝-in. hole, just right for the bushing, and act as large washers that the fixture's arm pivots between. Following a cardboard pattern, I cut out the 3/32-in.-thick hard sheet brass that surrounds the wood core, and drilled and countersunk it for screws. I used ⅛-in.-thick brass for the cap, which I dovetailed into the brass sides and tapped for the setscrews that hold the gouge.

The gouge sits in a groove cut into the top of the core under the brass cap. It's critical that the gouge's cutting edge be the same height as the lathe's center; so adjust the depth of the groove for the gouge you're using. *—Ralph M. Luman, Virginia Beach, Va.*

Methods of Work buys readers' tips, jigs and tricks. Send details, sketches (we'll redraw them) and photos to Methods, Fine Woodworking, *Box 5506, Newtown, Conn. 06470-5506. We'll return only those contributions that include an SASE.*

No Texas brags just low tool prices!

PORTER-CABLE

100	7/8 HP router	$93.00
330	Speed-Bloc sander with Stikit ™ pad	54.00
	4" x 30" Stikit™ rolls (80,100, 120, 150, 180, 220, or 320 grit)	11.95
	#13599 dispenser	11.95
555	Plate joiner w/case	158.00
	Biscuits, (box of 1000) assorted 0, 10 or 20	27.00
659	0-4000 VSR Screwdriver	78.00
693	1-1/2 HP Plunge router w/1/4" & 1/2" collets	164.00
696	Router table - fits all P-C routers	117.00
6931	New! Plunge base For Porter-Cable models 100, 690,691 and Bosch models 1601, 1602, 1604, 1606	74.00
7334	New! Random orbit sander	118.00
	5" Stikit ™ discs, 80 grit	20.00
	(100, 120, 150 or 220 grit)	12.50
	contour or standard pad	14.75
7538	New! 3-1/4HP Plunge router	245.00

PANASONIC

EY6205B	12v.15 min charge 3/8" drill, keyless chuck, V.S.R.	$199.00
EY6200B	12v., 15 min. charge, 1/2" drill	189.00
EY6281B	9.6v., 15 min. charge, 3/8" drill, kl.ck., V.S.R., electric brake	185.00
EY571B	9.6v., 1 hr. charge, 3/8" drill, kl. ck., V.S.R., clutch.	129.00
EY561B	7.2v., 2-speed, 1 hr. charge, 3/8" drill	99.00
EY503B	2.4 v. screwdriver, 2-speed, flexible from pistol to straight	62.00

Free freight on orders over $50

Prices subject to change without notice

Texas Residents add 8% state sales tax

C.O.D. add $3.30

Visa and Master Card accepted

HOURS 9:00-5:30 Mon. thru Fri. 10:00-5:00 Sat.

Serving the industry for over 9 years

MILWAUKEE

6365	7-1/4" Circular saw	$117.00
0394-1	9.6v., 3/8" Cordless driver drill, w/battery, 1/2 hr. charger and case	140.00
5936	4" x 24" Belt sander w/dust collector	196.00
6016	Finishing sander, 1/4 sheet	45.00
6236	2-speed AC/DC deep cut band saw	259.00
6256	Top handle jig saw	121.00

HITACHI

SV125A	Palm sander	$39.00
C8FB	8-1/2" Slide compound miter saw	467.00
C75A	7-1/4" Circular saw	69.00
TR12	3-HP Plunge action router 1/2",3/8" & 1/4"	169.00
C15FB	15" Miter saw 2.7 HP	389.00
C12FA	12" Miter saw 2.7 HP	339.00
SB75	3" x 21" Belt sander 2-speed	149.00
TR6	1/4" Laminate trimmer tilt base	93.00
CB75F	Resaw bandsaw 14-1/2" wheel/2.8 HP	1619.00
F1000A	Planer joiner 12" planer and 6" joiner	1499.00

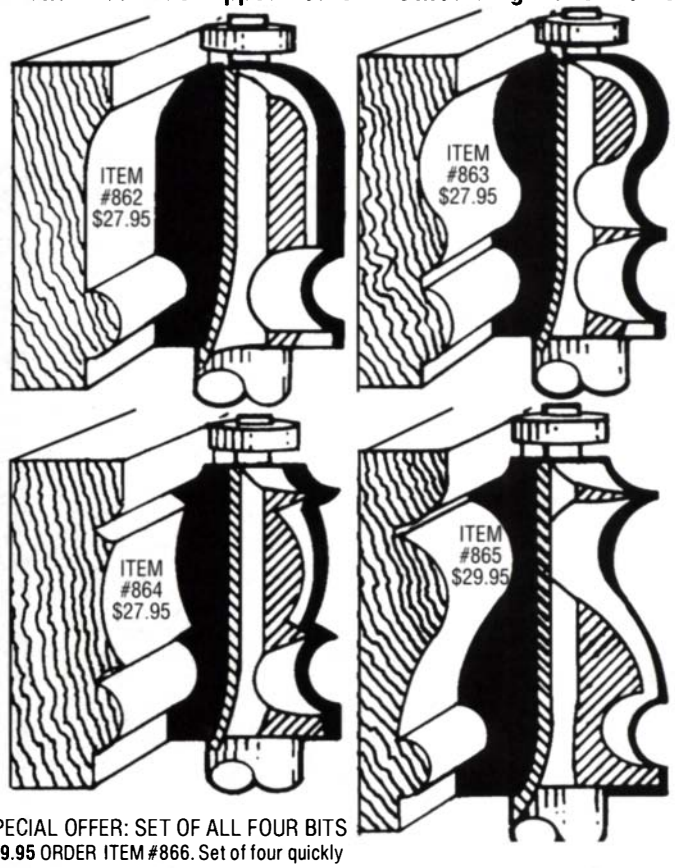
AMANA
Super Summer Carbide Sawblade Specials

610600 10"x60T - ATB
610601 10"x60T - TC
Your Choice $39.95
Call for other low prices on carbide router bits and saw blades

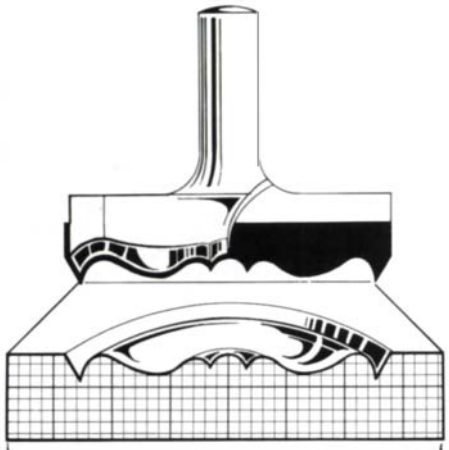
Gulf Central Tools
2102 Gulf Central Drive ■ Houston, Tx 77023
(713)921-0270 ■ FAX (713)-923-4949 ■ 1-800-275-6565
READER SERVICE NO. 39

Special Orders Welcome

1/2" Shank Carbide-Tipped Router Bits Moulding Plane Profiles



SPECIAL OFFER: SET OF ALL FOUR BITS
$99.95 ORDER ITEM #866. Set of four quickly produce classic traditional mouldings. Bits are shown **Full Size - 2 Flute Carbide Tipped.**
Order by VISA/ MasterCard, 7 Day / 24 Hour Service, Call **1-800-533-9298**
or send check to: **MLCS Ltd., P.O. Box 4053FD, Rydal, PA 19046**
READER SERVICE NO. 59



At Furnima we are seriously addressing the real potential of variable speed routers. Perfectly formed rosettes can be easily achieved using one of our two new Furnima rosette cutters and your variable speed plunge router. Comes with complete instructions and plans for a simple jig to facilitate high production rates of 200 quality rosettes an hour.

Model MRC-01 (1/2"shank dia.)
Block size 2 1/2"x 2 1/2" to 3 1/2" x 3 1/2"
O/A cutter Dia. 2 1/8" Price $87.99

Model MRC-02 (1/2"shank dia.)
Block size 3 "x 3 " to 4"x 4"
O/A cutter Dia. 2 5/8" Price $106.39

Our catalog is free

To order : Furnima USA 1-800-267-0744
CAN 1-800-267-8833

READER SERVICE NO. 91

✻ SANDPAPER ✻

NO GIMMICKS — GREAT PRICES

BELTS: GRITS ASSORTED

UNLESS OTHERWISE SPECIFIED

1 x 30	$.69 ea	3 x 24	$ .80 ea
1 x 42	.69 ea	3 x 27	.83 ea
1 x 44	.69 ea	4 x 21¾	.91 ea
2½ x 16	.73 ea	4 x 24	.94 ea
3 x 18	.74 ea	4 x 36	1.14 ea
3 x 21	.77 ea	6 x 48	2.98 ea
3 x 23¾	.80 ea	2¼ x 80	2.47 ea

OTHER SIZES ON REQUEST

NO LOAD PAPER

	50/pk	100/pk
180-A thru 400-A	$10/pk	$18/pk

PRESSURE SENSITIVE ADHESIVE DISCS!

6"	$1.06 ea	✻ OTHER ITEMS ✻
8"	1.99 ea	✻ WIDE BELTS
9"	2.46 ea	✻ ROLLS
10"	3.05 ea	✻ FLAP WHEELS
12"	4.45 ea	✻ PUMP SLEEVES
15"	6.95 ea	

SHEETS: (9 x 11) PRICE

CABINET PAPER

	50/pk	100/pk
40-D	$16/pk	$30/pk
50-D	15/pk	27/pk
60-D	14/pk	25/pk
80-D	13/pk	23/pk
100 thru 150C	12/pk	21/pk

FINISHING PAPER

	50/pk	100/pk
80-A	$ 9/pk	$16/pk
100 thru 280A	8/pk	14/pk

WET / DRY PAPER

	50/pk	100/pk
220 thru 600A	$13/pk	$23/pk

✻ JUMBO CLEANING STICK ✻
$8.80

SEND MAIL ORDERS TO:
ECON-ABRASIVES
P.O. BOX B865021
PLANO, TX 75086
NATIONAL 1-800-367-4101
IN TEXAS (214) 377-9779

✻ MINIMUM ORDER $25.00
✻ MASTERCARD, VISA OR CHECK
✻ SATISFACTION GUARANTEED!!
✻ TEXAS RES. ADD 7% SALES TAX
✻ SHIPPING CHARGES ADD $4.25

READER SERVICE NO. 106

Full-Size Professional Plan

ADIRONDACK CHAIR

Make this classic American design. Our special version may be folded for storage by using ordinary hardware available at your local store. Be ready for Summer and get your plan now!

Plan #700 . . . . . $12.95
(Catalog free with order)

CATALOG 200 full-size professional furniture plans — $3.00

FURNITURE DESIGNS, INC., Dept. KA-70
1827 Elmdale Ave., Glenview, IL 60025
(708) 657-7526

READER SERVICE NO. 303

PORTER+CABLE

The Fastest Way To A Fine Finish

New random orbit sanders do the work of two sanders; performs rapid stock removal almost as fast as a belt sander. . . removes stock three times faster than conventional finishing sanders while providing a swirl-free finish.

Now available in three models:

#7334 Standard 5" Sander..... 119.
#7335 Variable Speed 5" Sander.... 139.
#7336 Variable Speed 6" Sander.... 145.

WHOLE EARTH ACCESS
1-800-829-6300 • 822 Anthony St. • Berkeley, CA 94710
FREE FREIGHT VISA/MC

READER SERVICE NO. 75

✻NOW OPEN✻

OUR NEW ATLANTA SHOWROOM

404-416-6006

JOINTER
12" planing width 13-3/4 x 72" precision ground cast iron table3HP motor. JT-0012...$1895

INDUSTRIAL PLANER
7 5/6" max thickness, 1/4" max cut, 3 knives, return roller, mag. switch.
3 HP, 20" max width
WP-1120...$1990
5 HP, 24" max width
WP-1124...$2790

TILTING ARBOR TABLE SAW
Cast aluminum guide rail .Quick lock fence.
3HP Motor 2Belt drive
HTS0012A.$859
3HP Motor 3Belt drive
TS-1010...$1295

DUST COLLECTOR
1HP Motor
UFO-90.....$199
2HP Motor
UFO-101....$345
3HP Motor
UFO-102B..$495

WIDE BELT SANDER
3 precision bal. contact drums..Full pow. drive sanding& auto infeed. Computerizedl adj.table.
24" working width
A-2548....$6450
36" working width
A-3760....$9790

STROKE BELT SANDER
60"x21-1/4" sliding table,6" sanding belt width, 2 HP
SK-1500BS....$1590
80" x 21-1/4 sliding table,6" sanding belt width, 3 HP
SK-2100BS....$1890

DRUM SANDER
Double drums.Dust chute.1/4 HP feeding
15" 3 HP
SK-15DS...$1995
20" 3 HP
SK-20DS...$2250
25" 5 HP
SK-25DS...$2550

SPINDLE SHAPER
1" and 3/4" Spindle 3HP
28"x30" table F/R Switch
SK-30SPA..$849
SLIDING TABLE
SK-35ST....$239

18"BAND SAW 2HP, MBS-018...$959

Offering a complete line of fine quality tools including...
✔JOINTERS ✔LATHES
✔MORTISERS ✔PLANERS
✔SANDERS ✔SAWS ✔& more!

Featuring: CHIU TING

POWER FEEDER
1HP, 8 Speed, F/R
Two Year Warranty!
CT-280F....$990
1/4 HP
SK-321FD....$390
30 Days
FREE TRIAL!

NEW! VIDEO CATALOG$10
Refunded with ($500) order

TRUE VALUE & TRUE QUALITY

LOBO POWER TOOLS
9034 Bermudez Street, Box 890
Pico Rivera CA. 90660
(213)949-3747

In Canada:
Unit 3, 2375 Alpha Ave, Burnaby, B.C
Canada V5C 5L2 (604) 299-0911
All F.O.B. Pico Rivera,CA

Write or call now
FREE BROCHURE
Or $3, Catalog ($5 refunded with order)
One year free parts warranty
We specialize in customer satisfaction

READER SERVICE NO. 20

Solutions to mixing dyes

I run a small antique-furniture restoration and conservation business, and I prefer water-base dyes because of their transparent qualities, affordability and lightfastness. However, I'm wondering about the various possibilities of mixing these dyes: I've heard that water-base dyes can be mixed with other solvents to create solutions that supposedly make the dye both lightfast and non-grain-raising. Is this true, and if so, which are the best mixtures? ***—Thomas Darby, Vancouver, Wash.***

Chris Minick replies: The temptation to improve the properties of finishing materials by altering the solvent exists in all of us. Generally speaking, varnishes and lacquers are tolerant of minor solvent changes, but aniline dyes definitely are not. Changing the recommended solvent for an aniline dye can cause several interesting yet often undesirable effects. For example, a water-soluble aniline dye that produces a rich reddish-brown walnut stain on pine will produce an ugly yellow stain if dissolved in ethyl cellosolve. The same dye dissolved in methyl alcohol produces a purplish-gray stain on pine. Alcohol-soluble aniline dyes will likewise change colors if mixed in alternate solvents. A solvent change as seemingly minor as substituting butyl alcohol for methyl alcohol will cause a clear dark-brown walnut stain to become a muddy green brown; if mixed in water, a brilliant orange stain is produced.

The best way to ensure consistent color and color density with any aniline dye is to use the manufacturer's recommended solvent. However, simple experimentation on scrapwood will show the effect of solvent substitution with any particular aniline dye you choose, and you may wish to make up a sample board showing the various possibilities.

The pine sample board shown above was stained with a walnut-color aniline, with both water- and alcohol-soluble dyes mixed with various solvents. Top row, left to right is alcohol-soluble dye mixed with methyl alcohol, butyl alcohol, cellosolve, water; bottom row, left to right is water-soluble dye mixed with water, methyl alcohol, cellosolve, cellosolve/water mix.

[Chris Minick is a product development chemist and amateur woodworker in Stillwater, Minn.]

Titanium-nitride-coated router bits

Recently, several router-bit manufacturers have started selling special bits treated with titanium nitride. The cutting edges and surfaces of these bits have a characteristic golden color. How does the coating affect the cutting properties of the bit, and since these bits are expensive, are they a cost-effective alternative to carbide bits? ***—Charles R. Draney, Seattle, Wash.***

Mark Duginske replies: Titanium nitride is commonly used in a coating process for metal-cutting tools and has become available for router bits, shaper cutters and industrial-quality woodworking cutting tools. The primary advantage of such a coating is to increase the lubricity of the cutter, which makes chips and sawdust less likely to accumulate. This helps the cutting edge to run cooler, thus increasing the usable life of the edge before resharpening is necessary. Some manufacturers claim the coating increases edge life 5 to 10 times more than a non-coated high-speed-steel edge.

Most titanium-nitride-coated bit users that I've spoken to agree that the coating does increase edge life considerably; therefore, I think the coating is probably worth the added expense, especially on bits that are hard to sharpen because of their complex profile (intricate molding cutters, for example), or on bits used for router mortising, which tend to dull quickly in heavy use. However, in a production shop where a cutter is used all day long, it would probably be best to stick with carbide-tip or solid-carbide bits and cutters, which stay sharp longer than titanium-nitride-coated bits.

[Mark Duginske is a woodworker, teacher and author who lives in Wausau, Wisc.]

Shaping curved raised-panel doors

I am planning to build a set of kitchen cabinets that have frame-and-raised-panel doors that are curved at the top. Although I've made lots of regular raised-panel doors, I don't know how to go about shaping the curved rails and panels. Could you please help me out?

—Carl C. Steinmetz, Mercerville, N.J.

Steve Tipton replies: Creating raised-panel doors with curves requires more time and effort than making straight cuts, but the end result looks far more impressive and allows greater flexibility for creating a visually interesting kitchen. While the basic frame-and-panel construction remains the same, the curved top rails and panels require template-guided cutting on the shaper. The same shaper cutters used for cutting the cope, the bead or rabbet (on the back of the frame) and for raising the panels are used for the curved work, but with a special roller-bearing collar fitted on the spindle beneath the cutter. A hardboard template is tacked to the underside of the workpiece, and this rubs against the roller bearing and guides the cut.

When you're ready to begin the curved shaper work, all straight edges on panels, rails and stiles should already be done. The table fence, used to guide the work on straight cuts, is removed and the rub collar and cutter are installed. The next step is to make the template for the desired curve from ¼-in. hardboard, tempered Masonite or other thin stock. You'll need to make three templates: one each for the inner and outer curves on the top rails and one for the top edge of the panel. The template will ensure uniformity and a proper fit for all the door parts. After drawing the desired contour for each template, bandsaw the hardboard to within 1/16 in. outside the line, and carefully sand off the remaining material down to the line. I then use a 3-in.-dia. drum sander chucked in my drill press to follow the contours. This gives a smooth surface for the guide bearing to follow.

After the template is tacked onto the part, the work is carefully eased, freehand, into the cutter until the template contacts the guide bearing. To make this job safer, many shapers have a threaded hole in the tabletop to accept a small metal guide pin. This pin is used to stabilize the work as it is fed against the rotation of the cutters. Note that freehand shaping is an inherently dangerous operation—especially when using a large-diameter raised-panel cutter. Further, hold-down devices cannot be used with this setup, making the workpiece harder to control and more subject to dangerous kickback. Therefore, be sure to use extra caution when making freehand cuts, take light passes, use a guard over the spindle and cutter (shopmade, if necessary) and remember to ***always*** feed the stock ***against*** the rotation of the cutter.

[Steve Tipton is a woodworker in Calera, Ala.]

Motor capacity and shop wiring

I installed several 220v, single-phase electrical circuits in my new shop: five 20-amp circuits using no. 12 wire, and two 30-amp circuits using no. 10 wire. These are all one-receptacle-per-breaker circuits from a new feeder panel in

Grizzly IMPORTS, INC.

MUSCLES OUT THE COMPETITION

ORDER YOUR FREE CATALOG TODAY!

6" x 47" HEAVY DUTY JOINTER
MODEL G1182
REG. $375.00
SALE PRICE $345.00
F.O.B. Bellingham, WA or Williamsport, PA

6" x 48" COMBINATION SANDER
MODEL G1014
ONLY $195.00
F.O.B. Bellingham, WA or Williamsport, PA

1½ H.P. SHAPER
MODEL G1035
ONLY $495.00
F.O.B. Bellingham, WA or Williamsport, PA

15" PLANER
MODEL G1021
ONLY $735.00
F.O.B. Bellingham, WA or Williamsport, PA

WOOD SHAPER
MODEL G1024
ONLY $275.00
F.O.B. Bellingham, WA or Williamsport, PA

SLOW-SPEED GRINDER
MODEL G1036
ONLY $109.95

6" x 30" EDGE SANDER
MODEL G1531
ONLY $395.00
F.O.B. Bellingham, WA or Williamsport, PA

12" PLANER
MODEL G1017
ONLY $375.00
F.O.B. Bellingham, WA or Williamsport, PA

SUPER HEAVY DUTY TABLE SAW
MODEL G1023
ONLY $895.00
F.O.B. Bellingham, WA or Williamsport, PA

10" HEAVY DUTY TABLE SAW
with Cast Iron Wings!
MODEL G1022
REG. $365.00
SALE PRICE $355.00
F.O.B. Bellingham, WA or Williamsport, PA

16" BANDSAW
MODEL G1538
ONLY $525.00
F.O.B. Bellingham, WA or Williamsport, PA

20" PLANER
MODEL G1033
ONLY $1,295.00
F.O.B. Bellingham, WA or Williamsport, PA

2 H.P. DUST COLLECTOR
MODEL G1029
ONLY $295.00
F.O.B. Bellingham, WA or Williamsport, PA

West of the Mississippi contact:
P.O. Box 2069
Bellingham, WA 98227
Customer Service: 206-647-0801
1-800-541-5537
(Orders Only)

East of the Mississippi contact:
2406 Reach Road
Williamsport, PA 17701
Customer Service: 717-326-3806
1-800-523-4777
(Orders Only)

90-106

READER SERVICE NO. 62

my shop. However, the National Electric Code (NEC) says that the capacity of electrical circuits must be derated by 80%, which I interpret to mean that the largest allowable loads on my new circuits would be only 16 amps and 24 amps, respectively. Would I be in trouble plugging a 3-HP tablesaw, with a motor nameplate rated at 17 amps, into one of my 20-amp circuits? Am I interpreting the NEC correctly or am I being too conservative?

—Stephen R. Mosier, Greensboro, N.C.

Edward Cowern replies: Article 430 of the National Electric Code applies specifically to circuits for electric motors. It is quite true that the NEC does require conductors for motors to be oversize to the extent of 25% above the full-load nameplate current of the motors. This is equivalent to derating the wire to 80% of its normal capacity. Therefore, following the NEC to the letter, the wires for your tablesaw circuit *are not* adequate.

As a practical matter in a light-duty workshop, you would probably not experience any problems with the installation as it is. This is due to the character of woodworking operations. For example, the 3-HP motor would probably be under only a light load much of the time (depending on the material being cut). Under light-load conditions, the current used by the motor would be a good deal less than the amps stated on the nameplate. Also, cutting operations are not apt to last more than a few minutes at a time. For example, ripping a sheet of plywood from end to end might only take a minute to complete. Thus, the period of load is relatively small compared to the unloaded time. Also, you have the wires properly protected by the circuit breakers you've chosen.

The only time that you might experience difficulty is when you start up your tablesaw; the inrush of electrical current to the motor is a good deal higher than the 20-amp circuit breaker. Since the circuit breakers are probably of a thermal type, they would probably "ride through" the inrush of starting current without problems, but they may trip occasionally. If you do experience this problem, you could probably solve it by changing the circuit breaker to a larger size (up to 150%), which is allowed by the NEC for motor circuits of your existing wire rating. [Ed Cowern is an electrical engineer and president of EMS, a company that distributes Baldor electric motors.]

Finishing the inside of a cedar chest

Our shop has built several cedar chests, each constructed of solid aromatic cedar and finished with two coats of clear shellac, followed by one coat of sealer and a finish coat of polyurethane varnish. Unfortunately, we are having problems with what appears to be sap bleeding through the finish. I've seen numerous solid-cedar gift items with a finish that seems to seal in the natural oils found in aromatic cedar. Are these finishes a trade secret, and if so, how should we be finishing our cedar chests?

—David L. Stewart, Gillett, Pa.

Jon Arno replies: I am somewhat puzzled that the method you have been using didn't work. The shellac base coat is the key, and provided that the subsequent material will bond to shellac without softening it, your method should have been successful. However, if the wood was not thoroughly dry, it is conceivable that escaping moisture may have breached the shellac barrier and allowed the wood's oils to migrate into the varnish topcoat. Shellac will not hold up to moisture, and the wood's oils, which contain anti-oxidants, will raise havoc with some polymer-base varnishes.

Fortunately, I've learned of a durable aromatic-cedar finishing

SAVE $62

STOP "SCRATCHY" SAW CUTS and eliminate jointing and sanding.

Our Best Seller The 10" x 40T

Only $94 (List Price $156)

(other sizes available - see chart)

SALE PRICES!!
NO-CHIP BLADES & DADO SETS for MELAMINE & OAK/BIRCH VENEER
VERT. & HORIZ. PANL. SCOR. SETS
RADIAL & CHOP SAW
INQUIRE!!

The One Blade That Leaves A SMOOTH-AS-SANDED SURFACE!!!
(and lasts 10 to 20 sharpenings)

CALL 1 (800) 733-7111
IN NEW JERSEY (201) 473-5236. BUSINESS OPEN ACCT. CHECKS OR CREDIT CARD

- All purpose blade with 40 teeth and 1/8" or 3/32" thin kerf.
- Rips and Crosscuts 1" - 2" hard and soft woods.
- Cuts ply-veneers oak/birch with NO BOTTOM SPLINTER, (with blade set low and moderate feed rates).
- NO NEED TO CUT 1/16" OVERSIZE as JOINTING AND SANDING are USUALLY ELIMINATED (on a good machine).

WOODWORKER II (for table saws)

	List	SALE
14" x 40T x 1"	$215	$129
14" x 30T x 1"	195	117
12" x 40T x 1" 5/8" Bushing	183	109
12" x 30T x 1" add $3.25	162	97
10" x 40T 1/8" or 3/32"	156	94
30T 1/8" or 3/32"	135	81
9" x 40T	146	88
30T	125	75
8" x 40T 3/32"	136	82
30T 3/32"	115	69
7-1/4" x 30T 3/32"	112	49
7" x 30T 3/32"	112	49

5/8" holes, boring thru 1-1/4" add $7.50
Larger at Time Basis Shipping $3.50

FOR BETTER CUTS on all brands of blades, use our large 1/8" DAMPENERS-STIFFENERS against one side.
- Parallel and flat to .001
- Stop vibration, flutter, cutting noise and blade ring
- Tryable and returnable for full cash refund

6" ... $25
5" 24
4" 21

FREE dampener or $10 off with any 2nd blade
FULL RANGE OF OTHER INDUSTRIAL SIZES

40 years of fine American Saw Blade making & sharpening.

Dealer Inquiries Welcome

FORREST
MANUFACTURING COMPANY, INC.
461 River Road
Clifton, NJ 07014 1 (800) 733-7111

WE RECOMMEND OUR FACTORY SHARPENING (all makes of blades) (600 grit microscoped)
2-3 DAYS ON THESE AND ALL MAKES OF CARBIDE TIP SAWS.
SHIP UPS.
10 X 40T $15.00, 60T $17.75. ADD RETURN UPS $3 OR 2ND DAY AIR $5.

FORREST

BUSINESS OPEN ACCOUNT MasterCard VISA AMERICAN EXPRESS

TO ORDER BY MAIL, clip ad, circle choices and enclose payment. Specify Dept. FW when ordering.
PHONE TOLL FREE! 1 (800) 733-7111
To inquire Or Order in NJ: (201) 473-5236
SATISFACTION GUARANTEED OR FULL CASH REFUND.

READER SERVICE NO. 163

INTERNATIONAL TOOL CORPORATION

1939 TYLER STREET, HOLLYWOOD, FL 33020

MON.—FRI.
7:30 AM-4:00 PM ET

1-800-338-3384
(IN FLA 1-800-221-6767)

BOSCH CARBIDE ROUTER BITS

ALWAYS 40% OFF OF LIST PRICES

CHECK THESE EVERYDAY LOW PRICES

STRAIGHT BITS — TWO FLUTES

	Cut Dia.	Flute Lgth.	Shank Dia.	OUR PRICE
85213	1/8	3/8	1/4	$ 6.72
85214	3/16	1/16	1/4	$ 8.04
85221	1/4	3/8	1/4	$ 6.72
85250	1/4	7/8	1/4	$ 7.08
85459	1/4	7/8	1/4	$ 8.49
85460	1/4	7/8	1/2	$ 9.12
85613	1/4	1	1/4	$ 7.62
85223	9/32	7/8	1/4	$ 8.10
85224	5/16	7/8	1/4	$ 7.56
85225	3/8	7/8	1/4	$ 7.35
85276	3/8	29/32	3/8	$ 8.10
85241	3/8	1	1/2	$ 8.58
85226	7/16	7/8	1/4	$10.08
85233	7/16	7/8	1/2	$ 8.88
85227	1/2	7/8	1/4	$ 7.62
85427	1/2	1	1/2	$ 9.18
85242	1/2	1 1/2	1/2	$ 9.27
85251	1/2	2	1/2	$10.44
85229	9/16	5/8	1/4	$ 9.51
85230	5/8	5/8	1/4	$ 8.37
85454	5/8	1 1/8	1/2	$10.26
85231	11/16	5/8	1/4	$10.50
85232	3/4	5/8	1/4	$ 8.91
85265	3/4	1 1/8	1/2	$10.50
85262	13/16	5/8	1/4	$10.68
85457	13/16	1 1/8	1/2	$13.26
85458	7/8	1 1/8	1/2	$12.21
85243	1	1 1/8	1/2	$12.75

CALL FOR PRICES ON THE NEW BOSCH SOLID SURFACING BITS!

ROMAN OGEE BITS
TWO FLUTES, BALL BEARING PILOT

	Radius	Flute Lgth.	Shank Dia.	OUR PRICE
85270M	5/32	19/32	1/4	19.08
85591M	5/32	5/8	1/2	21.90
85271M	1/4	25/32	1/4	20.37
85592M	1/4	25/32	1/2	25.89

CLASSICAL BITS

85579M	1 1/4	1/2	1/4	23.07
85580M	1 1/4	1/2	1/2	24.96
85581M	1 1/2	5/8	1/2	29.13
85582M	1 1/2	5/8	1/2	29.31

ROUNDING OVER BITS
TWO FLUTES, BALL BEARING PILOT

85289M	1/16	5/16	1/4	16.20
85587M	1/16	5/16	1/2	17.40
85290M	1/8	5/16	1/4	16.74
85588M	1/8	5/16	1/2	17.94
85616M	5/32	5/32	1/4	15.60
85293M	3/16	3/64	1/4	15.54
85294M	1/4	35/64	1/4	15.60
85295M	5/16	3/64	1/4	16.74
85296M	3/8	9/64	1/4	16.83
85594M	3/8	9/64	1/2	20.97
85297M	1/2	5/64	1/4	18.39
85595M	1/2	5/64	1/2	21.69
85596M	5/8	15/16	1/2	27.12
85434M	3/4	1	1/2	32.34

OGEE BITS W/FILLET

85584M	1 3/8	9/16	1/4	25.05
85585M	1 3/8	9/16	1/2	25.80
85586M	1 5/8	11/16	1/2	27.99

Beading Stile and Rail Set
85620M $77.70

Ogee Stile and Rail Set
85625M $77.70

Raised Panel Cutters

Ogee	OUR PRICE
85638M	$57.00
85640M	$66.00

Raised Panel

85637M	$57.00
85639M	$66.00

BEADING BITS — TWO FLUTES
BALL BEARING PILOT

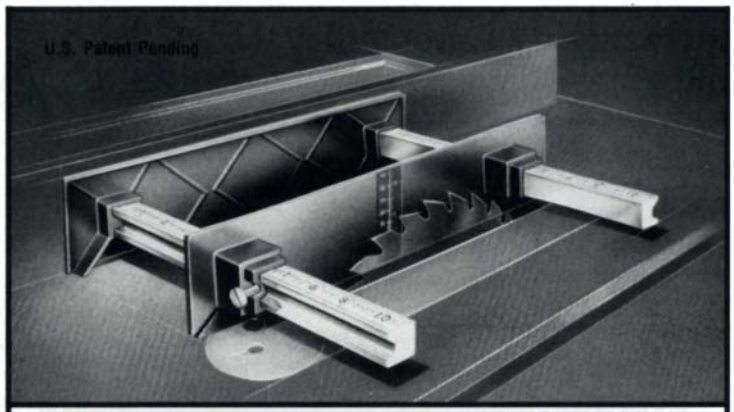
	Radius	Flute Lgth.	Shank Dia.	OUR PRICE
85493M	3/16	31/64	1/4	15.54
85494M	1/4	39/64	1/4	15.60
85495M	5/16	37/64	1/4	16.95
85496M	3/8	43/64	1/4	17.04
85599M	3/8	49/64	1/2	21.57
85497M	1/2	51/64	1/4	19.08
85600M	1/2	51/64	1/2	25.56

EDGE BEADING BIT

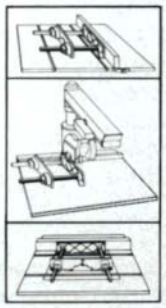
85631M	1/8	17/32	1/4	16.95
85632M	1/8	17/32	1/2	18.60
85666M	3/16	17/32	1/4	18.00
85667M	3/16	17/32	1/2	19.62
85668M	1/4	17/32	1/4	18.60
85669M	1/4	17/32	1/2	20.25

VISA & MASTERCARD * COD ADD $4.00 — FL.RES.ADD 6% SALES TAX
FREE FREIGHT & SAME DAY SHIPPING ON MOST ORDERS

READER SERVICE NO. 113



NOW, CUT WOOD ACCURATELY TO 10/1000"



Introducing **PARAGAUGE™**. The new parallel gauging tool for virtually every table and radial arm saw. It measures the distance from blade to fence so precisely, you can cut wood accurate to within ± 10/1000 of an inch.

PARAGAUGE. The portable gauge that produces perfect parallel alignment of the fence and your blade up to 10 inches in width, virtually eliminating kick back, binding, and burning.

PARAGAUGE. So versatile, you can use it to square your radial arm saw, gauge depth of cut, even set inside bevels. Use PARAGAUGE on router tables, band saws and drill presses, too.

WHY SPEND $100? $200? $300? or more on permanent fences?

SPECIAL INTRODUCTORY PRICE
$29.95
plus $3.50 S & H
MI res. add 4% sales tax

(Offer Expires 8/15/90)

To order **PARAGAUGE** using Mastercard or Visa:

Call 1-800-343-6129
(7 Day—24 Hour Order Service)

To order by check or for a FREE BROCHURE write:
Accuset Tool Co., Inc., P.O. Box 1088 Dept. F, Troy, MI 48099
30 Day Money Back Satisfaction Guarantee • SORRY, NO C.O.D.'s

READER SERVICE NO. 6

HOW WOULD YOU MAKE THESE WITHOUT Incra™ Jig

U.S. PATENT #4,793,604

These joints were made using the new ***Incra Templates****, with* ***Incra Jig*** *on the router table.*

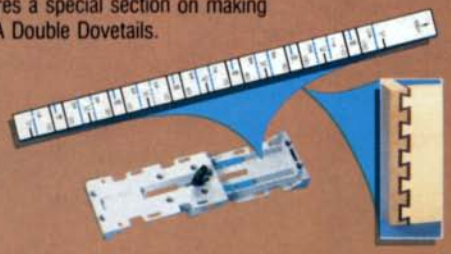
The intricate and beautiful joints shown here are just a small sampling of the flawless work that you can now readily accomplish with the unprecedented performance and accuracy that this remarkable new tool puts in your shop. No other dovetail jig, *regardless of cost,* can even come close to matching INCRA JIG's precision and versatility.

But the **INCRA Universal Precision Positioning Jig** is **much** more than just a dovetail and finger joint jig. It operates in **EXACT** 1/32" steps as a precision fence or stop block on your **router table, drill press, table saw, band saw, radial arm saw,** and more. Over-all error is under 1/500", and you can instantly return to any former position with a repeatability error that is unmeasurable.

Now Available

Set of 17 templates plus full-sized plans for making all of these joints plus hundreds of unique and beautiful variations. Just set INCRA JIG to the color-coded reference marks, and then rely on the precision of INCRA JIG's sawtooth positioning racks to lock each cut exactly into place for a perfectly fitting joint.

Handbook has 100 illustrated pages with detailed instructions and tips on getting the most out of your INCRA JIG. Includes expanded sections on making sliding, half-blind, and **THROUGH** dovetails with **ANY** combination of pin and tail spacing, using **ANY** dovetail bit ever manufactured. Features a special section on making INCRA Double Dovetails.



For a free brochure and your nearest dealer, write to:
Taylor Design Group, Inc. P.O. Box 810262 Dallas, TX 75381

INCRA Templates with included handbook are sold separately from INCRA JIG.

technique that's been used by one of the nation's largest and most respected furniture manufacturers for many years. Apply one coat of white shellac (4-lb. cut) directly to the raw but smoothly sanded wood. Allow at least 24 hours for the shellac to thoroughly dry (this is very important). Then, sand lightly with 220-grit or finer paper, and apply at least two coats of nitrocellulose lacquer, sanding lightly between coats until you have a glass-smooth surface.

For production reasons, the furniture manufacturer has recently substituted a new, proprietary vinyl precoat, which dries almost instantaneously, instead of the shellac. While the company won't let on to the composition of its secret vinyl sealer, I was assured that the shellac-base process described served well for more than 40 years. The company would still be using it if it didn't tie up its production line for 24 hours while the shellac cured bone dry.

As for the lacquer, the only caution is that it should be one which is formulated for application on wood so that it's flexible enough to allow expansion and contraction without cracking. Spray application of the lacquer produces the best results with the minimum number of coats.

[Jon Arno is a woodworker and amateur wood technologist in Schaumburg, Ill.]

Color-matching teak furniture

I made a breakfast table out of koa, and bought four chairs made of lacquered teak that matched the color of the koa reasonably well. However, when I oiled the koa table, it turned a reddish-brown color, destroying the match. Is there anything I can do to redden the teak or make the koa more brown?

—Mike Witkowski, Banks, Oreg.

Michael Dresdner replies: It is not easy to make one wood look like another, and although it is frequently done in commercial finishing shops, it's often at the expense of some of the natural depth of the wood being altered. As a rule, it's easier to make wood darker than lighter. If the finish on the teak chairs is a regular nitrocellulose lacquer, I'd suggest stripping them and coloring them with a reddish-brown stain, to bring them into line with the table. When you are happy with the color match, relacquer them, or oil them as you did the table. However, you should test the oil finish on an inconspicuous spot before finishing all the chairs, as the oil may unfavorably change the color of the wood, as you discovered previously. Unfortunately, if the teak chairs have been commercially produced, the most likely finish is catalyzed lacquer. This common commercial finish is notoriously difficult to remove, and you must get down to raw wood before staining.

On the other hand, while it is easier to refinish one table than four chairs, many oils are also quite difficult to remove. If you used a drying oil, such as linseed or tung oil, you'll probably have to use stripper to get it off. (For more on oil finishing, see *FWW* #75, pp. 45-47.) When the wood is clean and free of the oil, check the color by wetting it with naphtha or alcohol. This will give the wood the appearance it will assume under a clear finish. If it is acceptable, use a water-white lacquer or varnish to avoid adding any other color. If it is still too red, but not too dark, you can often mitigate red with a light-greenish-yellow stain. Of course, if the koa is too dark, your only recourse is to bleach it.

[Michael Dresdner is a Contributing Editor for *FWW* and an instrumentmaker and finishing consultant in Perkasie, Pa.]

Send queries, comments and sources of supply to Q & A, Fine Woodworking, *Box 5506, Newtown, Conn. 06470-5506.*

THE SANDER WITH WIDE APPEAL

44" TO BE PRECISE

Uniform thickness accuracy to within .010 of an inch–precision that you almost have to see to believe. Or take the word of thousands of woodworkers who are achieving flawless sanding results in their cabinet shops, craft shops, home workshops, custom furniture shops and in musical instrument making.

The Performax Component Sander appeals to such a wide variety of woodworkers because it allows you to select the components to fit your needs now with retrofitting options for potential heavier use later.

Plus, your sanding width won't ever be limited with the 44" wide sanding capacity, due to the open-end design of the Performax S/T Sander, which is just one of the many innovative features that makes the Performax Component Sander a wise investment and an excellent choice for all types of woodworking.

For a Free Brochure or the Dealer Nearest You Call or Write to:

PERFORMAX PRODUCTS, INC. 1-800-334-4910
12211 Woodlake Dr., PF, Burnsville, MN 55337

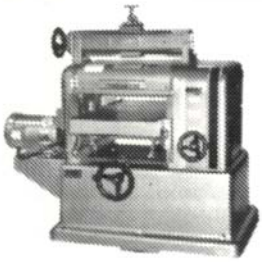
READER SERVICE NO. 108

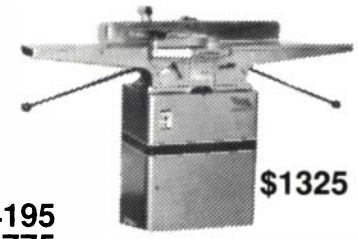
BLUME SUPPLY, INC.
3316 South Blvd. • Charlotte, NC 28209
704-523-7811 or 1-800-288-9200

STEP UP TO...
POWERMATIC III®
YOU DESERVE THE BEST!

$1275
#26 SHAPER 2 HP

$1425
#66 10" SAW 2 HP W/50" VEGA FENCE


#180 18" PLANER 5 HP W/ KNIFE GRINDER $4195
#100 12" PLANER 2 HP $1775


$1325
#60 8" JOINTER

NEW! RB-25 SINGLE PHASE 10 H.P. WIDE BELT SANDER $7299

CALL FOR OUR LOW PRICES ON OTHER POWERMATIC MACHINES NOT LISTED, AS WELL AS PRICES ON THE NEW ARTISANS LINE OF MACHINERY.

WOOD PARTS FROM MIDWEST DOWEL WORKS

Compare Our Low Prices!

		Qty.	Cost
3-1/2" Poplar Shaker Peg	$15/100		
1-3/4" Mini Shaker Peg	$7/100		
3-1/2" Country Wall/ Mug Peg	$15/100		
2-1/2" Country Shorty Peg	$12/100		
Large Bean Pot Candle Cup	$17/100		
Brass Inserts	$9/100		
1/2" Mini Candle Cup	$10/100		
1-1/2" Toy Wheel	$10/100		
2" Toy Wheel	$17/100		
Axel Pegs	$4/100		

SMOOTH SANDED HEARTS

3/4"x 1/8" Hearts	$2.75/100		
3/4"x 1/2" Hearts	$4.50/100		
1"x 3/16" Hearts	$6/100		
1"x 3/8" Hearts	$7/100		
1-3/8"x 1/8" Hearts	$7/100		
1-3/8"x 1/4" Hearts	$8/100		
1-3/8"x 1/2" Hearts	$10/100		
2"x 1/2" Hearts	$18/100		

Great Buys!

		Qty.	Cost
3/8"x36" Standard Dowels	$21/100		
3/4"x36" Oak Dowels	$15/10		
3/8" Maple Buttons	$2.15/100		
1/2" Maple Buttons	$2.25/100		
1-1/2" Maple Spindles	$9/100		
2-1/8" Maple Spindles	$18/100		

ORDER NOW

☐ MC/Visa ☐ Check Enclosed

Total Cost _____

Handling $3.00

Ohio residents add 5½% sales tax _____

Final Cost _____

MC/Visa Number

Expires Phone

Name

Address

City/State/Zip

FREE 16-PAGE CATALOGUE

Circle this section for FREE Dowels — mixed pack, Maple, Oak, Walnut Cherry, from 1/4" up to 1" Approximately 10 LFT. 14" long. $5.00 value with any order.

MIDWEST DOWEL WORKS

4631 Hutchinson Road
Cincinnati, Ohio 45248
(513) 574-8488

Same Day Service/Order before Noon
Factory Direct/Satisfaction Guaranteed

READER SERVICE NO. 32

MIRRORA - BEVELED CIRCLES

PERFECTLY BEVELED MIRROR

- 6 sizes of circles from 1½" to 6" and 63 other sizes, shapes and colors available • 1,000,000 pieces in stock–UPS Shipable–Ready-to-go
- Highest quality float glass–Double-backed for protection • We fabricate any shape or size of glass & mirror
- Call 1-800-MIRRORA Now to place orders and get our color catalog

FLORAL
Glass & Mirror, Inc.
895 Motor Parkway
Hauppauge, New York 11788
516/234-2200 800-647-7672

READER SERVICE NO. 65

Technical Writer

Technical writer needed for large mail order firm to produce copy for manuals, catalogs, updates, advertising, etc. Must be a highly skilled and motivated individual with command of the English language. Mechanical aptitude and experience with wood and metal working machinery a plus. Send resume to:

Grizzly Imports, Inc.
P.O. Box 2069
Bellingham, WA 98227
Attn: S. Balolia

READER SERVICE NO. 112

CASCADE TOOLS, INC.

P.O. Box 3110, Bellingham, WA 98227

S BRAND ***Finest Quality Carbide Tipped Shaper Cutters***

PANEL CUTTERS — 3/4" Bore

Our panel cutters are designed with a 10° upshear for faster, smoother cutting and longer life. Available in 5 profiles. For 1/2" -3/4" spindle shapers use our 4-5/8" cutters below. 5/8" panels. Top quality product.

ONLY **$67.95** EACH

5° Face Cut

C2065

15° Face Cut

C2066

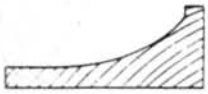
Ogee

C2067

12° Face & Qtr. Rnd.

C2068

Convex

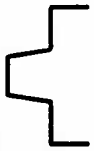


C2069

TONGUE & GROOVE

3/4" Bore — 3mm Thick — 3 Wing — Bushings Included

TONGUE
PART NO. C2029
2-5/8" O.D. 1"H
PRICE **$35.95**



GROOVE
PART NO. C2028
2-3/4" O.D. 1"H
PRICE **$35.95**

RABBETTING

SIZE	PART NO.	PRICE
1/4" Straight	C2030	$24.95
3/8" Straight	C2031	$26.95
1/2" Straight	C2032	$28.95
3/4" Straight	C2033	$32.95
1" Straight	C2034	$35.95
1-1/2" Straight	C2035	$36.95
2" Straight	C2036	$59.95

CORNER ROUND

SIZE	PART NO.	PRICE
1/4" Radius	C2059	$24.95
3/8" Radius	C2060	$26.95
1/2" Radius	C2061	$28.95
3/4" Radius	C2062	$35.95
1" Radius	C2063	$49.95
1-1/4" Radius	C2064	$49.95

FLUTE

SIZE	PART NO.	PRICE
1/4" Flute	C2046	$24.95
3/8" Flute	C2047	$26.95
1/2" Flute	C2048	$28.95
3/4" Flute	C2049	$32.95
1" Flute	C2050	$35.95

BEAD

SIZE	PART NO.	PRICE
1/4" Bead	C2052	$24.95
3/8" Bead	C2053	$26.95
1/2" Bead	C2054	$28.95
3/4" Bead	C2055	$32.95
1" Bead	C2056	$35.95

VISA **ORDER TOLL FREE 1-800-235-0272** MasterCard

90C-107

READER SERVICE NO. 87

MOBILE "K" FILTER

Captures Dangerous Respirable Dusts

removes

- Fine Sawdust
- Ceramic & Fiber Dusts
- Plaster Dust
- Oil Mist

$296.50

Tech Paper, Inc.
64 Euclid Ave., Pittsfield, MA 01201
(413) 499-3351

READER SERVICE NO. 41

Pink Ivory
Dagamé
Brazilian Rosewood
Pear
Plum
Burls
Snakewood
Bubinga
Koa
Satinwood
Cocobolo
Padauk
Rosewood
Bloodwood
Ziricote
Purpleheart
C.Ebony
Pau Rosa
Camphor
"It's a matter of pride for both of us"

Quality Exotic Wood

» TURNERS «
Thick Planks for Bowls/Squares
» CABINET MAKERS «
Individually Selected Lumber for Furniture/Boxes/Inlays
Over 70 Species
All Inquiries Welcome...Call or Write
The Berea Hardwoods Co.
125 Jacqueline Drive
Berea Ohio 44017
216-243-4452

Pernambuco
Mac. Ebony
E.I. Rosewood
Bocote
Curly Maple
Quilted Maple
Af. Ebony
Zebrano
Lacewood
Lignum Vitae
Osage
Tulipwood
Blackwood
Mahogany
Jelutong
Holly
Wenge
Goncalo Alves
Many More...
"It's a matter of pride for both of us"

READER SERVICE NO. 165

Everybody Knows

that the moisture content of wood is crucial. Moisture related defects such as surface checks, warpage, cracks, loose joints, foggy finishes, etc., can ruin the best piece ever built.

Everybody Knows

moisture defects are irreversible. Therefore don't waste money and time on wet wood. Use a moisture meter to be sure you work only with dry wood.

Ask for *free brochure* on moisture meters (range 4-30%, 4-60%) and accessories to monitor air or kiln drying.

Popular, Pocket-size
MINI-LIGNO
$110
Only

Incl. Case, Batteries and Pins for 3/16" and 7/16" Measuring Depth.

Also available as:
Mini-E: Range 6-36%
Mini-C with external probe.

Wood Moisture Meter
from Lignomat USA

P.O. Box 30145
Portland, OR 97230
Tel: 800-227-2105 503-257-8957

READER SERVICE NO. 38

You Design The Molding... We'll Make The Knives!
Shaper/Molder Knives
Knives made for all woodworking machinery
• 3 Day Shipping •
MasterCard/Visa/C.O.D.

Counselor Profiles
40 Lawlins Park, Wyckoff, NJ 07481-1443
1-800-635-6285 FAX: 201-848-9867

READER SERVICE NO. 73

CALL OR WRITE FOR THE FREEBORN DEALER NEAREST YOU. 1-800-523-8988

ANNOUNCING THE EXPANDED LINE OF FREEBORN CUTTERS.

Our Expanded Line Of Cutters Includes:
- **32MM System Cutters**
- **Flooring Sets**
- **New Cope & Pattern Sets**
- **New Double Easing Patterns**

More cutters. More applications. Each new cutter is manufactured with traditional Freeborn quality and precision. As with all our cutting tools, they're available with either Carbide or Tantung® Tips* to suit your application. And we can also provide you with quick turn-around on all your custom cutter needs.

Freeborn Tool Company, Inc.
E. 3355 Trent Ave. • Spokane, WA 99202-4459 • (509) 535-3075

Tantung® is a registered trademark of Fansteel VR/Wesson. *The colors yellow and orange are trademarks of Freeborn Tool Company, Inc.

READER SERVICE NO. 40

WOODSTOCK INTERNATIONAL INC

WOODWORKING TOOLS AND ACCESSORIES

Attention Dealers!

Add some of the fastest moving products to your line of woodworking accessories: Blast Gates, Floor Sweeps, Exhaust Hoods, Universal Hoods, Hose Clamps, Hose Connections and much, much more. Made of tough ABS plastic, these dust collection accessories can be used in virtually any shop. For more dealer information contact:

Woodstock International, Inc.
Post Office Box 2027
Bellingham, WA 98227 USA
1-206-734-3482
(Wholesale Only)

READER SERVICE NO. 88

Create Perfect Multiple Mortise & Tenon Joints Easily!

NEW

Introducing the World's First Multiple Mortise and Tenon Jig

At last you can create one of the most challenging-but most useful-joints in woodworking with just a simple plunge router. The fully adjustable Leigh Multiple Mortise and Tenon Jig lets you cut perfect multiple mortise and tenon joints in any size, or any layout you want, in virtually any size stock. The Leigh Multiple Mortise and Tenon Jig is available either as an attachment to the Leigh Dovetail Jig or as a separate, stand alone jig.

Call for FREE Brochure!

Discover today how to add the beauty and strength of multiple mortise and tenon joints to your projects. Call toll-free 1-800-663-8932 and ask for our FREE MMT brochure. In Canada 604-464-2700, collect.

LEIGH

LEIGH INDUSTRIES LTD
P.O. Box 357 Port Coquitlam BC
Canada V3C 4K6

Here's Your Help!

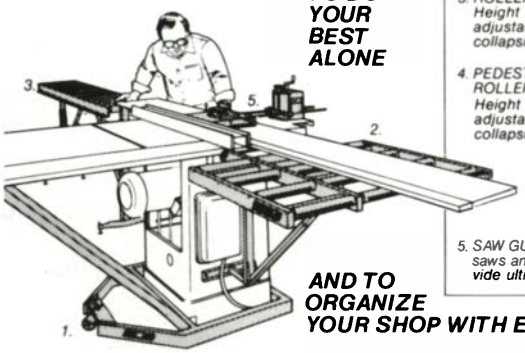
MOBILE BASES
1. Models available for any machine

WORK SUPPORTS
2. OUTFEED ROLLERS fold neatly to save space

3. ROLLERTABLE Height adjustable, collapsible

4. PEDESTAL ROLLER Height adjustable, collapsible

5. SAW GUARDS for Table saws and Band Saw provide ultimate protection.



TO DO YOUR BEST ALONE

AND TO ORGANIZE YOUR SHOP WITH EASE

HTC PRODUCTS, INC.
120 E. HUDSON, ROYAL OAK, MICHIGAN 48067

FREE CATALOG! CALL 800-624-2027/(313)399-6185, ext. 120

READER SERVICE NO. 63

Wood Lathes

The new powerful and sturdy M-Series lathes have been designed to fulfill all the requirements of woodturners, whether professional, hobbyist, or student.

Early in 1988, Richard Raffan commented that the Australian-made Woodfast lathe was one of the top two or three available to woodturners. Since then, Woodfast has implemented several design changes recommended by Richard Raffan and Dale Nish. The result is an excellent lathe for the woodturner, and the best value for the money of any lathe on the market today. The M-Series lathes are equal to, or better than, other lathes costing nearly twice as much. We think these lathes will be readily accepted by knowledgeable woodturners.

Send $2.00 for The Woodturners Catalog and lathe information. $2.00 refunded with order.

Craft Supplies USA
1287 East 1120 South
Provo, Utah 84606
(801) 373-0917

M400 Woodfast Lathe

Specifications:
Swing over bed — 16"
Outboard swing — 20"
Motor — 1½ h.p. TEFC 110/220V
Distance between centers — M400 18" / M600 38"
Spindle speeds — 370, 650, 1200, 2000 R.P.M.
Spindle size — 1¼-8 TPI
Weight — M400 460 lbs. M600 520 lbs.

M400 $1695.00/M600 $1850.00
F.O.B. Provo, Utah

READER SERVICE NO. 204

FORSTNER BIT AMAZING OFFER!

Quality, imported Forstner Bits make glass smooth, flat bottom, clean holes, even through veneer, knots and end grain, in any direction. Indispensable for furniture making. Will bore any arc of a circle, make pocket and blind holes and even make overlapping holes for mortising.

7-pc Set

¼" to 1" in wood case

ONLY $34.99 Ship/Handl $3.00

ITEM NO. #10-1325

- Precision Ground, Quality Bits
- Machined from High-Carbon Steel
- Hardened to HRC 50-52
- Reusable Moulded Covers Protect Rims

COMPLETE 16-pc Set

¼" to 2⅛" in wood case

ONLY $89.99 Ship/Handl $5.00

ITEM NO. #10-1330

- Wood Storage Box Included
- ⅜" shanks

For a FREE price list of individual Forstner Bits, and other wood working tools, send your name and address to: **Dollar Trading Corp. PO Box 964 Ridgefield, CT 06877**

3" FORSTNER BIT ½" SHANK

ONLY $34.99 Ship/Handl $3.00

ITEM NO. #10-1322

30-DAY MONEY-BACK GUARANTEE

CALL TOLL FREE CANADA INCLUDED **800-666-7227**

or write: DOLLAR TRADING CORP. Dept. FW70
P.O. Box 68666, Indianapolis, IN 46268

Indiana and Connecticut buyers please add sales tax

Take the work out of woodwork.

Take the work out of repairing nicks, cracks and gouges with **Elmer's® Fill 'N Finish™ Wood Filler.** It spreads easily, requires little or no sanding and takes on any stain.

The Home Solution® is:

ELMER'S THE HOME SOLUTION

For a 4 oz. sample of **Elmer's Fill 'N Finish Wood Filler,** send $2.00 with your name and address to Fill 'N Finish, The Fulfillment Center, P.O. Box 369003, Columbus, OH 43236-9003. Specify blond or tan. It's **THE HOME SOLUTION** to a beautiful finish.

FW

NAME_____
ADDRESS_____
CITY_____ STATE_____ ZIP_____

Offer good only in USA. Limit one per family. Offer expires December 31, 1990.

BORDEN®

© Borden Inc 1989

READER SERVICE NO. 117

AIR HANDLING SYSTEMS

Manufacturers Service Co., Inc.
5 Lunar Drive
Woodbridge, CT 06525

FOR CATALOG & PRICES
CALL **1-800-FOR-DUCT**
In Conn: 1-800-535-0425 or 203-389-9595

- Buy direct from the manufacturer and save.
- Install yourself and save more.
- We supply you with all the materials.
- All you have to do is put it together.

FAX# 203-389-8340

READER SERVICE NO. 52

LASER
The Toothless Woodworker

WE PROVIDE PROVEN LASER WOODWORKING AND EQUIPMENT

CNC POSITIONING SYSTEMS FOR:
- Fretwork & Marquetry
- Inlaying
- Profiling & Piercing
- Odd Hole Production
- Repeatability

ENGRAVING SYSTEMS FOR:
- Recognition
- Ad Specialty
- Giftware & Decor
- Signage & Platage
- Furniture Enhancement

Laser Machining, Inc.

500 Laser Drive, Somerset, WI 54025 • Tel: 715/247-3285 Fax: 715/247-5650

A Decade of Laser Processing And Systems Development — New Expanded Facilities

☐ Lasers ☐ Beam Delivery ☐ CNC Controls ☐ Service ☐ Laser-Gravel ☐ XY Tables ☐ Custom Systems ☐ Laser Job Shop

READER SERVICE NO. 33

Dust Boy, Inc.®

1-2 hp Dust Collectors. Portable - Stationary

Totally Enclosed Fan Cooled
- Cast Aluminum Blowers
- High Efficiency
- Extremely Quiet
- American Made
- 5 Year Warranty

"We Stand Behind OUR Product With Pride"

DUST BOY, INC.

RR 2, BOX 269C ***(812) 654-2918***
Milan, IN 47031 ***1-800-232-3878***

WE WILL NOT BE UNDERSOLD

READER SERVICE NO. 42

DISCOVER THE SECRET OF PROFESSIONAL QUALITY DOVETAILS!

Jim Kirchner, Luthier and Custom Furniture Maker, Milwaukee, WI. Tongue drum with compound angled through dovetailed case of cherry and padouk. Jim's work, including harps, dulcimers and psaltries, has been featured in Milwaukee Magazine.

FREE BROCHURE!

Our free brochure shows you why commercial woodworking shops all over America are choosing the Leigh Dovetail Jig. Only Leigh's patented sliding finger assembly allows dovetails to be cut in any size or spacing, for a truly handcrafted look. Why settle for less than the best in your home woodworking shop? Call 1-800-663-8932 today for free brochure, plus comprehensive, seven-page jig comparison report. In Canada collect 604-464-2700.

Video Offers: 1. Introducing the Leigh Jig $8.95.
2. Instructional Video $29.95. Plus postage and handling.

LEIGH

Leigh Industries Ltd. P.O. Box 357 Port Coquitlam BC Canada V3C 4K6

The **Better Built** portable saw mill.

The **"affordable portable"** one man saw mill. Weighs only 45 lbs. Cuts 20" diameter logs into lumber. Minimum 1/8" to maximum 9" thickness.

Write or call for free brochure.

Better Built Corporation

845 Woburn Street, Dept.FW, Wilmington, MA 01887
(508) 657-5636

READER SERVICE NO. 105

Lie-Nielsen TOOLWORKS
INC.

Rt. 1 Warren, Maine 04864 (207) 273 2520
NEW Low Angle Block Plane $75.
Free brochure of Heirloom Quality Tools.

READER SERVICE NO. 58

The Ultimate Building Calculator

Construction Master II *Works in Fractions, Solves Hundreds of Dimension Problems — Only $79.95. Order Risk-Free!*

Save time and avoid costly errors with the amazing **Construction Master II®** feet-inch calculator. Ideal for estimating, framing, stairs, rafters, woodworking, concrete and much, much more.

- **Works directly in and converts between Ft.-In.-Fraction, Dec. Ft., Inches, Yards, all Metric (M, CM, MM) — including Square and Cubic formats**
- **Right Angles, Hips/Valleys, Area/Volume, Board Feet and Circle Area all built-in**
- **Memory, %, π, 1/X, Sq. Root, X^2, +/–, Auto-Off, User Guide, Case, Batteries, 1-Yr. Warranty and more!**

30-DAY MONEY-BACK GUARANTEE!

Order Today!

Call Toll-Free: **1-800-854-8075**

Calculated Industries, 22720 Savi Ranch, Yorba Linda, CA 92687

Rush me ____ **Construction Master II(s)** for just **$79.95** (plus $3.95 shpg.— add $1.50 shpg. for ea. addl.) In CA add 6.25% tax. *5 or more $74.95.*

☑ Include my ***FREE*** Leather Case with each CMII I order.
☐ Also imprint initials |___|___|___| @ $1.50 per initial.
☐ Check—*incl. 6.25% tax in CA.* ☐ VISA ☐ MC ☐ Am/Exp

Name _____
Address _____
City/St/Zip _____
Acct# _____ Exp. _____
Sign Here _____ FWC-790

THE SCHOOL OF CLASSICAL WOODCARVING

The school offers training in all styles of ACANTHUS leaf carving as well as sculpture, furniture and architectural work. Instruction by British Master Carver Ian Agrell. Classes in San Francisco and Denver.

Send for a brochure to:

The School of Classical Woodcarving.

1301 Wazee St. Denver, CO 80204 303.825.6416

READER SERVICE NO. 48

READER SERVICE NO. 501

Choose from our new line of

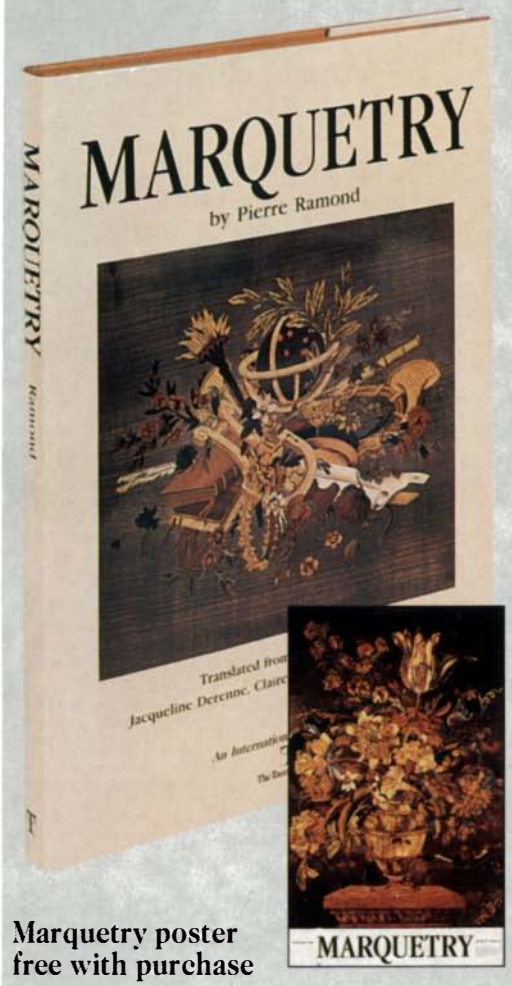
Great woodworking books from around the world.

New release

Marquetry

by Pierre Ramond

Here, for the first time in English, is the most in-depth and authoritative book on marquetry ever published. With the help of detailed photographs and drawings, renowned marquetry professor Pierre Ramond takes you into the marqueter's shop to see the work firsthand and to museums in Europe and the U.S. to see the results. HARDCOVER, COLOR, 240 PAGES, 257 PHOTOS, 101 DRAWINGS, #070098, **$59.95**



Marquetry poster free with purchase

When you buy *Marquetry* by Pierre Ramond you'll receive, free, a breathtaking poster of one of the works shown in the book. (Also available for separate purchase at $9.95.) #071005

Newly revised edition

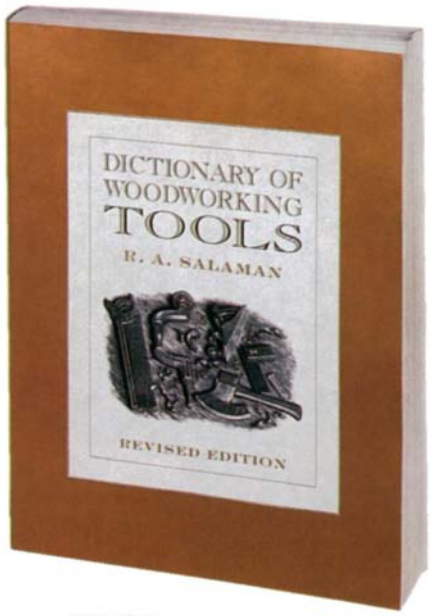
Dictionary of Woodworking Tools

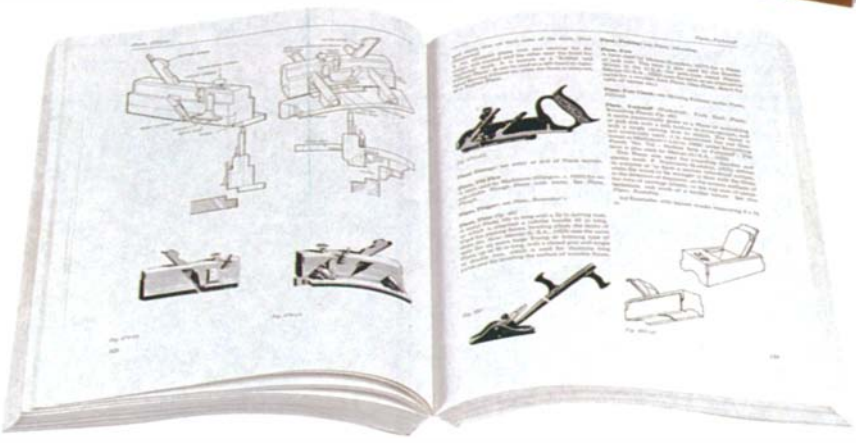
by Raphael Salaman, revised by Philip Walker

Over the centuries, woodworkers have devised thousands of ingenious and practical tools to make wood do what they want. You'll find them all, virtually every woodworking tool used from the beginning of the Industrial Revolution to today, in Raphael Salaman's 520-page *Dictionary of Woodworking Tools.*

Originally published in 1975 in England and available in the U.S. only at an exorbitant price, this internationally acclaimed book is now revised and available from us in softcover at half the price.

To assemble the information, British woodworker and research expert Raphael Salaman logged untold hours in museums and libraries, and visited over 450 town and country workshops to see the tools in action. With the help of detailed drawings, Salaman explains each tool's origin, purpose, use, and where possible, who designed and made it. He also gives descriptions of tools for allied activities such as sail making, leather working and smithing. Take it from *Workbench* magazine, the *Dictionary of Woodworking Tools* is the "definitive reference for hand tools." SOFTCOVER, 546 PAGES, DRAWINGS AND PHOTOS, #070121, **$27.95**

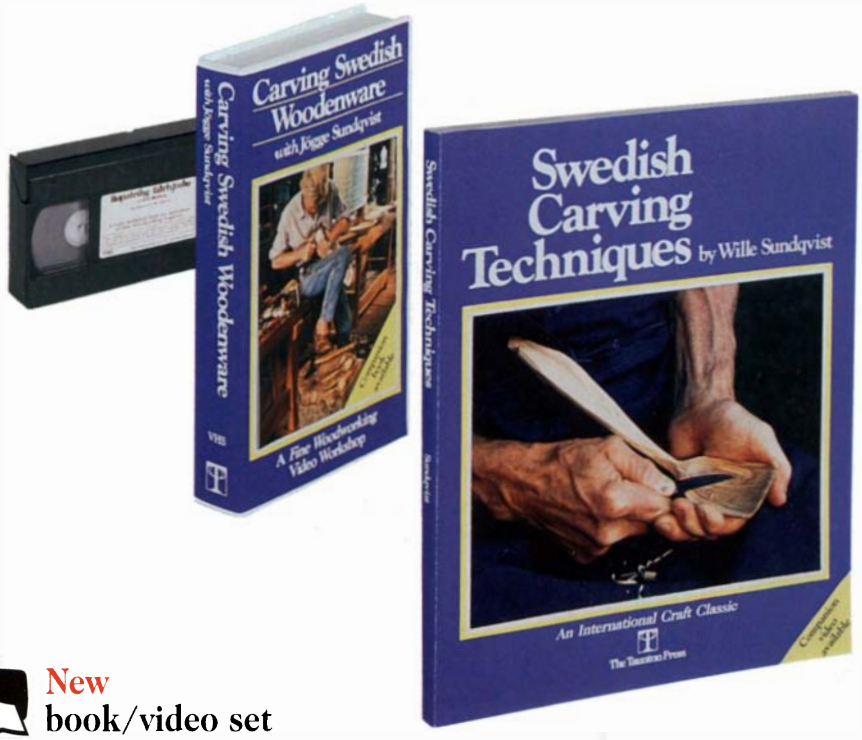




"...inspiring, indeed awe-inspiring...."
—*The Observer*

International Craft Classics.

On Wille Sundquist:
"...provides a rare experience of the deftness and skill of an old-world master craftsman."
—*Drew Langsner, Country Workshops*



New
book/video set

Swedish Carving Techniques

Traditional carvers in Sweden make lovely household implements — butter paddles, spoons, ladles and dough bowls — that those of us using power tools can't rival. Now in this integrated book and video set, Wille Sundqvist and his son Jögge show you how they do it.

Father and son draw on the rich traditions of their Swedish forefathers to demonstrate how to use a knife and ax skillfully. In the book, Wille Sundqvist provides a thorough introduction to his craft. With the help of careful illustrations, he explains the best qualities to look for in knives, axes and other edge tools, and how best to control them. By working directly with green wood rather than milled lumber, you'll get a deeper sensitivity for the material and gain complete control of the knife while cutting.

Then, in the video you'll watch as Jögge Sundqvist shows you the grips, strokes and rhythms that make for successful carving. He demonstrates how to make a dough bowl and a spoon from start to finish. And like his father in the book, Jögge explores the fundamentals of good design in spoons, bowls and other carved utensils.

Save $5.95 on the Sundqvist set: VHS #07A135, BETA #07A136, **$39.95**

The book: *SWEDISH CARVING TECHNIQUES*, SOFTCOVER, 144 PAGES, 223 PHOTOS, 34 DRAWINGS, #070107, **$15.95**

The video: *CARVING SWEDISH WOODENWARE WITH JÖGGE SUNDQVIST*, 60 MINUTES, VHS #060035, BETA #060036, **$29.95**

New

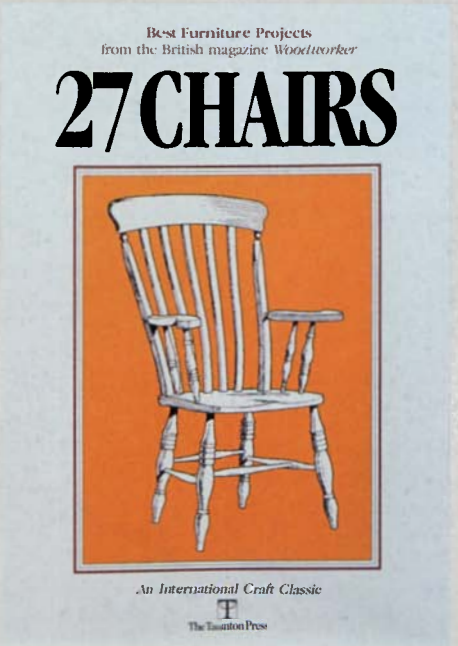
27 Chairs

Best Furniture Projects from the British magazine *Woodworker*: edited by Victor J. Taylor

Here are plans for 27 chairs you can make in your own woodworking shop. We've gathered the best chair projects of the past 80 years from the noted British magazine *Woodworker*. Each project has been chosen, checked and redrawn by Victor J. Taylor, the retired editor of *Woodworker*.

The result? You get a reference library of dimensions and construction details for every type of chair, ranging in style from ornate period pieces and sturdy Windsors to straightforward modern classics. Some feature turning, some rely on bending and some are upholstered. Whatever the project, you get complete measured drawings, detailed construction information and a cutting list so you can go out and make the chair you've always wanted.

SOFTCOVER, 110 PAGES, 139 DRAWINGS, #070113, **$12.95**



TAUNTON BOOKS & VIDEOS

HYDROCOTE
FINISHING PRODUCTS

SAFE

TAKE THE DANGER OUT OF FINISHING!

We've responded to your health needs, environmental concerns along with fire safety and insurance requirements.

HEALTH
HYDROCOTE® Finishes are non-toxic and virtually odor free. They require minimal spraying facilities. Perfect for on site work. Water clean-up.

ENVIRONMENTALLY SAFE
HYDROCOTE® Finishes comply with present and future air quality standards in every state - including California and, *do not* effect ozone depletion.

FIRE SAFETY
HYDROCOTE® Finishes are non-flammable - no need for explosion-proof equipment or hefty insurance bills.

PRODUCTIVITY
HYDROCOTE® Finishes provide 2.2 times faster build than typical nitrocellulose lacquers. Are quick drying and extremely durable.

EASY TO USE
HYDROCOTE® Finishes can be applied by brush, rag; conventional air, airless, or HVLP spray systems.

COST EFFICIENT
On the average, HYDROCOTE® Finishes cost 3.75¢ per square foot of coverage compared to 5.25¢ for a typical nitrocellulose lacquer. A saving of nearly 30%.

HYDROCOTE® brand Finishes represent a new generation of user-friendly wood and metal finishing products for interior and exterior application that are safe for you and the environment. There are no toxic solvent vapors to worry about - clean up with soap and warm water.

These are not just recently developed products - but *award winning* technological achievements that have taken five years to perfect. No wonder, Popular Science has selected HYDROCOTE® as one of the outstanding products of 1988.

For more information on HYDROCOTE® brand Finishes contact your nearest distributor:

HYDROCOTE Supply Co.
1140 Joshua Way
Vista, CA 92083
800-541-4886 619-727-9193

TERRY-LOCKE Distributing
2128 S. Kalamath
Denver, CO 80223
800-783-5772 303-935-5772

FLORIDA HYDRO-FINISH
3510C. Hwy 301N
Dade City, FL 33525
904-521-4076

HIGHLAND HARDWARE
1045 N. Highland Ave, NE,
Atlanta, GA 30306
404-872-4466

LYLE'S WOODWORKING MACHRY
1319 Frost Ave
Maplewood, MN 55109
800-624-5395 612-771-0167

HOOD PRODUCTS, INC.
P.O. Box 163
Freehold, NJ 07728
800-229-0934 201-254-7776

INDUSTRIAL FINISHING PROD.
465 Logan Street
Brooklyn, NY 11208
718-277-3333

THE BARN SHOP
P.O. Box 185
Modena, NY 12548
800-535-5708 914-883-5905

WOOD FINISHING SUPPLY CO.
100 Throop Street
Palmyra, NY 14522
315-597-3743

HYDROCOTE Supply Co., Inc.
112 Scioto Street
Green Camp, OH 43322
800-686-5496 614-528-2433

SEA STAR TIMBER CO.
P.O. Box 513
Newport, OR 97365
800-359-7571 503-265-9616

HYDROCOTE Supply Co.
217 So. 5th Street
Perkasie, PA 18944
800-899-5263 215-453-8663

RAL North America
616 Aljo Drive
Pittsburgh, PA 15241
800-783-7883 412-344-0720

J.M. ROGERS PRODUCTS
P.O. Box 33279
Kerrville, TX 78029
800-828-6327 512-896-5959

LYLE'S WOODWORKING MACHRY
1600A East 4th Street
Marshfield, WI 54449
800-472-5680 715-384-9998

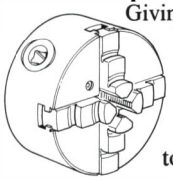
AIRFAST
2-645 Belfast Road
Ottawa, Ontario, Canada K1G 0Z4
800-267-7707 613-233-0073

WATER BASED FINISHES
10 Sword Street
Toronto, Ontario, Canada M5A 3N2
416-924-7900

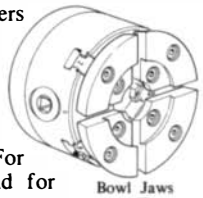
READER SERVICE NO. 64

4 JAW SELF CENTERING CHUCK

The ultimate precision chuck for woodturners. Giving the accuracy and simplicity of an engineers tool. Holding either round or square material from 1/8″ to 4″. Supplied with internal and external jaws ready threaded to suit any make of lathe.



For discerning bowl turners our precision dovetail jaws will hold bowls up to 24″ diameter. With our wood jaw plates, make your own special purpose jaws. For further information send for latest leaflet.



Bowl Jaws

4 Jaw Chuck
$189 inc Airmail Post

4 Jaw Chuck c/w Bowl Jaws and Wood Jaw Plates
$269 inc Airmail Post

Wood Jaw Plates

Please specify headstock thread, make of machine

Order by letter, fax or by phone

Payment by Visa, Mastercard or cheque

Sheffield Top Quality Hand Planes

Record Calvert Stevens CS88	$225
Clifton 3110 (3 in 1)	$129
Clifton 420 Shoulder Plane 3/4″	$122
Clifton 400 Shoulder Rebate 7/8″	$90
Clifton 410 Shoulder Rebate 18mm	$114

AXMINSTER POWER TOOL CENTRE
CHARD STREET, AXMINSTER, DEVON
ENGLAND EX13 5DZ
Tel. 011 44 297 33656 Fax 011 44 297 35242

AIR POWER CLAMP

Includes cylinder with built-in valve, pressure pad, 8′ of air hose and mounting bracket as shown.

Up to 250 lbs. of holding power from your shop air system. Please phone for your free catalog of our complete line of air clamps and accessories.

NEUWAY AIR SYSTEMS **1-800-334-0321**
710 So. Third Ave.
Wausau, WI 54401

MasterCard VISA

READER SERVICE NO. 17

Free Clock Kit Catalog

Send for your FREE copy of our 56-page color catalog featuring the most intriguing collection of clock and other reproduction kits in the world. Includes kits, dials, movements, tools, hardware, books and accessories.

586 Higgins Crowell Rd., Dept 2170, W. Yarmouth, MA 02673

READER SERVICE NO. 15

DELTA TOOLS THAT GO THE DISTANCE!

* Price Includes Rebate

All DELTA Rebates will apply.

34-781	1-1/2hp unisaw w/Bies	1399*
34-782	3hp unisaw w/Bies	1599*
34-763	3hp 1ph unisaw	1399*
34-761	1-1/2hp 1ph unisaw	1179*
34-897	50" DELTA unifence	349
34-915	30" DELTA unifence	279

31-730	6" belt/12" disc sander	1089
32-100	plate jointer NEW!	299
34-995	3 phase stock feeder	769
34-994	1 phase stock feeder	799

50-180	1hp dust collector	419
50-181	2hp dust collector	609
17-900	16-1/2" drill press	429
31-380	4"x132" edge sander	1299
70-200	20" drill press NEW!	749
36-040	8-1/4" comp. mitre NEW!	159

34-444	10" contr. saw complete	629
37-154	6" jointer with stand	1049
31-340	1x42 belt/8 disc sander	189
46-204M	12" wd lathe w/stand	1089
34-330	8-1/4" bench saw	199
34-080	10" miter saw	199

34-740	Super 10 saw NEW	399
33-990	10" radial arm saw	579
33-890	12" radial arm saw	1289
33-150	8-1/4" sawbuck	499

31-050	1x30 belt sander	75
11-950	8" bench drill press	149
31-460	4" belt/6" disc sander	149
23-700	wet/dry grinder	159
40-560	16" 2 sp. scroll s. NEW	189
11-990	12" bench dr. press NEW	229

POWERMATIC

1660760
66 Saw
3HP with 50" Biesemeyer
$1679

All Powermatic Priced to Sell!

HITACHI

C8FB
8-1/2" Compound Miter Saw
$468

CB75F	resaw bandsaw	1629
F1000A	planer/jointer	1549
C15FB	15" miter saw	389
C10FA	10" miter saw	279
C12FA	12" miter saw NEW!	349
TR-12	3hp plunge router	179
M12V	3-1/4 hp VS router NEW!	245

Mill-Route

MR1/MR-R1
Mill Route
$289

BIESEMEYER

50-B
50" Commercial
W/12" Left
$299

52B	52" homeshop fence	239
40B	40" homeshop fence	219
28B	28" homeshop fence	209

Adjustable CLAMPS

8" Handscrew
$12

1	10" handscrew	13
2	12" handscrew	15
3	14" handscrew	19
4	16" handscrew	25
2/0	7" handscrew	10
3/0	6" handscrew	9
4/0	5" handscrew	9
5/0	4" handscrew	8
7224	24" I-bar clamp	17
7236	36" I-bar clamp	18
7248	48" I-bar clamp	20
7260	60" I-bar clamp	23

LEIH

D1258-24R
24" Dovetail
$299

D1258-12R	12" dovetail jig	259
LJV	instructional video	29
MMTA-12	mortise/tenon attach	219
MMTA-24	mortise/tenon attach	239

makita

6093DWX
3/8" VSR
W/ Keyless Chuck
$138

6093DW	3/8 VSR cdls drill kit	128
6012HDW	3/8 2 sp. cdls drill kit	118
3612BR	3 hp rd base router	199
LS1020	10" miter saw	249
2012	12" portable planer	489
2708W	8-1/4 table saw w/ct bl.	259

shop-vac

890-11
10 Gal. 2 Stage
2 HP By-Pass
S. Steel Vac.
$249

610-50	10 gal. S. S. cont. vac	169
464-38	12 gal. poly. cont. vac.	179

freud

JS100
Jointing System With Case
$159

EB-100	edge bander NEW!	249
UC-900	5pc shaper cabinet set	329
94-100	5pc router cabinet set	159
91-100	13pc 1/2" router bit set	199
92-100	26pc router bit set	299
90-100	15pc router bit set	159
88-100	9pc router bit set	99
FB-100	16pc Forstner bit set	159
FRT-2000	router table	169

BOSCH

1273DVS
4X24 VS Belt Sander
$188

1273D	4x24 sander with bag	179
1272D	3x24 sander with bag	169
3270D	3x21 sander with bag	129
1290D	1/2 sheet finish sander	119
3050VSRK	9.6V drill kit/2 batt.	129
3283DVS	random orbital sander	119

1582VS "Clic" Barrel Grip Jig Saw
$133

1581VS	VS top handle jig saw	128
1654	7-1/4" saw w/ct blade	99
11212VSR	3/4" rot. hammer kit	199
3258	3-1/4" power plane	129
1632VSK	VS recip. saw kit	135

1611EVS
3-1/4HP VS Router
$238

1611	3 hp plunge router	195
1604	1-3/4 hp router	118
1606	1-3/4 hp D-handle router	149
1609K	3 in 1 trimmer kit	169
1611-220V	3-1/2 hp router	259

BOSTITCH

N12B-1
Coil Roofing Nailer
$399

N80S-1	16d stick nailer	409
N80C-1	coil nailer	399
N86C-1	coil nailer NEW!	499
N100S-1	6d-20d nailer	479
N60FN	1-1/4" to 2-1/2" fin. nlr	339
T28-5	1-3/16" finish stapler	269
T31-1	5/8" to 1" brad tacker	149
CWC100	1hp 4gal. compressor	329

Nails and Staples Priced to Sell!

PORTER+CABLE

555 Plate Jointer W/Case
$165

352	3x21 sander with bag	134
360	3x24 sander with bag	179
362	4x24 sander with bag	189
503	3x24 wormdrive with bag	345
504	3x24 wormdrive sander	335
330	Speed bloc finish sander	59
505	1/2 sheet finish sander	114

9850
3/8" Cordless 12V Driver/Drill Kit
$134

690	1-1/2hp router	129
691	1-1/2hp D-handle router	139
537	1-1/2hp Speedmatic router	205
518	3 hp 5 speed router	339
696	router shaper table	119
695	router table with router	209
7538	3-1/4hp plunge router	239

9345
6" Saw Boss Kit
$124

345	6" saw boss	98
9314	4-1/2" trim saw kit	144
9315-1	7-1/4"saw w/casect bl.	135
9647	NEW tiger cub w/case	119
7548	VS top-handle jig saw	129
7648	VS barrel grip jig saw	139
9629	VS Tiger saw kit	139
9118	Porta-plane kit w/ct cutter	199
5116	NEW Omni-Jig	269

9637
Electronic V.S. Tiger Saw Kit
$135

621	3/8" VSR drill	99
7511	3/8" VSR drill	109
7514	1/2" VSR drill	115
659	4000 VSR drywall	79
7545	2500 VSR drywall	105

7334
Random Orbital Sander
$119

693	NEW 1-1/2 HP plunge rter.	169
97310	NEW laminate trimmer kit	189
7312	NEW offset laminate trim.	124
7310	NEW laminate trimmer	94
6931	NEW Plunge router base	79
7399	NEW drywall cutout	79

realist David White Instruments

ALP6-18HD
18 Auto Level Pack
$379

LP6-20	20 x sight level package	204
AL8-22	automatic level	429
LT6-900	level transit	259
LT8-300	26 x level transit	479
ALT6-900	18 x auto level transit	399
AEL-300	auto-level laser NEW	1489

SENCO

SFN-1
1"-2" Fin. Nailer
$268

SN-4	6d-16d frame nailer	474
SN325	6d to 12d nailer NEW!	449
SFN-II	1-1/2 to 2-1/2 fin. nailer	398
M-II	1-3/8" to 2" HD stapler	348
LS-2	5/8" to 1" brad tacker	254
LS-5	1" to 1-1/2" brad tacker	288
PW	roofing stapler	348
SKS	1/4" crown finish stapler	258

Not Available In All States

BALDOR

L3504M
1/2 HP 1 ph. 1725 TEFC
$105

L3507M	3/4hp1ph 1725 TEFC	120
L3506	3/4hp1ph 3450 TEFC	120
L3510M	1hp1ph 1725 TEFC	140
L3509M	1hp1ph 3540 TEFC	145
L3514M	1-1/2hp1ph 1725 TEFC	185
L3513M	1-1/2hp1ph 3450 TEFC	195
L3516TM	2hp1ph 1725 TEFC	190
L3515M	2hp1ph 3450 TEFC	230

SKIL POWER TOOLS

77-01
7-1/4" Worm DriveSaw W/C.T. Blade
$145

2735-04	12V 3/8" VSR dr w/2 b.	129
5656	7-1/4" 13 amp saw	109

Elu

3338
2-1/4 HP Electronic V.S. Plunge Router
$255

3337	2-1/4 hp plunge router	239
3304	1hp elec. plunge router	179
40900	1hp router accessory kit	129

4024
3" X 21" Elect. V.S. Belt Sander W/Sanding Frame
$199

4029	4x24 belt sander w/frame	329
3375	3-1/8" universal planer	169
3380	jointer/spliner	269

Milwaukee

0399-1
12V VSR Cordless Drill Kit
$159

0395-1	3/8" VSR cdls drill kit	149
0222-1	3/8" VSR 3.5A drill	99
0234-1	1/2" VSR Magnum drill	114
0244-1	1/2" VSR Magnum drill	114
1676-1	2 speed hole hawg kit	234

6507
VS Sawzall With Case
$129

6508	VS sawzall with case	129
5397-1	3/8" hammer drill kit	139
5375-1	1/2" Mag. hammer kit	169
6256	variable speed jig saw	129
6142	4-1/2" grinder kit	114

6368
7-1/4" Saw w/CT Blade Case & Fence
$135

6750-1	HD VSR screwdriver	89
6540-1	cordless screwdriver kit	89
6753-1	0-4000 VSR screwdriver	79
0375-1	3/8"close quarter drill	129
0379-1	1/2" close quarter drill	159

Panasonic

EY6200B
12 Volt 1/2" cordless driver
$189

EY6205B	12V, 3/8",VSR drill	219
EY571B	9.6V, 3/8", VSR drill	139
EY503B	2.4V, 2-sp, screwdriver	69
EY571H	steel carrying case	25

Qual-Craft

2200
Pump Jack
$59

2201	brace	21
2203	guard rail holder	23
2204	work bench	41

DEWALT

1707
8-1/2" Compound Crosscutter Saw
$449

7770-10	10" 3-1/2 hp radial saw	849
7790	12" 3-1/2 hp radial saw	1049

PERFORMAX S/T

Per-ST100
Radial Saw Surface Sander
$289

Pro Stand	349
Powerfeed Attachment	299
Pro Max II	1399
Super Max	1999

HEGNER

Multi-Max II With Stand
$629

Complete Line In Stock!

RYOBI

RA200
8-1/4" Radial Arm Saw
$248

R500	2-1/4 hp plunge router	148
R501	2-1/4 hp plunge router	158
RE600	3 hp VS elec plunge rter.	208

AP10
10" Portable Planer
$348

TS251U	10" miter saw	178
JP-155	6-1/8" joint planer	318
BE321	3x21 VS elec belt sander	128

BLACK & DECKER

3047-09
7-1/4" Super Saw Cat
$169

2663	3/8" VSR cdls drill kit	119
2687	3/8" VSR cdls drill kit	129
1703	10" miter saw w/ct blade	179
3048-09	8-1/4" super sawcat	179

Emglo

AM78-HC4V
1-1/2 HP Vert. Twin Tank
$299

AM99-HC4	2 hp twin tank NEW!	359
AM78-HC4	1-1/2hp twin tank	289
AM39-HC4V	3/4hp v. twin tank	279
K15A8P	1-1/2hp wheelbarrow	599
K2A8P	2hp wheelbarrow	649
K5HGA-8P	5hp honda whlb.	699
045	3/8" x 50' Goodyear hose	20

JET

JWP-12
12" Portable Planer
$379

JWP-12D	dust chute	22
DC-610	1 hp dust collector	259
HES-6108	6"x108" sander NEW	1349
JSS-6168	stroke sander NEW	1549
OVS-10	osc. spindle sander	1549
SWSS-3-1	sliding table shaper	1849

Complete Line In Stock!

CALL FOR MIKE, TOM OR KEVIN
1-800-358-3096
Box 1716 • Grand Forks, ND • 58206
Send $2.00 For 170 Page Catalog

FAX US YOUR ORDER!
1-701-772-8725

FEDERAL EXPRESS

MasterCard DISCOVER VISA

TOOL CRIB OF THE NORTH

DIVISION OF acme

* Some Rebates Expire 7-31-90

JULY-AUGUST

*FULL LINE DISTRIBUTOR * FREE FREIGHT IN CONTINENTAL USA * FACTORY AUTHORIZED SERVICE * LIMITED OFFER * ERRORS AND PRICES SUBJECT TO CHANGE

READER SERVICE NO. 202

Building a Tinware Cupboard

Flush panels modify a Shaker design

by Christian Becksvoort

The author's Shaker-inspired tinware cupboard is a functional piece that fits well in almost any room. The cupboard on the right is cherry with an oil finish. The other is birch, which Becksvoort ebonized on the outside and left natural on the inside. Adding to the beauty of each is a frame-and-panel back, shown on the cherry cupboard.

This Shaker tinware cupboard is a fascinating piece because it breaks all rules of proportion. The golden rectangle, a proportional principle used since ancient Greek civilizations, maintains that a height-to-width ratio of 1.6-to-1 is most harmonious, and other proportions create conflict. Yet this cupboard's size is what makes it one of the most versatile pieces I build. It is equally suitable in a hallway, bedroom, bath, kitchen or living room—anywhere space is at a premium—to store crystal, linens, clothes, camera equipment, papers, books, canned goods or even stereo components. My adaptation of the tinware cupboard is based on a Shaker original I saw at the Renwick Gallery of the Smithsonian Institution, Washington, D.C., in 1973. Built in New Lebanon, N.Y., the dark red painted pine piece was probably used in a kitchen or pantry.

The first few cupboards I built were faithful reproductions, scaled from a photo. Since then I have made a few minor changes, such as lighter stock and movable shelves. I usually make the carcase from ⅝-in.-thick edge glued cherry and use ¾-in.-thick stock for the face frame and doors. The top and sides are rabbeted to receive the back and are dovetailed together, while the fixed middle shelf and the bottom are dadoed into the sides. The bottom is also screwed to the sides through glue blocks. Visually and structurally, the most important changes were to replace both the slab back and raised-panel doors with frames and flat-flush panels, as shown here, which give the piece a distinctive look while accommodating the natural expansion and contraction of the solid-wood doors and back panels. The face frame and flat-flush back panel are mortised and tenoned, and then glued to the carcase, resulting in an extremely rigid piece. Because five of the shelves are adjustable, rather than fixed as in the original, the cabinet is adaptable to a variety of storage requirements. And, instead of exterior spinners and a lock, I use interior spinners operated by the doorknobs.

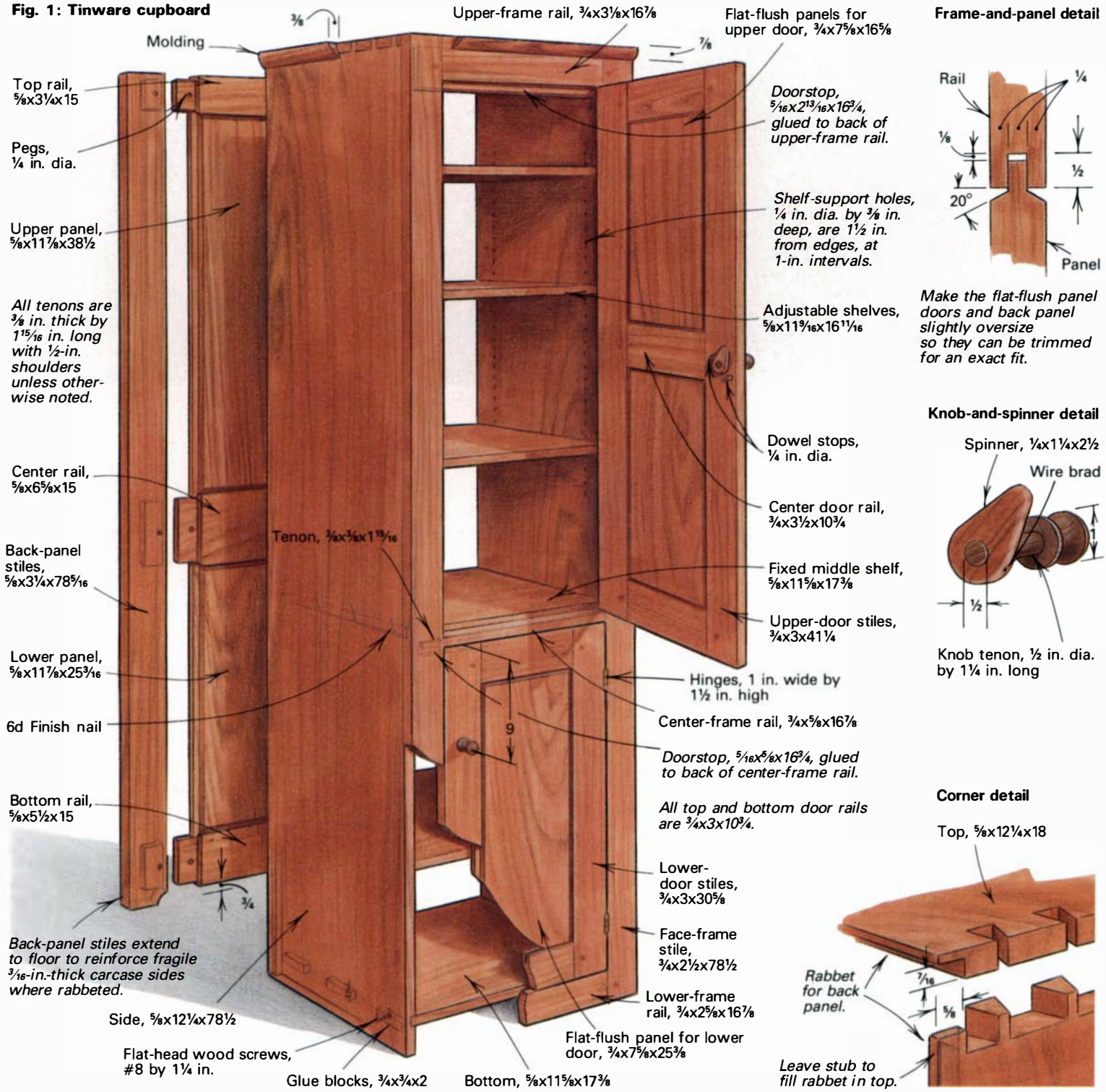
While I usually prefer an oil finish on natural cherry pieces, I was intrigued by John McAlevey's article on ebonizing wood (*FWW* #76, pp. 47-49), a process that chemically dyes the stock, yet lets the grain show through. The Shakers often ebonized their chair frames, and so I thought why not an entire case? I experimented with one of my cupboards, making the carcase out of birch and leaving the interior natural to contrast with the dark ebonized exterior. When the doors are opened, the light, bright interior is a bit of a surprise, as you can see here.

Carcase construction—To build this cupboard, you will need about 60 bd. ft. of cherry or birch, most of which gets glued up into four slightly oversize panels. Two panels, ¾x12½x80, will make the sides, and two more, ¾x12½x70, will be cut into the top and bottom, the fixed middle shelf and five adjustable shelves. After planing these panels to ⅝ in. thick, cut the individual pieces

to the correct lengths and widths given in figure 1 below. On the tablesaw, rip a ⅝-in.-wide by 7/16-in.-deep rabbet along the inside back edges of the two sides and top to receive the back panel. To dovetail the sides to the top, begin by laying out and cutting the tails on the top. The tails at the front and back edges are half-tails, and the tail at the back edge is positioned so the pin on the side does not interfere with the back-panel rabbet. Six more tails are equally spaced between the front and back tails. Now, secure the top to the sides with a 90° angle clamp, and lay out the pins by scribing the sides with a knife. Because I'm used to cutting pins for dovetails in a vertical position, I clamp the sides to the stringer of my open stairway and stand on the stairs to cut the pins. You may find it easier to lay the sides on sawhorses to cut the pins. When cutting away the waste for the pins, leave a stub at the back of the sides to fill in the gap left by the back-panel rabbet cut in the top, as shown in the detail in figure 1. Before assembling the top to the sides, rout the dadoes for the bottom and the fixed middle shelf, guided by the dual-fence router jig shown in the top, left photo on the next page. These dadoes can also be cut on the tablesaw guided by the miter gauge, but I find this operation unwieldy with long side panels. After sanding the interior surfaces, beginning with 120-grit paper and working up to 220-grit, I assemble the top to the sides. When clamping the dovetails, a spacer about a foot below the top keeps the sides from pulling together as the clamps are tightened (see the photo at right on the next page).

While the glue dries, sand the middle shelf and bottom as before, working up to 220-grit sandpaper. Slide the middle shelf into the dadoes and toenail it from underneath with three 6d finish

Fig. 1: Tinware cupboard



Left: This dual-fence jig guides the router from both sides, minimizing any possibility of miscutting the dado, and it is long enough to rout both side panels at once. The batten clamped beside the jig aligns the panels.

Right: To hold the sides in position for installing the top, the author clamps them to the workbench and a sawhorse. A spacer wedged between the sides prevents the clamps from bowing the sides during glue-up.

Below: This shopmade drill guide automatically spaces holes for movable shelf brackets and locates them 1½ in. from the carcase edge. A ½-in. dowel on the drill bit controls the depth of cut.

nails per side. You could glue the shelf in place, but it isn't really necessary because the rear panel and face frame will prevent the sides of the carcase from spreading. The bottom is assembled the same way, but for extra support, I prefer to add three ¾x¾x2 glue blocks to each side and screw up into the shelf, as well as into the sides (see figure 1). Using three separate blocks, rather than a single cleat, allows the solid-wood sides and bottom to move as moisture conditions change. While you are working on this end of the carcase, lightly chamfer the bottom edges of the sides. This makes it easier to move the cupboard across the floor.

Now that the case is fairly rigid, but before the back goes on, I drill the ¼-in.-dia. by ⅜-in.-deep shelf-support holes using the shopmade drill guide shown in the bottom photo. I made several of these ¾-in. by 4-in. hard-maple guides in different lengths for use in a variety of cabinet interiors. To make a guide, clamp a fence to the drill-press table and bore a row of holes 1½ in. from the edge of the drill guide at 1-in. intervals along the entire length.

To use the guide, label one end "down" on both sides. Butt this end against either the bottom or the middle shelf, and clamp the guide so that the holes are 1½ in. from the carcase edge. To get the cleanest holes, I use a brad-point bit chucked in my hand drill. A section of ½-in. dowel, drilled lengthwise and left on the bit, serves as a positive stop to prevent drilling through the cabinet sides. Determine the length of the stop by subtracting 1⅛ in. (¾ in. for the drill guide and ⅜ in. for the depth of the shelf-support hole) from the exposed length of the drill bit. Now, carefully insert the bit into the guide until it hits the cabinet side and drill until the dowel stop bottoms out. Repeat this process for all eight rows of holes, sanding the "fuzz" around the holes with 220-grit paper.

Making the face frame—When made as a single mortised-and-tenoned unit, the face frame strengthens the carcase greatly and prevents the sides from spreading or compressing. I use the assembled carcase as a reference for measuring the stiles and rails and for laying out the mortises and tenons. This reduces measurement errors and ensures the face frame will fit properly. The carcase is easier to work on if laid flat across two sawhorses. Measure the diagonals to be sure the carcase is square, and sight from top to bottom, across a pair of winding sticks, to check flatness. Clamp from opposing corners to correct squareness, and shim as necessary to remove any twist.

I cut the frame stiles and rails 1/16 in. larger than the dimensions in figure 1 so I can plane the installed face frame to fit the carcase exactly. Place the stiles in position on the carcase, and lay the frame rails in position over the stiles. The center and bottom rails should be laid out so they cover only the bottom half of the middle shelf and the bottom. The exposed upper half of the shelf thickness acts as a doorstop. Mark the position of the rails on the stiles and then lay out the mortises, leaving at least ½ in. to the ends of the stiles. I have a horizontal boring machine for cutting the ⅜-in.-wide by 2-in.-deep mortises in the stiles, but you can also use a router or drill press, or chop them out with a chisel and mallet. I cut my mortises first so that I can test the adjustment of my tablesaw when crosscutting the tenons. I set up the saw so the fence acts as a stop for the tenon, and I hold the stock against the miter gauge as I make multiple cuts on each face of the rail to form the tenon.

After cutting the tenons, assemble the face frame and sand it as before, working up to 220-grit. Dry-fit the frame onto the case so you can check for side-to-side fit, length and squareness. If the case sides are perfectly straight, you can joint the face frame's 1/16-in. overhang

Hanging flush cabinet doors

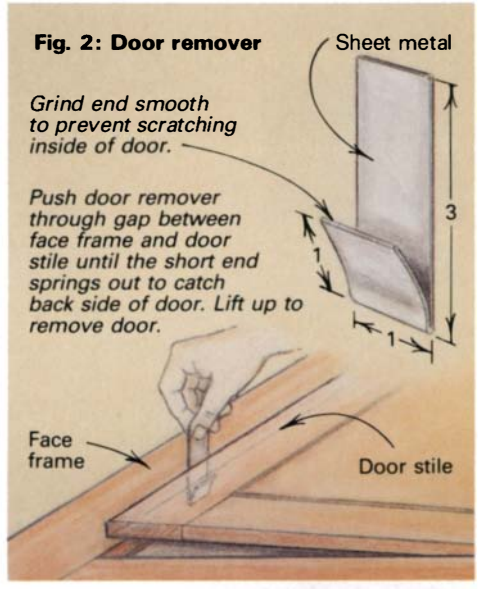
Everyone develops their own methods and routines for hanging doors. But I like to keep things as simple as possible, with a minimum of measuring. The tinware cupboard described in the main article is a good project for practicing door hanging because the carcase can be laid flat on its back and gravity will hold the doors as you adjust and position them for a perfect fit. Although it's easiest to install doors with the case on its back, these techniques will also work on vertical installations.

Fitting the door: I make my doors slightly oversize and then saw or joint the lock stile to fit, taking the dimensions directly from the opening. Leave the door relatively tight in the opening; you can always shave off more later. To mark the door bottom for trimming, first place the door in its opening as tight to the bottom as possible, and then draw a line on the door, parallel with and as close to the frame rail as possible. Saw or joint to this line. The door should now fit on three sides. With the door placed back in its opening, mark the top for cutting by drawing a line a full ⅛ in. below and parallel to the top frame rail. Saw or joint to this line and retest the fit.

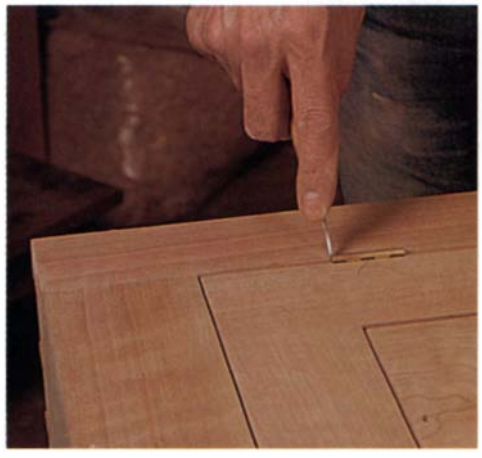
A flush door sitting in its opening is extremely difficult to remove. You can put a screw where the nob will go, predrill the knob hole to provide a fingertip grip or make a sheet-metal "door remover," as shown in figure 2 above, but don't try to pry the door out with a screwdriver or chisel.

Selecting the appropriate hinge depends on the size of the piece and the weight and width of the door. Generally, the larger the piece, the bigger and heavier the door will be and the larger the hinge needs to be. Also, the wider the door, the greater the leverage it exerts on the hinges. I've found that 1½-in. or 2-in. hinges work on 90% of the case goods I build, but for larger pieces, like an armoire, I'll use 2½-in. or 3-in. hinges. For smaller projects, such as jewelry boxes, aesthetics become more important than strength, and so much smaller hinges can be used.

The exact gap needed around the door is determined by the hinge type, the season of the year and the moisture content of the wood. As a very rough rule, I like to leave about 1/16 in. plus on the two sides and the top, and a bit more on the bottom. Age, wear and gravity conspire to move doors down, never up. While the gap on the hinge side is predetermined by the hinge, it is not unchangeable. The gap on the lock side should be bigger if it is winter and the wood is dry because next summer's humidity will cause the stiles to swell. Leave the gaps a bit bigger all around if the cabinet is to be painted. On the other hand, if it is mid-summer and the moisture content of the wood is 11% to 12%, the gap can be quite small. Remember that the hinge-side gap will remain constant; so all the wood movement of the door frame will be apparent on the lock side. Also, I usually bevel the edge of the lock stile a few degrees for greater swing clearance.



For best fit, hinge mortises must be accurately laid out. Here the author uses a knife to trace the hinge outline to the door stile.



With the door positioned, Becksvoort uses a knife to transfer the hinge location to the face frame. For accuracy, you must not move the door when making these marks.

Hinge layout: Butt hinges are usually set at the intersections of the door rails and stiles: the top hinge even with the top of the panel and the bottom hinge even with the bottom of the panel. Setting the hinge as close as possible to the rail is not only structurally sound, but also aesthetically pleasing, forming a sight line between rails and hinges. Also, I set hinges with the barrel fully revealed, which provides clearance when the door is opened 180°.

To set the hinges, first place the door in a vise, hinge-side up. Using a square, locate one end of the hinge by transferring the rail-stile intersection to the edge of the stile. Turn the hinge upside down and press the barrel against the outside face of the door, as shown in the top photo, aligning the top or bottom with the mark. With a knife, scribe the stile carefully for all three sides of the hinge. Then set your marking gauge to the thickness of the leaf and scribe the outside face of the door between the knife marks. Rout or chisel the hinge mortise as marked. For hinges with tapered leaves, chisel upward to the back of the mortise, matching the bevel of the hinge leaf. Repeat for the other hinge. Mount the hinges with screws in just the center holes so you have the option of persuading the hinge into a better position later, should that be necessary.

Now, carefully place the door in its opening with the desired gap left at the top and bottom. With a knife or razor, mark the tops and bottoms of the hinges where they touch the cabinet frame, as shown in the bottom photo, being careful not to shift the door. Remove the door and one of the hinges. Place the hinge barrel between the marks on the frame so that the barrel sits on the frame and the leaf hangs down along the inside frame edge. Then, scribe the hinge location with a knife and marking gauge and chisel out the waste as before. Test the fit by remounting the hinges with one screw per leaf, and make any necessary adjustments before installing the other screws. —*C.B.*

During glue-up, clamping strips are used to protect the face frame and the rabbet on the back edge. The large number of clamps ensures a good bond. The wedges and batten help secure the center-frame rail, where clamps won't reach. Wedges under the feet of the sawhorse remove twist from the carcase.

or you can wait until the face frame is attached to the carcase and then plane the overhang for an exact fit. Before gluing the frame in place, get all your clamps ready; I use 20 or more, as well as protective strips for the face frame and the fragile rabbet along the back edge. Then, spread the glue, position the face frame and clamp it to the carcase, as shown above. Two 5/16-in.-thick boards, glued and clamped to the back side of the center-frame rail and the top-frame rail, as shown in figure 1, serve as the top doorstops. These stops extend the full width of the cupboard's interior, butt against the top and the middle shelf, and extend 5/16 in. below the frame rails, balancing the 5/16-in. exposed edge of the middle shelf and bottom.

Building frames and panels—I like double-sided, flat-flush frames and panels for the doors and back panel instead of the raised-panel doors and the single-board back on the original cupboard. The 3/4-in.-thick doors and the 5/8-in.-thick back are slightly oversize so they can be trimmed to fit. Mortise the stiles 3/8 in. wide by 2 in. deep, as previously described, and then tenon the rails to fit. Dado 1/4-in.-wide by 1/2-in.-deep stopped grooves on the stiles, and dado through grooves on the rails for the panels. By stopping the stile's groove, you eliminate the need to cut a haunched tenon on the rail without leaving a visible groove at the ends of the stiles. The 1/4-in.-thick by 1/2-in.-wide panel tongues are cut with only two tablesaw setups. Although the shoulder cut can be vertical, I like a slight bevel, as shown in figure 1 on p. 39. The first setup cuts the face of the tongue. Set the blade 1/2 in. above the table and add a high auxiliary fence to support the panel on edge. Adjust the fence to leave a 1/4-in.-wide center section, which will form the tongue. Cut the panel by running it over the blade vertically on all four edges, referencing for the first cut from the face of the panel and for the second cut from the back of the panel. Then, tilt the blade 20° to 25° and set the fence 1/2 in. from the side of the blade farthest from the fence. With the panel flat on the table, cut the waste from the tongue, which now forms the beveled shoulder. Sand the tongue and bevel carefully to remove sawmarks.

Dry-fit the doors and back panel, making adjustments for a snug but not-too-tight fit, and then glue and clamp the frames around the floating panels. In keeping with Shaker tradition, I peg the doors' mortise-and-tenon joints and the back panel. To save time and to free up clamps, I drill for the 1/4-in. pegs right away, pound them through and then remove the clamps. Excess peg length is sawed off both sides. Although you can plane and hand-sand the doors and back panel to final dimensions, I rely on the wide belt sander at a local mill shop to save me hours of labor. I have the panels sanded to 180-grit, which leaves barely perceptible cross-grain scratches on the rails. I easily remove these scratches with a vibrating sander.

To install the back panel, turn the carcase facedown on the horses and fit the back snugly into its rabbets. The bottom rail on the back will be 3/4 in. from the bottom of the carcase, but the stiles continue to the floor to reinforce the fragile 3/16-in.-thick carcase sides where rabbeted. Beveling the inside corners of the back panel makes it easier to slide into its rabbets, as well as provides space for excess glue. Get the clamps and clamp sticks ready, apply the glue and clamp everything together. The back should be clamped front to back, as well as side to side, to fully seat it in the rabbets. If you don't have enough clamps, 6d finishing nails help hold things together while the glue dries. Countersink the nails deeply, and plug the holes by gluing in wooden pegs and chiseling them flush to the back panel.

The top molding shown in figure 1 is one of my favorites. While the glue is drying, I shape the molding stock with a cutter in a molding head on my tablesaw. Since you only need 46 in. of molding, however, it can be roughed and shaped easily with a block plane in 10 to 15 minutes. Start with a piece of 7/8-in.-thick stock that is 4 in. to 6 in. wide by 50 in. long. Draw the profile on each end, mark off 3/8 in. (the total thickness of the molding), clamp the stock in a vise and plane the stock to shape. When it looks just right, rip the 3/8-in. molding on the tablesaw and finish-sand it.

Before applying the molding, I sand the carcase, starting with 150-grit paper in a belt sander and working up to 180-, 220- and 320-grit paper in a palm sander; finish up by hand-sanding with 320- and 600-grit. Now, miter the front molding and glue it in place. To keep the molding from slipping while clamped, I drive two small brads into the carcase at the molding location, snip off their heads and force the molding onto the pins. Glue the miters and the first 2 in. of the side molding, and then nail the rest in place with countersunk and filled 6d finish nails, which allow for seasonal movement of the carcase side. Now, sand the top, following the same sequence as before, and touch up the molding as needed. Be careful not to leave cross-grain scratches on the case sides.

The details—I fit and hang the doors as described in the sidebar on the previous page, and then I install the door bumpers, knobs and spinners as shown in figure 1. Shopmade 3/8-in.-dia. leather pads, glued to the lock side of the upper and lower doorstops, make for quiet closings and convey quality construction. I turn the knobs from a 1 1/4x1 1/4x2 1/2 block on the lathe after shaping the knob tenon with a 1/2-in. plug cutter on the drill press. Drill the knob holes with a 33/64-in.-dia. bit, which will allow the knobs to turn easily in the doors, as shown in figure 1.

The spinner, a 1/4x1 1/4x2 1/2 scrap with a 1/2-in.-dia. hole, is cut to a pointed oval shape so that it protrudes about 3/8 in. beyond the door frame. The spinner's placement on the tenon is critical: too loose and it feels sloppy, but too tight and the knob won't turn. I carefully hammer the spinner into place until it feels just right, and then drill a pilot hole and drive a brad through the spinner and tenon to lock them together. Cut off the excess tenon and install the 1/4-in.-dia. dowels that stop the spinner in the open and closed positions.

A final sanding and the finish of your choice completes the cupboard. I normally use Watco oil on my cherry cupboards, but I ebonized my birch cupboard following the process in McAlevey's article. I applied two coats of the steel wool/vinegar ebonizing mixture, sanding lightly between coats. Some experimenting with ebonized scraps showed oil does not give very satisfactory results, but a sprayed lacquer finish brings out a rich ebony color and provides a satin sheen. Don't polish the lacquer. Remember, this is a Shaker cupboard, not a grand piano. □

Christian H. Becksvoort builds custom furniture in New Gloucester, Maine, and is a Contributing Editor to FWW.

Edgebanding

Tools and materials for hiding a panel's edges

by Jack Gavin

The Virutex edgebander uses hot air to melt the glue on preglued tape. With it, you can apply veneer to panels of almost any size because you move the tool and not the panel. The hand-held Virutex, which costs about $300, can also apply tape to curved edges.

Plywood, fiberboard and particleboard have been a great boon to the modern woodworker. These panel products are solid, easy to handle and relatively inexpensive. They are dimensionally stable and, if stored properly, perfectly flat. Eighteenth-century cabinetmakers would have been ecstatic if they had the opportunity to buy great slabs of material that were jointed, thicknessed, squared, veneered and ready to be cut to any shape. But despite their virtues, panel products all have ugly edges.

Several solutions are possible, but I think edgebanding, a glue-on veneer, is the best. A solid hardwood edge looks great, but making and installing it is very time-consuming. Plastic T-moldings and aluminum edge strips are strictly utilitarian. And nail-on edge moldings have to be filled and sanded. Edgebanding tape, although not a perfect edge treatment, has many advantages. It is faster to apply than any other method of edging, with the possible exception of T-molding. Edgebanding tape is inexpensive, tool outlay to install it can be minimal, and it's available in a great assortment of attractive wood species, as well as in colored plastics and metallics.

You should be aware of several drawbacks to all edgebanding tape. First, it is only as thick as heavy paper and doesn't offer any protection to an edge, as does solid wood. So high-abuse areas should have a heavier, more durable edging. Second, both pressure-sensitive and hot-melt adhesives can be adversely affected by solvents in finishing products. Even though tapes have a solvent-resistant, resin-coated paper backing, solvents can seep into the glue at the tape's joints. You should prime edgebanded panels with a sealer coat of finish, not allowing it to accumulate at the tape's joints. A heavy coat could penetrate and delaminate the tape. Another problem is that you can't do much with a veneered edge but leave it square. You can wrap tape around a bull-nose edge, but it seems to me this would be as much work as using solid wood.

Edgebanding tapes—Tapes are available in several standard widths, 13/16 in. being the most popular since it is used with 3/4-in.-thick material. Other common widths include 1 5/8 in., 2 in. and 3 in., but widths up to 12 in. can be ordered from some manufacturers. Wooden edgebanding tape is made by selecting flitches of 1/40-in.-thick veneer and cutting out imperfections to produce matched 12-in.-wide sheets. These sheets are color matched, spliced into rolls with finger joints and then backed with a resin-impregnated paper before they're sanded. Then the 12-in.-wide roll is slit into narrower widths. To produce preglued tape, hot glue, which is a high-viscosity vinyl-acetate plastic, is applied to the back. Depending on the wood species, preglued veneer tapes cost about 10 cents to 13 cents per foot, and polyvinyl chloride (PVC) tapes cost several cents less.

Depending on the method of application, three different types of edgebanding tape are available. Pressure-sensitive tape, like adhesive tape, is simply pressed on without special tools; preglued

Left: It's simple to apply preglued edgebanding tape with a hot iron that melts the glue. Keep the iron moving and press the tape down with the rounded edge of a piece of wood. Above: After ironing on the tape, it is trimmed with a single-edge razor blade and the corners are lightly sanded.

tape, which has a thin layer of hot glue on the back, is laminated to the edge with a hot iron or edgebander; and non-glued tape is usually applied with an automatic edgebander, which spreads hot glue on the panel edge before it presses on the tape (and some fully automatic machines then trim excess tape from the panel's edges and ends). In each case, it is important that the panel's edge be clean and freshly cut, since dirt or dust on the surface will prevent the tape from sticking properly.

Pressure-sensitive edgebanding tape is the simplest and fastest to apply. You simply peel off its protective backing strip, and then align and rub the tape on the panel edge using the blunted corner of a piece of wood. To finish the corners of the panel, trim the excess tape with a handplane or router and then sand lightly. The tape has an adhesive similar to but stronger than the adhesive on duct tape. Pressure-sensitive tapes have been around longer than preglued tapes, and although the quality of adhesive may vary, the better tapes adhere almost as well as tapes applied with hot glue. The disadvantage of pressure-sensitive tapes is that they cost at least twice as much as preglued or non-glued tapes.

Preglued wood-veneer edgebanding is the most popular type for small shops and non-professionals because it's easy to apply—an excellent job can be done with an electric hot iron and a razor blade (for trimming), as shown in the photos above. Tape usually comes on 250-ft. rolls, and it's available in natural birch, walnut, cherry, mahogany, red and white oak, maple, teak, white ash, pecan and pine. Rolls of flexible plastic edgebanding tape are available in white, almond, gray and black PVC. Some manufacturers will custom make tapes in any wood species or PVC color.

Non-glued tape is designed for automatic edgebanding machines, which have a built-in glue applicator. Without one of these machines, non-glued tapes can be applied with contact cement, hot glue or yellow glue and clamps, but this defeats the purpose of edgebanding. It is supposed to be a simple, fast way to cover panel edges. Non-glued tapes cost about the same as preglued tapes and they come in as many species, colors and sizes, but they are about 1/16 in. wider.

Applying preglued tape with a hot iron—Although you can apply edgebanding with a variety of equipment, the simplest method is with a hot iron, as shown in the left photo. Turn the iron on "high," place the tape glue-side down on the panel edge and press it on. Allow enough time to melt the glue, several seconds at the most, but don't let the iron linger over any one spot: You can burn the veneer as easily as you can burn a shirt. To adhere the tape to the edge once the glue has melted, use the slightly radiused corner of a wood block and rub the veneer back and forth several times with moderate pressure. If you find any bubbles, simply reheat the veneer with the iron and rub the bubbles out.

After several seconds, the glue will cool and harden. When the glue has cooled, I slice off any excess tape with a single-edge razor blade, as shown in the photo at right, but some people prefer to remove it with a file. Then the corners should be lightly sanded with 120-grit paper. You can use a router with a flush-trimming bit to do the job faster, but the tape may fray and chip when its grain isn't parallel to the edge. I have also seen edgebanding trimmed with a belt sander, but this requires a deft hand to keep from sanding through the veneer on the face of the panel.

The Freud and Virutex edgebanders—Between the hot iron and fully automatic edgebanders are several edgebanding machines, each a little more automated than the next, each a little bit faster and each a bit more expensive. I reviewed two that are somewhat more convenient than but not much faster than a hot iron: the

Sources of supply

Edgebanding tape is available from:

Canplast Inc., 4797 Couture Blvd., Montreal, Que., Canada H1R 3H7; (514) 327-9555.

Edgemate Division, Westvaco Corp., 333 Closfon Road, Roaring Springs, PA 16673; (800) 458-3761.

Edging Plus, Inc., 103-K Creek Ridge Road, Greensboro, NC 27406; (919) 273-4210.

Flexible Materials, Inc., 11209 Electron Drive, Louisville, KY 40299; (502) 267-7717.

Therm O Web, 112 W. Carpenter Ave., Wheeling, IL 60090; (708) 520-5200.

Woodtape Inc., 11403 120th Ave. N.E., Kirkland, WA 98033; (800) 426-6362.

Edgebanding tools are available from:

Freud, 218 Feld Ave., High Point, NC 27264; (919) 434-3171.

Edgemate Division, Westvaco Corp., 333 Closfon Road, Roaring Springs, PA 16673; (800) 458-3761.

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

The Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374-9514; (612) 428-2199.

Freud, shown in the top photo, and the Virutex, shown in the photo on p. 43. The manufacturer's list price for both machines is about $370, although I found them discounted at about $300, and both were easy to set up right from the box. I had to file down the Freud's tape guide, since it scraped glue from the tape before the tape reached the panel's edge. Other than that, both machines worked well once I learned to use them.

And both machines took little time to learn. After several hundred feet of tape I felt comfortable with them, but I still don't consider myself an expert. You must get a "feel" for feed rate, which depends on the heat setting, which in turn depends on your expertise. Applying tape, I averaged 1 ft. in four to six seconds.

I was skeptical that hot air could melt the glue sufficiently. However, the heat in both the Freud and Virutex edgebanders is supplied from adapted Steinel brand adjustable heat guns, which are commonly used to remove paint. And both edgebanders get very hot. In fact, if you linger on one area, you will scorch the veneer. I had to use the Virutex on the lowest setting until I was familiar with it.

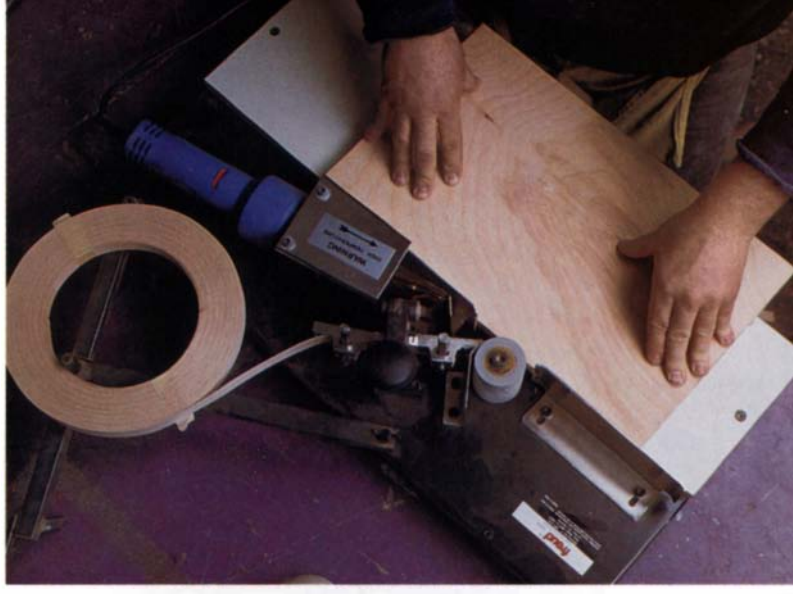
The Freud is a stationary machine, mounted on a tabletop, while the Virutex is hand held. Both require preglued tape and have a built-in cutter that trims the tape to length when you finish gluing it to an edge. The Freud works best for panels up to about 2 ft. wide by 3 ft. long. Larger panels are difficult to wrestle through the machine without auxiliary tables to support the weight. Although the Virutex is a bit cumbersome with small pieces, it handles larger panels easily, since you must clamp the panels in a vise and move the machine over the edge. The disadvantage to the Virutex is that the operator must stop and reclamp the panel to tape each edge. This gives the Freud a decided advantage in speed when edging smaller panels. However, an added advantage of the Virutex is its ability to apply tape to curved edges; the Freud can only tape straight edges.

Neither the Freud nor the Virutex automatically trims the excess tape flush with the panel's surfaces, but the Virutex comes with a trimming tool with blades that cut both sides of the tape at once, as shown in the center photo. The idea is good, but the tool tended to tear and chip the tape where the grain wasn't parallel to the tape's edge. Freud doesn't supply a trimming tool.

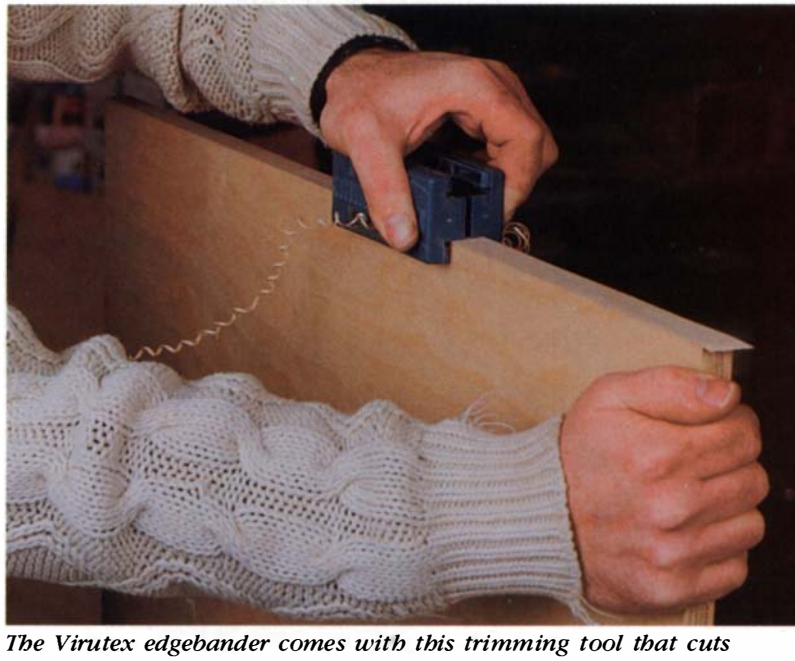
A fully automatic edgebander—I bought a fully automatic Holz-IDM edgebander for my five-man cabinet shop. The machine is 10 ft. long, weighs 2,500 lbs. and costs almost $20,000. Besides veneer and PVC tapes, this automatic edgebander applies plastic laminate and solid-wood edging up to ½ in. thick. As you feed panels onto a conveyor belt, the machine automatically coats their edges with melted glue before it applies edging material, which is fed from a roll or from a magazine. Then, two saws flush-trim both ends of the edging and two routers cut excess edging flush with the top and bottom panel surfaces. All of this takes about five seconds and the machine edges as fast as I can feed panels into it, all day long.

Now I can apply plastic laminates, as shown in the bottom photo, much faster than with any other method, and I no longer have to wait for contact cement to dry. But the Holz-IDM really earns its keep when thicker wood edging is applied. On a recent job, we built many doors with mahogany veneer on fiberboard cores that were edged with ⅛-in.-thick mahogany on all four edges. It would have taken two men at least four days using yellow glue—clamping, cleaning up squeeze-out, planing, trimming and scraping. The job took three hours with the edgebander, including set-up time. □

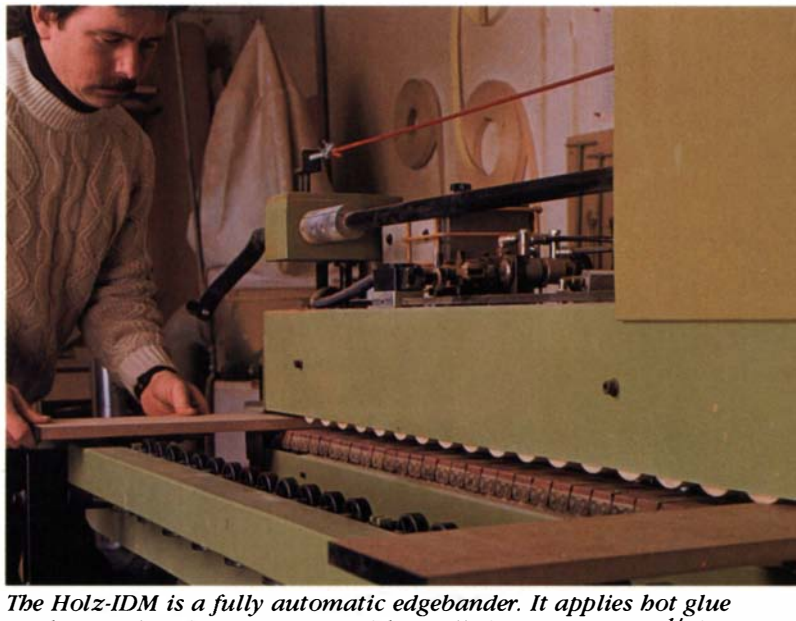
Jack Gavin, who owns and operates Gavin Construction in Brooklyn, N.Y., builds custom cabinets and furniture.



The Freud edgebander can apply preglued tape to panels up to 2 ft. wide by 3 ft. long without table extensions. It melts the tape's glue, automatically applies the tape and has a cutter to trim the tape to length. It sells for about $300.



The Virutex edgebander comes with this trimming tool that cuts both sides of the tape at the same time.



The Holz-IDM is a fully automatic edgebander. It applies hot glue to the panel's edge, presses on either rolled tape or up to ½-in.-thick plastic or wood, saws the banding flush to length and routs it flush with the panel's surface. It sells for about $20,000.

Multiple-Segment Turnings

Designing with structure and color

by Janelle Lenser

In Neil Munson's segmented turnings, design and structure are interdependent. Clockwise from upper left, "Ovals," named for the grain pattern of the segments in the center bands; "Thermos," a double-wall vessel with a walnut bowl in an oak outer shell; "Jewel Case," a walnut box assembled from two separate turnings; "Chimney," end-grain oak segments glued up on a tapered, Philippine mahogany block; and "Skyline," a lidded cherry bowl with a handle that represents a city skyline.

Segmented construction is not new to woodturning. By gluing up various precut wood segments, a woodworker can create a turning blank that is greater than the sum of its parts, the same way that a composer arranges notes into complex and unique compositions. But just as a piece of music can be either monotonous or moving, so too can segmented turnings be boring or appealing. Neil Munson of Lincoln, Neb., knows the difference. His turnings, a few of which are shown in the photo above, demonstrate some of the possibilities if a segmented turning is well planned and constructed with carefully selected segments.

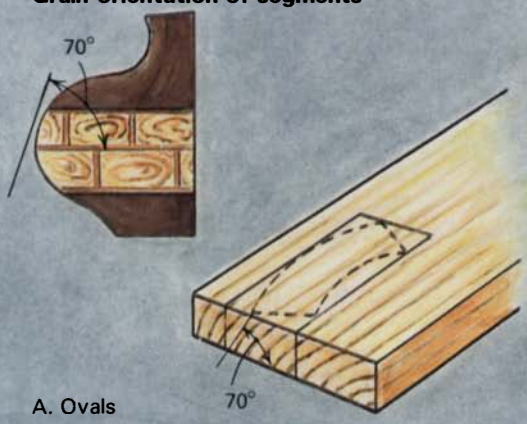
Munson, who recently retired after 41 years as an industrial-education instructor at the University of Nebraska, has been experimenting with segmented turnings for the last 15 years. His responsibilities as a teacher left little free time for his own woodworking, and so he's only produced three or four pieces a year. With this low output, he hasn't worried about sales; nevertheless, his turnings have been purchased as gifts for a governor of Nebraska and a retiring dean at the university.

With most laminated turnings, the contrast between the colors of the parts is the first thing to catch your eye. But Munson is much more interested in the overall structure of the finished turning than he is in just making colorful bowls with contrasting woods. His turnings are carefully thought-out experiments where design and structure go hand in hand. He works out all the details of each turning at the drawing board, beginning with two or three different views of the final shape. The drawings help him determine the number, shape and size of the segments that make up the turning blank. Visualizing the finished turning in this way also guides his selection of wood for each segment, which is based not only on the species or color of wood, but also on the precise grain orientation. This concern with structural details is the thread that runs through all of Munson's work. Each of the turnings shown here represents a unique combination of some of the basic structural elements in Munson's design vocabulary. An abridged dictionary of this vocabulary follows.

Grain orientation—In experimenting with segmented construction, Munson discovered that he could produce patterns and color schemes in the finished work by carefully orienting the grain of the segments. For example, in his turning called "Ovals," far left in the photo above, each of the Douglas fir segments in the two center bands has an oval grain pattern, hence the name. But the ovals did not happen by chance. Referring to his drawing, Munson measured the angle that the surface of the segments would have on the finished turning and then "went hunting" through his stock for just the right grain that would result in an oval when turned (see detail A in the drawing). In "Chimney," front right in the photo above, he cut segments with similar end-grain patterns and centered each segment on the most vertical medullary ray to add an even subtler uniformity (see detail B in the drawing).

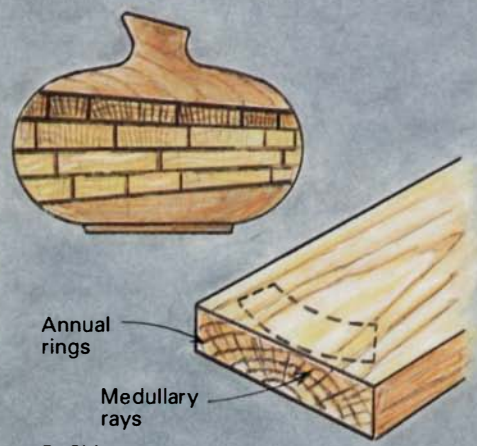
The turning that Munson calls "Thermos" (because of its double-wall construction), center in the photo above, illustrates a different way that grain can produce a pattern. Detail C in the drawing shows how Munson glued-up the original three-part oak sections that form the vessel's outer shell. The color difference between the endgrain and the side grain reverses depending on the angle of light reflection; dark areas turn light and vice versa. To make sure the visual effect was uniform, Munson cut all the pieces with the annual rings running straight through the endgrain, thereby also ensuring that the medullary rays ran squarely through each piece.

Grain orientation of segments



A. Ovals

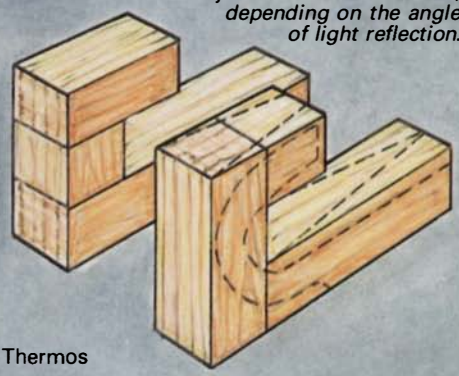
Cutting segments from stock where the annual rings are at the same angle as a line tangent to the finished contour, results in a uniform oval grain pattern on each segment. (Slow-growth Douglas fir works well.)



B. Chimney

To orient all the medullary rays similarly on the finished turning, the endgrain segments are cut to center on a radius line extending from the pith.

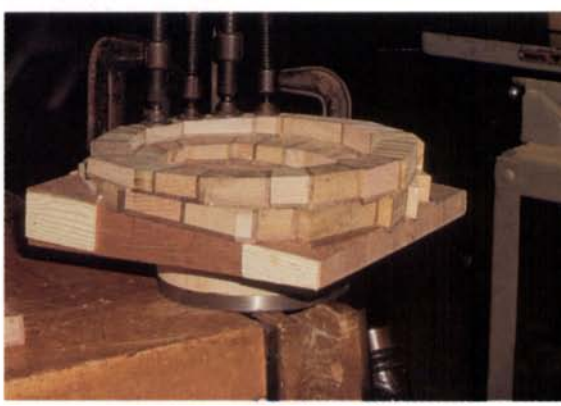
A color difference results from endgrain contrasting with side grain at each joint. The colors reverse, depending on the angle of light reflection.



C. Thermos

Two types of three-piece segments are glued-up, bandsawn into wedges and glued together alternately to form the outer shell of the vessel. The medullary rays are aligned squarely through each block for uniformity.

Left: To create the tilted plane for the turning "Chimney," Munson mounted a solid block of mahogany at an angle between two pieces of plywood and ran it over the dado blade, repeatedly adjusting the fence until the whole block was tapered. Right: The tapered block becomes the foundation for layers of segments. Using the jig shown in the photo at left, each layer is tapered in the opposite direction from the original block until the blank is once again of equal thickness. The blank is then bandsawn round and turned on the lathe. The small pieces of plywood on the sides of the mahogany block are spacers for the jig.



Mortar around the brick—"Chimney" and "Ovals" share another of Munson's structural experiments: surrounding each segment with a thin band of a contrasting wood, a technique he calls "mortar around the brick." The "mortar" wood can be glued around each individual segment, but whenever possible, the segment stock is selected and glued, surface to surface, onto an 18-in.- to 24-in.-long piece of the mortar wood before each segment is cut out. Then the ends of the segments are disc-sanded to fit the adjacent segments, and a small piece of mortar is glued to one end of each segment (see the right photo above). Because the curvature of the bowl will affect the thickness of the horizontal layers of mortar, it may be necessary to reduce the thickness of a layer if all the layers are to be of equal width after turning.

Removing and replacing segments—In the turning that Munson calls "Skyline," front left in the photo on the facing page, he left certain segments unglued when he assembled the blank, and then removed them before turning the outside shape. When the outside was complete, he shaped and sanded the missing walnut segments and glued them in place so they protruded slightly. Then, he finished turning the inside of the bowl so the reinserted segments were flush on the inside. The handle, which forms the skyline for which the vessel is named, was glued up as a unit from individual blocks and the pieces that form the lid were cut to fit around it.

In "Jewel Case," upper right in the photo on the facing page, removing segments has a functional purpose. The segments for mounting the hinges were fitted but not glued during assembly. The hinge blocks were then glued in place after the outside of the glued-up hollow form was turned. Segments can also be effective by their absence; leaving them out completely or filling them with other materials, such as stained glass, can add a special effect.

Segments on a tilted plane—"Chimney" is one of Munson's most striking pieces because of the tilted plane of the segments. The left photo above shows how he begins with a solid block mounted on a faceplate, and then tapers it with a jig and a dado blade on the tablesaw. From there he glues the segments onto the block and tapers each layer in the reverse direction from the block so that the last layer of segments brings the blank back to equal thickness (see the photo above right).

Cutting turnings to reveal the shape—Munson thinks that "Cutting a completed turning exposes and verifies its dimensional features, its total shape, in the same way a mechanical drawing examines the sections of objects." The top of "Ovals," sliced to reveal a section view, ultimately provides a glimpse of the shape of the entire piece. Sometimes a turning is cut apart and then reassembled to give it a completely new form, or as with "Jewel Case," to give it a function. But even then, cutting the piece reveals its structure: When the doors of "Jewel Case" are open, they reveal a circular shelf (its edge is visible as the thin lamination just below the pulls in the photo on the facing page), which Munson inserted between the preturned shallow bowls that he glued together to create the hollow form of the finished case. □

Janelle Lenser is Features Editor for the Fremont Tribune *in Fremont, Neb., and a former student of Mr. Munson. Since retiring from teaching, Neil Munson has continued to experiment with segmented turnings in Lincoln, Neb.*

Photos this page: Richard Ramirez; drawing: Tom Mangano

Building a Cradle

Slab construction and heart-shaped dovetails

by Jacques Berger

My good friend was expecting a baby and I decided to build a cradle for the new arrival. The cradle I designed and built, shown below, is basically an open box made with simple slab construction, using flat boards sawn to shape. The cradle's corner joints needed to be strong, and since I had been experimenting with unusual variations of dovetails (see the sidebar on p. 51), I decided it would be fun to come up with a special joint for the piece. Because a new baby is such a sweet thing, I designed special heart-shaped dovetails that I call "lovetails." Further, I thought these exposed corner joints enhanced the look of the simple cradle so well that I decided to develop the lines of the cradle around this theme. Before I get into how I constructed the cradle and cut the lovetails, I'll tell you more about how my design evolved.

The design—Although I wanted my cradle to be a precious piece of furniture to be kept as a family heirloom after the baby has grown, I also wanted the design to allow simple construction. My cradle is basically a box with trapezoid-shaped ends, which have sawn rockers on the bottom. I made the cradle rather small, so it wouldn't be too heavy and unmanageable. As you can see in figure 1 on the facing page, the cradle is 36 in. long, with the ends tapering from 19 in. wide at the top to 16 in. at the bottom of the joined sides. These dimensions allowed me to make the cradle 13 in. deep, enough to prevent an active baby from falling out and to allow the cradle to be used safely until the baby starts sitting up and needs a full-size crib.

Built from Brazilian mahogany with slab sides joined together by unique heart-shaped "lovetails," the author's cradle is an attractive, simple-to-build project for any woodworker who knows someone expecting a visit from the stork.

One of the most important design parameters for the cradle is the radius of the rockers and their location in relation to the box. If the box is too high, it becomes too tippy; if it is too low, it doesn't look right. I found that 5 in. between the bottom of the rockers and the bottom of the box is just right, both for appearance and stability. The radius of the rockers must also be planned carefully to allow the cradle to rock gently, without tipping. If the rocker's radius is too long, the cradle comes to rest very quickly; if it's too short, the cradle becomes tippy. After a little experimentation, I settled for a radius of 25 in. I also added a slight knob on the rocker ends, for a little extra protection against tipping too far.

Once the rocker dimensions were established, I drew out the cradle's basic outline so that it had smooth, continuously flowing curves. To emphasize the heart motif in the lovetails, I designed a heart-shaped cutout on the headboard and echoed that shape with half-hearts on each end of the sides. I made the design consistent with the softness of the future resident by rounding the edges of the headboard and footboard and curving the sides slightly. And since I wanted the cutout heart on the headboard to be part of the curve, I extended the cutout to the edge, rather than just making it a hole in the board.

When sketching the cradle, I drew half of each curve freehand and then used tracing paper to draw the other half symmetrically. While lines drawn in this fashion are not as perfect as those made using a French curve, I find that working freehand gives me more freedom in creating shapes and in blending different curves—like those at the bottom of the cradle's ends—in one single movement. In the same way that you sight down a board to see if it is straight, I "eyeball" my curves from a low angle. This lets me see any irregularities, which I then correct by smoothing out the lines.

Preparing the stock—I chose Brazilian mahogany for this project, but any stock dense enough to hold detail and make strong dovetails will do. While the wood I chose was nicely figured, I found it slightly too dark after oil finishing, and I would choose a lighter wood, say oak or maple, if I made another cradle. I planed my rough 4/4 stock down to 7/8 in., which kept the cradle fairly

lightweight but gave me enough meat for the dovetails. It is very important (as I learned too late) to choose pieces of wood of almost equal density for the cradle sides. If one side is heavier than the other, the cradle will lean when sitting at rest.

I glued up stock for the two sides and ends with the grain oriented to run horizontally around the cradle, and I left extra width for cutting out the curves later. For glue-up, I used the techniques illustrated in Chris Becksvoort's article "Edge Gluing Boards" (*FWW* #79, pp. 68-70), although I had a little trouble matching my mahogany's color and figure. Once the glue dried, I scraped off the excess and sanded the four sides to a nearly finished state. Sanding now prevents problems later; if the stock is sanded after the dovetail pins are cut on the sides, the pins won't fit snugly into their sockets.

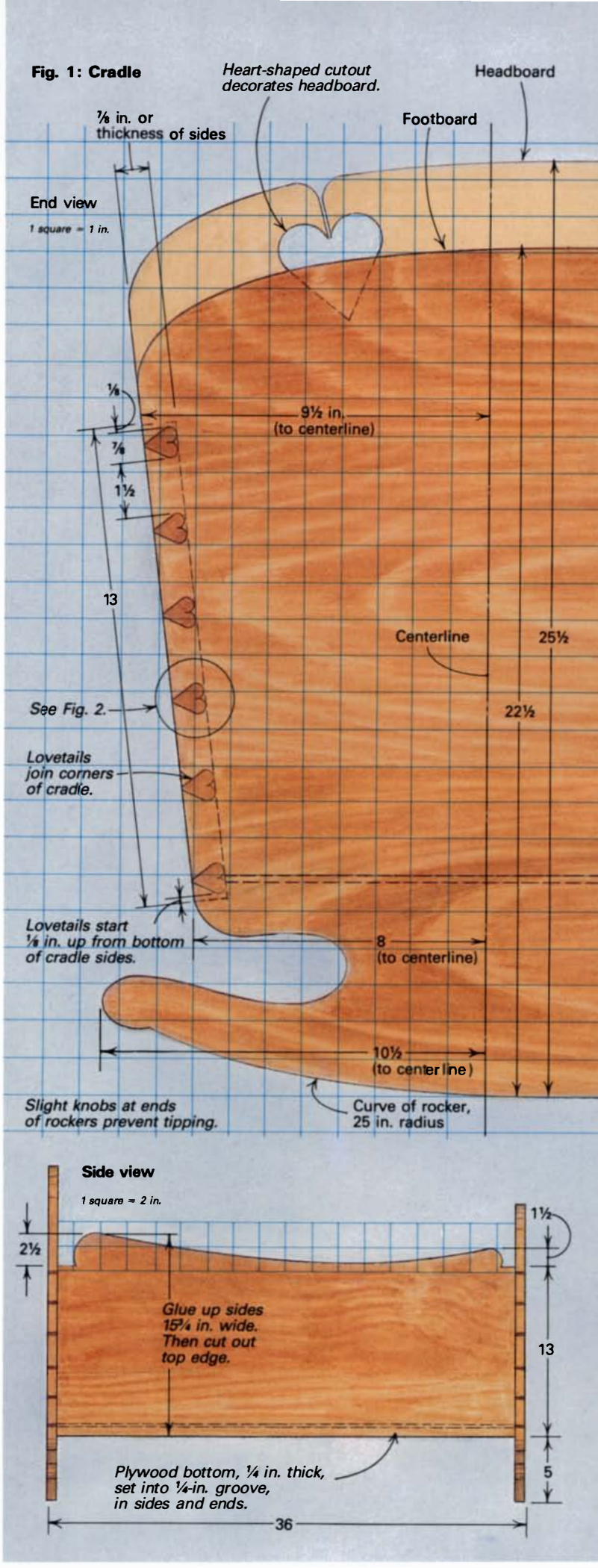
Next I cut the glued up slabs for the sides and ends to the dimensions shown in figure 1, using the tablesaw for the straight cuts and the bandsaw for the curves. After tracing the curves from my cardboard patterns onto the four slabs, I ran the bottom edge of each over the jointer to true them up. Then, with the miter gauge set to 90°, I trimmed the ends of the two sides to length on the tablesaw. After resetting the gauge to 76.5°, I taper-cut the ends of the headboard and footboard, stopping the cuts short to avoid sawing into the rockers. Finally, I replaced the regular sawblade with a dado blade and plowed a single ¼-in.-wide by ⅜-in.-deep groove in each slab for the cradle's bottom. The rip fence is set so that the near edge of the groove will be ⅜ in. from the bottom edge of each side and 5⅜ in. from the bottom on the ends.

To cut out the curved edges on the slabs, I used a ¼-in. 8 t.p.i. bandsaw blade, which produced fairly clean cuts and easily handled the smallest radius in the pattern. Because the 12-in. throat of my Craftsman bandsaw was too narrow to handle the rotation of the stock for some of the cuts, I had to trace the curves on both sides of the slabs and flip the piece partway through some cuts. But you won't have this problem if you use a larger bandsaw, a hand-held sabersaw or a bowsaw.

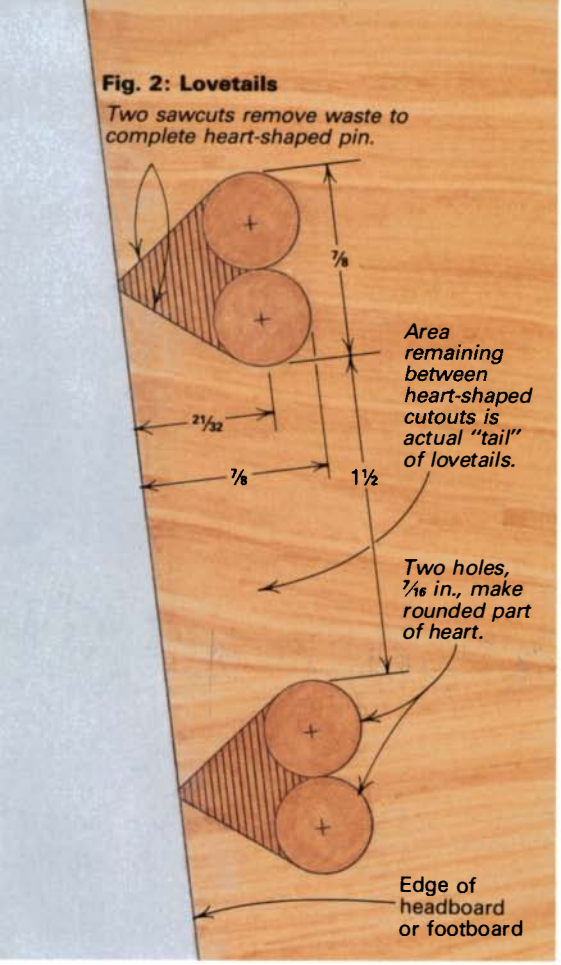
After cutting the curves, I removed the sawmarks on all the edges, first with a fine rasp to eliminate the major flaws and then with sandpaper. The cradle sides were then ready for cutting the lovetails. Incidentally, because the stock is sanded before the joints are cut, it's important to work on a clean surface; wood chips pressed between the workbench and the pieces can leave nasty indentations on the nearly finished surfaces.

The corner joinery—I started making my lovetails by laying out and cutting the tails on the ends of the cradle. First I marked where the sides of the cradle were to meet the ends. Then, working on paper, I sketched out the heart shapes (that are cut out to create the tails) to come up with a spacing scheme that would look neither too crowded nor too sparse. Six pins, each ⅞ in. high and ⅞ in. wide (to correspond with the thickness of the stock), looked like the right number. The six hearts were laid out evenly along the 13-in.-wide ends, 1½ in. apart, with the first and last ones set back from the board ends ⅛ in. (see figure 1).

Next I cut the tails. Each tail results from the wood left between the heart shapes, which are bored and sawn out. Before starting, I matched the sides with the ends and numbered them, so I could be sure all the parts would go together correctly at assembly time. Following the layout scheme shown in figure 2 on the next page, I marked the points of the hearts on the outer edge and located the centers of the two side-by-side holes that make the rounded top of each heart. I used the drill press fitted with a 7/16-in. brad-point bit to bore the holes. Two straight cuts made with a Japanese saw extend from the point of the heart and run tangent to the inside of

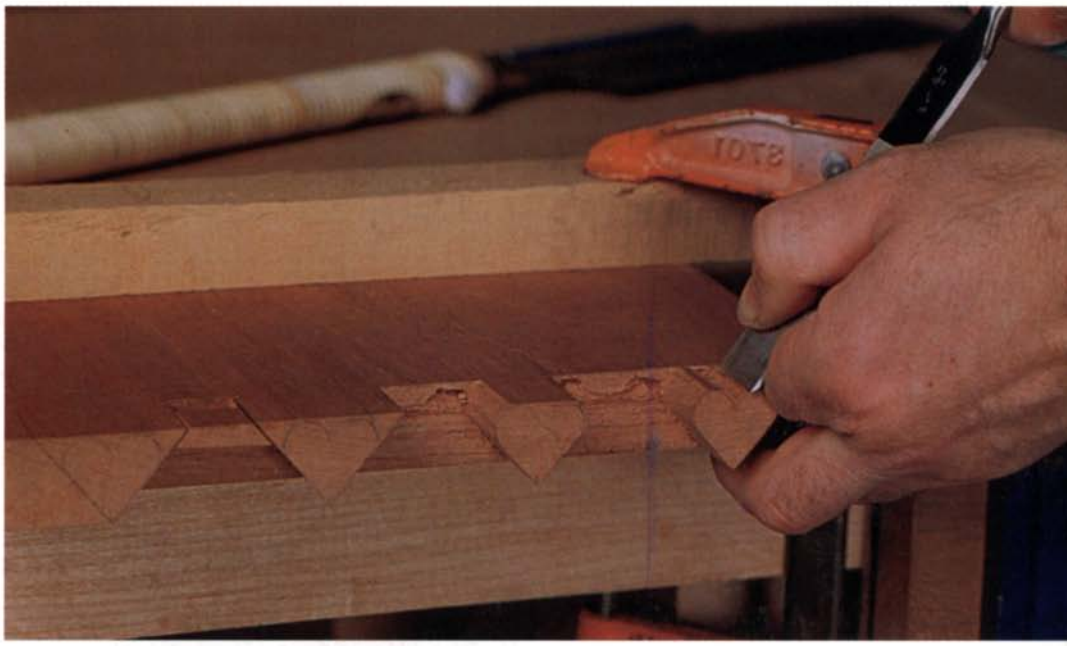


Drawings: Vince Babak



Left: After laying out the tails and boring two holes for the rounded top of each heart, cut the straight lines of the pins with a thin-bladed Japanese saw.

Below: A wide chisel is used to shape the rounded top of the heart-shaped pins.



the holes to finish the hearts. The Japanese saw, with its thin blade that cuts on the pull stroke, is great for such fine-line sawing jobs because it can be controlled precisely and the resulting cuts are extremely clean. I draw the lines guiding the sawcuts after the holes are drilled rather than before, in case the holes end up slightly out of line. Once the tails are done, I don't touch them again; the fit of the joint will be adjusted by trimming the pins later.

The next step is to trace each row of heart-shaped holes onto the end of the corresponding cradle side to create the pins, as you would if you were cutting regular dovetails. I traced the pins by placing the tail side on the end of the board in what would be its actual position. To ensure that the lines would be as close as possible to the original heart shape, I used a pencil that I sharpened often. I marked the depth of the pins by striking a line across the edge of each board. After marking out, all I have to do is cut accurately to the lines, minimizing final-trimming. With the board clamped to the side of the bench, I then cut the straight parts of the pins, again using the Japanese saw (see the top photo above). After the first cut, I chiseled out the waste between the pins in the traditional fashion, going halfway through the stock thickness on each side and hollowing the bottom slightly to allow the joint to slide together more easily. Finally, I rounded the final shape of the top of each pin heart using a wide, sharp chisel and file (see the bottom photo above), and then I started the fitting process.

Generally, if the pins are cut with care, the joint will go together partially on the first try. The pins should slide in place to a depth of about 1/16 in. to 1/8 in. This is excellent, as far as I am concerned, as I much prefer to have a joint that is too tight rather than too loose at this stage. Then I filed and chiseled each pin, a little at a time, for a good fit. I know where to remove excess wood by the friction marks the tails left on the pins at each fitting. This can be a long painstaking process, but I always follow the rule that it's better to remove too little than too much. When all four corner joints fit snugly, I dry-assembled the cradle and enjoyed a first look at it.

With the four sides assembled, I checked to make sure the surfaces of the joints were all flush and I did some touch-up planing and sanding where needed. Finally, I rounded over all the edges of the pins and tails slightly by sanding them lightly across the ends. I have two reasons for doing this: First, it makes the joints look softer, and second, the rounded edges help camouflage any imperfections in the fit. Without rounding, I find it nearly impossible to make this unusual type of dovetail fit perfectly without the hint of a gap between the pins and tails.

Final assembly—All that remains is to cut out the bottom, assemble the cradle and finish it. The bottom is a piece of 1/4-in. mahogany plywood that is inserted in the groove cut earlier. The final assembly of any project is always a tense period for me; so I always recruit my wife as a helper (and for moral support). Before beginning, I resand each part down to 280-grit. It was clear that I could not assemble the entire cradle in one operation; with 24 pins to paint with glue and four sides to assemble around a bottom piece using clamps and protective pads, I decided to assemble one end at a time. I glued the footboard to the sides first, leaving the headboard in place dry to align the sides. After the glue had set a few hours later, I slid the bottom piece into its groove and final-assembled the headboard.

After cleaning up a little glue squeeze-out and giving the entire surface of the cradle the once-over with #000 steel wool, I finished the cradle with three coats of Watco Danish oil. Some people may worry about the baby chewing on the wood and getting sick from the finish; fortunately, most oil finishes are non-toxic when they're completely cured (about six weeks or so). You still should check with the manufacturer of the finish you choose, just to be on the safe side. □

Jacques Berger is an amateur woodworker and language instructor at Laurentian University in Sudbury, Ont., Canada.

The dovetail revisited

A dovetail joint on a piece of furniture or cabinetry is usually the hallmark of conscientious workmanship. In addition to its prestige, the handmade dovetail is a very strong joint: The two halves lock two boards together and create an ideal joint for heavily used furniture components, such as drawers, which take a lot of stress and strain. Finally, the dovetail is aesthetically pleasing—so much so that many craftsmen employ dovetails throughout their work to show off their skill on drawer fronts or the edges of a carcase.

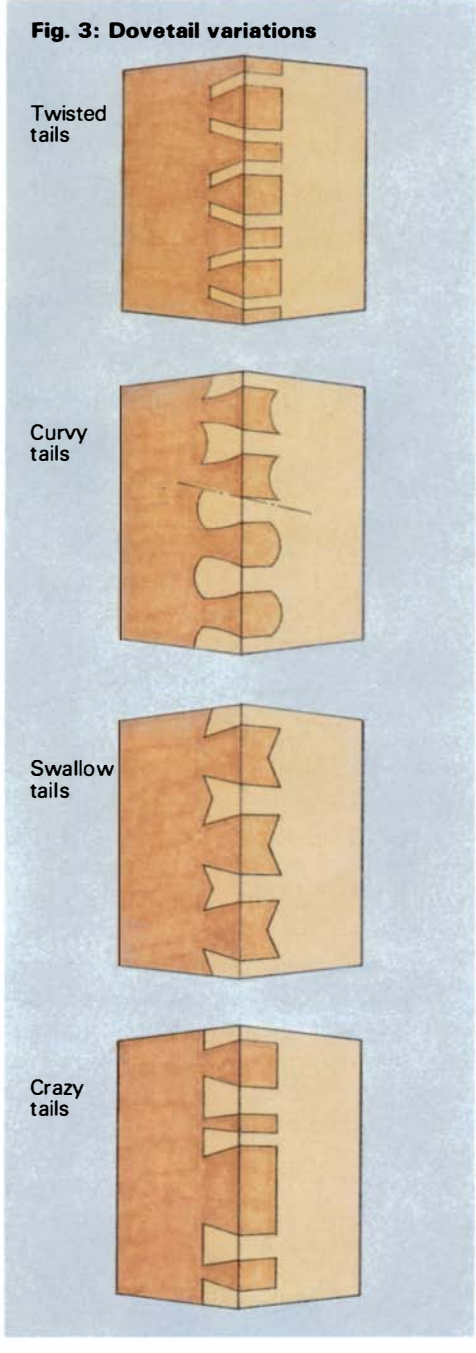
But as strong and beautiful as the dovetail is, is it really the perfect joint? After you've cut hundreds of dovetails and explored all the possible variations on the basic theme—varying the angle of the dovetails, changing the distance between the pins, cutting the pins tiny or wide—you may end up feeling that a dovetail is a dovetail is a dovetail. When I investigate a piece of furniture, I'm always thrilled to discover something unusual or special in the joinery; a little hidden treasure that reassures me of the piece's quality.

That's the feeling that got me thinking about what could be done to spruce up the design of the good old standard dovetail, but without changing the basic principle of the joint: two halves that lock together. The fruits of some of my joint-designing experiments are shown in the photo above and figure 3 at right. The "twisted tails," my first try, were easy to cut, and different from anything I'd seen before, but the design isn't very bold. Although my next attempt, "swallow tails," also resembled regular dovetails, the pins and tails were almost the same and showed on both sides of the joint.

My next try was an experiment in changing angles; when I realized that there was nothing forcing me to keep the same angles throughout the entire joint, I came up with the "crazy tails." I was still not satisfied, however. To me, the resulting joints looked too typical, too humdrum. I thought, why not try curves? By rounding off one edge of both the tails and pins, I ended up with the "curvy tails." The mating parts create an undulation of concave and convex lines. Then, I thought, the regular dovetail's locking effect produced by complementary angles could also be created by conflicting curves, as shown in the bottom, left test joint in the photo above. Even though the joint wasn't very strong because of its curved pins, I liked its appearance. In fact, most of my fancy joints probably lack the strength of the regular dovetail. They are, however, at least as strong as finger joints and their slight loss of strength is counterbalanced by the pleasing design.

Experiments in joinery: Berger makes up pattern boards in his quest for unique alternatives to the standard dovetail.

Fig. 3: Dovetail variations



If you're willing to experiment, there's no limit to the possibilities for unusual joints. The principle of the dovetail, not the dovetail itself, becomes the guideline: complementary angles and/or curves will create a locking joint. While unusual joints can be effective in any piece of furniture or cabinetry, you probably won't want them in situations where you have lots of joints to cut because they're usually too time-consuming. Rather, use them as a decoration or for a prominent feature on the piece. This is how I've used the lovetails to join the sides on my cradle, shown in the photo on p. 48.

Construction: To those who have mastered regular dovetails, my fancy joints may seem unrealistic or just too much trouble to cut. But, aside from a few tricks, the main ingredients in producing these joints are patience and good skill with a handsaw, chisel and mallet. Here are a few tricks that may help you cut the joints pictured or any others you may wish to design yourself.

On dovetails that involve rounded parts, start by cutting the tails first. Then, cut the pins and trim them till they fit snugly with the tails. This is contrary to the way many people cut regular dovetails, but it seems to work well for the unusual joints. In some designs, determining which part is a pin and which is a tail may be difficult; I usually choose the half with the more convex shape as the pin, since this is easier to chisel, file or rasp when trimming to fit.

With some of my joints, as with regular dovetails, the bottom of the spaces between tails and pins is flat. In this case, the depth of the joint is a straight line that's laid out as far from the corner as the joining stock is thick. When bottoms of the spaces aren't flat, as with the swallow tails, chisel out the pattern on the bottom first. Then, transfer it to the end-grain of the other half and chisel it out to match, undercutting it slightly if needed. In some cases, as with the lovetails, I create round patterns by simply boring on the drill press. The shape of the concavity can be completed by sawing, chiseling or filing after drilling. Some designs have pins that can be cut directly on the bandsaw, such as the twisted tails. Unless you are a hand-tool purist, the router used with a template can be indispensable for creating curved or irregular joints, like the example shown on the top right in the photo above. *—J.B.*

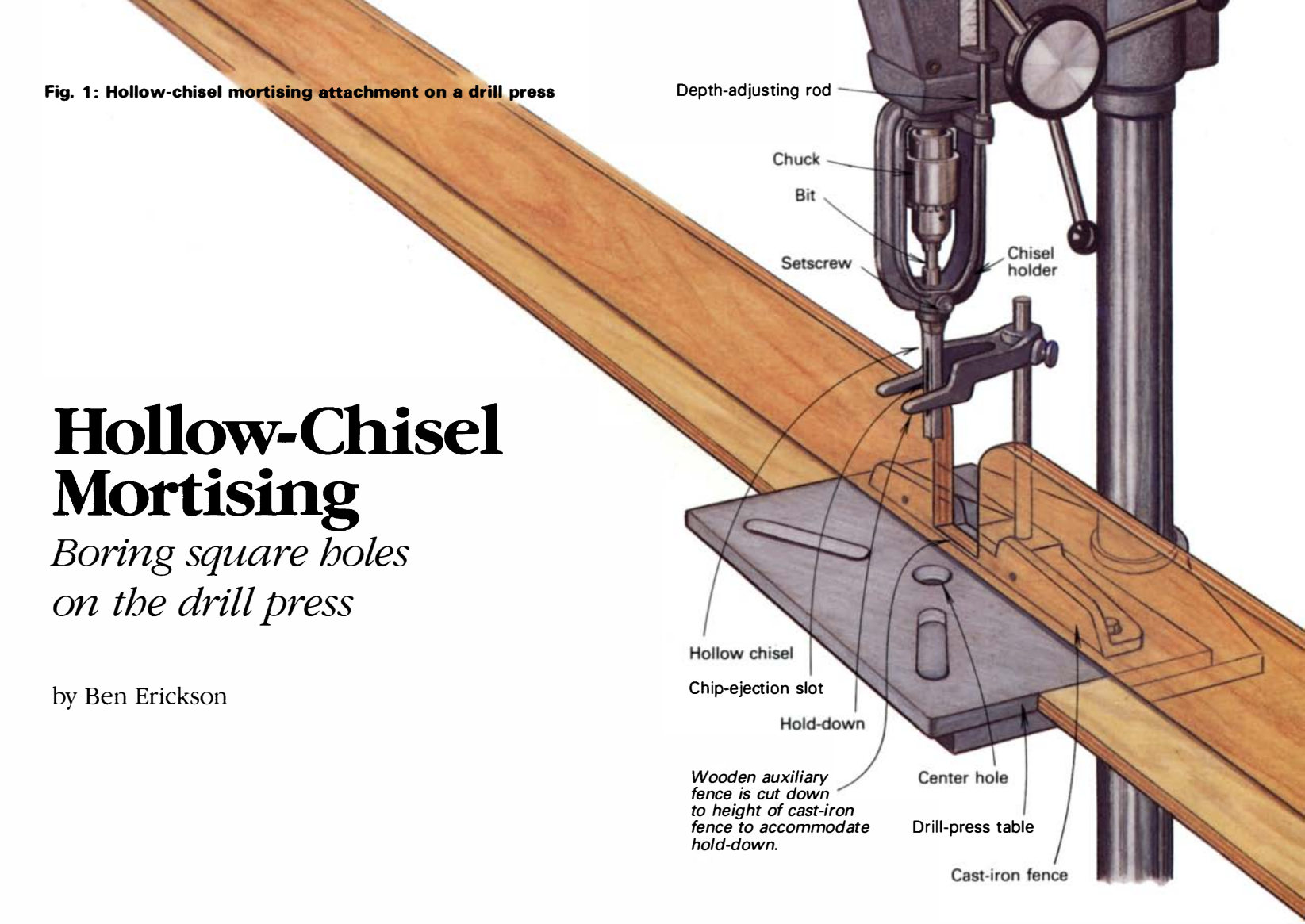


Fig. 1: Hollow-chisel mortising attachment on a drill press

Hollow-Chisel Mortising

Boring square holes on the drill press

by Ben Erickson

My first major mortising project was in 1980, when I was reconstructing our antebellum home. I made four exterior frame-and-panel doors, each of which required 10 through mortises. Because the door stiles were 5½ in. wide, the mortises had to be cut from both sides of each stile, and so I felt like I was cutting 20 mortises in each door. Using a marking gauge, a set of mortising chisels and a mallet, I went to work; fourteen hours and a sore arm later, I finished and vowed that I'd find a better solution next time.

Since then, I've been using a hollow-chisel mortiser on my drill press, shown at left on the facing page. Mortising this way has cut my time from 10 minutes per mortise to 1 minute. This method has its shortcomings though. The tool has a tendency to overheat, and a lot of pressure is required to make the cut. But you don't have to mark out each joint. Instead, you can set up a fence and stop blocks and cut identical mortises accurately and repeatedly in a series.

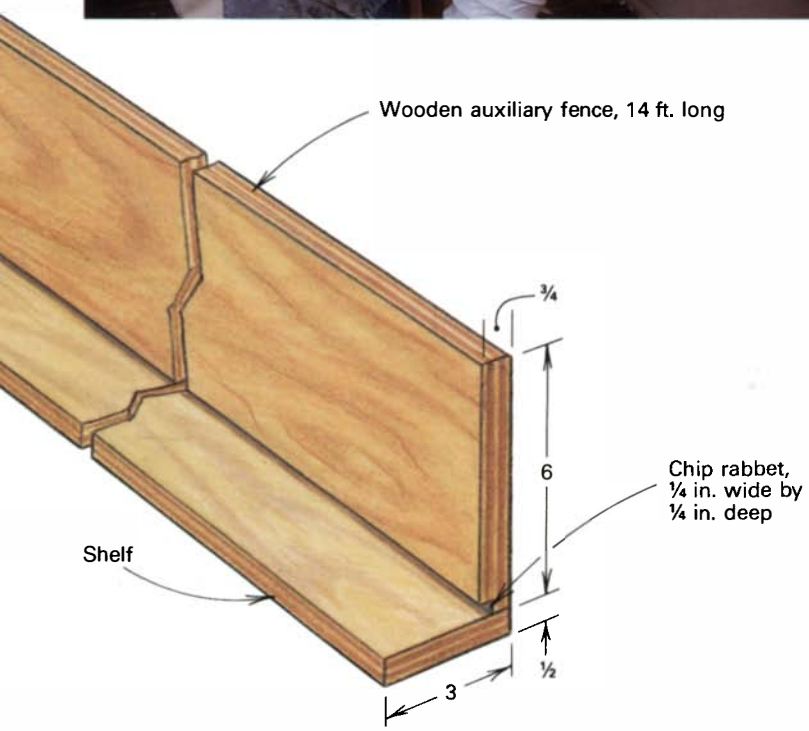
Besides your drill press, the mortising attachments you need consist of a square, hollow chisel with an auger bit inside (see figure 1 above). The chisel is secured in a holder that is attached to the drill-press quill; the bit's cutting edges are in line with the chisel's cutting edges, and its shank is fixed in and turned by the chuck. As you plunge the chisel into the wood, its cutting edges shear a square hole as the auger simultaneously bores out the center. Chips are ejected through a slot in one side of the chisel.

You can make mortises of any length with repeated plunge cuts, and you can set the depth with your drill-press depth-adjusting rod. Maximum mortise depth depends on the effective cutting length of the chisel, which can be from 1⅞ in. long to 3¾ in. long. Through mortises, however, can be almost twice as deep as the chisel's length if you cut them by entering the workpiece from both sides. This also limits tearout, compensates for drift and ensures that the mortise is centered on each side. I also use the mortiser to cut small square holes for muntin or kumiko on window frames and for *shoji* screens (see "Making *Shoji* by Machine," *FWW* #78). Additionally, this system is indispensable for large millwork jobs, such as the 50 exterior louvered shutters I completed recently.

Installing a hollow chisel on a drill press—A mortiser's accuracy depends on the drill press you use. I have had no problems using it on my middle-of-the-line Sears drill press. Horsepower is not a factor since most of the effort is in manually pressing the chisel into the hole and not in the drilling. Because you must use both hands here, the addition of a foot pedal (see the sidebar on p. 55) would free them to perform other operations. There shouldn't be any play in the drill-press quill or you won't be able to locate mortises repetitively and accurately. Although slight runout (worn bearings) on the spindle should not affect the cut, it may cause the chisel and bit to wear prematurely. Mortiser manufacturers recommend that drill-press chuck speed be 2,300 RPM for hard woods and 4,250 RPM for soft woods. I keep mine at 2,300 for all types of wood, because I don't think higher speeds offer any advantages. Although the mortiser works best on less dense woods such as redwood, poplar and mahogany, I have had good results on harder woods like walnut.

To set up the mortiser, first ensure that the table and quill are perpendicular to one another—the quill must be 90° to the table surface. Then, on most drill presses, you must remove the chuck and stop collar. Replace the stop collar with the chisel holder (attach the depth-adjusting rod, if your press is equipped with one, to the chisel holder) and reattach the chuck. Removing and replacing

Above: After the chisel holder and chuck are installed, the chisel is inserted in the holder and advanced until it extends through the table's center hole. Then the chisel's front face is aligned parallel to the front edge of the table. Left: As the author uses a hollow-chisel mortising attachment on his drill press, a dust collector vacuums up debris. The stop block clamped to the auxiliary fence positions the workpiece so he can cut one end of a mortise.



the chisel holder is time-consuming, and so I leave mine on as much as possible. Although depth of cut will be reduced significantly during normal, round-hole boring, most regular-length drill bits can be inserted up through the holder into the chuck. Then you can operate in the usual way, as shown in "Antebellum Shutters," *FWW* #53. You can use long-length bits to increase your working time before you have to remove the chisel holder.

Next, slide the mortising chisel all the way into the chisel holder and temporarily secure it with the holder's setscrew. Since it's easy to drop the chisel and bit during assembly, you can prevent them from being damaged by covering the iron table and base with scrapwood.

Aligning the chisel–The chisel must be square or parallel to the fence. You should set the fence the requisite distance from the chisel, and then adjust the chisel to a try square held against the fence.

My chisels are worn and difficult to adjust, and so I set them only once by making them parallel to the front of my square drill-press table. Then each time I readjust the fence, I make it parallel to the table front (shown in the top photo on the following page). I first align the chisel's front face parallel to the table's front edge (or a line drawn on a round table).

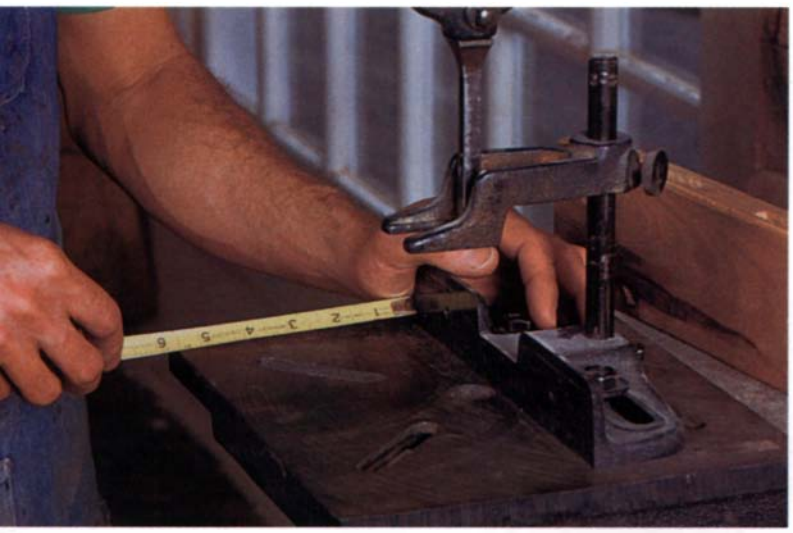
To do this, first lock the chisel in the down position so that it extends through the table's center hole (see the above photo at right). Then make a wooden test jig that is about ¾ in. thick, as long as the table is wide, and as wide as the distance from the front of the chisel to the edge of the table. The chisel and table are parallel when one edge of the test jig is flat against the face of the chisel and parallel to the front of the table. When the chisel is aligned, secure it tightly in the chisel holder.

Now insert the bit through the chisel and into the drill chuck. If the bit is too long to go all the way into the chisel, you may have to cut its shank. You should leave about a 1/64-in. to 1/32-in. gap between the bit's spurs and the chisel's corner points (shown in the bottom, left photo on the following page). Otherwise, the two will wear against each other excessively and cause overheating. Adjust the height of the table so the stock to be mortised is about ¼ in. below the chisel when the chisel is raised to its upper limit. Finally, realign the chisel and table by centering the table under the chisel.

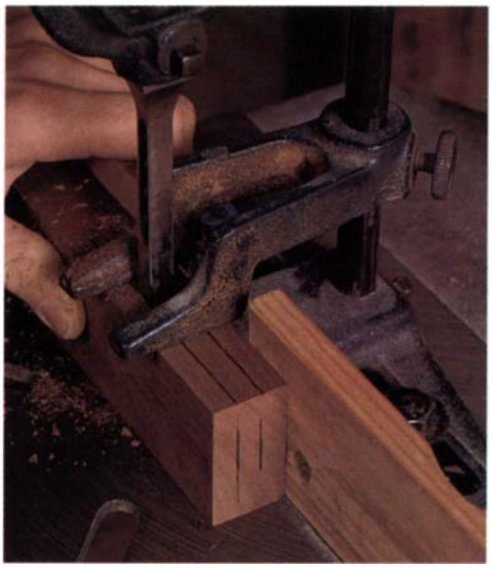
Installing the fence–The fence must have a hold-down (such as the one shown in figure 1 and the bottom, right photo on the next page) so you can retract the chisel after cutting the mortise. My cast-iron fence is about as long as my drill-press table is wide and it's attached with bolts that pass through slots in the table.

In order to mortise long pieces and to provide a place for attaching stop blocks, I fastened a ¾x6x168 auxiliary wooden fence to the cast-iron fence, shown in figure 1. To do this, I drilled holes and tapped the iron fence for ¼-20 machine screws and countersunk the flat-head screws into the auxiliary fence. I glued a ½-in.-thick by 3-in.-wide shelf to the bottom edge of the auxiliary fence on each side of the table. As shown in the left photo above, the shelf supports the workpiece and makes it easier to attach stop blocks that control the length and location of mortises. In order for the workpiece to fit snug and flat against the fence and table,

Drawings: Lee Hov



After aligning the chisel to the table and setting the table height, Erickson aligns the fence and chisel. He positions the table's center hole under the chisel, and then adjusts the fence parallel to the table edge so that the mortise will be parallel to the sides of the workpiece.



Left: The auger has been inserted up through the hollow chisel, with about 1/32-in. clearance between its cutting edges and the chisel's beveled edges (to prevent wear), and its shank has been secured in the chuck. The author has ground the corners of this chisel to reduce friction when mortising. Right: Erickson adjusts the fence to center the chisel between lines on a test piece and cuts a practice mortise. Debris is expelled through the chip-ejection slot and a hold-down clamp retains the workpiece in order to withdraw the chisel.

you must keep debris out of the inside corner between them. To provide space for debris until it's vacuumed out, I cut a 1/4-in.-wide by 1/4-in.-deep rabbet in the bottom edge of the fence. Then, to accommodate narrow workpieces as well as wide ones, I cut the wooden fence to be as high as the cast-iron fence adjacent to the hold-down. Be sure to provide support legs under each end of the auxiliary fence to keep it from sagging.

Setting up and checking the cut—If you center the mortises on the edge of the workpiece, you can flip the piece over and finish cutting through mortises from the opposite side, without having to move the fence or change the position of stop blocks. If you cut mortises off center, you will have to keep the same side of the workpiece against the fence and reset the stop blocks for half of the cuts. Center the workpiece under the chisel. To do this, draw two lines on the workpiece surface that are equidistant from each edge and a little farther apart than the width of the chisel using a marking gauge as a guide along each edge. When you lower the chisel against the workpiece, it should be centered between the lines. Make a test piece the same thickness and width as your workpiece and adjust the fence until the test piece is centered under the chisel. Check that the fence is parallel to the front table edge, secure it and cut a test mortise.

Finally, crosscut through the trial mortise and use the previously set marking gauge to check that the mortise sides are parallel to and centered between the sides of the workpiece. If the sides aren't aligned correctly, you can adjust the auxiliary fence parallel to the chisel by shimming between it and the iron fence. Set the mortise depth with the drill-press depth-adjusting rod and check it by using the crosscut test piece as a gauge.

Cutting mortises—Depending on the hardness of the wood, you might have to apply quite a bit of downward pressure to cut a mortise, and for deep cuts, you may need to use both hands on the handles. Advance the chisel smoothly, and raise it as soon as it reaches the bottom of the cut to prevent it from overheating and clogging. The chisel normally gets very hot in use, but you can reduce friction by coating the outside of the chisel with paste wax or non-silicone lubricant. I've used Elmer's Slide-All (available at hardware stores), which hasn't caused fisheyes in my finishes. However, if the chisel causes undue heat or smoke, stop and sharpen the chisel and bit. It also helps to hone the sides of the chisel smooth.

Once your chisel is advancing smoothly, the chips it removes should eject from the chisel's slot during the cut. If the chisel clogs, it often clears between cuts or during the next plunge. However, if it becomes jammed, try blowing compressed air into the chip-ejection

Fig. 2: Stop blocks and inserts

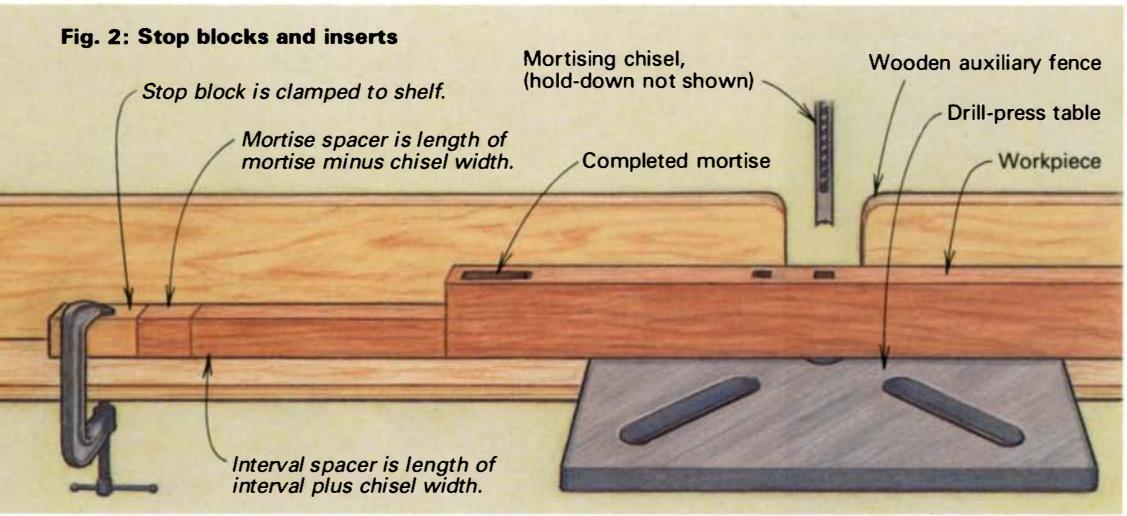
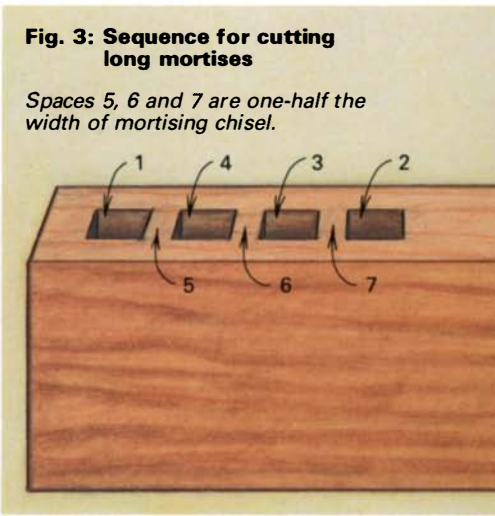


Fig. 3: Sequence for cutting long mortises

Spaces 5, 6 and 7 are one-half the width of mortising chisel.



A pedal feed for a drill press

by J. Kirkham Jenner

Some time ago, I greatly increased the versatility and convenience of my drill press by equipping it with a foot-pedal mechanism. Now I can advance the quill with my foot, and both hands are free to hold the workpiece. I don't use the pedal all the time, but it's invaluable for certain operations such as mortising, where pieces have to be aligned, clamped, cut and then released.

My bench-type drill press is fastened to a shop-built, angle-iron stand. Since your machine is probably different, you may have to adapt the setup shown in figure 4 at right to your machine's configuration. The mechanism's two levers pivot at their center point on axles mounted on the stand. The pedal lever's motion is reversed by the upper lever, which pulls down on a wire that turns the pinion shaft and lowers the quill.

The foot pedal is ⅝x4x20 plywood stiffened with two pieces of 1½-in. angle iron screwed to its sides from underneath. The pedal's angle-iron sides are drilled to accept its ⅝-in.-dia. pivot rod. I turned each end of the rod to ½ in. dia. and then threaded them. The rod's threaded ends are first inserted through ½-in.-dia. holes in the middle of the ¼-in.-thick by 1½-in.-wide angle-iron stretchers on each side of the stand and then secured with nuts. If you don't have a lathe to turn the rod, you can drill ⅝-in.-dia. holes in the stretchers and secure the pivot rod with cotter pins.

The angle iron on the right side of the pedal is longer than the one on the left, and it extends beyond the stand at the back. Here, it's attached to a ¼-in.-thick by 1½-in.-wide flat-bar linkage that connects the pedal lever to the front end of the upper lever. The ends of the linkage bar are attached to the pedal and upper lever by 1-in.-long, ¼-in. machine screws that are held in place by two nuts jammed together. In order for the joints to move freely, don't tighten the first nut, but hold it while you tighten the jam nut against it.

The upper lever, which is made of the same flat bar as the linkage, pivots on a ⅝-in.-dia. rod that is fastened to the stand's back legs in the same manner that the foot-pedal pivot rod is attached to the stretchers. To position the upper lever on the rod (aligned with the pedal and the drill-press pinion shaft), I slid a short piece of electrical conduit over the rod on each side of the lever, and I secured it with #8-32 machine screws that pass through the conduit and rod.

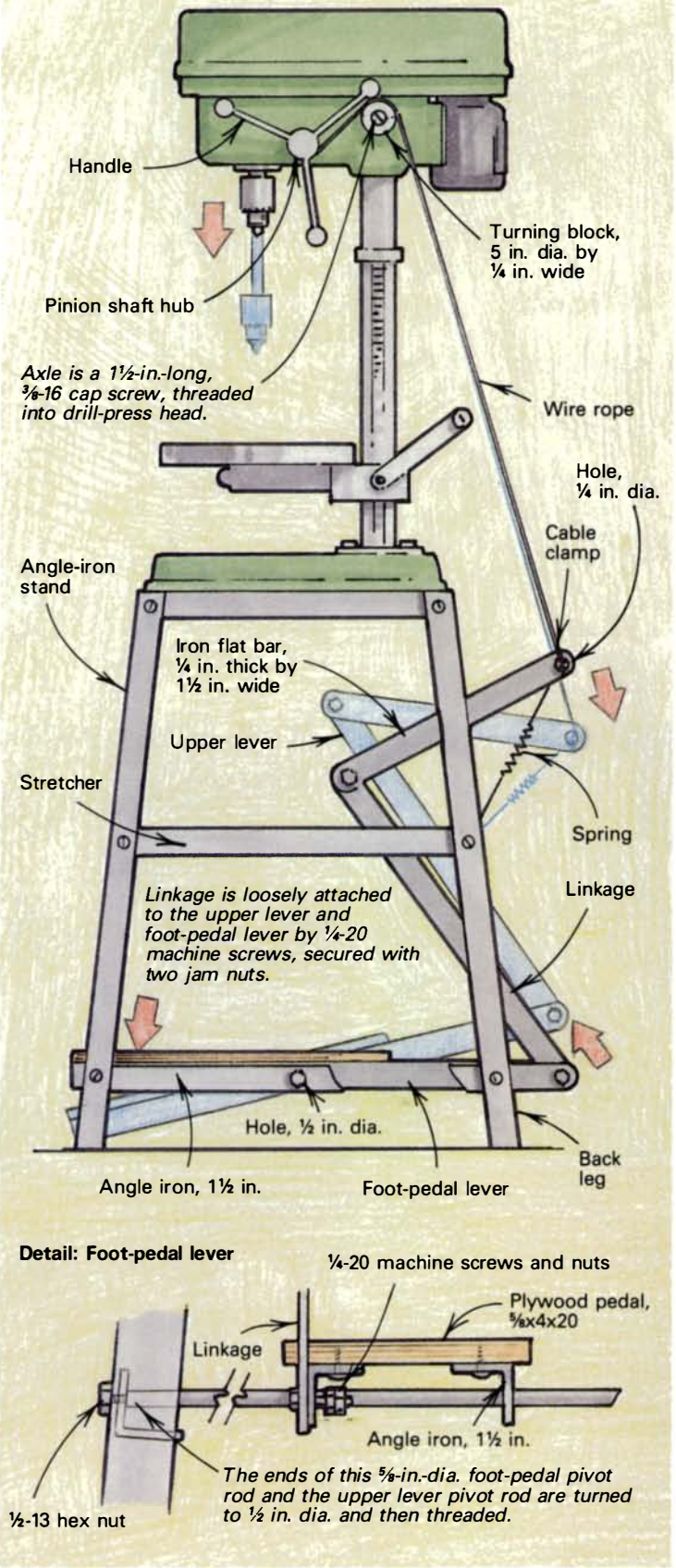
Next, I anchored stainless-steel wire rope (which was bicycle brake cable in its past life) to one of the hub's handles. I did this simply by backing the handle out a couple of turns, wrapping the frayed end of the cable around its exposed threads, and then tightening the handle, which jammed the wire in its threads. The wire is then wound counterclockwise around the hub four or five times. The wire is led from the underside of the hub back over a turning block and then down to the top of the upper lever. The turning block is a 5-in.-dia., ¼-in.-wide V-belt pulley, and it rotates on a 1½-in.-long, ⅜-in.-dia. machine-screw axle that is threaded into the right side of the drill-press head. Almost any narrow V-belt pulley will do, or you could use a wooden one turned on a lathe.

I attached the wire to the lever with a loose loop through a ¼-in.-dia. hole in the lever and secured the wire with a small cable clamp. To keep the wire moderately taut at all times, I attached one end of a spring to the back of the upper lever and anchored its other end to the middle stretcher on the back of the stand. This spring should be stiff enough to cancel the weight of the levers upon the quill's return ascent.

There isn't enough power in my foot pedal to drill large holes in wood or small holes in hard metal; it was designed for speed. You can add power by attaching the bottom of the linkage closer to the pedal lever's pivot point. But as you gain power, you sacrifice speed. □

J. Kirkham Jenner is a woodworker in Grant's Pass, Oreg.

Fig. 4: A foot pedal for a drill press



Drawing this page: Bob La Pointe

slot while the machine is running, or shut off the drill press and pick out as much as possible by hand. Then try again. As a last resort, remove the bit, clear it, and then realign and resecure it in the chuck.

You should keep the table and fence clean, to prevent chips and dust from misaligning the workpiece. When cutting a lot of mortises, I attach the vacuum's nozzle close to the chisel and workpiece to help remove the chips and cool the bit (shown in the left photo on p. 53). You may have to clear chips from completed mortises with a screwdriver or chisel, or push jammed chips out the other side of through mortises.

Using stop blocks—By clamping stop blocks to the auxiliary fence, you can ensure that all mortises will be cut the same length and in the same location in each piece. The simplest method is to clamp a stop block in position at each end of the workpiece.

If your workpiece requires multiple mortises, clamp only one stop block in position and insert spacers between the stop block and workpiece to set the length and location of each mortise, as shown in figure 2 on p. 54. First, align the right end of the mortise with the right cutting edge of the chisel, temporarily clamp the workpiece to the table, and clamp a stop block to the fence so it bears against the left end of the workpiece. Then, cut a mortise spacer as long as the mortise minus the width of the chisel. When the spacer is inserted between the stop block and end of the workpiece, it aligns the left end of the mortise with the left cutting edge of the chisel.

To cut the mortise, first butt the spacer against the stop block, hold the workpiece against the spacer and cut the left end of the mortise. Then, remove the spacer, hold the workpiece against the stop block and cut the right end of the mortise. Finally, complete the mortise in between. Similarly, you can make spacers that govern the interval distance between mortises. You'll have to use three spacers for double-tenon mortises because you need to set the limits for each mortise and the space in between. Mark them A, B and C so you will always use them in the proper order. By saving the spacers, the length of the mortise and spacing intervals can be reproduced.

When you're cutting long mortises, don't use a succession of overlapping cuts. Instead, skip a space between each cut (about half the width of the mortising chisel), as shown in figure 3 on p. 54, to keep the chisel from bending into a neighboring hole or wandering off center and to prevent undue sideways stress on the chisel and the drill press. Drill the length of the mortises in this way and then return to clear out these sections.

If the stile is to have a panel groove on its inside edge, it may be cut before or after mortising. If the groove is plowed first, be sure it is centered on the stock, and if you are using haunched tenons, the groove should be the same width as the mortising chisel to accommodate the haunched portion of the tenon.

Sharpening hollow chisels—To grind the bevel angle and sharpen the chisel's edges, you must use a conical-shape stone (see the left photo). Although the stone I use is intended for a die grinder, I dressed it to fit the chisel's bevels and use it in a portable drill clamped in a bench vise with the stone pointing up. Then, with the stone turning at about 1,000 RPM, I hold the chisel perpendicular and lower its end gently onto the stone. Since repeated use grooves the stone, you must dress it often. I prefer sharpening the chisels with countersink-like Clico sharpeners shown in the right photo. These high-speed-steel cutters, which are turned with a bit brace, have either fixed or interchangeable pilots matched to the inside diameter of the hollow chisel. Grind or cut only until the chisel's edges are sharp, and then remove the burrs left on the outside of the chisel by honing each side on a hard (fine-grit) benchstone. To reduce surface area and therefore friction, you can grind away the corners of your chisel to look like the one in the bottom, left photo on p. 54. As with any spur bit, sharpen the mortising bit with an auger file. Clamp the bit in a vise (between protective wood blocks), and file the inside edges of the spurs and the bevel. Then, hone the burrs from the edges with a hard slip stone. □

Left: The author grinds the inside bevels of a hollow chisel by lowering its end onto a conical-shape stone turning at about 1,000 RPM in a hand drill. Edges are ground only until sharp, and burrs are removed by honing the chisel's outside on a flat stone. Right: Erickson prefers to sharpen hollow chisels by grinding their bevels with high-speed-steel, countersink-like bits turned by hand. The bits have fixed or interchangeable pilots that center them in the chisel.

Ben Erickson is a woodworker in Eutaw, Ala.

Sources of supply

Hollow-mortising attachments—chisels, holders and fences—are available from the following:

Delta International Machinery Corp., 246 Alpha Drive, Pittsburgh, PA 15238; (800) 438-2486, (800) 438-2487.

General Manufacturing Co., Ltd., 835 Cherrier St., Drummondville, Que., Canada J2B 5A8; (819) 472-1161.

Grizzly Imports Inc., 1821 Valencia St., Bellingham, WA 98226; (800) 541-5537, (800) 523-4777.

Jet Equipment and Tools, Box 1477, Tacoma, WA 98401-1477; (206) 572-5200, (800) 243-8538.

Powermatic, Morrison Road, McMinnville, TN 37110; (800) 248-0144.

Sears, Roebuck and Co., Sears Tower, Chicago, IL 60684; (312) 875-2500.

Shopsmith Inc., 3931 Image Drive, Dayton, OH 45414-2591; (800) 762-7555, (800) 543-7586.

Wilke Machinery Co., 120 Derry Court, York, PA 17402; (717) 846-2800.

Sharpening stones are available from:

Forest City Tool—Textron, 620 23rd St. N.W., Hickory, NC 28603; (704) 322-4266.

Countersink-like sharpeners are available from:

Clico, Sheffield Tooling Ltd., Unit 7, Fell Road Industrial Estate, Sheffield S9 2AL, England; (0742) 43307.

The author peels birch bark from the log with a 2-in. slick. The board lying behind him can be used to help hold the bark out of the way as the work progresses.

Veneering with Birch Bark

A natural way to add a decorative touch

by Dick Sellew

I've always enjoyed the natural beauty of the birch trees that grow in abundance on my father's 100-acre lot in southwestern Massachusetts. The contrast of the dark streaks on the lighter background and the texture of the bark itself is so intriguing that I wanted to incorporate these features in my work. The similarities between the flexible bark and veneer inspired my first efforts: I veneered the aprons on a Shaker-style table and found the effect very appealing. Flush with success, I veneered a folding screen, but the ostentatious bark on this scale was overpowering.

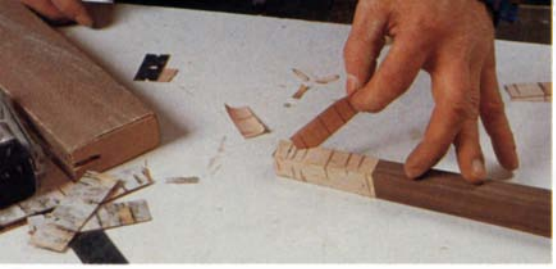
As a result of these experiments, I use small splashes of bark to accent and brighten simple designs, like the display tables shown in the photo at right on the following page and discussed in the sidebar on p. 59. I also played with color by using various hardwoods or tints and dyes, and found that the bark's neutral color goes well with almost everything.

Finding and harvesting birch bark—One of the most enjoyable aspects of working with the bark is tramping through the woods looking for the perfect birch tree. Indians harvested bark for their canoes in the spring or fall, when the sap is running and the trees are easier to skin. I'm not excited about taking bark off living trees; it reminds me a little of elephant hunters seeking the tusks. But I enjoy roaming the woods for dead birch trees and there is a certain satisfaction in knowing that an otherwise lost resource will find a continuing life in one of my projects. Stripping a dead tree is also easier than a live tree, because often the trunk has shrunk, leaving the bark loose and manageable. Also, I have found the bark to be looser in late winter or early spring than in the hot and humid summer. To avoid a lot of strenuous hauling, I debark the logs where I find them. Other than a chainsaw, all you need is a razor knife, a 2-in.-wide slick chisel and a ¾-in. board, roughly 6 in. wide by 24 in. long, beveled along one edge. To further simplify the equipment requirements, you can substitute a bucksaw and a lot of energy for the chainsaw.

I look for a birch tree that has enough clear bark to cover the individual pieces of a project. Because birch bark has many layers, surface defects like sloughy bark, mold and other growth can be removed easily, but branch protrusions and other defects that penetrate the bark should be avoided. You can glue up sections of the bark for larger panels, but unlike regular veneer, the seams will generally show and it would be almost impossible to match patterns for making repairs. If I find a prime tree with lots of clear bark, I try to get as large a piece as possible. However, the larger skins are also more difficult to handle and apply as veneer. Designing projects with only small areas of bark makes your quest much easier because almost any dead tree will do.

If the birch tree I select is still standing, I first cut it down with my chainsaw and then section it to yield the largest pieces of clear bark. With the razor knife, slit the bark the length of the log section, and then begin working the 2-in.-wide slick between the bark and the sapwood along the length of the slit. Grasp the edge of the bark with your free hand and continue working around the log with the slick to free the bark, as shown above. Once you get one-third to one-half of the way around the log, or if the bark starts to split, use the bevel-edge board for holding and pushing the bark back as you continue to peel it away with the slick. If the bark is particularly difficult to remove, find another dead tree to debark, leaving the first tree for another day.

When I arrive back at my shop, I flatten the bark by moistening its inside face, laying it on a flat surface and then weighting it down under a piece of plywood to dry overnight. The next day, I clean both faces of the bark with a standard 1-in.-wide paint scraper to



Above: After contact-cementing the bark veneer to the leg, the excess layers are peeled away to leave a single layer of paper-thin veneer. Below: The author blows off loose and damaged bark with compressed air at 80 psi. Clear sections of bark large enough to cover the aprons and top can then be selected.

The plain lines of these display tables make a perfect stage for showing off the natural beauty of the unusual birch-bark veneer that accents the top, aprons and feet.

remove dirt, mushrooms and other protrusions that would damage the bark during clamping. Although you should exercise some care in this operation, don't be overly concerned about marring the bark because removing the sloughy outer layers with blasts of compressed air at 80 psi, as shown in the bottom, left photo, will also remove minor defects. The bark is ready for veneering when the air blasts no longer lift loose layers. As an alternative to compressed air, you can apply 2-in.-wide masking tape to the face of the bark. When the tape is removed, it will pull away loose bark. However, this method is slow going and will require several taping applications.

Applying birch-bark veneer—There are other differences between birch bark and regular veneer besides matching patterns and hiding joints. Because the bark-veneered panels are small, the stable man-made core materials can overcome any tendency to warp when veneered on only one face. For anything larger than a square foot, however, I recommend laminating the opposite face with any 1/28-in.- or 1/32-in.-thick veneer so that the panel's construction remains balanced. Also, you can apply the bark veneer before cutting your pieces to final size. If I veneer after the panel is sized, I allow the birch bark to overhang the backing panel and then I trim the bark with a flush-trimming bit in my router. However, the bark mars very easily and cannot be sanded, so you must handle it with care throughout the process. One benefit of the delicately layered bark is that minor blemishes can be repaired by blowing off a few more layers.

Using your backing panels as templates, select and cut the birch bark, allowing about 1/8-in. overhang on all sides. Roll or spread a thin, even coat of yellow glue on the back of the bark to ensure good adhesion without a lot of squeeze-out and then position the bark on the backing panels. I tape the bark to keep it from slipping out of position and clamp the panels in pairs, using 3/4-in. plywood on top and bottom as pads and wax paper between the layers to keep them from being glued together accidentally. For larger panels, you will need heavier cauls and battens to evenly distribute the clamping pressure. Make sure there is no debris on the cauls or panels, as this could damage the bark before clamping the layers together. I like to let these veneered panels dry at least six hours and preferably overnight. When the clamps are removed, I again blast the bark with 80 psi of air to remove any more loose material.

Detail work, such as on the bottoms of the legs of the display table in the photo at right, is best done by laminating the bark directly to the piece. I used to inlay this detail, but because of the variability in thickness of the birch bark, it was a time-consuming process and it was impossible to get the veneer flush with the surface. Now I contact-cement a piece of bark to the surface and peel away the extra layers, leaving a single thickness of paper-thin bark; this method is quicker and yields more consistent results.

Finish-sand the piece before veneering and assembling, as this single layer is easily damaged. When veneering the feet of table legs or when accenting a similar piece, I use a hardboard template to cut strips of bark to size. After covering the area with contact cement, I apply the bark and fix it with firm pressure from a veneer roller to ensure good contact. Trim the bark to the edge of the piece with a safety razor blade and then use the blade to lift up a corner of the extra bark and pull it away (see the top, left photo). Turn the piece and repeat this procedure until all sides are done.

Applying a finish—As I mentioned earlier, I think the birch bark looks good with a variety of colors, so don't be afraid to experiment with tints, stains and dyes. For a protective finish, however, I prefer Sherwin-Williams Sher-Wood, a moisture-resistant lacquer with a medium sheen. Before finishing, touch up with 120-grit sandpaper, but be sure to avoid the birch bark. Then spray on the first sealer coat. I let this coat dry an hour and then test the adhesion of the birch bark with a blast from the air compressor. If there is any sloughing at this point, a lighter-color lower layer of bark will be revealed. However, another light coat of Sher-Wood on the damaged area will usually blend it in with the rest of the piece. Sand between coats, avoiding the bark, and apply two more coats per the instructions on the can. The final coat can be left as is, waxed, or polished with wool lube or rubbing compound to the desired sheen. □

Dick Sellew is a furnituremaker in New Marlboro, Mass.

Making a display table

I designed this display table with simple lines to complement the more intricate pattern of the birch-bark accents on the aprons, top and feet. By using sliding tables on my tablesaw to cut all the parts, construction goes very quickly. I used biscuits to join the tapered legs to the bark-veneered plywood aprons and to join the mitered frame to the bark-veneered top. A piece of glass recessed into the top frame protects the birch bark, and metal tabletop fasteners secure the assembled top to the base.

Shaping the legs: I use three shopmade sliding tables with a variety of guides and stops to taper the legs, cut the compound angles for the top and bottom of the legs, cut the angled sides of the aprons, and miter the top edgebanding. With these setups, I perform repeated operations easily and accurately; I can then quickly assemble the display table with biscuit joints, as shown in the drawing at right.

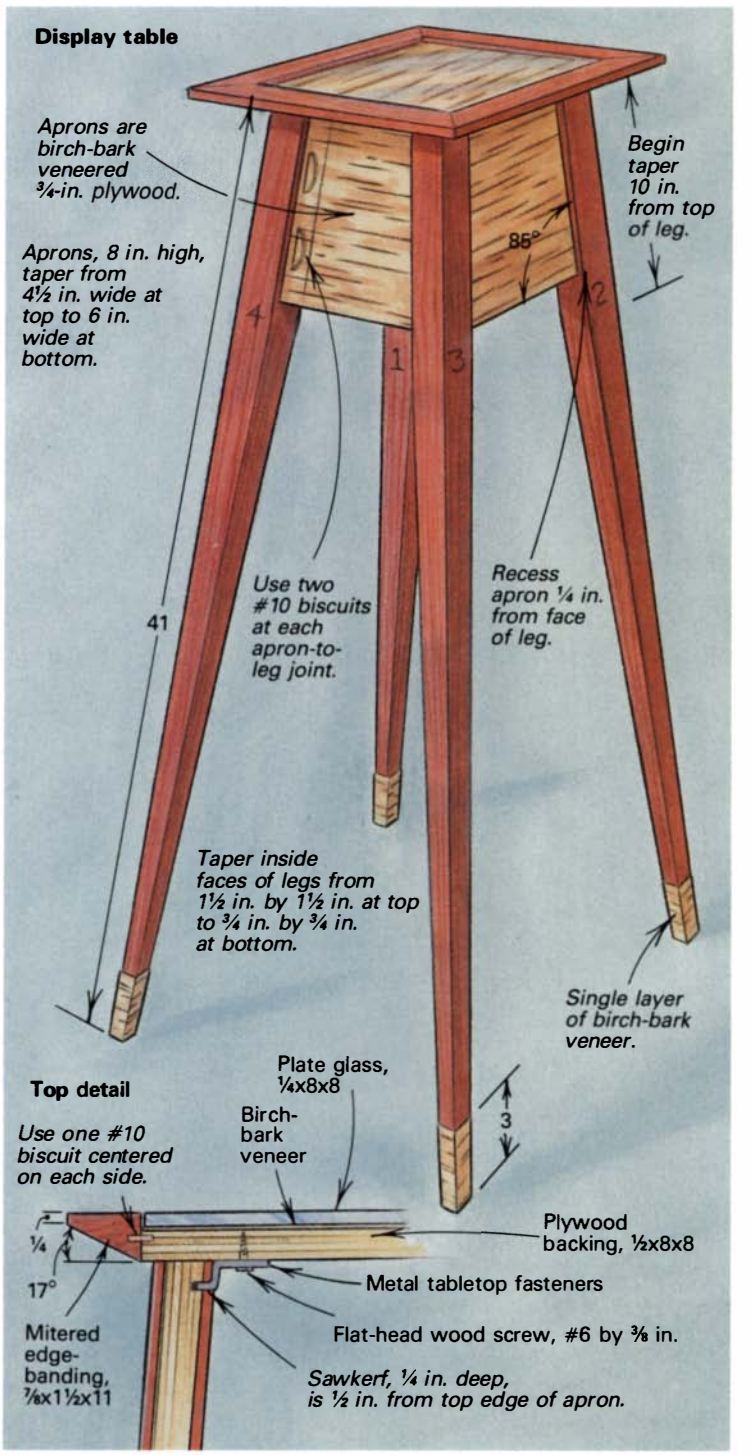
I begin by dimensioning the leg stock as shown and then arranging the four legs for the most pleasing grain and color match. Next, I number each leg and mark the outside faces for reference when cutting and assembling the table. Tilt the tablesaw blade to 5° and with a 5° angle block on the sliding table, cut off the top and bottom ends of the legs. To cut the top of each leg, the outside faces of the leg should be against the fence and the table, but for the bottom, these faces should be away from the fence and table. Beginning 10 in. down from the top, I taper both inside faces of the legs, from 1½ in. at the top to ¾ in. at the bottom, on an extra-long sliding table with a tapered fence. A regular taper jig and the standard tablesaw fence can also be used. Clean up the sawmarks with a light pass on the jointer or with a handplane.

Assembling the base: The sides of the aprons are mitered at 5°, thereby splaying the legs for a lighter appearance and a stable base. After veneering the core material, flush-trim the overhanging bark with a router (see the main article). I usually veneer oversize blanks and then cut them to the sizes given in the drawing on a sliding table, using a 5°-angle block on the left side for the first cut and a 10°-angle block on the right side to compensate for the 5° angle already cut. A ¼-in.-deep sawkerf, located ½ in. down from the top edge of the apron, receives the tabletop fasteners (available from The Woodworkers' Store, 21801 Industrial Blvd., Rogers, Minn. 55374-9514; 612-428-2199) that hold the top to the base.

I join the aprons to the legs with two #10 biscuits at each joint, recessing each apron ¼ in. from the face of the legs. Biscuits were developed specifically for manufactured sheet goods and they provide a reasonably secure joint between man-made panels or between panels and solid stock. Additionally, biscuits are great in production situations because they are quick and easy to use. (See *FWW* #76, pp. 60-64, for more on biscuit joiners.)

Before gluing up the base, use the previously drawn reference marks to ensure that the legs are in the appropriate position, and have clamps and pads close at hand. To ease the burden of holding clamps, pads, legs and an apron all at the same time, I make special clamping pads by sandwiching two pieces of ½x1½x8 scraps between two pieces of 24-in.-long duct tape, with the scraps at each end of the tape. Spread the glue evenly on the sides of the biscuit and the slots, as well as on the edge of the apron and on the mating face of the leg. Glue two leg-apron units, aligning the top of the apron with the top of the legs. The special clamping pad is then laid across the top of the leg-apron unit, with the wood scraps hanging down the sides of the legs ready for clamps. After clamping, check that the unit is square and flat, and clean up squeeze-out with a damp rag, rubbing gently to avoid damaging the bark. When the glue has dried, complete the base by gluing these two units to the remaining aprons.

Topping it off: The top edgebanding is mitered on a sliding table and biscuit-joined to the veneered plywood top. By aligning the bottom of the edgebanding with the bottom of the plywood top, a recess is created for plate glass that protects the bark from wear and tear. A full ⅞-in.-thick top looks heavy on this small table; so I bevel the underside of the edgebanding on the tablesaw to form a ¼-in.-thick edge. A light touch with a belt sander removes sawkerfs, and you're ready for finishing as discussed in the main article. —*D.S.*



Drawing: Bob La Pointe

Left: To clean the wood's pores of impurities before filling, Frank uses a soft-steel-bristle brush, scrubbing lightly and with the grain. The brass-bristle brush on the bench can also be used. Right: After sealing the dyed wood with a thin coat of shellac, Frank mixes the filler made of powdered whiting with colored pigments and paste wax. He rubs the filler into the grain with a cheese-cloth applicator.

Creating a Decorative Filled Finish

Treating wood's pores for color and contrast

by George Frank

When I left my native Hungary and emigrated to Paris in 1924, I carried all my possessions in a small suitcase that couldn't have weighed more than 15 lbs. But I also carried a wood-finishing method in my head that was to keep me busy experimenting for many years to come. The wood-finishing process involved filling the pores of dyed open-grain woods with a contrasting-color filler to produce decorative effects. My old wood-technology teacher at the Technological Institute of Budapest, Hungary, had showed me an example of decorative filling years earlier on an oak desk that had been blackened and its pores loaded with white filler. The effect was striking! Although he told me that the piece had been made by Central-European cabinetmakers around the turn of the century, he couldn't tell me anything about the pore-filling process other than the composition of the white filler: plaster of Paris.

Three years later, I struck a bargain with the elderly owner of the rooming house where I lived: I repaired her furniture, and she gave me the key to a decent little workshop where I could experiment with decorative filled finishes. After endless research and hundreds of ruined samples—a potbellied stove helped me dispose of my errors and failures—I produced 15 pairs of master samples that helped my fledgling finishing business take a giant step forward.

Of all the finishing methods I've ever conjured up, the decorative filled finish is probably the most versatile and one of the most successful processes I've used to enhance wood furniture, cabinets, paneling and architectural interiors. A decorative filled finish is an easy, attractive way to dress up plain woods, giving them color and bringing out the grain pattern. It is accomplished by using a dye of one hue to color the surface of the wood, and a contrasting- or complementary-hue filler to color the pores. Thus, you can create a vast range of decorative effects, adding color as subtly or as boldly as you choose. I'll tell you how I produce a set of samples with my decorative filled finish, including preparing the wood, dyeing or staining, sealing, filling the grain, and finishing. With these methods and a little practice, you can produce decorative filled finishes, like the samples on the facing page, and use them to create colorful effects on your furniture and cabinets.

Preparing the wood—While the decorative filled finish will work on any open-pore wood, the finish is most stunning on ash or red oak. Close-pore woods, like birch or maple, won't work because the pores are too small to accept the filler. To prepare my original master samples, I started by cutting several dozen ¼-in.-thick boards. To make the proportions of the samples pleasing, I cut them 10 in. long by 6 3/16 in. wide, which corresponds to the "golden mean," a sophisticated and visually pleasing ratio that occurs in nature. (For more on the golden mean, see *FWW* #66, p. 78.)

After selecting the best-looking sample boards, I smooth each piece with a steel scraper blade, filed flat and freshly sharpened, and then sand with 100-, 120- and 150-grit papers. To keep the surfaces flat, I stretch the sandpaper over a hand-size block of marble. With sanding complete, I use a clean sponge to apply warm rainwater on the samples. You may substitute distilled or spring water for rainwater; the point is, use water free of chemical contaminants. After the wood has dried, I resand with 220-grit to clean up the raised grain.

By staining or dyeing wood, sealing it and then packing the pores with a contrasting filler, you can create a decorative filled finish that adds color and brings out the grain pattern in any open-pore wood. From left to right, the samples are: red oak with black aniline dye and plain white filler; red oak with red aniline dye and yellow-color filler; ash with walnut stain and peach-color filler; white oak with green aniline dye and blue-color filler; ash with logwood and potassium-dichromate dye and beige-color filler.

The sample boards are now smooth as a baby's bottom; next, the pores have to be cleaned, since the filler can't be introduced into pores filled with debris. I have a powerful air compressor in my shop and flush out most of the sawdust with a blow gun. Then, as shown in the left photo on the facing page, I use a dry, clean wire brush to scrub the wood with the grain to clean the pores of impurities. I prefer a brush with either soft-brass or fine-steel bristles. *Don't* use a brush with coarse, hardened-steel bristles.

Coloring the wood—The smooth, clean, dustless samples are now ready to be stained. For me, coloring the wood is a passion; I feel wood is alive and responds to my care with shades, hues, brilliance, depth and beauty that compensate me for all the preparatory work. To color my first sets of samples, I used mostly natural dyes, combined with some color-producing chemicals. For example, I combined brazilwood extract with varying concentrations of dichromate of potassium to create attractive reds, from crimson to pale pink. One of these colors is shown in the sample on the right. Another one of my favorite colors comes from a natural dye made from walnuts called "brou de noix." This dye changes a light-color wood to a rich brown color, as shown in the center sample. All my natural coloring ingredients are water soluble, and I use them as warm as I can handle, to get better penetration. For more on natural and chemical dyes, see my book, *Adventures in Wood Finishing* (The Taunton Press, 1981) and my article in *FWW* #66. A variety of natural and chemical dyes are available from Olde Mill Cabinet Shoppe, 1660 Camp Betty Washington Road, York, Pa. 17402.

As my Paris wood-finishing business grew during the 1920s to employ over two dozen workers (a success bolstered by my winning France's prestigious "Brevet d'Invention" award in 1928 for my finishing processes), we were faced with larger commissions requiring decorative filled finishes done by the square meter. I then reluctantly replaced my natural and chemical dyes with aniline dyes. The little lost in the sheer beauty of the natural dyes is gained back in consistency and ease of application with the anilines. I favor the German Arti brand dyes (available from Highland Hardware, 1045 N. Highland Ave., Atlanta, Ga. 30306), preparing them according to the directions on the package. To apply the dye, I saturate a small piece of scrap foam rubber and wipe it with the grain, using long, overlapping strokes. If you use a water-base aniline, you may need to lightly resand the wood with very fine paper.

Once the wood is dyed, I apply a coat of shellac using the French-polishing method. Using a tampon (but *no* lubricating oil), I rub on several breath-thin layers of shellac, so that the wood's dyed color is well protected by a transparent shield, but the pores remain open and clean. For more on this, see "French Polishing" in *FWW* #58.

Mixing and applying the filler—I filled the pores on my earliest samples with plaster of Paris, but cleaning off the hardened excess proved too time-consuming. Therefore, I improved the filler mixture by substituting a new basic ingredient: whiting, a powdered chalk sometimes called "gilder's whiting," (available from local hardware stores or Pearl Paint Co., Canal Street, New York, N.Y. 10013). This mixture not only fills pores well, but excess is easy to clean off. To make colored filler for a decorative finish, I combined about a cup of whiting with a couple of teaspoons of colored pigment powder (sometimes called earth colors or fresco colors, and available from Constantine, 2050 Eastchester Road, Bronx, N.Y. 10461). Mix the whiting and pigment into a paste by adding a little varnish maker's and painter's (VM&P) naphtha or mineral spirits until the filler is slightly thicker than toothpaste. Also to this mix, I add a teaspoon or so of regular paste wax (available at hardware stores or supermarkets), which acts as a binder. Don't substitute a specially formulated automotive wax, as it may contain petroleum oils or silicones that can cause finishing problems later.

To use the filler, mix it in a clean container, stirring it into a smooth, heavy paste. Then, using a piece of cheese cloth, wipe the paste on the colored wood surface, forcing it into the pores by rubbing in a swirling motion (see the photo at right on the facing page). After the pores are loaded, use a clean piece of cheese cloth and wipe off the excess filler (you don't have to wait for it to dry) *across the grain*. The filler dries completely in two to three days, depending on the thickness of the mixture and the humidity in your area.

Final finishing—With the samples sporting deep, well-defined colors, with contrasting fillers emphasizing the natural markings of the wood, the next job is to preserve and protect the colors with a topcoat of finish. While you can apply most common finishes (such as oil, varnish and shellac) over the filler, it's a good idea to seal the surface with shellac before topcoating and to check finish compatibility on a sample before doing an entire piece.

Now that I've given you the basics for preparing a decorative filled finish, experiment with different stains or dyes and color combinations. You may choose to leave the wood natural and add wild colors—maybe even metallic pigment—to the filler. Another possibility is to bleach the wood before filling and use a very light-color filler, to create a soft, weathered effect. Each of these options works well with my techniques. Just take careful notes and keep track of how you prepare each mixture, so you can duplicate it if it's a winner.

In conclusion, I'll leave you with a true story about how much a decorative filled finish can appeal to a customer. In 1935, I had my eyes on a revolutionary new car, the Citroen 6. Unfortunately, not only was it costly, it was hard to get: one could wait two or three years for delivery. So, I went to the local Citroen dealer, with samples in hand, and I told him, "I would be honored to refinish the paneling in your showroom, if you're willing to do me a little favor..." Three months later, yours truly was driving his own Citroen 6 around the streets of Paris, with a smile on his face. □

George Frank is a master wood finisher living in South Venice, Fla.

String Inlay

Using dental burrs for cutting grooves

by Irving Gerber

String inlay adds another dimension to a flat surface by defining its shape and filling its empty spaces with eye-pleasing curves. The simple vine-and-berry pattern on the author's cherry two-drawer chest sets off the drawers and complements the drop pulls.

Furnituremakers have used string inlay to decorate their work for centuries. The fine, contrasting lines can accentuate the shape of a drawer front or tabletop, emphasize the taper of a leg or create the swirling design of a vine-and-berry pattern. Although the technique is often associated with Federal-style furniture, it is adaptable to most styles and the design possibilities are many and varied, as shown here.

The thin, flexible inlay material, known as stringing, is often sliced from holly veneer because of its nearly pure-white color. But any other straight-grain veneer that is not too brittle and is of a contrasting color to the primary wood will also work. The stringing is inserted edgewise into the surface to be decorated; so the resulting inlay is only as wide as the veneer is thick. Traditionally, the narrow grooves that receive the stringing were scratched into the surface with a tiny rectangular tooth filed or ground on the edge of a cabinet scraper that's mounted in a wood holder. This shopmade tool, called a scratch stock, works well enough, but presents certain problems: The necessary 0.033-in.-wide tooth is fragile and hard to grind accurately. And in some cases the edges of the grooves tear or crumble, especially when cutting across the grain or on highly figured veneers. As an alternative to the scratch stock, I've been using a hand-held rotary tool, the Dremel model 395. It cuts grooves faster and with consistently better quality, but it's not foolproof. Cutting grooves is precise work and there is a technique to be mastered.

Setting up the rotary tool—Dremel (4915 21st St., Racine, Wisc. 53406; 414-554-1390) has three models of Moto-Tools: a single speed (no. 275), two speed (no. 285) and variable speed (no. 395), ranging in price from about $45 for the single speed to $100 for the variable speed. When routing the small grooves for stringing, I run the variable-speed model at its top setting of 30,000 RPM. Since the single-speed model runs at a comparable 28,000 RPM, I don't see why any of the models wouldn't work equally well for this operation. You'll also need Dremel's router-base attachment, part no. 230 (about $24), which quickly turns any of the standard hand-held models into a minirouter (see the top photo on the facing page). However, I replaced the platform portion of the base with a piece of ⅛-in.-thick clear Plexiglas cut 4 in. longer and 2 in. wider than the platform that came with the tool. Drilled to mate with the router attachment and screwed in place, the larger clear plastic platform adds immeasurably to the stability of the tool and gives you a better view of the bit while cutting. The router attachment comes with a guide fence that mounts on two rods and that is adjustable out to about 3 in. If you need a straight groove more than 3 in. from the edge, you can clamp a wooden guide fence to the workpiece. For cutting curved grooves, I made a separate compass platform that attaches to the router base (see figure 1). The compass platform is made by laminating pieces of ⅛-in.-thick Plexiglas and leaving a slot for an adjustable arm fitted with a center point. I borrowed a center point with a shoulder from a compass set and bonded it into a hole in one end of the arm with instant glue (cyanoacrylate glue). My prototype version of this compass platform depends on double-stick tape to secure the arm once it's set. It might be better to make a slot in the arm and countersink it for a flat-head machine screw that could lock the adjustable arm in place with a wing nut. But this is one of those fixtures that I put together quickly to see how it would work, and it worked so well I haven't gotten around to rebuilding it yet.

For the cutting bit I use an S.S. White carbide dental burr #SSWFG56 available from Health Co International, 1 Field Lane, Orchard Ridge Corporate Park, Brewster, N.Y. 10509; (914) 277-4074, and other dental-supply houses. Ten bits cost about $13. This particular burr has spiral flutes similar to a twist-drill bit, and it cuts cleaner and disposes of the debris better than the more common dental burrs with straight flutes and serrated or toothed sides. The burr cuts a 0.034-in.-wide groove, which works well with stringing sliced from the most common, 1/30-in.-thick (0.033 in.) veneers.

With the tool set up for use as a router, chuck the burr into the tool and adjust the router base to allow for a 1/16-in.-deep cut. But don't be in a rush to groove your finished work; some practice and experimentation to get the hang of this minirouter is essential. The tiny-diameter burr will deflect and then break if you advance it too fast. If you move it too slowly, the bit will burn rather than cut. Although some burning is inevitable because the tiny chips clog the groove, you should adjust the speed of your forward motion to keep burning to a minimum. To further complicate matters, you must vary the feed speed to minimize bit deflection and drift as

Photo this page: Morse Peterson Photography

you cut through areas of different hardness when the groove passes close to a knot or from one material to another, such as from a solid banding to a veneered field on a tabletop. With this minirouter, the tiny bit will deflect instead of overload, and so there will be no change in the pitch of the motor as there is with a full-size router. The only way to learn to deal with all the variables is by practicing long cuts on the same material as your project. Before you move on to the project at hand, experiment with both straight and curved cuts until you can put the tool to the wood with confidence.

Here are a few more tips that will help you become proficient at routing grooves. Always shut off the tool while the burr is still in the groove. If you try to lift it out while it's still rotating, it will invariably nick the edge. Don't make a second pass to remove the debris that stays packed in the grooves. This will only widen the groove and increase the potential for error. Instead, loosen the debris by running a single-edge razor blade down the center of the groove, and then clean out the loose sawdust and chips with a minichisel made from a broken-off piece of hacksaw blade. The minichisel is also handy for squaring the end of a groove at a corner.

Cutting the grooves—The surface to be inlaid should be trimmed to final size and completed except for finish-sanding. In pencil, draw the design for the stringing pattern onto the workpiece exactly as you want it to be cut. Make sure the lines are dark enough that you can see exactly where each straight cut should end, and mark the centers of the arcs.

When grooving in a rectangle, for example outlining the face of a drawer, it's best to start each cut where the last cut ended, as shown in figure 2A below. I usually work from left to right when it's convenient, but because you're making such a light cut, working in either direction doesn't present any problems. To start the first cut, hold the guide fence against the edge of the workpiece with the burr directly above the groove's starting point but not touching the wood. Then, turn on the tool, lower the burr into the wood and proceed through the cut, holding the fence against the workpiece edge (see the top photo). After cutting the first groove, move the guide fence around the corner of the workpiece and, with the fence against the edge, try to set the burr down into the end of

Above: Gerber uses a Dremel tool, fitted with an auxiliary router base and a dental burr, to cut the narrow grooves for string inlay. Here he's making a straight cut near the edge of a drawer front. The router-base platform has been replaced with a larger piece of Plexiglas to increase stability and visibility. Above: For cutting curved grooves, Gerber replaces the router-base platform with a shopmade compass platform. He holds the adjustable arm's compass point with one hand and slowly advances the tool with the other. The steel rule, affixed to the work with double-stick tape, acts as a barricade at the end of the cut.

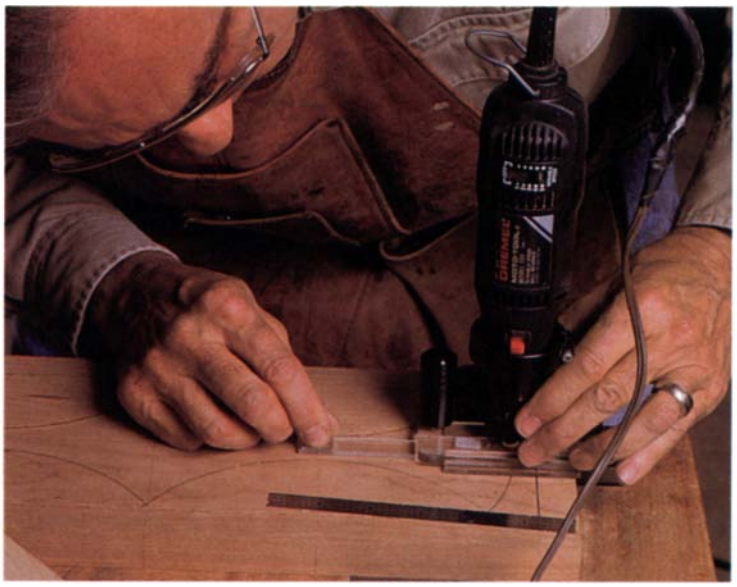


Fig. 1: Compass platform

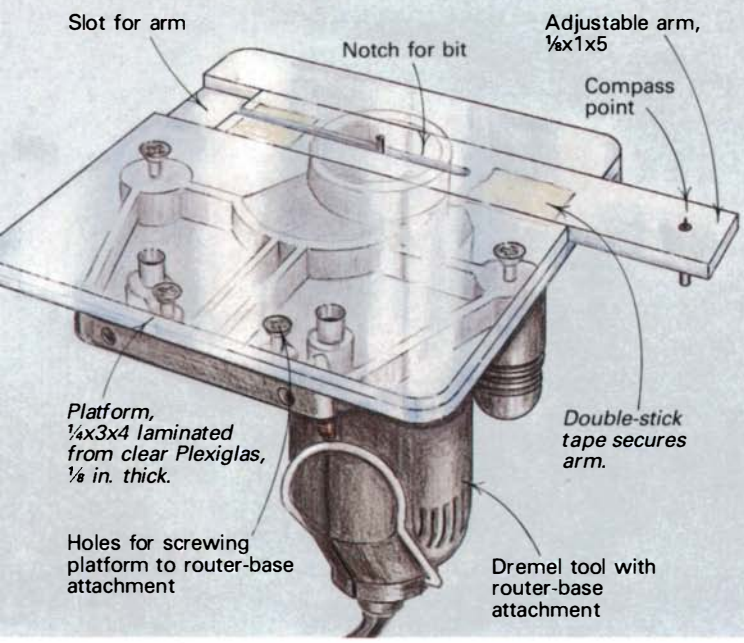
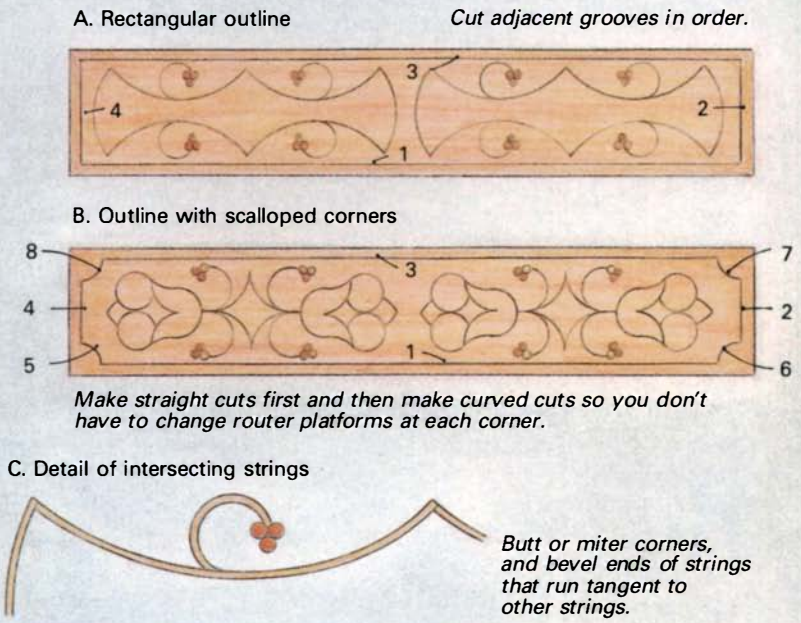
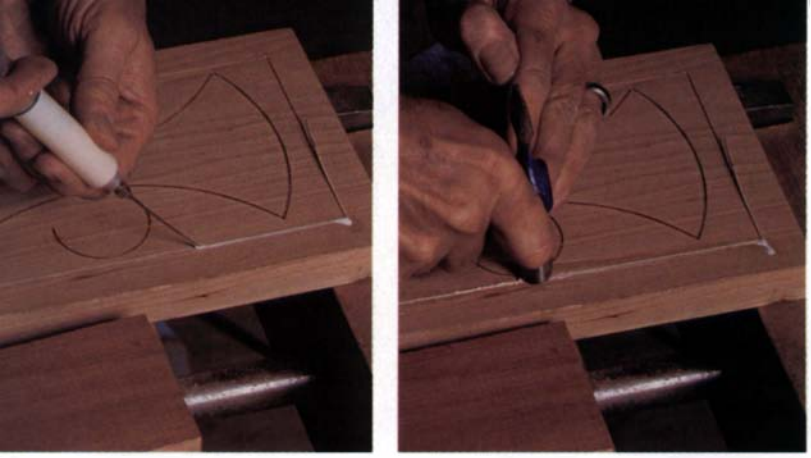


Fig. 2: Drawer patterns



Drawing: Bob Goodfellow



At left, glue is injected into a groove with a syringe. Then a piece of stringing is placed in the groove and pressed home with a hammer (right). Note the stub of stringing inserted into the adjacent groove to keep glue from seeping into it and hardening.

the first groove. If you stopped the first groove a bit short or ran it a tad long, adjust the fence accordingly until the burr fits right into the end, and then switch on the tool and make the second cut. Readjusting the fence is preferable to trying to extend a groove once you've stopped because the burr may have been deflecting slightly at the end of the cut. Resetting the fence will ensure a crisp corner, which is much more critical than a slight discrepancy in the distance of the stringing from the edge of the work.

If your drawer pattern has scalloped corners, like the one in figure 2B on the previous page, it's impractical to go around the drawer's perimeter, from cut to adjacent cut, because it requires changing router platforms from straight to curved and back again four different times. In this case, you should make the straight grooves first, stopping them precisely as drawn, and then connect the ends of the straight grooves with the curved grooves. Instead of just relying on my eye to precisely stop a cut, I fasten a small metal pocket rule with double-stick tape at the point where I want the cut to end (see the bottom photo on the previous page). When I hear the carbide bit hit the metal, I know it's time to stop.

After cutting all the straight grooves in your pattern, remove the fence and platform from the router attachment and install the compass platform. The arcs on the scalloped drawer pattern must connect the ends of the straight grooves, which means careful placement of the center point is essential. If you stopped your straight cuts right on the mark, you can simply use the same center you used when drawing the pattern. But if there is any discrepancy from the drawn pattern, set your drawing compass for the original radius and relocate the center so that the arc intersects the end points of both straight cuts. Then use the compass spread to set the adjustable arm on the platform. When you're sure that the center point of the compass platform is located properly, place the burr in the end of one of the grooves that the arc is intersecting and switch on the tool. As shown in the bottom photo on the previous page, I hold the compass point with one hand as I swing the tool through the arc with the other. If you are making the first cut in some part of the pattern, you'll have to hold the center point in place with the burr above the work, switch on the tool and lower the burr into the wood. To avoid marring the finished surface with compass-point holes, fasten a thick piece of veneer at the center point with double-stick tape. When the center of an arc falls beyond the edge of the workpiece, I clamp a block to the edge for locating the center.

Inlaying the stringing—After carefully cutting all the inlay grooves, clean out any debris with a single-edge razor blade and the minichisel described previously. Square up any corners that aren't crisp, but be careful not to widen the grooves. Use a sharp X-Acto knife and a straightedge to slice stringing from standard 1/30-in.-thick veneer. Select veneer with as straight grain as possible, and slice parallel with the grain so the stringing doesn't splinter out of the groove when you scrape it level with the host surface. To ensure straight grain, slice through one sheet of veneer at a time and if necessary orient the cut diagonally on the sheet to follow the grain. Hold the knife vertically as you slice because you want a square cut on the stringing so it will seat well in the bottom of the groove. If your grooves are 1/16 in. deep, cut the stringing 3/32 in. wide so it will stand 1/32 in. proud of the host surface; stringing that protrudes any more than that will split or mush out when you try to press it into the groove.

If you used the burr I recommended, your grooves will be 0.034 in. wide. And if your stringing is sliced from standard 1/30-in. veneer, you will have 0.001-in. clearance in the grooves. However, since the thickness of the veneer can vary, you should check each string for fit after cutting it to length. If it feels at all snug when inserted into the groove dry, take a few swipes with 180-grit paper on each side of the stringing to knock off any fuzz or splinters. Also, keep in mind that the veneer will swell a little when it hits the wet glue in the grooves. To be sure you have the right fit, practice by gluing a sample string into a groove that's at least as long as the longest run in your pattern.

I squirt yellow carpenter's glue into the groove with a #18 medical hypodermic needle, as shown in the left photo, to ensure I get a continuous layer of glue. If it's difficult or illegal to obtain these needles in your state, you can get a glue injector, which is an inexpensive plastic syringe without a needle, from The Woodworkers' Store, 21801 Industrial Blvd., Rogers, Minn. 55374-9514.

After cutting a piece of stringing to length and testing its fit in the groove, place one end tightly into the groove's corner and hold it there with one finger as you work the string into the length of the groove with a finger of the other hand. Press the string home by running the face of a hammer over it, as shown in the photo at right. As you get close to the end of the groove, you'll find that the combination of the moisture in the glue and the pressing action of the hammer has caused the stringing to stretch slightly; so a final trim to length is necessary. I use a small pair of jeweler's side cutters to nip off the excess, and then I press the stringing into the last inch or so of the groove with the hammer. If there are other grooves that intersect with the one you're inlaying, insert short stubs of stringing as temporary dams to keep the glue from seeping into the adjoining grooves (see the left photo). Pull out the stubs when the glue starts to set or you'll ruin the groove trying to dig it out later. If you're a purist, you may try to miter the corner, but it becomes such a gooey mess that I don't think it's worth the trouble. However, it is necessary to trim the end of a string at an angle with an X-Acto knife to make a continuous transition between inlays where a curved groove runs tangent to another groove (see figure 2C on the previous page). I inlay the straightest string first and then cut the tangent string to fit up to it. When one string actually intersects and passes through another, I run one string and butt the other to it from both sides. As an alternate method, you can cut only one of the intersecting grooves, glue the stringing into it, scrape it flush, and then come back and cut the intersecting groove right through the inlaid string.

After all the stringing has been glued into the grooves and the glue has had time to set completely, scrape the stringing flush with the surface. If your pattern includes berries, the circular inlays that often accompany stringing, drill holes for them with a Forstner or brad-point bit after scraping the stringing flush, and let one of the berries slightly overlap the end of the stringing. Make the berry inlays with a plug cutter by drilling several plugs in a narrow board and then resawing the board to release 1/16-in.-thick discs. □

Irving Gerber builds custom furniture in Charlestown, Mass. *For more on string inlay see* FWW *#59, pp. 58-60 and* FWW *#72, p. 79.*

Tagua: The Vegetable Ivory Substitute

Clead Christiansen turns palm nuts into translucent vessels

by Fred J. Hunger

Tagua, a vegetable material from the nut of a South American palm tree, looks, feels and works like animal ivory. It has been used for decades to make small functional and decorative items.

Clead Christiansen is one woodworker who turns tagua on the wood lathe to make tiny translucent bowls, boxes, vases, rings and vessels, like the ones shown here.

Animal ivory has been crafted into functional and decorative objects for millennia. But the potential extinction of the animals that provide that precious material has made the question of whether or not to use ivory a serious ethical issue. Those in favor of using ivory say it's a shame to waste the tusks of elephants or walrus that have died naturally; those against it say that even using "antique" ivory, which has been around longer than these issues have been argued, creates a public desire for animal ivory—and a market for the poachers who will wantonly slaughter ivory-bearing beasts into extinction.

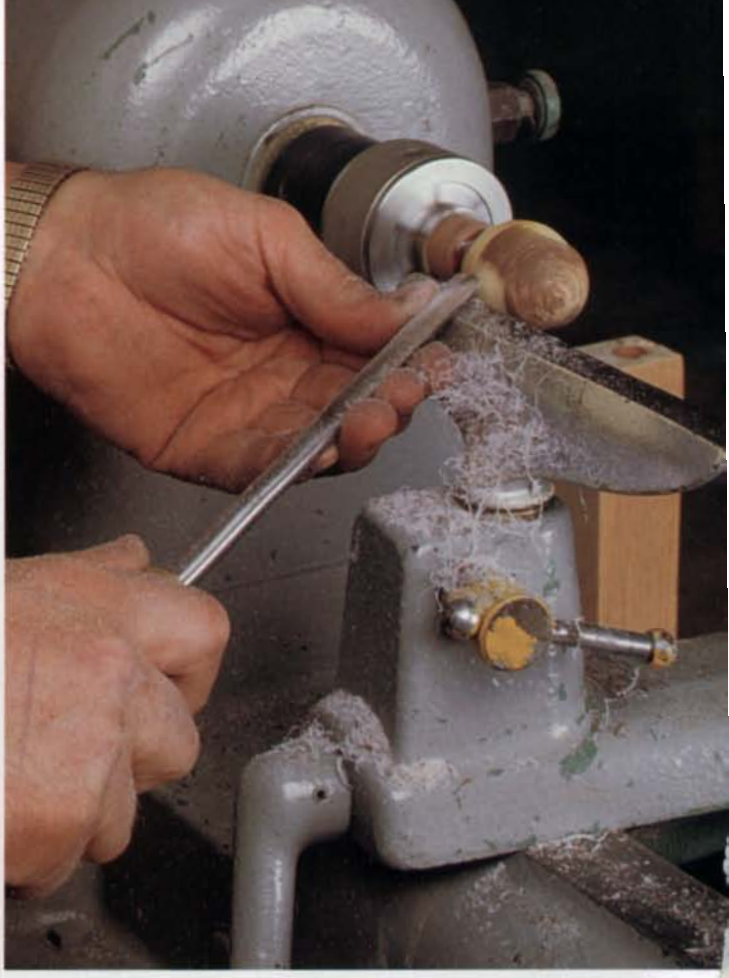
Fortunately, there is an ivory substitute available that may resolve the ethical dilemma for many craftsmen who want to use small pieces of ivory. It's a natural material that has most of animal ivory's working and aesthetic qualities, and it literally grows on trees: The tagua nut is the seed of a South American palm tree. One craftsman who has used tagua extensively is Clead Christiansen, a woodturner in Ogden, Utah. Christiansen first became aware of the tagua nut when he saw a scrimshaw artist engraving the material at a Maryland craft show in 1982. He believed that if tagua could be engraved, then it probably could be turned as well. Since then, Christiansen has turned hundreds of tagua nuts into beautiful miniature vases, boxes, bowls, rings and vessels, like those shown above. In this article, I'll describe the tools and methods Christiansen uses for turning a tagua vessel on a regular woodturning lathe. But first, a little more background on the amazing tagua nut.

All about tagua—Sometimes called ivory nuts, tagua nuts come from the ivory palm tree *(Phytelephas macrocarpa)*, where they grow in clusters weighing up to 25 lbs. The ivory palm is native to the equatorial regions of Central and South America, and flourishes along the banks of the Rio Magdalena, in Columbia. After the tagua (pronounced tah-wah by Andean natives) nuts are harvested, they become dry and hard, protected by a crusty, shell-like covering. A medium-size tagua nut is approximately 1½ in. long by 1¼ in. in diameter. It is rounded with four slightly flat sides, a pointed end, and a stem end that is slightly concave, much like the indentation on the stem end of an apple. The tagua nut is completely non-toxic, composed of mannose sugar; in fact, when the nut is first harvested, it is soft, edible and sweet.

Tagua ivory, according to Shirl Schabilion's booklet, *All in a Nutshell,* has been used as a crafting and commercial raw material for more than 160 years. The Japanese have been using it for 100 years or more for carved netsukes and, since Victorian times, tagua has been fashioned into jewelry. It was also used extensively in button manufacturing until plastics became popular in the mid-1900s. In past decades, craftsmen have found tagua nut ivory quite suitable for turned and carved needle boxes, dice, cane handles, scrimshaw, and other applications for durable, attractive items. There are even stories that one man used tagua to construct replacement dentures for himself (an indication that the dried, carved nut is moisture resistant). Today, tagua nuts are available from several mail-order sources, including: Woodcraft Supply, 210 Wood County Industrial Park, Parkersburg, W.V. 26102-1686; (800) 225-1153, (304) 428-4866; The Turning Post, 225 23rd St., Ogden, Utah 84401; (801) 393-2320; Mississippi Petrified Forest, Box 37, Flora, Miss. 39071; (601) 879-8189; or Lee Valley Tools Ltd., 1080 Morrison Drive, Ottawa, Ont., Canada K2H 8K7; (613) 596-0350.

Mounting the nut for turning—To prepare the ivory nut for turning, a portion of its outer covering is sanded away, usually at

Left: Before turning, the tagua nut is sanded flat on one end and glued to the end of a dowel to be held in the lathe by a spigot-type chuck. Christiansen checks the nut-to-dowel fit before bonding. Right: Turning small vessels from tagua is much like turning miniatures from dense hardwood. Christiansen uses a ⅜-in. bowl gouge, with the tip reground to a lady-finger profile, to rough-turn the outside of the vessel. Below: Producing shavings that look like coconut, Christiansen starts hollowing the inside of the vessel using a ⅛-in.-deep fluted gouge, cutting from the edge toward the center.



Left: By positioning a lamp above the spinning tagua vessel, Christiansen can judge its wall thickness by watching the shadow of the tool and the light color of the translucent tagua. He uses a modified dental tool with a reground tip to contour the inside. Above: After sanding all the way down to 600-grit, the tagua vessel is polished to a high shine with a small cloth buffing wheel chucked in an electric hand drill.

the more pointy end, creating a flat surface. The nut is then glued to a short (approximately 2 in. long), 1-in.-dia. hardwood dowel using cyanoacrylate adhesive, which can be purchased at a hobby or hardware store as Super Glue, Hot Stuff or Flex Zap. While gluing, Christiansen uses a spray-on accelerator called Hot Shot to speed the curing time of the glue. I asked Christiansen about using a five-minute epoxy instead of the cyanoacrylate, but he said epoxy didn't seem to work well for gluing tagua.

After the glue is set, the dowel is inserted into the lathe's headstock collet, a spigot chuck or a self-centering three-jaw chuck, so that the dowel extends about ¾ in. beyond the chuck. (Using the three-jaw chuck is a hazard to fingers and hands, and great care needs to be taken.) Christiansen uses an old Oliver lathe, set to rotate at approximately 2,000 RPM.

The method Christiansen developed for turning tagua nuts into tiny translucent products is fairly simple. Actually, turning tagua is very similar to turning regular hardwoods; Christiansen uses the same tools, techniques and about the same amount of tool pressure against the turning tagua. Good lighting is provided by an adjustable lamp set very close to the turning workpiece, shining from the back side of the lathe. Christiansen wears a face shield and follows the same safety practices he would for any woodturning.

Turning the outside—Before turning begins, the tool rest is positioned just below the centerline of the lathe and is set as close as possible to the tagua nut so that it just clears the rough nut. The initial angle of the tool rest in relationship to the lathe's centerline is between 7° and 10°, with the tool rest closer at the chuck end (see the top, right photo on the facing page). This setting allows the bottom of the turned vessel to be shaped first. Then, Christiansen rough-turns the vessel on the outside, using ⅛-in.- and ⅜-in.-dia. fluted gouges. (He uses Henry Taylor brand gouges that are available from Craft Supplies USA, 1287 E. 1120 South, Provo, Utah 84601; 801-373-0917.) The gouge's cutting edges are sharpened to a "fingernail" profile so that they cut with a shear-scraping action, as described in Steve Gellman's article in *FWW* #79. The actual cutting takes place just about the centerline of the spinning tagua nut. Instead of dust, the shear-scraping produces thin shavings that look just like finely shredded coconut. The tool rest should be adjusted frequently to remain very close to the work during roughing out, to prevent chatter problems; however, these nuts have very good dimensional stability and rarely crack or break apart during turning.

The final shape of a turned tagua vessel is affected by several things: the original size and shape of the raw nut, as well as by the nut's internal structure. Each nut has a natural cavity inside and a small hole, connecting the cavity to the outside, covered by a small kernel. You must cut around these features so you don't end up with a void in the finished object, unless it's desired; Christiansen sometimes accentuates a hole in a vessel, such as the small vase in the photo on p. 65. If you're turning a small bowl, vase or other vessel that's open at the top, it's best to glue the nut to the dowel with the navel pointing away from the dowel. Still, the shape of the turning might have to change as you discover the extent of the void inside.

Hollowing—To hollow the inside of a vessel, the tool rest is repositioned perpendicular to the centerline at the free end of the nut. The lip is formed at the beginning of the hollowing process. While cutting the lip, Christiansen stops the lathe often to verify lip thickness, because the dark color of the natural edge looks deceptively wide when seen with the vessel spinning. Christiansen often leaves the natural brown edge of the tagua's crusty outer shell intact on the lip, as a decorative touch.

To start hollowing, an initial entrance hole is made with the ⅛-in. gouge plunged into the nut until it encounters the natural cavity inside the nut. The kernel is removed during the evacuation of the nut's center. Initial cutting into the irregular shape of the nut must be done very carefully to avoid snagging the material. It's best to start the entrance cut at the outer perimeter of the nut and move the tool toward the center. This eliminates chatter, which can result while making the rough surface cuts on the interior of the vessel.

For the major hollowing, Christiansen uses a modified dentist's tooth-filling packing tool. This tool has an approximate 60° elbow near its cutting end, which makes it handy for reaching inside a bulbous vessel. He regrinds the top surface of the tool to create a flat, sharp cutting edge (similar to a round-nose scraper), and then he mounts the tool in a hardwood handle. (Dental tools are available from dental-supply houses for approximately $15 or, if your dental bill is paid, you might ask your dentist for an old one.) As Christiansen hollows the vessel deeper and deeper, the shavings tend to get stuck inside, so he uses a simple soda straw to blow them out.

Christiansen continues hollowing with the modified dental tool until the wall starts getting thin. At this point, he positions the desk lamp above and slightly behind the turning, until he can actually see the shadow of the tool through the translucent tagua nut (see the bottom, left photo on the facing page). By gauging the darkness or lightness of the nut, Christiansen can tell how thin the vessel's wall is getting. Experience with this method tells him when the wall thickness is just right—about 1/16 in.

Trimming, sanding and buffing—After the wall of the vessel is worked to a uniform thickness, Christiansen removes any ridges and smooths out rough areas left from the hollowing-out process. He repositions the tool rest to the outside of the workpiece as before and then shapes the vessel's base and does any final trimming or fairing on the outside.

After all the shaping is done, the tool rest is removed from the lathe to allow unobstructed access to the vessel for sanding and buffing. The nut is then carefully sanded, usually beginning with 220-grit paper. Christiansen sands the vessel's exterior with the lathe running and until all scratches and tool marks are gone. He sands with progressively finer-grit paper, until final-sanding with 600-grit. Next, the nearly finished vessel is buffed using a 4-in.-dia., white-cotton buffing wheel chucked into a hand drill. Christiansen first charges the wheel with brown tripoli buffing compound (available from a jeweler-supply house) and then presses it against the spinning vessel (see the bottom, right photo on the facing page).

After buffing, the tool rest is reinstalled and positioned parallel to the lathe's centerline, to allow the vessel to be parted off the dowel. Most vessels will part-off easily; however, it's prudent to keep a hand around the vessel while parting, just in case. The little ridge or boss that remains on the bottom of the vessel can be sanded away by hand.

In an hour, an experienced tagua-nut turner can produce three or four miniature vessels, which typically sell for about $25 each, although some of the best work sells for hundreds of dollars. Christiansen signs the bottom of the each tagua turning he makes, using a vibrating marker (the kind used to identify tools and other valuables). Hot branding-iron-type markers should be avoided, because the heat may scorch or crack the nut. □

Fred Hunger writes and works in Ogden, Utah.

Making a Veneered Game Cabinet

A journeyman's exam piece to test your skill

by Norbert Heinold

This veneered game cabinet was part of the author's journeyman's exam. Building it not only provides attractive and flexible storage for a variety of games, but it also provides lessons in a variety of veneering techniques with several different core materials.

While electronic games are currently all the rage, traditional pastimes like chess, checkers and backgammon are still very popular. These games have lots of pieces, however, that become dust collectors or are easily lost unless you have a good way to store them. A game chest or cabinet has been a practical and beautiful solution to these problems for centuries. The inlaid decorations on the cabinet shown here add some fun to the piece, and challenge the woodworker's skill.

This game cabinet is the culmination of my three-year apprenticeship at Werkstaetten Knorr, a workshop in Wuppertal, Germany. As part of my journeyman examination, I had to design and build a cabinet with doors and at least one dovetailed drawer; so I developed the veneered game cabinet shown in figure 2 on p. 71. Veneering has many advantages over solid-wood construction. First, using dimensionally stable core materials eliminates wood-movement problems. And veneers are available in species that might otherwise be prohibitively expensive, are easily stored and can be made into panels of any size. But the main reason I favor veneers is they allow for a design freedom that is impossible to achieve with solid woods.

Because the construction of the game cabinet is relatively simple, here I'll concentrate primarily on veneering techniques rather than on joinery. The carcase is ¾-in. lumbercore plywood, edged in solid mahogany, and veneered on the outside with mahogany and on the inside with maple, as shown in figure 2. The mitered corners are reinforced with special L-shape plastic angles; I haven't found these in the United States, but instead you can use plastic miter dowels (available from The Woodworkers' Store, 21801 Industrial Blvd., Rogers, Minn. 55374-9514; 612-428-2899). The partitions and top and bottom shelves are doweled in place, but the other three shelves are adjustable to provide flexible storage for board games. To make the drawers for game pieces and cards, I screwed an inlaid and veneered front to dovetailed maple boxes, as shown in figure 2 on p. 71. I picked ¾-in. particleboard as the core material for the doors because greater dimensional stability is particularly important for inlaid veneers. The particleboard is edgebanded with solid mahogany and veneered on both sides with book-matched mahogany. Ledger strips attached to the inside of the doors store two veneered game boards.

Some veneering basics—Veneering requires few special tools: an X-Acto knife, a veneer saw, a paint roller for spreading glue and most importantly, a method for applying even pressure over a large surface. Hot-press veneering provides a solid, durable, moisture-resistant bond and is my favorite method, but the high cost of a hot press (as much as $40,000) puts this technique out of reach for the average woodworker. Cold pressing remains the most reasonable alternative for the home woodworker. The most common method of cold-pressing veneers, and the one I'll discuss here, is with clamps, press plates and cauls, which distribute clamping pressure across the entire veneer, as shown in figure 1 on the facing page. Another cold-pressing method gaining popularity is vacuum veneering (see Greg Elder's article in *FWW* #56, pp. 70-71).

Any veneer project starts with selecting and preparing the core material. Furniture-grade particleboard or preferably medium-density fiberboard (MDF) offers an extremely stable base for veneer, but both are heavy. Although plywood is a lighter yet still stable material,

it tends to warp or cup unless held in place by carcase joinery. Whatever core material you choose, the edges must be banded. Edgebanding not only dresses up the raw core material, but also provides a solid surface for joining, hanging hinges, machining details or easing the veneered corners without fear of sanding through to the core. Often, veneer suppliers can provide solid stock from the same tree as the veneer so the solid edgebanding matches the veneered faces. The edgebanding should be just wide enough to accommodate the desired edge treatment. The wider the edgebanding, the more it will react to moisture changes, while the man-made core material remains stable. This may result in the glue joint between the edgebanding and the core material telegraphing through the veneer. After I glue on the solid edgebanding, I usually wait two to three days to allow for any minor wood movement before planing the edgebanding flush to the core material and veneering the faces.

Because veneers are so thin, usually ranging from 1/16 in. to 1/32 in. thick, it is easy to store a large quantity in a small space. But proper storage is important. Lay the veneer sheets out flat so they are fully supported with no overhang. Keep the sheets away from direct sunlight, which can fade the woods. If possible, the veneer should be kept at a temperature of 60°F to 70°F and a humidity of about 80%. If you live in a dry area, wrap the veneer in plastic to retain moisture and keep it clean. However, if the veneer is too dry or cracked, sprinkle water on each sheet and put it in a cold press or on a cement floor weighted down under boards for at least six hours and preferably overnight. After the sheets are flat and dry, tape the cracks and secure the ends with veneer tape to prevent further cracking. For greater stability when using a plywood core, the veneer grain must be perpendicular to the plywood grain.

A major principle in veneering is that core materials must always be veneered equally on both sides or else each face will react to moisture differently and the piece will warp. Generally, the backing veneer can be an easily worked species such as mahogany, but it should be the same thickness as the show veneer to maintain structural balance. Bird's-eye maple veneer, however, should be backed by bird's-eye maple, even if it will not show, because this veneer is strong enough to bend more easily worked species.

Applying veneers—Before beginning a veneering project, you should be well organized, have a clean working surface, and prepare the core material and veneers, including marking each piece so you know exactly where it goes. A felt-tip marker works well to mark the core material, but chalk is better on the veneers and is easier to remove. All surfaces have to be sanded, clean and dry, and you should have plenty of glue and clamps. A shopmade press, like that shown in figure 1, can greatly reduce the problems of managing the numerous pieces of plywood, particleboard, battens, cauls and clamps. MDF on the face of the cauls provides a very stable and perfectly flat surface. Plastic laminate or heavily waxed tempered hardboard makes good press plates that won't stick to the veneer and that are easily cleaned of glue that might squeeze through the porous veneer.

Begin the actual veneering process by placing the bottom caul on a work surface or bench so you can clamp along both the front and back sides. Lay the bottom press plate on the caul and then lay the backing veneer facedown on the bottom press plate. Make sure no debris is stuck to the cauls, press plates, veneers or core material that might mar the finished surface. With a paint roller, apply a thin, even coat of white glue to one side of the core. Experience is the only way to learn how much glue is needed, as requirements will vary with each material and veneer. But you don't want so much glue that it squeezes out around the edges and through the veneer, creating a mess that requires considerable scraping and sanding to clean up. Then, place the core, glued-side down, on top of the backing veneer. After rolling a thin, even coat of glue on the exposed side of the core, complete the veneer "sandwich" by adding the face veneer, the top press plate and finally the top caul. Begin applying clamp pressure from the center of the panel to the outer edges, to avoid trapping glue in the center and causing bubbles in the finished surface. Leave the panel clamped for two to four hours, or longer depending on humidity and temperature. Higher temperatures cause the glue to set more quickly. Conversely, higher humidity lengthens the setting period by increasing the moisture content of the wood, and it inhibits glue penetration. I leave some veneers, such as inlays, clamped for eight hours or more. Once the panels come out of the press, I trim the overhanging veneer with a knife, a saw or just a sanding block with 80-grit to 100-grit paper.

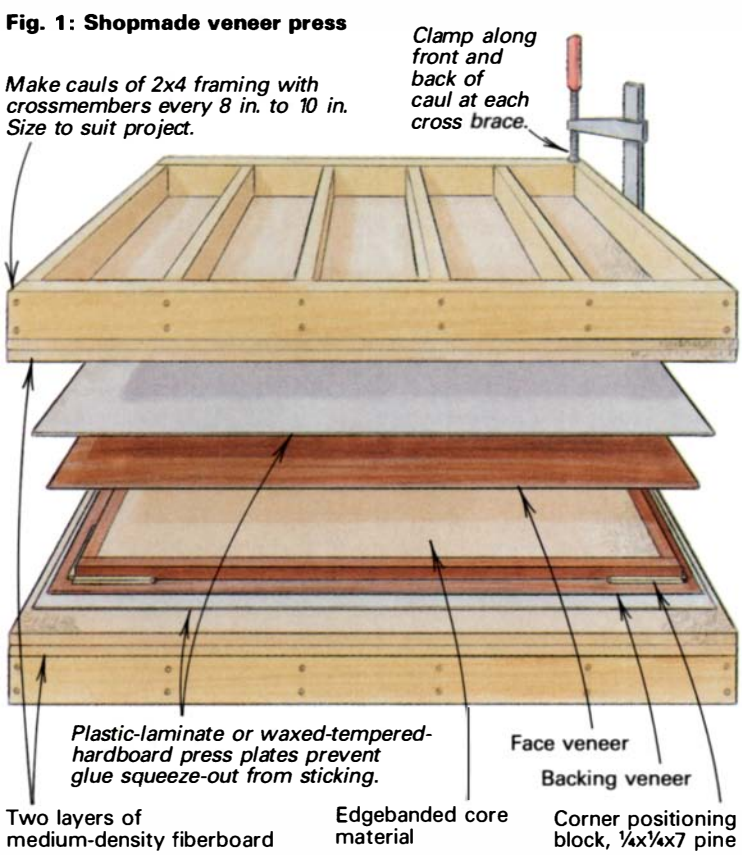
It is common for the veneer to slip slightly on the core as the clamps are tightened. Because the veneers are cut about 1/2 in. oversize on each side, this is usually of little consequence. However, if grain orientation or positioning is important, as with the game boards, I prevent veneer slippage by gluing 1/4x1/4x7 pine positioning blocks on each corner, as shown in figure 1 below.

Inlaying veneers—I really enjoy inlaying designs and decorations in my projects. Not only do they add interest and detail, as shown in the photos on the following page, but they can provide information about the piece. The playing card symbols on the doors of my game cabinet and the game pieces on the drawer fronts, for example, tell what's inside.

To inlay a pattern, draw the design on the background veneer, or on a piece of paper and then tape the design to the veneer. Holding the X-Acto knife at 90°, cut the pattern for the inlay from the background. Choosing the right color and pattern for the inlay from the dizzying selection of domestic and exotic veneers that is available can take longer than the actual cutting. But attention to detail here is important to the overall success of the piece.

The fruit-wood veneers, like cherry, pear, plum and apple, are best for beginners because they are easy to work. Walnut and maple

Fig. 1: Shopmade veneer press



Photos: Eric Gersh; drawings: Bob La Pointe

Above: The club and spade inlays add an interesting detail to the plain cabinet exterior. The knobs are glued up from endgrain and are edge-veneered to emphasize their shapes. The diamond knob operates the cabinet latch. Left: The inlaid veneer in the drawers will challenge your veneering skills. Custom trays and racks can be designed to accommodate your particular games and storage needs.

also work well. Veneers like oak, mahogany, teak and basswood are better saved for later projects because they are brittle. If I'm inlaying small straight pieces in a soft veneer, I can just press the background veneer down on top of the inlay veneer and cut through both layers in one pass. To do this, hold the knife at 65° to 70° with your hand tipped to the center of the inlay. The resulting inlay will be slightly larger than the opening, and when inserted from the back, it will eliminate gaps between the inlay and the background veneer. For the more brittle veneers, I first cut out the pattern from the background veneer and then lay the background veneer over the inlay veneer to lightly trace the pattern with my knife. To prevent movement while tracing these inlays, it helps to first cut the inlay piece slightly oversize and tape it to the back of the background piece. After tracing the pattern, remove the background veneer and complete the cut by making several light passes on the inlay veneer. The most difficult veneers to work without damaging are ebony, rosewood, tulip wood and any burl. To avoid splitting and breaking these veneers, I cover the entire back with paper veneering tape and then make numerous light passes to complete the cut. The backing tape must be removed before glue-up.

When making up an inlay of several small pieces, like the joker on the drawer bottom in the photo on p. 68, I use clear tape to hold the cut pieces in place as I go, which allows me to see the design as I work. Once the inlay is complete, I tape it into the background and then hold it up to the light and check for gaps and broken pieces. After the inlay is glued in place, I remove the tape by gently pulling it across the grain to avoid lifting the veneer.

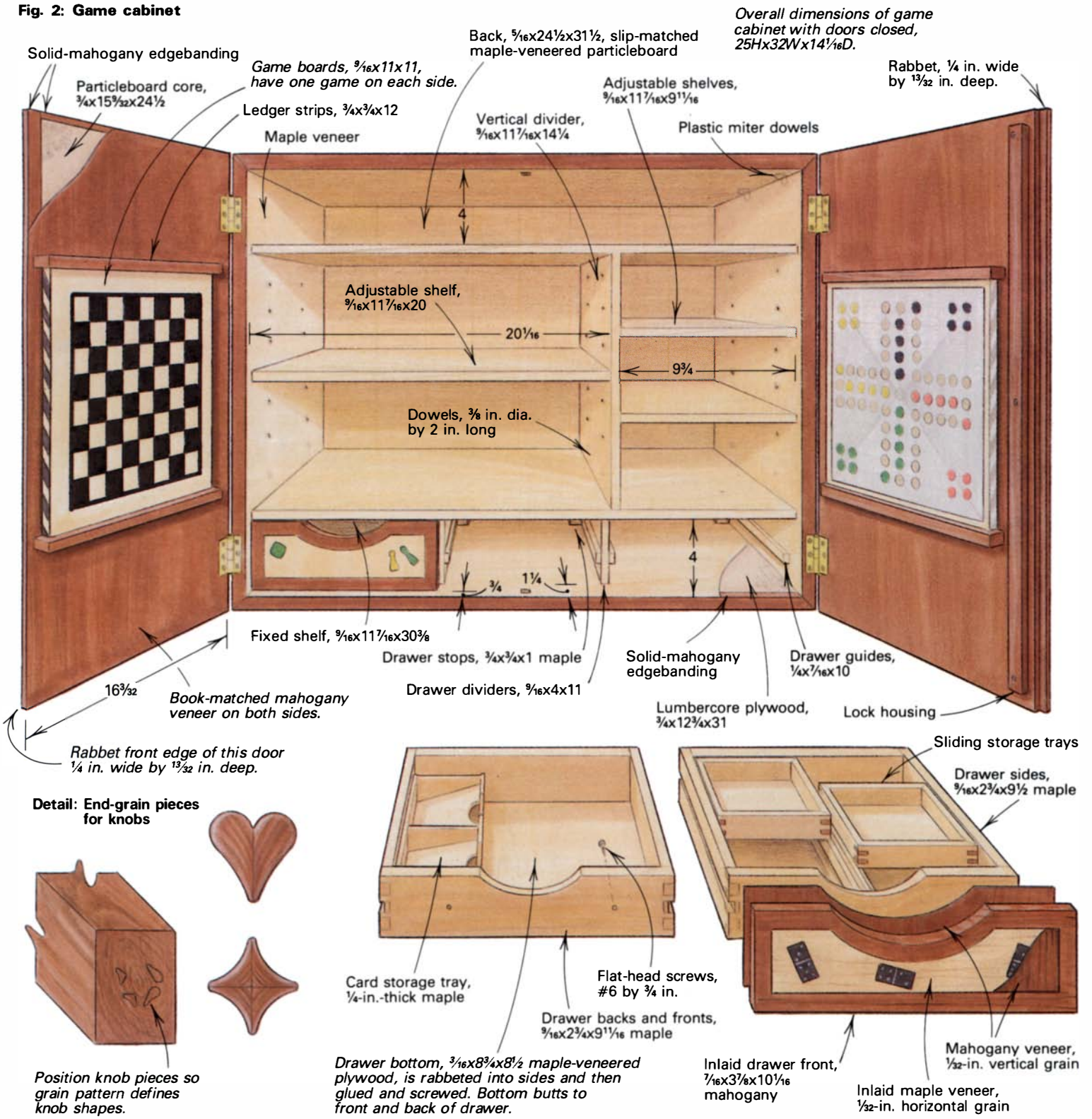
When I'm making the game boards, I use the same technique to prepare the veneer for the field and the edging. To make the checkerboard with 1¾-in. squares for example, first cut veneer strips about 16 in. long and about 2¼ in. wide. You will need five strips of one veneer and four strips of a contrasting color. Clamp the veneer strips between two solid pieces of ¾x1¾x18 stock by screwing the solid stock together at the ends, without screwing through the veneer, and then plane the protruding edges of veneer flush to the clamping stock. Remove the clamping stock and tape the veneer strips together, alternating the colors. Then, with a straightedge guide and an X-Acto knife, cut across the alternating strips to form 1¾-in. strips with contrasting colored squares of veneer. Reposition and tape these strips to form the checkerboard pattern by offsetting every other row. The diagonal-stripe edging is made by alternating ½-in. strips of ebony or gray-dyed maple with maple and then crosscutting on an angle instead of straight across the veneer strips as the checkerboard was done. After trimming off the extra squares at either end, laminate the checkerboard to ½-in. particleboard and add the striped edging.

Building the carcase—Begin by determining the size cabinet you want. My cabinet was designed in Germany to fit continental game sizes, but American game boards in general and your collection of games in particular may dictate different dimensions. Work backward from your finished dimensions, subtracting the thickness of veneers and solid edgebandings to find the size of the core panels. Depending on the veneer, I used ¼-in.-thick mahogany or maple edgebanding, mitered at the corners, on all edges of each piece, except on the mating edges of the doors and on the ends of the carcase pieces. Here, ½-in.-thick edgebanding provides extra stock for rabbeting the door edges and mitering the carcase corners. Edgebanding at the ends of the carcase pieces allows me to slightly ease the mitered joint if necessary without fear of sanding through the veneer to the core. I wanted to match the faces of the panels as closely as possible, but was unable to get solid edgebanding stock to match my veneers; so I veneered all the exposed panel edges with mahogany from the same flitch used for the face veneers. Edge veneers are particularly recommended when using aniline- or alcohol-base stains to ensure even color. Before staining, raise the grain with a slightly damp rag and then lightly sand with 180-grit paper to remove the fuzz.

With all of the individual panels veneered, I began the actual construction by rabbeting the back edge of the sides, top and bottom, ½ in. deep by 1 in. wide, to accept the maple-veneered particleboard back and to conceal the French cleat used to hang the cabinet on the wall. I drilled the holes for the plastic miter dowels before mitering the ends of the carcase pieces, and then I drilled the holes for the adjustable shelves as well as the holes for the ⅜-in.-dia. by 2-in.-long dowels that join the fixed shelves and vertical dividers. The plastic miter dowels made dry-fitting these parts much easier. Before final assembly, all parts were sanded with 100-grit and then 150-grit paper. Although the back is dry-fitted during construction, it is not glued and screwed into its rabbet until after the carcase is assembled, the drawer guides installed and the interior lacquered. To make the French cleat, rip a ¾x5x31½ maple board down the center with the sawblade at a 30° angle. The top half of the board, glued and screwed to the cabinet back, hooks over the bottom half of the board, screwed to the wall, to hang the cabinet.

Dovetail and fit the solid-maple drawers, shown in the bottom photo above, to their openings before dadoing the drawer-guide slots and rabbeting the sides for the bottom. The 3/16-in. maple-veneered plywood bottoms are glued and screwed into the side rabbets and simply butt against the front and back of the drawer. The inlaid front screwed to the drawer is solid mahogany with veneers on both sides. The back of the drawer front is veneered with vertical-grain mahogany. Then, I rout an inset in the face of the drawer front to accommodate a double layer of veneer. A vertical-grain mahogany substrate provides a good base for the maple veneer that

Fig. 2: Game cabinet



has grain running in the same direction as the solid drawer front.

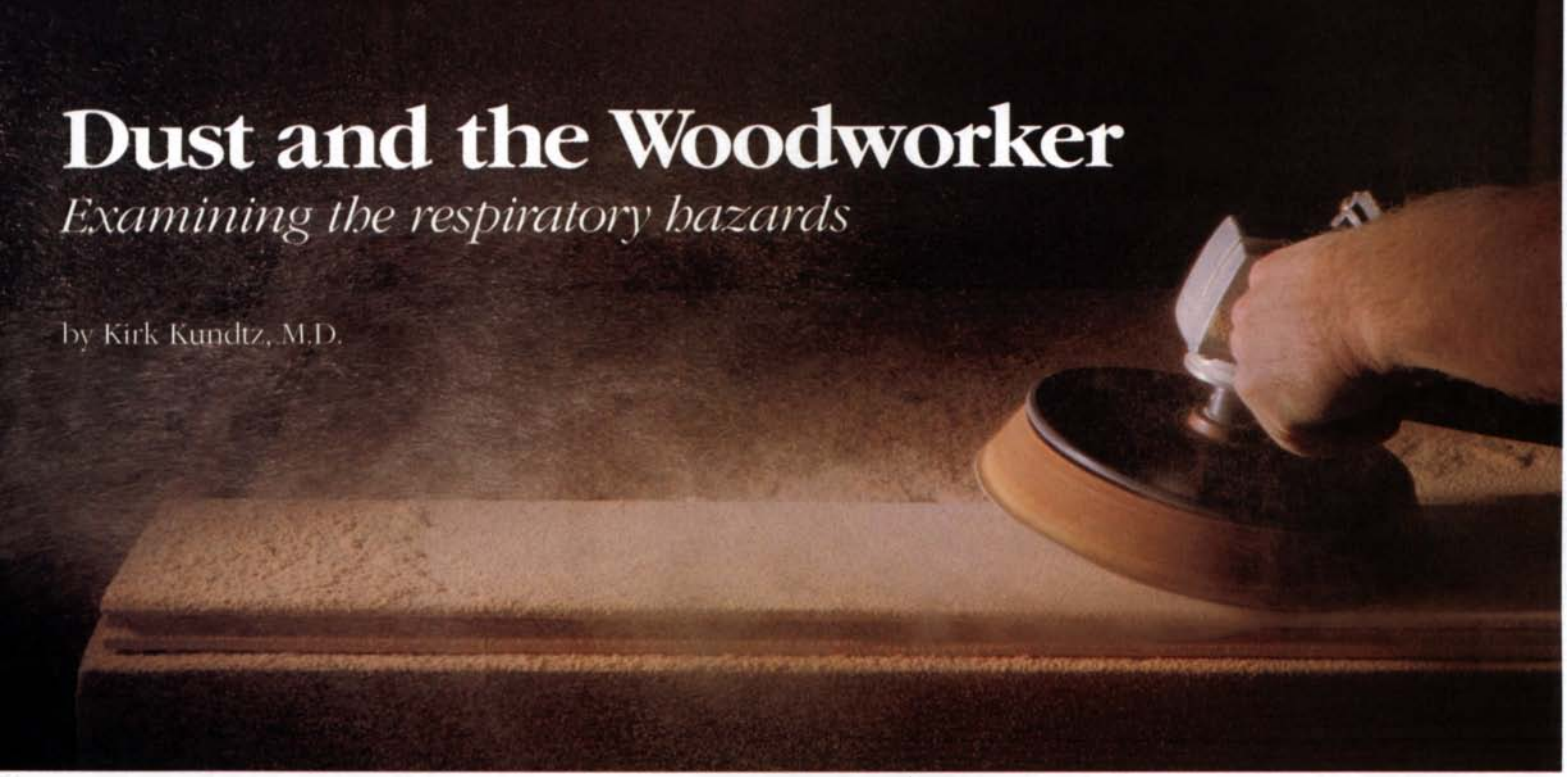
The doors are built, as detailed in figure 2, with ½-in.-wide edgebanding on their mating edges. Rabbets cut into this edge form a lap joint so that the right door overlaps the left. This way, the locking mechanism, two sliding bars operated by turning the knob, will also hold the left door closed. I made the doorknobs from sections of endgrain glued together, so the grain pattern reflects the design of the knob, and then chiseled, carved and sanded the knobs to shape. The veneer edging strips were glued on with contact cement because it's difficult to clamp these odd shapes. While contact cement works well in this application, and is the adhesive of choice for plastic-laminate work, I don't recommend it for general veneer work because it has a tendency to soften and loosen over time and it can cause the veneer to shrink, leaving gaps up to 1/16 in. wide. Also, solvents in many finishing products can penetrate the veneer and hasten the softening process. The ledger strips holding the game boards on the back of the doors work just like a sliding-door track. The rabbet in the bottom ledger is 3/16 in. deep and the rabbet in the top ledger is ⅜ in. deep so that the top of the board may be raised into the top ledger to move the bottom of the board into or out of the bottom ledger. □

Norbert Heinold builds custom cabinets and veneered pieces in Canoga Park, Cal.

Dust and the Woodworker

Examining the respiratory hazards

by Kirk Kundtz, M.D.



In 15 minutes of use, this disc sander filled a shop's atmosphere with a cup of powdery dust, the size that can negotiate your lung's smallest airways. The Occupational Safety and Health Administration (OSHA) recommends that your short-term exposure limit (STEL) be less than one rounded teaspoon of dust in a 24-ft. by 24-ft. shop in 15 minutes. OSHA's permissible exposure limit (PEL) for an eight-hour shift is about one-half of a teaspoon of dust suspended continuously in the same shop's atmosphere.

What serious woodworker doesn't know the pleasure of wiping a delicate film of very fine dust off a well-waxed jointer bed? I like reaching into a tablesaw base and spilling out arm loads of wood dust onto my knees and the surrounding floor. In fact, I don't mind dust in my hair, in my beard and in my pockets. And I've not only come to love the feel and sight of wood dust, but the satisfying aroma as well. I was first tempted to start woodworking when my best friend built a cedar porch swing for me—the air in his shop was filled with the rich scent of the wood. Since then, I've built my own shop and filled the air with dust from a dozen different woods, including sassafras, walnut, redwood, mahogany, teak, cherry, maple, oak and poplar.

Yes, the woodworker in me enjoys wood dust, but the doctor in me is suspicious because the dust so often irritates my eyes and lungs. My concerns led me to the hospital library to research woodworking's effects on the respiratory system. What I found was both surprising and a little disconcerting. A computer search of medical literature revealed more than 250 articles pertaining to the hazards of woodworking. The articles covered a wide range of problems, including traumatic injuries, skin disorders and cancer associations, but most dealt with how wood-dust inhalation affects the lungs.

How much dust is harmful?—Wood comes off tools in many different shapes and sizes, including broad, flat shavings; long, thin splinters; small chips; and coarse and fine powdery dust, such as that produced by the disc sander shown above. Hand-sanding produces fine dust. But power sanders, the big guns in the sanding arsenal, are the tools most responsible for creating lingering dust clouds in the shop. Powdery dust consists of the smallest particles and represents the greatest health hazard to the lungs. This fine powdery dust not only floats in the air for a long time, but it can be inhaled very deeply.

Dust particles can be classified into two groups: those smaller than 10 microns in diameter and those larger than 10 microns (one micron equals one millionth of a meter). The smaller particles are respirable: they are little enough to negotiate the tiny airways that reach deep into the lungs. Particles bigger than 10 microns tend to get trapped in the larger airways.

Wood dust, as inviting as it may be, is no friend to the woodworker. Given the fact that most of us are not going to sacrifice woodworking to save our respiratory system, the question arises: How much wood dust is too much? Two variables that must be considered are the amount of dust you breathe and how long you breathe it. If you spend just a few hours per week in the shop or if you work mainly on small projects that do not demand much sawing and sanding, you probably do not have to worry about bronchitis, pneumonia or nose cancer. If, however, you spend long hours on big projects that require extensive ripping and sanding, you should be cautious, especially in light of the small amount of dust that researchers and government regulators say is the threshold limit for ambient dust (beyond which lung disease begins to develop).

According to a 1981 report published by the American Conference of Governmental Industrial Hygienists, the maximum level of airborne respirable particles should average no more than five milligrams of dust per cubic meter of shop space in eight hours. Other studies suggest that this level is too high and recommend a maximum of two milligrams of dust per cubic meter. These studies propose that more than two milligrams of wood dust per cubic meter of shop space may damage your lungs.

What do these limits mean to you? Let's suppose your shop is 27 ft. long by 21 ft. wide and the ceiling is 9 ft. high, so it is roughly 170 cubic meters. According to the stricter guideline of two milligrams of dust per cubic meter, you should limit airborne dust to less than 340 milligrams. This is one-third of a gram, which I discovered equals slightly less than one-quarter of a teaspoon of dust. A full sandwich bag weighs almost 50 grams, which is enough to exceed the threshold limit of a 25,000-cubic-meter shop. This is all very disconcerting and even the authors of the cited study conceded that, though ideal, this strict (two milligram per cubic meter) standard is not very realistic.

A guide to your respiratory system—Dust's affect on your lungs, however, is realistic, but you must first understand your

Getting out of the dust

by Theodore J. Fink, M.D.

Getting rid of dust in a woodshop is like trying to eliminate salt from your diet, which is impossible because almost everything you eat or drink contains sodium. So the goal is not to totally eliminate dust, but to minimize your exposure. This can be accomplished with a three-phase dust-control plan that includes: decreased dust production, wood-dust capture and personal protection.

3M's model 8500 dust mask, on the right, should be used "for comfort only," and isn't approved by the National Institute for Occupational Safety and Health (NIOSH). The Gerson 1710 and 1725, in the center, are approved for dust and some mist protection. The 1725 has an easy-breathing valve. The NIOSH-approved Willson 1200 series cartridge respirator, on the left, comes with replaceable particle filters, and an assortment of cartridges is available that protect you from a variety of hazardous chemical vapors and mists.

Decrease your dust production: Your woodworking techniques and tools determine the quantity and size of dust particles you produce. The larger the particles, the less hazardous the dust. Large particles settle quickly, are more easily captured by dust-collection systems and are not respirable. The finest dust particles, which are the most hazardous, tend to escape most collection methods. If you shine a beam of light through a dark, presumably clean workshop, the airborne particles you will see are those larger than 20 microns in size. Respirable dust (under 10 microns) is invisible.

You can reduce very fine wood dust by minimizing the need for sanding. By cutting rather than scraping when turning wood and by planing and scraping rather than belt-sanding, you will produce shavings rather than dust. All sawblades, planer blades and bits should be sharp, because dull blades produce finer dust. You should select the proper blade and feed rate to produce smoother surfaces when sawing. When bandsawing scroll work, you can get a finer finish requiring less sanding by using a blade with more teeth per inch (t.p.i.) and with standard tooth form (not a hook tooth). When ripping with a hook-tooth blade, be sure it has a large-size gullet that will accommodate large particles and use a fast feed rate. To decrease the amount of finish-sanding, be sure stock is precisely dimensioned by planing and jointing before assembly.

Dust capture: Despite your best efforts, you will make dust. Therefore, you should attempt to capture the dust before it becomes airborne. The most efficient method includes a dust-collection system hooked directly into stationary tools (see *FWW* #67, p. 70). Also, when buying small power tools, such as sanders and power planes, select those equipped with dust-collection bags. Although these are commonly called "dustless" and greatly reduce the amount of dust put into the air, they fail to capture some of the very fine dust.

Whenever wood is machined, a wide assortment of particle sizes is produced and to each particle a positive electrical charge is imparted. This is especially important for the smallest particles, which, because of low mass and positive charges, remain suspended in air for hours after production. Eventually these fine particles do settle, but because they repel each other, they are easily resuspended in the atmosphere when swept with a broom. Thus, it is much better to vacuum dust whenever possible.

Skin and eye protection: Coveralls that can be taken off before leaving the shop protect most of your skin. The coveralls should be cleaned regularly and dust remaining on skin and hair should be washed off immediately after leaving the shop.

Standard safety goggles provide some eye protection from fine dust, but if you are using a very irritating wood or one to which you have developed an allergy, an airtight full-face mask or diver's (underwater) goggles may be necessary.

Respirators and dust masks: The amount of exposure to the skin and eyes is minuscule compared to the surface area in the respiratory tract. Furthermore, all the respiratory surfaces are moist and very reactive to foreign substances. Thus, the most critical personal protective equipment is the dust mask or respirator.

These items, which must cover nose and mouth, vary widely in cost, comfort and effectiveness. The most comfortable, least expensive *and* least effective is the lightweight molded mask that is commonly held in place by a single elastic band, such as the 3M 8500 (shown above on the right) or the Gerson 1501 (not shown). Although these masks filter out up to 95% of airborne dust, air leaks readily around their edges. Neither mask is approved by the National Institute for Occupational Safety and Health (NIOSH).

3M's Model 8710 mask (not shown) and the Gerson 1710 mask (shown above, second from the right) filter in excess of 99% of respirable dust. Both have two wide elastic straps for a tight, form fit, yet they're still quite comfortable, lightweight and disposable. And they are durable enough for extended use. Both are adequate for fine-dust protection, but not for harmful vapors.

If you need protection from paint, varnish or other harmful vapors, as well as dust particles, NIOSH recommends a cartridge-type mask, such as the Willson 1200 respirator (shown above on the left) or a similar model from 3M, U.S. Safety or North Safety Equipment. The Willson comes with replaceable particle filters and you can purchase an assortment of cartridges that protect you from a variety of hazardous chemicals.

Masks and respirators are only as good as their fit, and a tight fit may be difficult if you have a beard. The air helmet, such as the Airstream Dust Helmet (or similar battery-powered air-purifying respirator/hard-hat combinations), may be a solution for bearded woodworkers.

Respirable dust remains suspended in the air for hours and it's invisible. Therefore, once you put on a mask or respirator for a dust-producing operation in the shop, leave it on for the rest of the workday.

As a mask or respirator is used, retained wood particles clog its pores and breathing becomes more difficult. As this happens, the effectiveness of dust capture by the mask actually improves, provided there are no air leaks around the mask. When you notice the increased breathing difficulty, it is time to change filters or the mask.

Before using any respirator or dust mask, always be sure to read and follow all instructions and warnings supplied by the manufacturer and NIOSH. □

Dr. Fink is an internist in Shelburn, Vt., a consulting physician for Digital Equipment Corp. and an amateur woodworker.

respiratory system so that you realize just how injurious dust can be. The lungs are extraordinary organs that continually bring fresh air into very close contact with your body's circulatory system. Structurally, the lungs are like sponges with millions of tiny air pockets. Their ultimate purpose is to remove carbon dioxide from the blood stream and replace it with fresh oxygen from the atmosphere. This process is called gas exchange. The air pockets are called alveoli, shown in the drawing on the facing page, and gas exchange takes place within them. When you breathe in, the alveoli fill with air and oxygen passes through their ultra-thin walls and into the surrounding blood. At the same time, carbon dioxide from the blood passes into the alveoli, where it is expelled during exhalation.

The flow of air in the lungs takes place through a set of airways that spread out very much like the branches of a tree, as shown in the drawing. The tree trunk corresponds to the trachea, the first large branches are the bronchi and the smaller branches are the bronchioles. In this analogy, the alveoli are like the leaves of the tree.

In addition to moving air in and out of the body, the lungs must keep themselves and the air clean, warm and moist. This job is accomplished by the "mucocilliary transport" system, a term for the mucus-producing tissue that lines the "bronchial tree" (see the drawing). We are all familiar with mucus, though we may not be familiar with its purpose. Not only does it serve to moisten the air, it also protects the underlying tissue from drying out. In addition, it acts like flypaper to catch the microscopic dust and dirt in the air we breathe. Once these dust particles are trapped, they must be discarded. This is done by the other part of the mucocilliary transport system, the ciliated epithelial cells. These cells have hundreds of tiny little arms that literally sweep the dust-laden mucus up and out of the lungs. In addition, a backup mechanism, the "alveolar macrophage," serves to clean out dust that gets into the alveoli. This system consists of cells that wander around in the alveoli like little street cleaners, sweeping up particles that threaten to interfere with the crucial gas-exchange system.

How does dust harm these organs?—In the healthy person, occasional dust particles in the lungs is not a serious problem because the lungs have built-in defense mechanisms, such as the mucus that lines the airways, that halt harmful substances like dust. The dust-laden mucus is then expelled from the lungs by the sweeping-motion cells lining the airways, as well as by coughing. Unfortunately, however, chronic inhalation of wood dust may damage the lungs' cleaning systems. When this happens, a vicious circle begins as more dust collects and further damages the lungs. The body then responds as it does to skin injury—it mobilizes an inflammatory response. That is, the bronchial airways become red, swollen and painful. Swelling decreases the diameter of the airways and produces shortness of breath, induces coughing and increases sputum, which is saliva and other discharged matter from the respiratory passages. A number of studies have shown that these symptoms are common in active woodworkers: those that spend long hours in the shop. Other studies have shown that woodworkers tend to develop lung problems similar to those found in patients with chronic bronchitis and emphysema—diseases associated primarily with cigarette smoking. Inhaling wood dust, while probably not as harmful as smoking, can be dangerous.

Perhaps the most documented effect of wood-dust exposure is nose cancer. Dozens of studies in more than 10 countries have shown an increased rate of this relatively rare form of cancer among woodworkers. Medically it is known as "nasal adenocarcinoma." Mucus-secreting glands in the noses of woodworkers tend to become cancerous at a rate 1,000 times greater than non-woodworkers, apparently because of the dust. Fortunately, this type of cancer is relatively rare even among woodworkers (only about one in 1,500 active woodworkers will ever develop it), and the time lag between exposure and the onset of symptoms is as much as 40 years.

Finally, wood dust can cause respiratory illness because it contains many types of allergens and toxins. These range from chemicals deposited on the tree from the outside, such as pesticides and fungal spores, to chemicals created by the trees themselves, such as alkaloids, saponins, aldehydes, quinones, flavonoids, steroids and resins. Individuals respond differently to these various toxins, but the symptoms are universal: coughing, sneezing, increased phlegm and sputum production, runny nose, red eyes and, in extreme conditions, bronchitis, pneumonitis, and asthma. These symptoms are found in woodworkers more often than in the general population.

You are probably more familiar with some toxins and allergens than with others. Perhaps woodworkers are most aware of the allergen called plicatic acid, a substance in red cedar that is responsible for a condition known as red-cedar asthma. This very debilitating condition occurs in about 5% of people who work with red cedar. Another similar condition is maple-bark disease, a severe form of asthma probably caused by fungal spores found in maple bark. Two other North American woods considered to have significant allergenic effects are boxwood and sequoia redwood.

Clearly, the concern about dust is not just academic and all of us woodworkers must be aware of these insidious problems. Most of us don't hesitate to use goggles, push sticks and blade guards, but how many of us use face masks and dust collectors regularly? Not many, I'm afraid. Dust masks can be uncomfortable and dust collectors are expensive, but both are well worth the investment. As with many other items I've bought for my shop, I've agonized over spending money on a dust-collection system, but I'll probably wonder how I ever got by without it once I use it. □

Kirk Kundtz is a resident physician in internal medicine at Mount Sinai Hospital in Cleveland, Ohio, and is an active woodworker.
Thanks to Drs. Lawrence Martin and James Edmonson for assistance in preparing this article.

Sources of supply

Dust masks and respirators are manufactured by:

Louis M. Gerson Co., Inc., 15 Sproat St., Middleboro, MA 02346; (508) 947-4000.

Glendale Protective Technologies, 130 Crossways Park Drive, Woodbury, NY 11797; (516) 921-5800.

Mine Safety Appliance Co., Box 426, Pittsburgh, PA 15230; (412) 967-3000.

North Healthcare, 1515 Elmwood Road, Rockford, IL 61103; (815) 877-2531.

North Safety Equipment, 2000 Plainfield Turnpike, Cranston, RI 02921; (401) 943-4400.

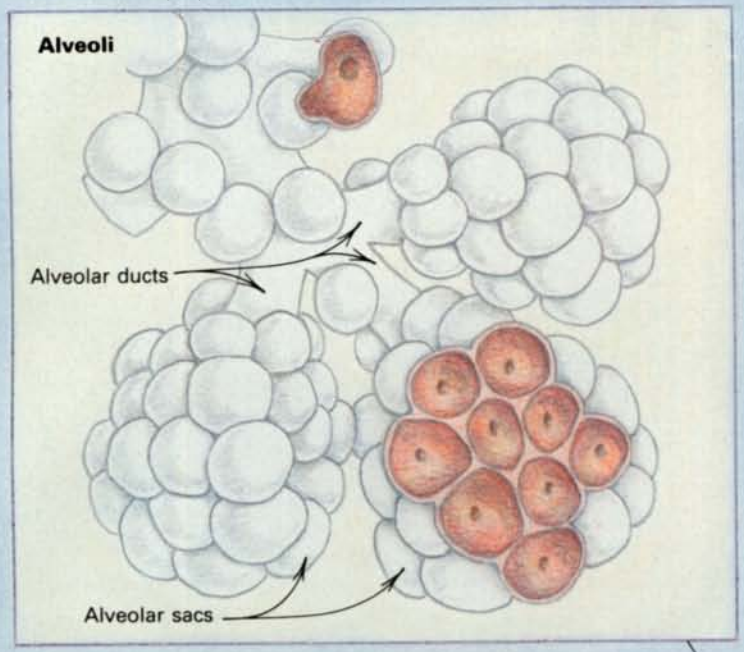
Racal, Airstream Division, 7305 Executive Way, Frederick, MD 21701; (301) 695-8200.

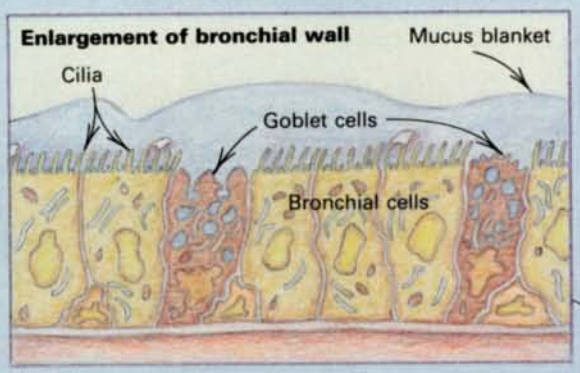
3M/Occupational Health & Environmental Safety Division, 220-3E-04 3M Center, St. Paul, MN 55144-1000; (800) 328-1667, (612) 733-8029.

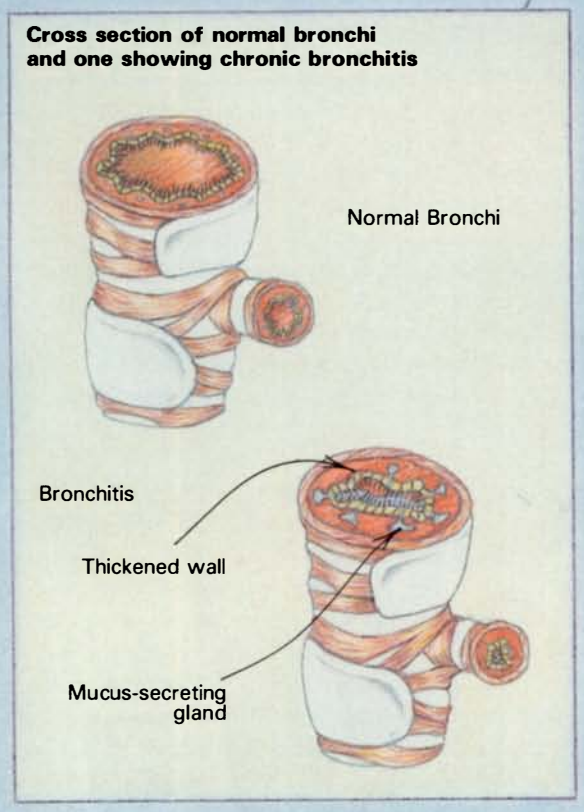
U.S. Safety, 1535 Walnut St., Kansas City, MO 64108-1312; (816) 842-8500.

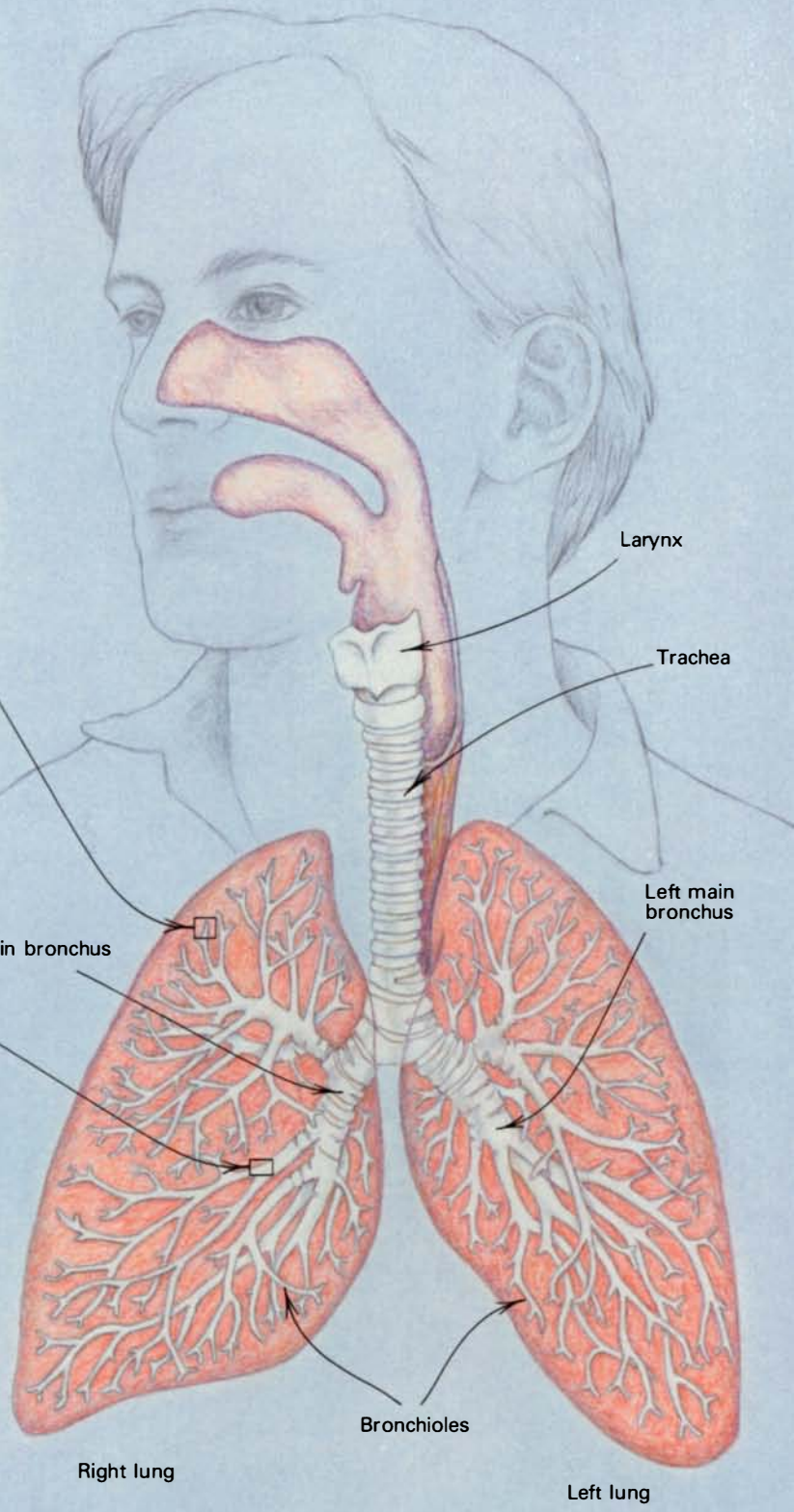
Willson Safety Products, Box 622, Reading, PA 19603; (215) 376-6161.

The respiratory system









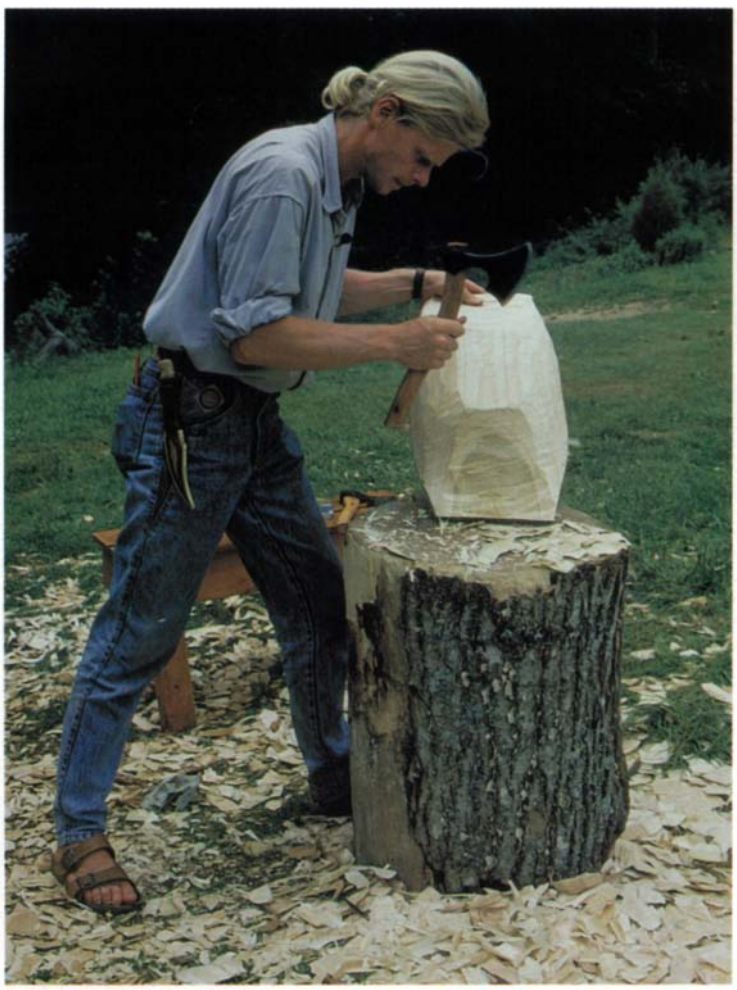
Drawing: Anne Feinstein

Carving a Dough Bowl

Using ax, adze, knife and gouge

by Wille Sundqvist

My experience with carving is rooted in my very early years in my grandparents' kitchen. My grandfather's workbench was there, and my brother and I often sat at it whittling toys and other important things. In later years I have often pondered the fact that never once did I hear my grandmother complain about the chips and shavings we left behind on the kitchen floor. At one time, the kitchen was the room that was kept warmest, and it was there that people spent the most time, making and repairing things. Women carded wool, spun yarn, wove and knitted, while men made utensils and other implements for the household and farm, including dough bowls. These bowls were very common kitchen objects when I grew up and they are still useful in today's homes.



For a safe stance while hewing, keep your legs wide apart and the blank well forward on the chopping block. This way, if the hatchet slips from the wood, it ends up in the block, not in your leg.

In this article I'll tell you how to carve a dough bowl using mainly an ax, adze, knife and gouge. Deformities in trees, such as burls, can be hollowed to make natural bowls or scoops. Traditional Swedish drinking vessels were made from burls, and sometimes part of the tree trunk was left on the vessel as a handle. Larger troughs or bowls, however, are often made from split round stock. Feeding troughs, several feet in length, were made for livestock. Smaller troughs were used for making cheese, kneading bread and serving food.

Tools and material—You will need an ax or hewing hatchet, a hollowing adze and a couple of gouges to rough out the bowl. For truing surfaces and finish-carving, a knife, drawknife or splitting knife, spokeshave and plane will be helpful. A stable workbench or a low bench with some means of securing the stock is an advantage. And, of course, you will need a chopping block.

The size and sweep of the gouges determine the technique needed to work with them and the type of cut produced. Wide gouges remove more wood, but require more power. A gouge with a deep sweep is good for roughing out; a shallow gouge removes ridges left by the deep gouge. A bent gouge is sometimes necessary to smooth the bottom of the bowl.

Traditionally, softer woods have been used for troughs and bowls. Aspen and birch are among the first choices, but pine and spruce are not uncommon. Almost any kind of wood can be used, except for those that are toxic, contain resins or might otherwise taint food. Alder, tulip poplar and basswood are easy to work; maple, beech, mountain ash, juniper and fruitwood are more challenging.

Avoid wood with knots and uneven grain. The pith and some wood close to it should be removed to avoid radial checking. Whether you work with green or dry wood is often a question of what you have access to. Roughing out green wood is easier than dry wood, but you must prevent checking and cracking when it dries. For green-wood bowls, leave the blank ⅜ in. to 1¼ in. larger than you intend the final shape to be, so you can make adjustments after the wood has dried.

Hewing with an ax—To shape an object with an ax, it is necessary to use a technique other than one you would use when felling or limbing trees. When you hew on a chopping block, you don't chop the wood, but shear it. The cut starts at the near corner of the blade edge and slices toward the far corner. This stroke, combined with the momentum gained through the ax's weight, lets you cut with the entire length of the blade edge. This technique applies to axes with short edges, but precision is increased with long-edge axes because the bevel registers on more of the blank's surface.

Because of this shearing action, your feet should be fairly wide

apart. If you hew with your right hand, your right leg should be far back, as shown in the photo on the facing page. This stance keeps your leg out of the path of the ax and also helps you gain power for your stroke. When making a stroke, the ax head should angle upward, with your hand well below it. It's a good idea to support the blank on the far side of the block, especially on full-powered strokes, so if you miss or strike a glancing blow, the ax edge ends up in the block, not in your leg.

Start hewing low on the blank and work upward, but not clear to the top; then turn the blank upside down to work the opposite end. Work carefully in controlled increments. Don't take that last stroke after you've decided you're getting tired and should stop for a rest.

Roughing out the blank—Choose a piece of round stock at least 4 in. longer than the intended bowl. Remove the bark, split the stock down the middle and hew away the pith. Hew a flat on the bark side, approximately parallel with the pith side, and true this with a plane. This flat will become the bottom of the bowl.

On the other side of the blank, lay out the shape of the bowl's inner rim, leaving a 1-in. margin along the sides and twice that at the ends. The margin can vary depending on the strength of the wood you are using and the shape you are aiming for, but the end walls must be thicker than the side walls to accommodate the weaker endgrain. If the ends will be shaped with handles, leave room for them, too. You can draw the shape freehand or make a symmetrical pattern by folding a piece of paper and drawing half the shape on the fold. Cut out the pattern with the paper still folded.

Use a hollowing adze with a short handle to rough out the bowl. The blank can be held at an angle on a chopping block, as shown in the top, left photo on the next page, or secured between the dogs of a cabinetmaker's workbench. But to get a longer, more powerful swing, a low bench with pegs and wedges is ideal (see the top, right photo on the next page). You can straddle the bench or stand to the side to work on the walls of the bowl. You can also secure the blank in a bowl-chopping block, which allows you to work on the blank without having to hold it with your hand.

The stroke with the adze is that of a pendulum, with your wrist at the center. The knob of the handle is rounded to fit in the palm of your hand, and so there is some tool rotation at the beginning

Dough-bowl design

A bowl made from wood should be designed to be functional. Dough bowls, like the one shown in the photo below, need wide, long bottoms to keep them from tipping, and serving bowls need handles. Basic Scandinavian bowl design is usually worked out from the rectangle of a split bowl blank, as seen in the plan views in figure 1 at right. The bowls are usually at least twice as long as they are wide, and their walls are not very steep. This is especially important for the end-grain walls, which should be thicker than long-grain walls to ensure adequate strength. Handles can be included by extending the length of the bowl and undercutting for a finger hold, as shown in figure 2 below. A common bowl shape has curved corners. If your blank is tapered, a boat-shaped bowl can be an attractive result. Bowls can also be made from a split round, pith-side down. Such bowls will be shallow, but they will be graphically striking because the annual rings will follow the inner shape of the bowl. —*W.S.*

Fig. 1: Design variations for a dough bowl

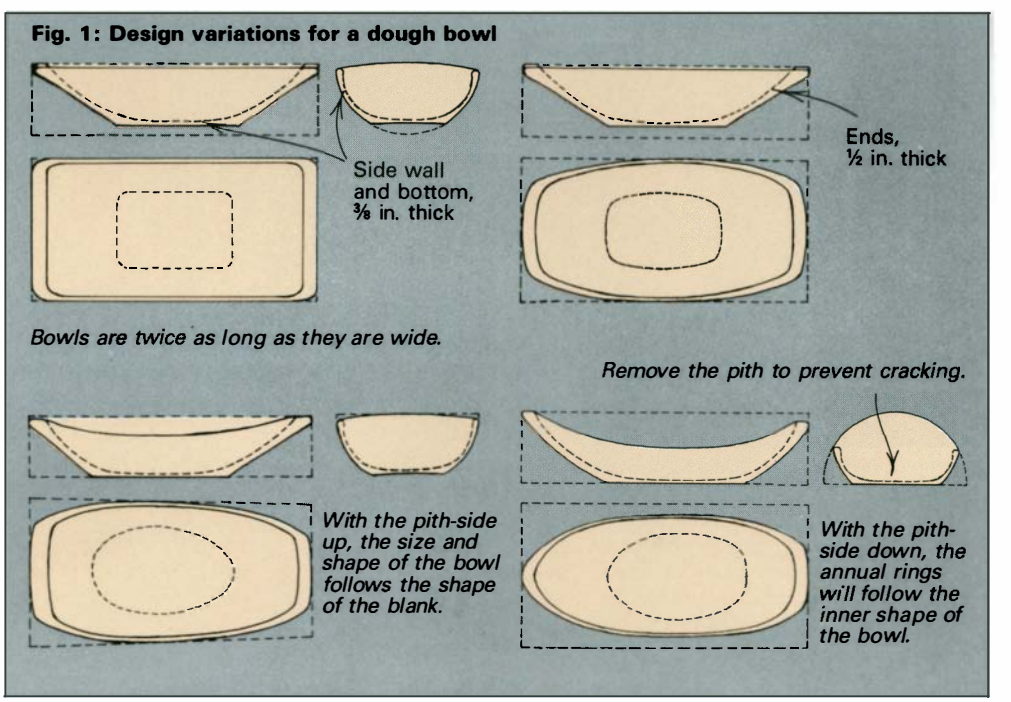
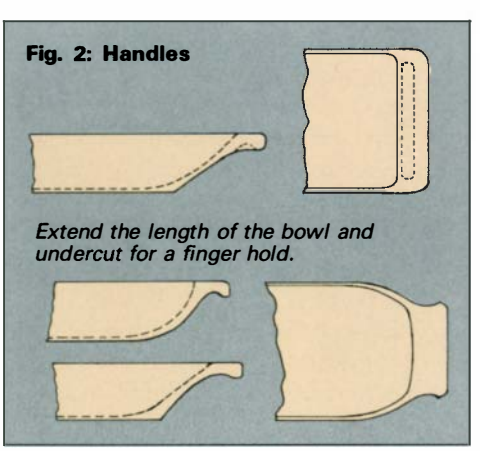


Fig. 2: Handles



Tool marks are still visible on this fruit-filled dough bowl, a traditional Swedish vessel that was carved with a hatchet, adze, gouges and knives from half of a fireplace-size log.

Drawings: Wille Sundqvist; photos: Rick Mastelli

Left: After initially shaping the outside, a hollowing adze excavates the blank that is held at an angle on a chopping block.

Above: Instead of a bowl-chopping block, a low bench fit with pegs and wedges allows the user to hollow the bowl taking longer strokes. Support is added by grasping the adze with both hands.

Right: Check the depth of your bowl periodically, using a straightedge and ruler. The bottom thickness should be finished to about ½ in.

Above: Control the gouge by supporting your hands against your body, the blank and the bench. Use two hands on the gouge: one pushing and one pressing the bevel down while restraining stroke travel. Right: When you can, wrap a finger or fingers around the edge of the blank for support.

and end of the stroke from this center, too. You can add support by grasping the adze hand itself, as shown in the top, right photo, or the wrist of that hand. But don't grip the adze handle above the adze hand, as this would inhibit the arc of the stroke. As when hewing, there is also a more powerful one-handed stroke, entering the wood high up and following through on an arc. Snapping your wrist releases the chip.

Work alternately from both ends to keep from cutting up the grain. You can hollow entirely with the adze, or you can remove the rough waste in the middle with an ax. First, use the adze to cut inward from either end, and then chop out the waste with the ax parallel to the sides of the bowl, working from either side toward the middle. As you deepen the hollow, slope the end-grain walls inward, but not too steeply or they will be weak. You can now use the adze to carve down one end and along the bottom to meet the adze strokes on the other end. Check the depth of your bowl with a straightedge and ruler, as shown in the center, right photo, so you don't cut too deeply. Once you are familiar with the hollowing adze, you'll discover its effectiveness for quickly hollowing a blank.

Shaping the inside—The hollowing adze has a deeply curved edge and it always leaves some chop marks, so a gouge is used to smooth the shape. There are two technical difficulties when working with gouges: powering the stroke and stopping it. A gouge can be tapped with a mallet, but this tends to leave a choppy surface. Powering by hand can yield longer, smoother strokes, as long as you can stop the gouge before it cuts against the grain. The bottom of the bowl curves into and then out of the grain. In addition, any wavy grain will change direction in a flat surface. The gouge must always cut with the grain or the wood will tear; so you must be able to stop the stroke precisely where grain direction changes.

You can control power with the gouge by locking your arms against your sides and/or the blank and pushing with your entire body, as shown in the bottom, left photo. You can also rest your

Above: After shaping the rim, taper the outside ends of the bowl, first chopping off the corners of the blank and then the remaining wood until the outside shape parallels the inside. Right: Fine-tune the width of the rim as you smooth the inside gouge marks with a wider, flatter gouge.

elbow against your hip to power the stroke. As when using an ax, if you are working at a standard-height bench, your stance should be wide and the stroke should be initiated from your legs. A low bench, on the other hand, permits you to kneel or sit, but your legs should still be spread wide and you should power the stroke with your upper body.

You should have two hands on the gouge: one pushing forward and the other pressing the bevel down as well as resisting too much travel in the stroke. Keep your hand positioned on the chest, with an arm on the knee, or a forearm or wrist on the blank so that power is controlled through the stroke. Along the sides of the bowl you can hook your thumb or fingers over the rim for guidance, as shown in the bottom, right photo on the facing page. You should take repeated cuts at a controlled depth, and stop at the same place each time.

Roughing the outside—If you are working with green wood, it is best to rough-hew the outside of the bowl as soon as you have hollowed the inside so that the blank will dry evenly and be less likely to crack. Even so, if you ever put the blank aside for a while, keep it from drying too rapidly by storing it in a plastic bag with some shavings. Shape the rim along the sides first, working from the middle toward each end. Hew as close as possible to the layout line. Next, chop the corners off the back of the blank, and then angle the ends as in the left photo above. With both ends tapered to an angle that corresponds to the end-grain walls on the inside of the bowl, begin shaping the outside to match the long-grain walls. Here you are trying to duplicate the inside shape of the bowl, and you must stop periodically to test the thickness with your thumb and fingers.

Smoothing the bowl—To smooth the outside surfaces roughed out by the ax, clamp the bowl upside down on a bench and work it with a drawknife or spokeshave, taking long strokes for a smooth, continuous cut. Position a block of wood inside to support the bowl above the bench's surface. You can finalize the shape of the bottom at this time.

Before smoothing the inside of the bowl, it's a good idea to refine the shape of the rim. You can use a block plane or knife to carve the perimeter. With the bowl held on the chopping block, use a block plane or spokeshave to smooth the surface of the rim. Now you can adjust the width of the rim as you smooth the inside of the bowl with a wider, flatter gouge, such as the one in the above photo at right. The gouge marks you leave can be the final surface of the bowl. Aim for long, smooth strokes that produce a pleasantly sculpted surface. Alternately, you can sand the bowl, but green wood must first be allowed to dry.

Green wood carves easily, but it's fibrous; so when you try to smooth it, it tends to fray. Drying it makes it hard and crisp and easier to cut. But you must take measures to keep the blank from drying too fast, which causes it to check and crack. I learned an excellent drying method at a workshop at the Sätergläntan School in 1974. The instructor, Birger Lindén, had carved a spoon from very green wood. It was evening. He rubbed its surface with a boiled potato and laid it on a warm radiator. The next morning the spoon was completely dry, without checks or cracks, and the potato residue didn't make further carving difficult. Be particularly careful to rub the potato into the end-grain areas, especially on the bowl's ends, both inside and out. If drying is not retarded, moisture will leave these areas too quickly and cause checks and cracks.

Finally, an old recipe for finishing cooking utensils is merely to boil them in milk for a couple of hours. The casein, which is sometimes used in water-resistant, water-base paint or glue, is absorbed into the wood, protecting and preserving it. Raw linseed oil (found in art-supply stores) or walnut oil (from health-food stores) are edible finishes and should be applied two or three times, with about a week between applications. These oils take a long time to cure, but the process can be hastened by heating the oil in a double boiler or by immersing the oil container in water that is already hot, and then keeping the oiled utensil warm until it dries. □

Wille Sundqvist teaches traditional Swedish woodworking and is a retired Provincial Handcrafts Consultant in Västerbotten, Sweden. He is teaching a carving class at Country Workshops, 90 Mill Creek Road, Marshall, N.C. 28753, this July. *This article has been adapted from* Swedish Carving Techniques, *©1990, published by The Taunton Press. Sculptor's adzes and knives are available from Kestral Tool, Route 1, Box 1762, Lopez, Wash. 98261; some Swedish original and American reproductions of these tools are also available from Country Workshops.*

Making a Walnut Occasional Table

A simple project from a single plank

by Richard Kapuaala

Cutting up a large, rough plank of wood is always exciting for me, but I can't help feeling a little anxiety. I worry whether the furniture I intend to build will enhance or detract from the wood's natural beauty. This was my dilemma when I set out to build an occasional table from a roughsawn, 4x13x96 walnut plank. It was hard to tell what the piece of wood was like beneath its exterior; but upon resawing, I saw the lovely color and grain pattern inside, and I adapted my design ideas to fit the character of the wood. The resulting table, shown here, has a single drawer with all-wood guides, a custom-made wooden pull, and a top large enough for a lamp, magazines or other accessories. Construction is based on joinery that you're probably familiar with: dovetails for the drawer, mortises and tenons for the legs and aprons, sliding dovetails for the aprons and bridle joints for the partitions. Even with the small details I've added to make the table more visually interesting, building it should take you about 30 hours. The drawing on the facing page and the bill of materials on p. 83 include the dimensions for all the parts. To help you get started, I'll tell you how I built my table.

The author's occasional table was designed to fit the character of the wood: a single plank of 16/4 walnut that he resawed for the book-matched top, matched pairs of legs and most of the other parts. The top has room for magazines, a lamp or other accessories. The table has a single drawer with all-wood guides and a custom-made wooden pull.

Sawing the parts—After a little handplaning, I knew my walnut planks were richly colored with deep crimsons and purple streaks. What I couldn't see until after I had resawn the planks was the wood's beautiful flame-figured grain pattern, with dark, wing-shape intrusions at the edges. When I set the pieces side by side and in mirror symmetry, I knew the figure would look best if the tabletop was book-matched. Since the table's legs required the thickest material, I cut them out before resawing the plank to ¾-in.-thick stock for the other parts. Because the plank was more than twice the thickness needed for the 1⅝-in.-square legs, I cut them out in pairs, so they would match and the grain would be symmetrical. It's a good idea to match the legs of any piece to minimize problems in case there is any moisture-related twisting or bowing: The opposing pairs of legs will warp symmetrically. If you can't saw matching legs from the same piece of stock, choose stock with straight grain for less chance of warping.

After crosscutting the plank into more manageable, shorter lengths with my radial-arm saw, I jointed the bark-side edge to remove sapwood from the walnut, and then I ripped the sections to rough widths. Using a standard bandsaw fence and a ¾-in.-wide blade, I resawed the sections of the plank to about ⅞ in. thick (except for the legs). This left enough stock to thickness-plane the sections to ¾ in. or thinner, as required for the parts. Before final thicknessing, sticker the resawn stock and let it stabilize at shop temperature and humidity for a few days. This way, you can take out slight warping with the jointer or planer and set aside any stock that warps more severely. Finally, I use the tablesaw and radial-arm saw to cut all the parts to width and length, following the bill of materials. If some of the parts on the bill appear to be oversize, the extra stock is either for joinery or it will be trimmed away later.

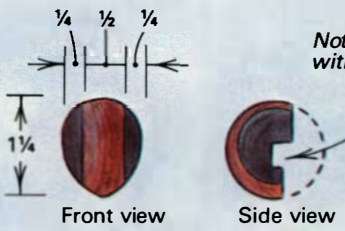
Cutting the joints—First cut the 5-in.-wide by 1-in.-long tenons on the ends of the front and back aprons that will join the legs. There are many good machine or hand techniques for cutting tenons, but I prefer to use my tablesaw and a shopmade tenoning jig, which holds the stock upright during the cut. My procedure is similar to the one described in *FWW* #66, p. 70. Next, I cut the sliding dovetails on the ends of the side aprons, again using my tablesaw and the tenoning jig. As with tenons, the jig holds the workpiece vertically, but the blade is tilted 12° to cut the male dovetail (see the left photo on the next page). I prefer this method to using a router and a dovetail bit because it allows me to change the angle of the dovetail if I desire.

Next I cut the female dovetail slots into the front and back aprons. A regular miter gauge fitted with a special wooden fence is

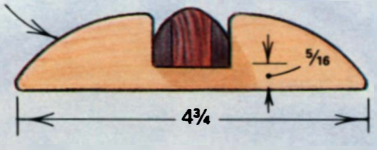
Occasional table

Knob detail

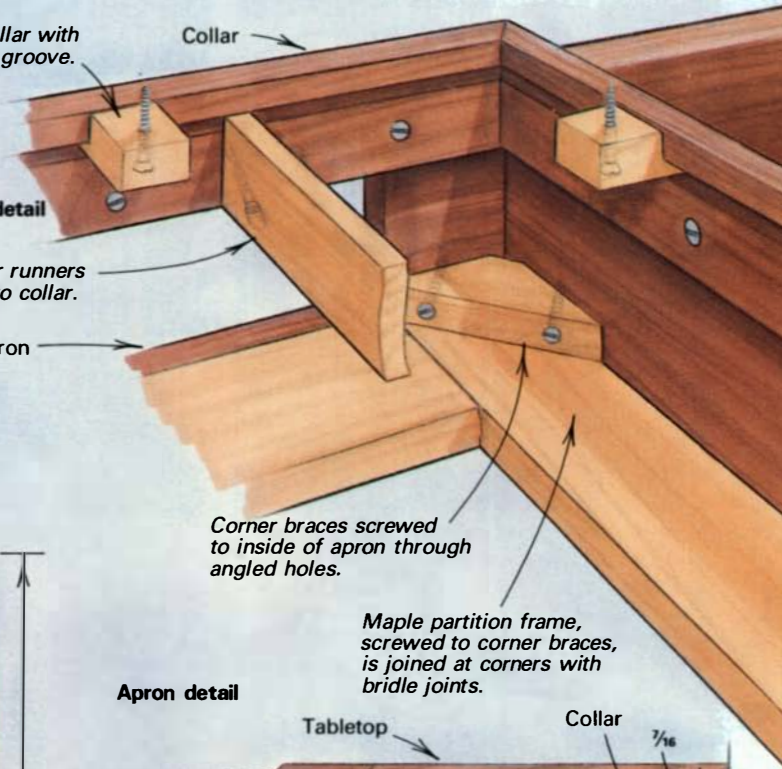
Ebony (sides) and cocobollo knob



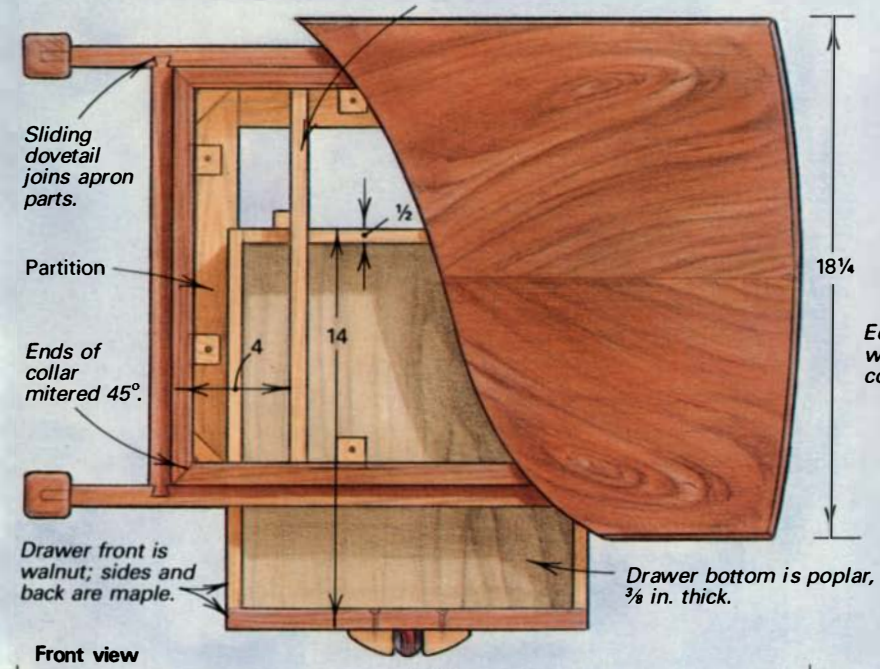
Maple wing, ⅜ in. thick



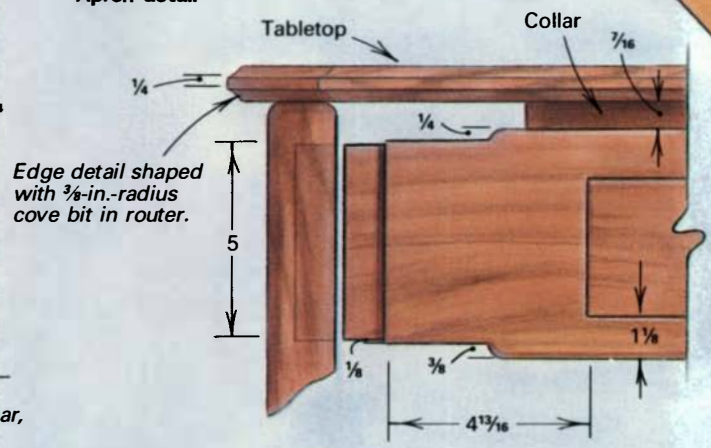
Construction detail



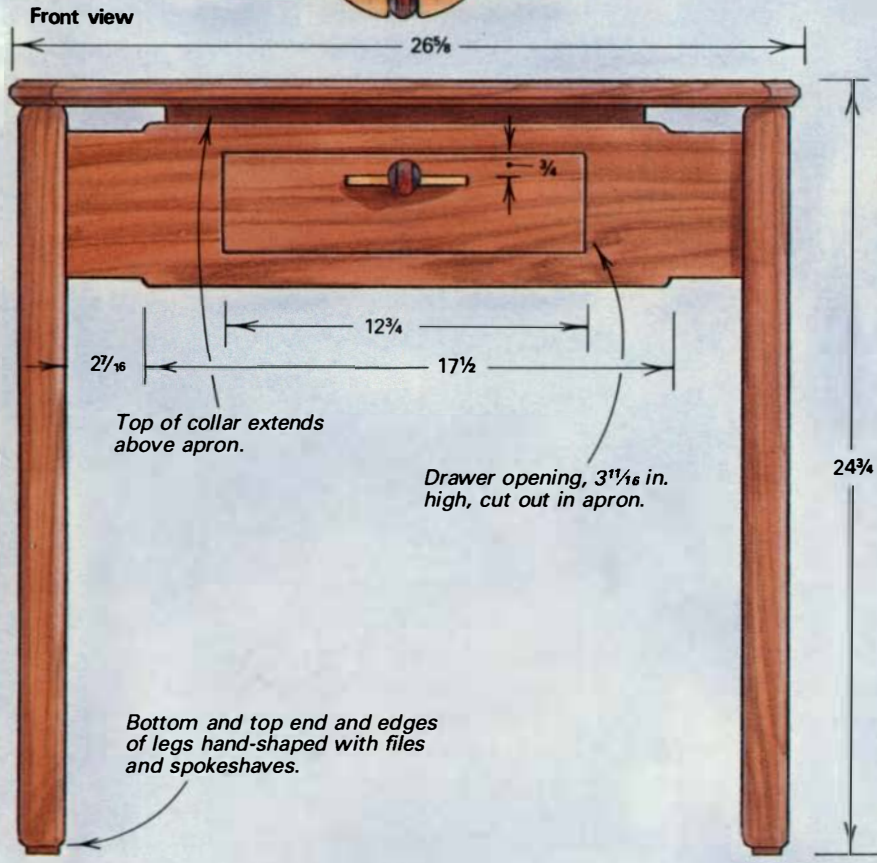
Top view



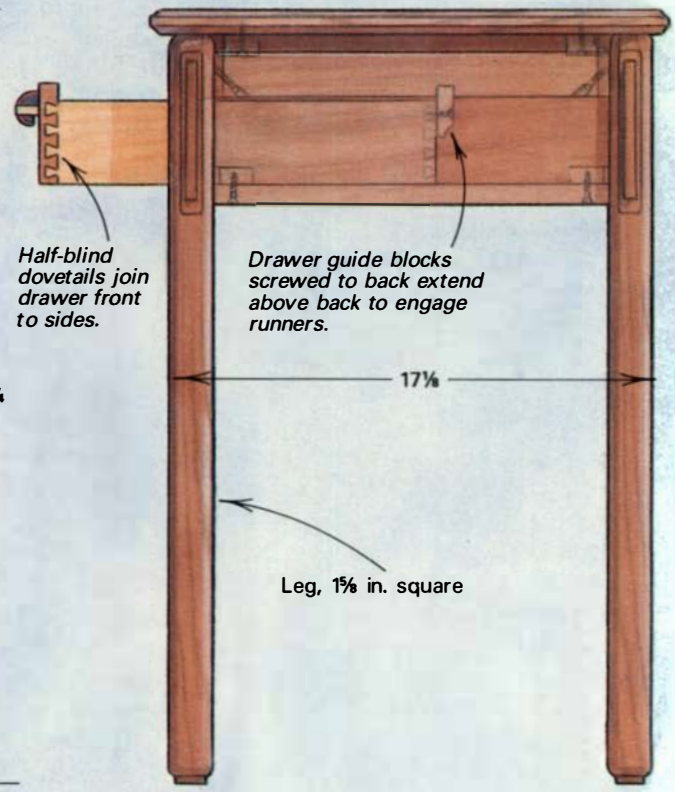
Apron detail



Front view



Side view



Drawing: Bob La Pointe

Left: To cut the male dovetails on the ends of the side aprons, Kapuaala uses his tablesaw and homemade tenon jig, which supports the workpiece vertically as it is guided past the tilted blade. Center: After crosscutting the female sliding dovetails in the front and rear aprons with a miter gauge on the tablesaw, Kapuaala pares the bottom of each flat with a chisel. Right: To cut out the drawer opening in the front apron, the author uses a plunge router fitted with a guide bushing that follows a rectangular hole cut into a particleboard template. With the template clamped on top of the apron, he plunges the bit and follows around the template clockwise, cleaning up the corners of the opening with a chisel after routing.

used to push the stock through, again with the blade tilted 12°. The fence I made is as long as my saw table and has a wooden runner that fits in the slot on the right side of the blade. I cut one side of the dovetail, rotate the piece around and then cut the other side, repositioning the stop between cuts. After cutting both sides of each female dovetail, I remove the waste in the center by crosscutting with the blade squared and lowered; then I pare the bottom flat with a chisel (see the center photo). Now trial-fit the apron pieces, and if necessary, trim the male dovetail until the joints slide smoothly, yet fit snugly together.

With the joints done, it's time to trim the aprons to their final width. I joint both edges *after* cutting the dovetails so that all traces of tearout disappear. You may decide that you don't need to do this, but if your joints aren't perfect, it helps keep the apron looking good.

Shaping the aprons—To lend a decorative element to this occasional table, the corners of the front and back aprons are cut back and rounded. I bandsaw four 2 7/16-in.-long pieces from each apron, as shown in the drawing. I first make the rip cut using the fence on the bandsaw as a guide. Don't go too far or you'll cut into the sliding dovetails. Then, crosscut with the bandsaw's miter gauge to remove each corner strip, and use a rasp or file to round over the corners on the new stepped areas. Next, I chuck a ¼-in.-radius roundover bit into the router table to shape the entire edge on the outside faces of the front, back and side aprons, stopping short of the tenons.

Now comes a potentially tricky step: cutting out the drawer opening in the front apron. I use a ½-in.-dia. straight bit in a plunge router with a guide bushing fitted in its base. The bushing follows a rectangular hole cut into a Masonite or particleboard template. I waste the cut-out piece because it's too tedious a job to saw it out with a thin-kerf sawblade and save. I substitute a piece with similar grain for the drawer front. With the template clamped on top of the apron, I plunge the bit down about ¼ in. and then follow around the template clockwise (see the photo at right). I repeat this till the bit cuts all the way through. I clean up the rounded corners of the opening with a chisel, but before routing, you could cut these corners square with a hollow-chisel mortiser if you have one. Routing sometimes tears up the wood, so it's wise to make an extra apron front, just in case. Finally, glue up the aprons without the legs.

To complete the apron assembly, I make and attach the collar: a thin frame that fits around the apron assembly's top inside edge and sticks up 7/16 in. above the apron assembly. A ¼-in.-wide by ⅜-in.-deep groove around the inside of the collar, cut with a dado blade on the tablesaw, provides a means for attaching the top with small cabinetmaker's buttons, as described further on. The ends of the collar are mitered, and the four pieces are screwed to the apron through countersunk holes. Take care not to drill a hole where the drawer runners will be attached later (see the drawing). I use a marking gauge to scribe orientation lines on the inside of the apron to help align the collar as it is screwed into place.

Making the drawer—Having routed the opening earlier, handplane the piece for the drawer front until it fits snugly. Now you're ready to make the drawer. I won't go into detail on drawer construction since it's covered in other texts (see *FWW* #73, p. 48). I prefer to make all my drawers with hardwood rather than softwood because I think it lasts longer and looks better. For my occasional table, I made the drawer sides and back from maple, which contrasts nicely with the walnut. The drawer bottom is ⅜-in.-thick poplar, but a ¼-in.-thick plywood bottom works also. The dovetails on my drawer aren't sized in any fixed way: I lay them out so they look pleasing. With a sliding T-bevel, I mark the angle of the half-blind dovetails at the front of the drawer and the through dovetails at the back. To keep the drawer from rubbing on the sides of the opening, make the front of the drawer slightly wider than the back. Cut the pins on the drawer back slightly deeper, between 1/64 in. and 1/32 in., and then handplane them flush with the sides after assembly.

The drawer-guide system I use is a bit unusual, but it is relatively easy to install, is adjustable and keeps the drawer running smoothly. This system consists of two hardwood runners screwed to the apron's collar that keep the drawer aligned via two small guide blocks screwed to the back end of the drawer. For strength and wear resistance, I make the runners out of ½-in.-thick maple. The runners are attached with screws in countersunk holes drilled at an angle through both ends. Be sure to countersink the holes deep enough to keep the screw head from sticking out and interfering with drawer operation. Before screwing the runners in place, check that they are flush with and at perfect right angles to the bottom edge of the collar and are parallel to each other and the apron sides.

Next, turn the apron assembly upside down so that it rests on the collar and insert the drawer so that it rests on the drawer runners. Drill oversize pilot holes in the guide blocks (made from

maple scraps) so you can shift them around to adjust the drawer tracking in the future. With the drawer front flush with its opening in the apron, position each guide block to lightly contact the outside edge of each runner, and screw both to the back of the drawer with round-head screws and washers.

Before flipping the apron assembly over, I make the table's partition and the four corner braces it will be screwed to. In addition to keeping the apron from racking, the partition supports the drawer, like a dust-panel frame in a dresser, and provides a surface for the drawer to slide on. The ¾-in.-thick partition frame is joined at the corners with bridle joints. These joints are cut on the tablesaw in much the same way that the apron tenons were earlier.

The corner braces, made from maple scraps with 45° cuts on each end, are screwed to the inside corners of the apron through angled holes (see the drawing on p. 81). Before securing the braces, I scribe a line around the inside of the apron to mark where the top edge of the partition will be when installed. This way, when the table is upright, the top of the partition is flush with the bottom edge of the drawer opening. Since the partition screws to the braces, this line also determines where the bottom edge of each brace will be. When everything jibes, I screw on the braces, but I leave the partition off until the top has been attached.

Gluing up the tabletop—If you haven't already glued up your tabletop, do so now. I used blind splines to join the two 9⅛-in.-wide book-matched walnut boards, but you may prefer biscuit joints or just glue. In any case, after the glue is dry and the excess is scraped off, I lay out the top's curved outline with the spline-and-weight method described in *FWW* #71, p. 45. However, I didn't have real architect's weights; so I used regular C-clamps to hold the spline I made from a ⅛-in. maple strip, and then I bandsawed the top. The table's edge detail consists of two small cove cuts, one on the top of the edge and one on the bottom. I would have preferred to use a ⅜-in. ball-bearing-piloted cove bit in the router to shape the detail, but since I didn't have one, I used the cove portion of my Roman ogee bit.

Small cabinetmaker's buttons are screwed to the underside of the top and attach it to the table; a small tongue cut on one end of each cabinetmaker's button engages the groove around the inside of the collar. The buttons allow the top to float: an important feature since wood can get very cranky if it's denied freedom to expand and contract. I space the six cleats around the collar; you might want to use more than six, but don't use fewer or the top will move whenever you touch it. When you set the cabinetmaker's buttons, make sure the tongues don't bottom out in the grooves, as that would restrict the top from moving and defeat the purpose of the cleats. Once the top is attached, screw the partition to the braces. Now, flip the apron/top assembly over and make sure the drawer slides smoothly. Adjust the guide blocks if they rub too hard against the runners and wax them if necessary.

Shaping and mortising the legs—With the top on and the drawer in place, it's time to attach the legs to the occasional table. Taking the blanks that were cut out earlier, hold the top end of each leg against the bottom of the tabletop with one edge butted to the apron tenon it will join. Now, with a marking knife, scribe lines at the top and bottom of the tenon to show where the mortise will begin and end. Repeat with all the legs, and then lay out the width of the mortises, centering them 11/16 in. from the outer face of each leg. To chop the mortises, I used the mortising table attachment on my combination jointer/planer. However, a router with a straight bit and a good mortising jig, like the one described in *FWW* #80, p. 46, will also work. If you chop the mortises by hand, you may wish to leave a "horn" at the top of each leg to prevent the short endgrain at the top of the mortise from splitting out (it gets cut off after mortising).

I wanted the tops and bottoms of the legs to be slightly rounded, and so instead of shaping those profiles on the router table or shaper, I used a combination of files, planes and spokeshaves. First, I ease the edges with a small block plane, and then use the files and spokeshaves to create the soft contours on the edges and ends. Finally, I finish-sand the legs before gluing them to the apron, since it's a real pain to try to sand after glue-up.

Making the drawer pull—Since I built my occasional table from an original design, I wasn't about to settle for a store-bought pull for the drawer. For this design, I came up with the pull shown in the drawing because it seemed to fit the mood of the piece. The design has a central knob glued up from small pieces of ebony and cocobolo, with a horizontal maple "wing" intersecting the knob.

To make the knob for the drawer pull, I cut out three round blanks using a 1⅜-in.-dia. hole saw in the drill press. This yields three 1¼-in.-dia. discs that I laminate together: two ¼-in.-thick ebony with one ½-in.-thick cocobolo in between. After the glue dries, I clamp the knob in the vise on my workbench and cut out the notch for the wing, proportioned as shown in the drawing. I used my Japanese dovetail saw for the cuts, but any thin-blade, sharp handsaw will do. I then shape the knob to its soft contour on a stationary belt sander, holding the knob in a pair of channel locks with padded jaws so I don't sand my fingertips.

The pull's maple wings are marked out with a compass and then cut out on the scroll saw. I set my pencil compass to a 3⅞-in. radius, and then sketch an arc on the ⅜-in.-thick maple stock. After sawing the arc, I cut out the notch to fit the knob with a standard dovetail saw. Next, dry fit the pieces and trim the notches to fit. Gradually use finer and finer grades of sandpaper to polish the pull. Finally, glue the knob and wing together, drill two 1/16-in.-dia. holes on the back of the wings, and screw the pull to the drawer front.

By now your occasional table should be ready for a good finish. I used several coats of tung oil, with a final coat of beeswax after the tung oil had dried. All the work I put into my table seemed worthwhile the first time I saw the midday sun hit it, sending shimmering ripples of light across the walnut top. □

Richard Kapuaala is a professional woodworker in Salinas, Cal.

Bill of Materials

No.	Description	Dimensions (T × W × L)
4	Legs	1⅝ × 1⅝ × 24
1	Top	¾ × 18¼ × 26⅝†
2	Aprons (front and back)	¾ × 5¾ × 24⅜*
2	Aprons (sides)	¾ × 5¾ × 15½**
2	Collars (front and back)	¾ × 1 13/16 × 16††
2	Collars (sides)	¾ × 1 13/16 × 14¾††
1	Drawer front	⅝ × 3¾ × 12¾†
2	Drawer sides	½ × 3 5/16 × 14†
1	Drawer back	½ × 3 5/16 × 12¾†
1	Drawer bottom	⅜ × 16 × 12¾†
2	Drawer runners	½ × 1 7/16 × 13⅜†
2	Drawer guide blocks	½ × ¾ × 2
2	Partition frames (front and back)	¾ × 2 × 16##
2	Partition frames (sides)	¾ × 2⅛ × 14¾
4	Corner braces	¾ × 2¼ × 2††
6	Cabinetmaker's buttons	¾ × 1½ × 2

* Includes 1-in.-long tenons on both ends.
** Includes ⅜-in.-long sliding dovetails on both ends.
† Trim to final size.
†† 45° miter on both ends.
\# Includes ¼-in.-thick tongue on one long edge.
\## Includes bridle joints on both ends.

John Wittenburg takes a break from fitting mortises and tenons for a koa bedstead. Like many of Hawaii's earliest furnituremakers, Wittenburg immigrated from Germany as a journeyman cabinetmaker and adapted his training to the styles and materials of Hawaii.

Furnituremaking in Hawaii

Where East meets West and koa is king

by Jim Boesel

Historically, Hawaiian furniture is a blend of two traditions: the Western, characterized by the simple furniture brought, commissioned and built by early New England missionaries, and the Eastern, which came with the influx of Chinese and Japanese immigrants in the late 1800s. But the one unifying element in Hawaiian furniture that transcends East and West, as well as past and present, is the use of koa as the primary furniture wood.

Acacia koa, a large evergreen hardwood, is unique to the Hawaiian Islands. It boasts perhaps the widest variation of color and figure of any hardwood: from light, almost blonde, straight-grain construction-grade timber to the dark-reddish brown, cabinet grade that often displays outrageously iridescent fiddleback or quilted figuring. In Hawaii, the appreciation of koa, among residents and tourists alike, is so universal that it can be difficult for furnituremakers to sell anything not made from koa. But, as several Hawaii-based furnituremakers pointed out, "If you have to be stuck with a single wood to work, this is the one to be stuck with."

My exposure to Hawaiian woodworking began with the book, *Hawaiian Furniture and Hawaii's Cabinetmakers 1820-1940,* by Irving Jenkins (see the sidebar on p. 87). Although this book is historical, tracing the development of furnituremaking in Hawaii from its beginning in 1820 until 1940, it turned out to be a very appropriate place to begin my exploration of present-day furnituremaking in Hawaii. When I began visiting shops in Hawaii, I found it

recently came over from Boston, Mass., was finding work in his area of expertise, art nouveau carving. And John Gonczar of Waipahu, Oahu, broke with tradition by building a non-mission-style rocking chair with gracefully turned spindles and a high, flaring backrest.

By far the most contemporary designer-oriented furniture I saw was from the partnership of Stephen Meder and Steven Hill. Meder and Hill met in the 1970s at the Rochester Institute of Technology in Rochester, N.Y., where they were both enrolled in the furniture-design program. They came to Honolulu together in 1979, and after working for a short time at Martin and MacArthur, a commercial shop specializing in traditional koa furniture, they went into business together. In addition to building custom furniture, they hoped to get several designs into production, either in their own shop or with other manufacturers. Although this dream was never fully realized, they did produce a good deal of high-end commercial and residential furniture over the next five years. The office suite in the top photo at right on the facing page is a good example of their sense of design, range of techniques and attention to detail. However, they have recently closed up shop and turned their attention totally to designing.

In spite of the more cosmopolitan atmosphere on Oahu, some of the nicest work I saw there was firmly rooted in an earlier wave of cross-fertilization: the oriental influences that became a significant factor in Hawaiian furniture around 1880, when both Chinese and Japanese immigrants came in large numbers to work on the sugar cane plantations.

Alan Wilkinson came to Hawaii from Glendale, Cal., in 1962 because of the surfing. One of his first big breaks was signing on as an adviser and extra for the mid-'60s film, *Ride the Wild Surf*; at $175 a day, it was a lucrative couple of weeks. After his short-lived film career, he worked in a shipyard repairing wooden boats and at the same time began dealing in antiques, both of which led to his interest in building furniture. In 1975, Wilkinson and his wife opened The Artists' Guild, a gallery specializing in local handicrafts and featuring Alan's furniture. Now he works by himself in a 2,400-sq.-ft. shop in a small industrial complex in the village of Wahiawa, about 25 miles outside of Honolulu. His gallery experience taught him the importance of presentation, and he now makes 70% of his sales out of a showroom built into a portion of his shop. He keeps the showroom stocked by building an extra piece along with many of his commissioned pieces, often using different woods and varying details.

The koa chest of drawers in the bottom photo at right on the facing page was inspired by traditional Japanese tansu, usually built as a kind of hope chest for brides-to-be. Like the tansu made by Japanese craftsmen in Hawaii in the early 1900s, Wilkinson used the highly figured koa to best advantage by resawing his own thick veneer and laminating it to much plainer, vertical-grain koa drawer fronts. However, by adding short legs with rosewood pad feet to the base and Chinese-style bird's-tail extensions to the top, Wilkinson has subtly altered the typically rectangular tansu form. That Wilkinson names the Craftsman-style architects Greene and Greene as a major influence is not surprising. Their designs often combined oriental details with the simple, mission style—exactly the same influences found in Hawaiian furniture. The maple chair in the bottom, left photo on the facing page has some Greene and Greene-type details, especially on the front legs; but again, Wilkinson adds his own touch with the shaped koa seat and curved back legs.

Robb Young is another Oahu furnituremaker whose work shows an oriental influence. Robb and his wife, Tish, run a custom-furniture shop out of the back of Winkler Wood Products, a lumber company in Honolulu that cuts, dries and surfaces koa from its Big Island-based mill. The couple moved to Hawaii from Los Angeles in 1971 to attend college. After receiving an undergraduate degree

Photo: Jim Kastner

Robb Young borrowed the basic design and proportions for his koa sideboard from a 19th-century museum piece. Then he commissioned John Nippolt to carve plumeria-leaf pulls and mango-branch relief carvings alongside the mirror, creating a piece that's even more Hawaiian in spirit than the original.

in premed, Robb worked as a technologist in a hospital, but by 1980 he was having trouble finding time for both work and their fledgling craft business. So he quit his job and went into woodworking full time. With Tish handling most of the production items, such as jewelry boxes and hand mirrors, Robb concentrated on furniture. They worked craft fairs for several years, supporting themselves with sales of the production pieces and building up interest in their furniture by showing their portfolio. Eventually, they dropped the production pieces, left the craft-fair circuit and began building custom furniture full time. Now, they're backlogged nearly a year with commercial and residential furniture commissions. Robb does very little work on speculation. Instead, he generally designs around the clients' wishes, and he rarely turns away a job no matter how big or small. Through the years he's been hired several times to build props for the *Magnum P.I.* television program, as well as furnishing the personal office of its star, Tom Selleck.

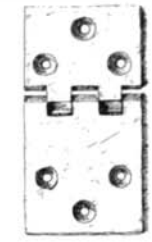
Although Young doesn't identify himself with any particular style of furniture, various oriental elements often show up in his work. He has modified the typical Chinese bowed leg with inward-turning "horse-hoof" foot, common on low tables, by reducing its usual bulky profile so it can be bandsawn from standard ¾ lumber. However, Young credits the personal taste of his clients for many of the oriental influences in his furniture. For example, the basic design of the koa sideboard in the photo above is taken from a piece pictured in Jenkins' book that was made by a transplanted European. But the carved handles and the relief carvings around the mirror and handles, done by John Nippolt of Honolulu, were added at the client's request and give the piece a look more reminiscent of highly decorated Chinese furniture.

Hawaii's furnituremakers find themselves in a unique situation. While the present market for furniture is good, it is very restrictive; the greatest demand is for regionally traditional furniture from locally grown woods. I found that most of the furnituremakers are finding ways to work within the regional tradition, while at the same time contributing to its evolution. In a way I envied them. To be part of a tradition in these days is a rare blessing. □

Jim Boesel is an Associate Editor at FWW.

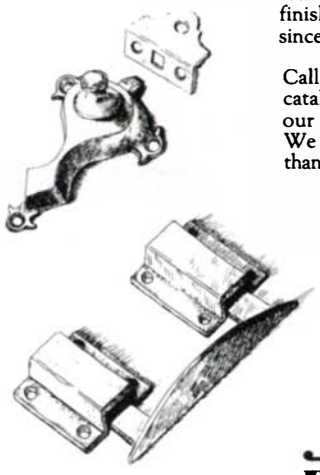
UNDERSTANDING ORIGINAL HARDWARE

UNDER THE TABLE HARDWARE . . .



Seldom seen, usually never polished, often taken for granted, — catches for tilt top's, hinges for drop leaves and holding clips for sectional dining tables all contribute to the function of the finished piece.
Square, round, lion paw, or cup casters of all sizes, using brass, china, wood, cast iron, leather, or no wheels finished thousands of legs since 1700.

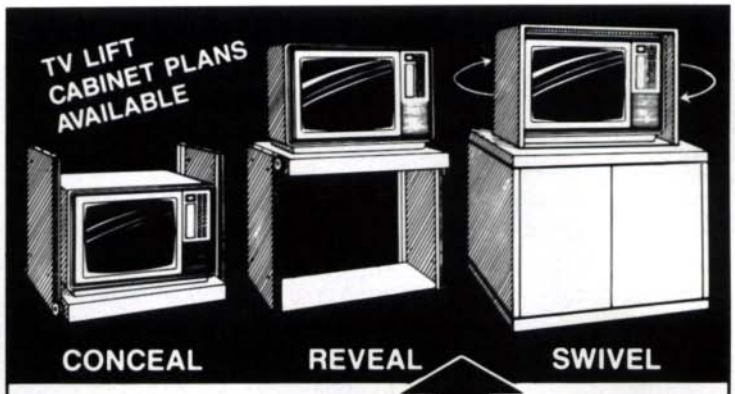
Call or write for free mini-catalog, or send $5.00 for our full 108 page catalog. We now reproduce more than 100 items like these.



BALL and BALL
Finest Quality Reproductions

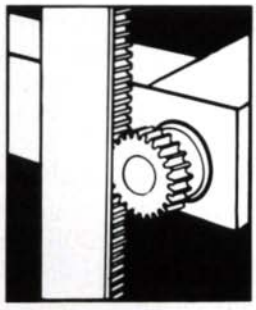
463 W. Lincoln Hwy • Exton, PA 19341 • (215) 363-7330

READER SERVICE NO. 47



AUTON® POP UPS

YOU BUILD THE FURNITURE—WE'LL PROVIDE THE AUTOMATION



Smooth and quiet rack and pinion drive.

Radio Remote Controlled
Auton revolutionary design utilizes a power motor encased in a 3" high lifting platform. It glides smoothly and quietly on four rack and pinions which totally eliminates wobble (makes the "old-style" scissor lift obsolete). Radio remote control (not infrared) has a range in excess of 100 feet.

Motorized Swivel
An exciting option is our exclusive motorized swivel which allows the unit to turn 360° by remote control.

Wide range of sizes
Custom systems available to 20 feet wide, 8 feet high and capacities to 2000 pounds.

Free Brochure Write for our brochure or call us today. Send $10 for T.V. Lift cabinet plans—will apply toward purchase.

AUTON COMPANY Box 1129 • Sun Valley, CA 91353-1129 • (213) 659-9533
Telex 362238/FAX (818) 362-9215/W.U. EASYLINK 62004443
Beverly Hills (213) 659-1718 • Honolulu (808) 734-1260.
Worldwide service to the design community since 1955.
Auton does not make furniture. U.S. & Foreign Pat Pend. MADE IN U.S.A.

READER SERVICE NO. 44

TRANSPOWER HEAVY DUTY, HIGH QUALITY & FULL WARRANTY
Don't have to cost a fortune!

For express catalogue call
(714) 594-9018

VISA MasterCard

SHAPER / ROUTER MACHINE
Extra Large Table
Only $698

1", ¾" & ½" spindles, ¼" & ½" router bit chucks. 3 HP moter, 25" x 22" milled table, T-slot mitergauge, 8000 / 11000 reversible 2 speeds, 3" spindle travel. independent precision fence, 6" insert opening, side & top spring hold-downs.

WIDE BELT SANDER

3600HD 24" x 7"
10 HP Motor $6150
4800HD 36" x 7"
15 HP Motor $8995

AUTO PLANER

AP150 12", 2 HP $339
AP650 15", 2 HP $695
AP200A 20, 3 HP $1245
AP400 24", 7½ HP $2590

BAND SAW

SB500 14", ¾ HP $285
SB600 16", 1½ HP $495
SB800 18", 2 HP $625
SB800 20", 3 HP $1340

TABLE SAW

TS200A 10", 2 HP $795
TS200HD 10", 3 HP $895
TS300HD 12", 3 HP $1495
MS250 10", 1½ HP $365

AUTO FEEDER

RF150 ¼ HP, 3 rollers, 10" travel $385
RF250 1 HP, 3 rollers 20" travel $595

EDGE SANDER

SP860 Tilting spindle sharper $1150
HP600 3HP sharper $825
DH150 1½ HP sharper $398

JOINTER

SD800 6" x 90" belt, 2 HP w/stand $435
SD1200 6" x 132" belt, 2 HP w/stand $990

JT650 6", 1HP $325
JT860 8", 1½ HP $685
JT980 8", 2 HP $745
JT1200 12", 3HP $1695

DUST COLLECTOR

747 1 HP, 2 bags $165
2000 2 HP, 2 bags $295
3000 3 HP, 2 bags $375
4000 3 HP, 4 bags $475

AIR DRUM SANDER
Sale $285

1 HP motor, 1725 RPM
4" x 9" sanding brush,
4" x 9" air drum, 1" shaft.

WOOD LATHE
Sale $595

17" swing, 36" travel. ¾ HP motor, 6 speeds, cabinet stand, sanding attachment.

TRANSPOWER **TCM Industries, Inc.** 322 Paseo Sonrisa, Walnut, CA 91789
Send $1.00 or stamps for catalogue. ($5 refund with first purchase)

READER SERVICE NO. 154

MLCS Ltd.

CONTROL THE SPEED OF YOUR ROUTER - ROUT AT THE SPEED THAT GIVES THE BEST RESULTS WITH THE WOOD AND BIT YOU ARE USING!

NOW ONLY **$39.95** Order Item #200

FEATURES:

- **Speed Adjustable from Full Speed to 0 RPM**
- **Full Horsepower and Torque at All Speeds**
- **Go Back and Forth from Any Pre-Set Speed to Full Speed at the Flip of a Switch**
- **Works with All Routers 3 HP or Less**
- **120V 15 Amp**
- **Gives Your Router a Feature Only Available on Routers Costing Hundreds of Dollars!**
- *Less Tear Out*
- *Stops Burning*
- *Feed at Comfortable Rate*
- *Better, Safer Results with Large Diameter Bits*
- *Less Wear on Bits*
- *Less Noise and Softer Starts at Lower Speeds*

EASY TO USE - Simply plug in Speed Control and plug your router into the Speed Control - turn dial for best results. (Speed Control has a clip that can be worn on your belt or hung on wall or left loose.)

- Reduces speed electronically without reducing torque; electronic feed-back maintains speed by increasing voltage to motor as load increases.

CARBIDE TIPPED ROUTER BITS PROFESSIONAL PRODUCTION QUALITY *GUARANTEED*

WHEN ORDERING ANY THREE OR MORE DEDUCT $1.00 EACH. ALL PRICES ARE POSTAGE PAID

ITEM NO.	BEST CUT BEST PRICE	DESCRIPTION	ANGLE/DEPTH/RADIUS CIRCLE DIAMETER	LARGE DIA.	CUTTING LENGTH	SHANK SIZE	PRICE
#385		**25 degree**	25 degree	1 5/16"	1/2"	1/4"	$25.00
#686		**Raised Panel**	25 degree	3 1/4"	1"	1/2"	$45.00
#231		5/32" **Roman Ogee**	5/32" R	1 1/4"	15/32"	1/4"	$17.00
#232		1/4" Roman Ogee	1/4" R	1 1/2"	3/4"	1/4"	$18.00
#661		1/4" Roman Ogee	1/4" R	1 1/2"	3/4"	1/2"	$21.00
#340		1/8" **Cove**	1/8" R	5/8"	1/2"	1/4"	$12.00
#341		1/4" Cove	1/4" R	1"	1/2"	1/4"	$13.00
#342		3/8" Cove	3/8" R	1 1/4"	9/16"	1/4"	$14.00
#343		1/2" Cove	1/2" R	1 1/2"	5/8"	1/4"	$15.00
#644		3/4" Cove	3/4" R	1 7/8"	3/4"	1/2"	$28.00
#350		1/8" **Round Over**	1/8" R	3/4"	1/2"	1/4"	$11.00
#351		3/16" Round Over	3/16" R	7/8"	1/2"	1/4"	$11.00
#230		1/4" Round Over	1/4" R	1"	1/2"	1/4"	$12.00
#354		3/8" Round Over	3/8" R	1 1/4"	5/8"	1/4"	$15.50
#355		1/2" Round Over	1/2" R	1 1/2"	3/4"	1/4"	$17.00
#656		3/4" Round Over	3/4" R	2"	7/8"	1/2"	$21.00
#657		1" Round Over	1" R	2 1/2"	1"	1/2"	$33.00
#460		1/4" **Bull Nose**	1/4" Dia. of Circle		1/2"	1/4"	$14.00
#461		3/8" Bull Nose	3/8" Dia. of Circle		5/8"	1/4"	$15.00
#462		1/2" Bull Nose	1/2" Dia. of Circle		3/4"	1/4"	$16.00
#463		5/8" Bull Nose	5/8" Dia. of Circle		7/8"	1/4"	$19.00
#464		3/4" Bull Nose	3/4" Dia. of Circle		1"	1/4"	$21.00
#403		3/8" **Dovetail**	9 degree	3/8"	3/8"	1/4"	$ 7.50
#405		1/2" Dovetail	14 degree	1/2"	1/2"	1/4"	$ 8.50
#409		3/4" Dovetail	14 degree	3/4"	7/8"	1/4"	$10.50
#709		3/4" Dovetail	14 degree	3/4"	7/8"	1/2"	$10.50
#402		3/8" Dovetail	8 degree For	3/8"	1/2"	1/4"	$12.00
#404		1/2" Dovetail	8 degree Leigh	1/2"	13/16"	1/4"	$12.00
#708		1 1/16" Dovetail	8 degree Jigs	1 1/16"	1"	1/2"	$14.00

ITEM NO.	BEST CUT BEST PRICE	DESCRIPTION	ANGLE/DEPTH/RADIUS CIRCLE DIAMETER	LARGE DIA.	CUTTING LENGTH	SHANK SIZE	PRICE
#370		3/8" **Rabbeting**	3/8" Deep	1 1/4"	1/2"	1/4"	$14.00
#670		3/8" Rabbeting	3/8" Deep	1 1/4"	1/2"	1/2"	$14.00
#366		1/8" **Slot Cutter**	3/8" Deep	1 1/4"	1/8"	1/4"	$14.00
#368		1/4" Slot Cutter	3/8" Deep	1 1/4"	1/4"	1/4"	$14.00
#415		1/4" **Core Box**	round nose	1/4"	1/4"	1/4"	$10.00
#416		3/8" Core Box	round nose	3/8"	3/8"	1/4"	$11.00
#417		1/2" Core Box	round nose	1/2"	11/32"	1/4"	$14.00
#418		3/4" Core Box	round nose	3/4"	5/8"	1/4"	$15.00
#719		1" Core Box	round nose	1"	3/4"	1/2"	$18.00
#470		1/4" **Straight**	plunge cutting	1/4"	3/4"	1/4"	$ 7.00
#471		5/16" Straight	plunge cutting	5/16"	1"	1/4"	$ 7.00
#472		3/8" Straight	plunge cutting	3/8"	1"	1/4"	$ 7.00
#474		1/2" Straight	plunge cutting	1/2"	1"	1/4"	$ 7.00
#775		1/2" Straight	plunge cutting	1/2"	2"	1/2"	$14.00
#476		9/16" Straight	plunge cutting	9/16"	1"	1/4"	$ 7.00
#478		5/8" Straight	plunge cutting	5/8"	1"	1/4"	$ 8.00
#479		3/4" Straight	plunge cutting	3/4"	1"	1/4"	$10.00
#781		1" Straight	plunge cutting	1"	1 1/2"	1/2"	$12.00
#545		**Tongue & Groove**	Straight	1 5/8"	1"	1/4"	$29.00
#845		Tongue & Groove	Straight	1 5/8"	1"	1/2"	$29.00
#546		Tongue & Groove	Wedge	1 3/16"	1"	1/4"	$29.00
#846		Tongue & Groove	Wedge	1 5/8"	1"	1/2"	$29.00
#859		**Multiform Moulding**	Unlimited Patterns	2 1/4"	2"	1/2"	$50.00
#601		1/8" **Spiral Cutter**		1/8"	1/2"	1/4" *	$ 9.00
#602		3/16" Spiral Cutter		3/16"	5/8"	1/4" *	$12.00
#603	**Solid Carbide**	1/4" Spiral Cutter		1/4"	3/4"	1/4"	$12.00
#903		1/4" Spiral Cutter		1/4"	3/4"	1/2" *	$12.00
#904		3/8" Spiral Cutter		3/8"	1"	1/2" *	$24.00
#905		1/2" Spiral Cutter	*Proper Adaptor Will Be Supplied	1/2"	1 1/2"	1/2"	$29.00

New 24-page catalogue now available, featuring hundreds of bits.

MAKE BEAUTIFUL RAISED PANEL DOORS . . . WITH YOUR 1/4" ROUTER!

Professional production quality bit makes it quick and easy to produce matching rails and stiles — the panel raising bit with ball bearing guide makes the raised panel perfect every time.

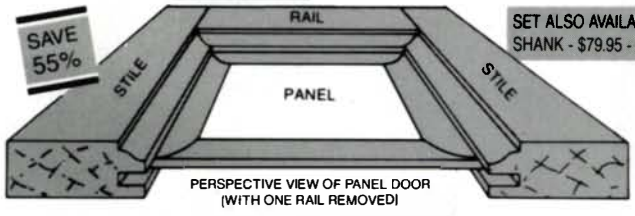
RAIL & STILE SHAPER CUTTER
Item #150 - **$49.95**

SALE PRICE **$69.95** FOR COMPLETE SET

Regular value Over $150.00

ORDER ITEM # 554 for 1/4" Shank Set (Includes all bits shown below)

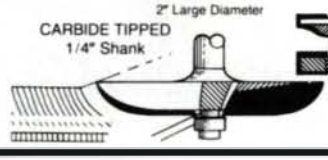
SAVE 55%



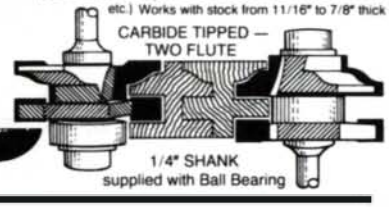
PERSPECTIVE VIEW OF PANEL DOOR (WITH ONE RAIL REMOVED)

SET ALSO AVAILABLE IN 1/2" SHANK - $79.95 - Item #852

RAISED PANEL BIT
SUPPLIED WITH BALL BEARING



REVERSIBLE COMBINATION RAIL and STILE BIT
(For making matching rails and stiles in raised panel doors, etc.) Works with stock from 11/16" to 7/8" thick

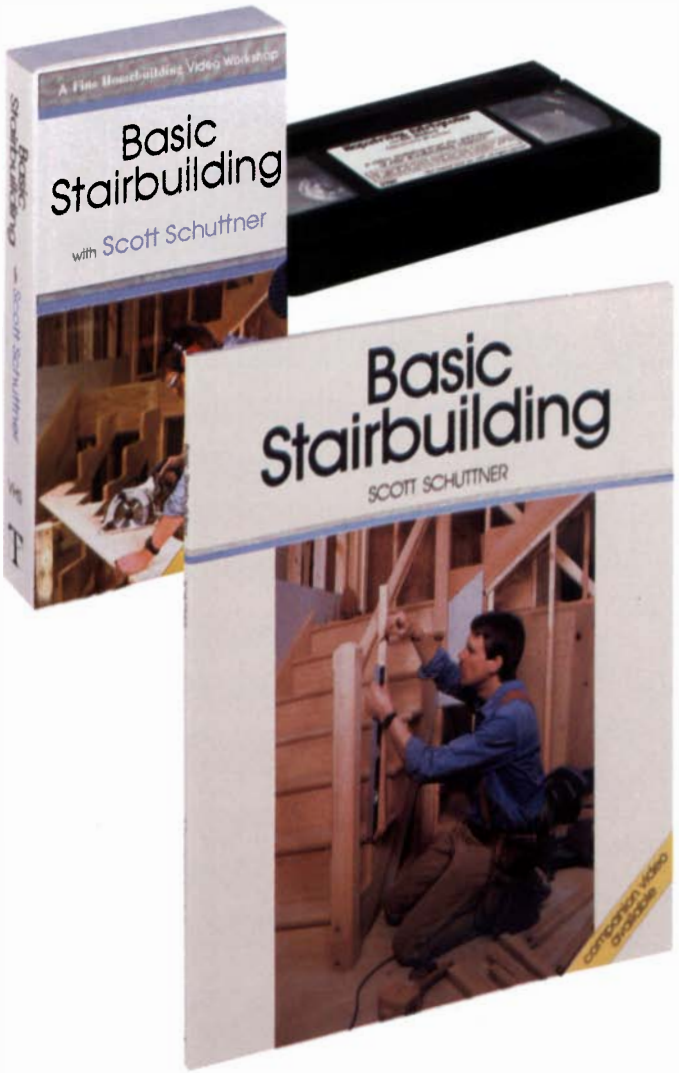


To order by Master Charge or Visa Call Toll Free, 7 Day - 24 Hour Order Service
1-800-533-9298 or send check to: **MLCS Ltd., P.O. Box 4053FH, Rydal, PA 19046**

READER SERVICE NO. 59

At last, a great way to learn stairbuilding.

New
book and video set



If you've ever thought of stairbuilding as a job best left to the experts, Scott Schuttner's dynamic new book and video will change your mind. For the first time, you'll get the detailed drawings and step-by-step photographs you need to build professional-quality stairs. And just when you wish you could move around or under the stairs to better understand what's going on, the video camera is right there, with close-ups and long shots that provide a level of information no book alone can match.

Schuttner is an experienced carpenter who's built and designed lots of stairs. He knows what you need to know, and he takes the time to show you every step in the process. You'll learn how to figure out the rise and run for your stairs (you'll be amazed how simple it is), how to lay out the carriages with a framing square, how to cut and install carriages and treads, and how to anchor the stairs to the framing. You'll learn about installing newel posts and balusters, and much more besides.

This is practical, real-world instruction, with tips and jigs that can save you time and money. With information on straight-run, L-shaped and open-riser stairs, this unique book and video set will prepare you for virtually any basic stairbuilding project you face.

Order your book/video set today, and start building stairs you'll be proud of.

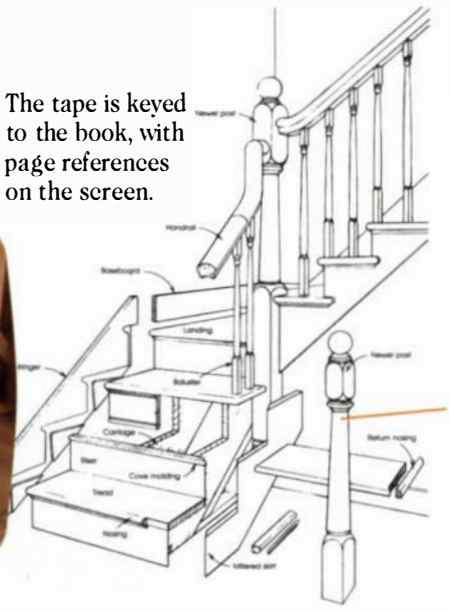
The book: *Basic Stairbuilding*
SOFTCOVER, 128 PAGES, 91 PHOTOS, 44 DRAWINGS, #070104, **$14.95**

The video: *Basic Stairbuilding with Scott Schuttner*
60 MINUTES, VHS #060037, BETA #060038, **$29.95**

Save $4.95 on the book-video set:
VHS #07A139, BETA #07A140, **$39.95**

The tape is keyed to the book, with page references on the screen.

The video takes you right on-site; you see exactly what needs to be done from a variety of angles.



The book gives comprehensive, no-nonsense information with sharp illustrations.

To order from The Taunton Press, use the attached insert or call 1-800-888-8286

TAUNTON BOOKS & VIDEOS

The Japan Woodworker's Catalog is . . .

loaded with the best tools you can get your hands on. In our catalog you will find a huge selection of Japanese saws, waterstones, chisels, planes, carving tools, cutlery and books. Send $1.00 for our catalog and supplements during the next two years.

THE JAPAN WOODWORKER
1731 Clement D3, Alameda, CA 94501
Phone 1-800-537-7820

READER SERVICE NO. 157

ASHMAN TECHNICAL LTD.

Machinery • Tools • Shop Equipment
351 Nash Rd., N., Hamilton, Ont., Can. L8H 7P4
(416) 560-2400

CALL COLLECT

GENERAL

10" Table Saw 350-1, 3HP	$1300.
with Biesemeyer	$1420.
with EXCALIBUR	$1500.
160-2 VS Lathe, 3/4 HP	$1120.
260-1 VS Lathe, 1 HP	$2050.
1180-1 6" Jointer	$ 495.
480 8" Jointer, 1 1/2 HP	$1495.
490-1 15" Bandsaw, 3/4 HP	$ 899.

READER SERVICE NO. 99

QUALITY THAT'S TOP DRAWER...

...for all your drawers. If it's pulls you need, we've got you covered. Whether it's Chippendale or Queen Anne, Hepplewhite or Victorian, we'll help you get a handle on it. It's all there in our new 70-page catalog–a valuable reference tool that fully decribes our expanded line of period hardware. To get your copy, use circle #401 and send $4.00.

PAXTON HARDWARE LTD

7818 Bradshaw Road, Dept. FW30, Upper Falls, MD 21156
Quick Shipment Free Mini-Catalog

READER SERVICE NO. 1

Breathe Easier!

Powered Air Respirators for Wood Dust

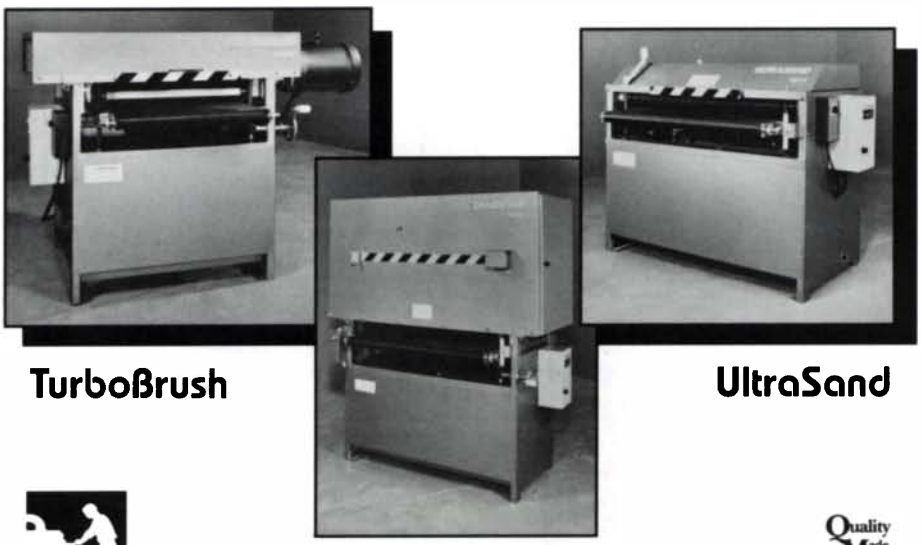
$279 Model AGHI

Excellent for all woodworking jobs which create "DUST." Also offers eye protection. Systems also available for paint and lacquer fumes.

AIRSTREAM DUST HELMETS
16 Division St. W. Elbow Lake, MN 56531
Toll Free 1-800-328-1792 or 218-685-4457

READER SERVICE NO. 76

You Want Great Sanders - Come To Us!



TurboBrush

UltraSand

SandStar

Quality Made IN THE U.S.A.

KUSTER MFG
BELLE MEAD, NEW JERSEY

For information & literature call today:
1-800-458-7837

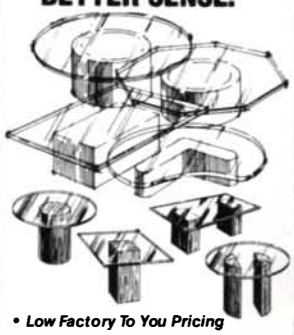
READER SERVICE NO. 79

GLASS & MIRROR CRAFT

HEAVY
GLASS TABLE TOPS

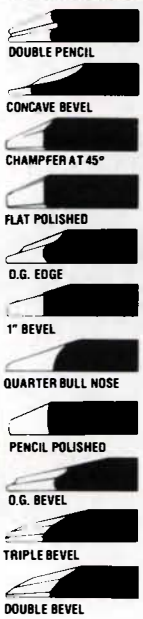
1/4"-3/8"-1/2"-3/4"-1" THICK GLASS
"USING GLASS MAKES SENSE!"

Using Us Makes BETTER SENSE!



- *Low Factory To You Pricing*
- *Low Transportation Costs*
- *Prompt, Courteous Service*
- *Toll Free Order Department*
- *Two Factories To Serve You Better In Michigan & Georgia*
- *We Guarantee Quality & Satisfaction*

MANY EXCLUSIVE EDGEWORKS!



NATIONAL TOLL FREE NUMBERS

NORTHERN PLANT	SOUTHERN PLANT
1-800-528-5544	1-800-999-1192
MICHIGAN	ATLANTA
1-800-827-7238	1-404-881-0892

For FREE IDEA BROCHURE Write:
Glass & Mirror Craft Industries, Inc.
2111 HAGGERTY ROAD • P.O. BOX 516
WALLED LAKE, MICHIGAN 48088

READER SERVICE NO. 70

Imported European Hardware

4320 W. Bell Drive
Las Vegas, Nevada 89118
(702) 871-0722
SEND $1.00 FOR CATALOG

MasterCard VISA

READER SERVICE NO. 158

SQUARE DRIVE SCREWS

Simply the Best!

- Square Drive Beats Driver Slippage
- Hardened Steel for Extra Strength
- Deep Thread for Super Grip
- Also Brass & Stainless Steel

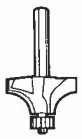
Send $3 for Samples and Catalog

McFEELY HARDWOODS
P.O. Box 3 • Dept FW83
Lynchburg • VA • 24505
Toll Free 1-800-443-7937
or FAX (804) 847-7136

READER SERVICE NO. 3

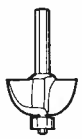
TUNGSTEN CARBIDE ROUTER BITS

- Heavy Duty Industrial Quality
- 1/4 by 1-1/4 inch long shafts
- Enclosed Ball Bearing Guides
- Bits pass ATCS Std. 103



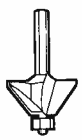
Corner Round-over

Radius	Price
1/4 "	$12.50
3/8 "	$13.75
1/2 "	$14.50



Cove Bits

Radius	Price
1/4 "	$14.50
3/8 "	$15.50
1/2 "	$17.00



45° Chamfer Bits

Diameter	Price
1 "	$12.00
1-1/4 "	$14.00
1-1/2 "	$15.50

100% Money Back Guarantee

ORDER NOW – TOLL FREE
1-800-767-4747 24 HRS.

Mail check to:
SKYCROFT TOOLS, INC.
P.O. Box 418F3
Myersville, MD 21773-0418

Catalog $1.00, comes with $3.00 coupon.

READER SERVICE NO. 159

QUALITY HARDWOODS

Clear • Kiln Dried • Surfaced 4 Sides • 3/4" Thick
3" to 10" Widths • 2-Ft. to 7-Ft. Lengths
20 Sq. Ft. Packs • Random Widths & Lengths

Red Oak - Plain	$45.00
White Oak	$44.00
Pecan	$42.00
Cherry	$59.00
Walnut	$60.00
Hard Maple	$33.00
Ash	$49.00
Basswood	$31.00
Poplar	$35.00
Aromatic Red Cedar (Tight Knots)	$32.00
Cypress (Tight Knots)	$31.00
Birch	$43.00

Orders Shipped C.O.D. by UPS. Shipping Charges Added
Texas Residents Add 7% Sales Tax

To Order Call 214-693-4735 or Write to:
K & S SPECIALTY LUMBER
P. O. Box 125 · Hill's Lake Road · Carthage, TX 75633

READER SERVICE NO. 89

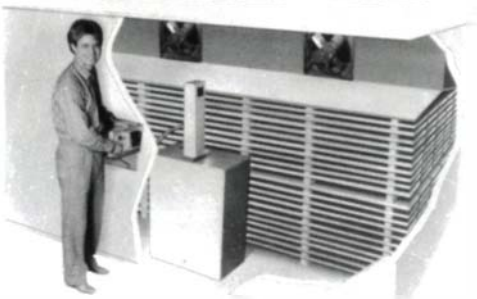
Garrett Wade

161 Avenue of the Americas
New York, NY 10013
(212) 807-1155 *for service*
(800) 221-2942 *for orders*

Woodworking Tool Catalog: 212 pages of tools from the USA and around the world. Workbenches; Router Bits and Accessories; Measuring Tools; Carving Tools; Planes; Chisels; Finishing Supplies; and Books. With tips on selecting, using, and maintaining the tools that will serve you best. $4.00

Classic Hardware Catalog: 64 pages of the finest brass furniture hardware. Hinges; Latches; Locks; Handles; Knobs; Casters; Architectural and Door Fittings. $2.00

SAVE MONEY!
KILN DRY LUMBER



MAKE MONEY!
Kiln Dry for others.
As the nation's largest manufacturer of dehumidification Dry Kilns, we can supply you with the same type equipment used by many of the major firms.

Call or write today for free facts that will help you make and save money.

nyle DRY KILN SYSTEMS
1-800-777-NYLE
207-989-4335
Nyle Corporation
P. O. Box 1107, Bangor, Maine 04401

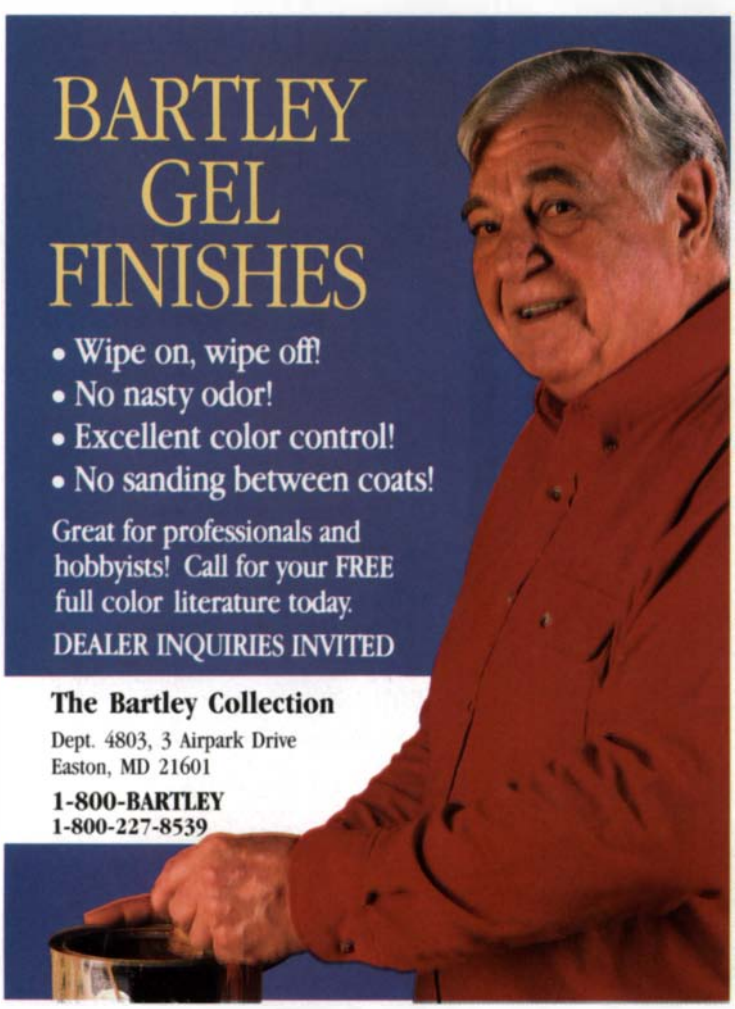
READER SERVICE NO. 2

BARTLEY GEL FINISHES

- Wipe on, wipe off!
- No nasty odor!
- Excellent color control!
- No sanding between coats!

Great for professionals and hobbyists! Call for your FREE full color literature today.

DEALER INQUIRIES INVITED



The Bartley Collection
Dept. 4803, 3 Airpark Drive
Easton, MD 21601
1-800-BARTLEY
1-800-227-8539

READER SERVICE NO. 121

TOOLS ON SALE™

AMERICA'S LOWEST PRICED TOOLS
FREE FREIGHT TO THE 48 CONTINENTAL STATES ON EVERY ITEM.

FREUD FESTIVAL OF SAVINGS!

FORSTNER BITS

Item	Description	List	SALE
FB107	7 pc set - 1/4" - 1" w/case	82	49
FB100	16 pc set 1/4-2 1/8" w/case	300	155

Individual Forstner Bits - 1/4" to 2-1/8" Priced at 25% off of List

CARBIDE ROUTER BIT KITS

88-100	9 pc basic set w/case	186	99
90-100	15 pc advanced set w/case	309	159
92-100	36 pc artisan set w/case	550	285
94-100	5 pc cabinet door set w/case	305	155

WOOD CHISEL SETS

WC104	4 pc set 1/4-1" comp w/case	58	39
WC106	6 pc set 1/4 -1" comp w/case	77	52
WC110	10 pc set 1/ 4-1 1/2" complete w/case	127	79
TT108	8 pc turning tool set complete w/case	145	94

POWER TOOLS

EB100	Edge Banding Machine	370	265
FT2000	3 1/4 H.P. Plunge Router	318	185
CE82	3 1/4" Planer w/case, fence, & carbide blades	230	135
JS100	Biscuit jointer w/case	318	159
F0	1-1/4"x5/8" Biscuits 1000 qty	34	27
F10	2 1/8"x3/4" Biscuits 1000 qty	34	27
F20	2 3/8"x1" Biscuits 1000 qty	36	29
FA	Assorted Biscuits 1000 qty	36	29
FRT2000	Wood Router Table	265	165
C600	Steel blades for Ryobi AP10 Planer		27.45

SAFETY DADO SETS

Item	Description	List	SALE
SD306	6" Carbide with case	195	105
SD308	8" Carbide with case	208	109
SD310	10" Carbide with case	259	154
SD312	12" Carbide with case	299	169
SS100	Dado shims - for small incremental adustments	15	11.45

DRILL BITS

DB107	7 piece brad pt bits w/cse	25	16.95
DB050	**50 pc drill bit assortment:** 6 mason, 25 H.S. Steel,4 H.S. sheet metal, 6 brad pt, 6 stop collarsand case		49.99
DB030	**30 pc drill bit assortment** 6 screwdriver bits,center punch 6 H.S.S, 5 masonry, 5 brad point,2 stub & cse		31.95

FAMOUS FREUD CARBIDE BLADES-5/8" Bore

Item	Description	Teeth	List	SALE
LU72M010	Gn'l Purp A.T.B.-10"	40	62	38
LU82M010	Cut-off Tr Chip-10"	60	82	44
LU84M011	Combo -10"	50	69	40
LU85M010	Super Cut-off ATB10"	80	102	55
LU85M015	Super Cut-off ATB 15"	108	160	105
LM72M010	Ripping - 10"	24	61	37
LU73M010	Cut-off - 10"	60	75	44
LU91M008	Compound Mitre 8-1/4"	48	62	49
LU87M010	Thin Kerf - 10"	24	64	38
LU88M010	Thin Kerf - 10"	60	78	44
LU98M010	Ultimate - 10"	80	114	69
LU89M010	Non-ferrous mtl10"	72	93	54
SC001	Blade Stabilizers - 5/8" bore - reduce vibration **Special Sale**			8.75

INTRODUCING THE NEW "TK" BLADE SERIES CARBIDE-TIPPED 5/8" BORE

Item	Description	Teeth	List	SALE
TK203	7 1/4" Framing	24	29	17.35
TK206	10" Framing	24	33	19.80
TK303	7 1/4" Finishing	40	36	21.60
TK306	10" Finishing	40	40	23.95
TK903	7 1/4" Combo	30	31	18.60
TK906	10" Combo	50	45	26.95

1990 TOOL CATALOG AVAILABLE
Call Toll-Free 1-800-328-0457 In Minnesota Call (612) 224-4859
FAX: (612) 224-8263
CHECK • MONEY ORDER • VISA • MASTERCARD • DISCOVER
SEVEN CORNERS ACE HARDWARE, Inc.
216 West 7th St. • St. Paul, MN 55102 • Est. 1933
PRICES SUBJECT TO CHANGE WITHOUT NOTICE

READER SERVICE NO. 110

CLASSIFIED

The CLASSIFIED rate is $5.75 per word, minimum a d 15 words. All payments must accompany orders; all are noncommissionable. The WOOD & TOOL EXCHANGE and SITUATIONS WANTED are for private use by individuals only; the rate is $8.00 per line. Minimum 3 lines, max. 6 lines, limit 2 insertions per year. DISPLAY CLASSIFIED rates on request. Send to: *Fine Woodworking*, Advertising Dept., Box 5506, Newtown, CT 06470-5506. FAX (203) 426-3434, 1-800-243-7252. Deadline for the *Sept./Oct.* issue is June 25.

Business Opportunities

HOBOKEN WOODWORKING BUSINESS seeks others to share expenses and space. Very convienient to NYC. Joint venture a possibility. Call Patti, (201) 963-1385.

4800sf WAREHOUSE, 3500sf HOME, large pool, electronic security system, 2.85 acres with 6ft chainlink fence. Blountstown, FL. Midway between Tallahasee and Panama City. $98,000. Call owner (904) 385-0966.

SMALL FAIRFIELD COUNTY cabinet shop with established client base seeks partner with same. (203) 849-8774 evenings.

DEALER INQUIRIES INVITED

We are a direct importer stocking all quality hand tools needed for a woodworking tool store or specialty department. Resale only—no enduser sales.

Robert Larson Company, Inc.
33 Dorman Avenue
San Francisco, CA 94124 (415) 821-1021

Situations Wanted

SEEKING JOB IN OMAHA, NEBRASKA. Moving in August for personal reasons. Experienced in cabinet door shop, cabinet work, remodeling, finishing. Versatile. Contact Walter Crouch, 2442 S. Fort, Springfield, MO 65897. (417) 886-1678.

GRADUATE OF WOODWORKING program seeking an apprenticeship in fine furniture making. Interested in custom work, traditional pieces, and museum reproductions. New England, NY, Penn. area preferred. (508) 829-4019.

Help Wanted

WANTED: AN EXPERIENCED CABINET MAKER for special effex company. Dale, (818) 969-4519, Pasadena, CA.

CABINETMAKER/FURNITUREMAKER. Excellent opportunity for experienced woodworker in well-equipped shop located in central New Jersey. Must be able to produce extremely high-end work. Salary commensurate with abilities. Call (201) 442-4023.

DAKOTA JACKSON, INC. a fine custom furniture manufacturer seeks a cabinetmaker to join an elite group. We require 10 years exper. in veneers, hard woods, machining and bench work. Excellent benefits, SEND RESUME TO DAKOTA JACKSON, INC., 40-05 21 St., LIC, NY 11101, or call (718) 786-8600.

FINISHER/WOODWORKER for busy shop. Some experience required. Excellent opportunity to learn in a diversified environment. Call LINCOLN GALLERIES, Orange, NJ. (201) 677-2000.

MASTER CRAFTSMAN WANTED: Supervise production. Working knowledge of all mechanical phases of woodworking; design, finishing, and highest quality production. (407) 832-2590.

SUPERVISOR FOR HIGH-END CASEWORK/ architectural woodwork shop with four people. Will pay up to $40,000. Plus benefits. Buzzy (212) 662-8283.

SUPERVISOR WITH FINISHING. Excellent opportunity to join established NYC Co. that is now #1 in top quality antique reproductions. This is a hands-on leadership position in a finishing dept. of 10 people. Previous successful supervisory position a must. Send Resume to PO Box 1189, LIC, NY 11101.

Instruction

APPRENTICESHIP IN PROFESSIONAL FINE FURNITURE MAKING with the prominent Jeffrey Greene Design Studio–realistic preparation for a vital career as an independent artisan designing, making, and marketing the very finest furniture in solid walnut/ rosewoods. Tuition. New Hope, PA. (215) 862-5530. Call Mon.thru Thurs., 2:-4:pm EST.

WOODWORKING,design, business, marketing associate degree. Haywood Community College, Freedlander Dr., Clyde, NC 28721. (704) 627-2871

VILLA MARIA WORKSHOPS, Aug. 12-18, 1990; carving classes in caricature, relief, waterfowl, songbird, stylized, marquetry. PO Box 37051, Minneapolis, MN 55431.

LEARN TO TURN WOOD. Precision lathe work for fun and fine products taught by JAMES L. COX WOODWORKING SCHOOL. Free brochure. RD 2, Box 126 Beaver Dam Rd., Honey Brook, PA 19344. (215) 273-3840.

GILDING WORKSHOPS with Frances Binnington. FINISHING FOR ANTIQUE FURNITURE and classes in Chinoiserie with Peter Binnington. The Binningtons have run their restoration shop in London, England for over a decade and now bring their workshops to Garrett Wade & Co., Inc., NYC. For details please call Kelly at P&F Binnington Inc. (609) 392-5252.

INDIVIDUAL INSTRUCTION learning furniture making from log to finished product with classical hand joinery emphasized. Instructor: graduate John Makepeace School, Dorset, Eng. Contact Geoffrey Noden. (609) 890-8152.

THE HYMILLER SCHOOL of Fine Finishing repair and hand joinery. One-and two-week intensive in-shop training will give you all the necessary knowledge to start your own business. Send $5 for complete info package. 3rd generation master craftsman. 912 Lakeshire Dr., Fairfield Glade, TN 38555. (615) 484-9309. Payment plan now available.

LEARN TRADITIONAL WOODEN BOATBUILDING
6 Month Program • One Week Seminars
Weekend Workshops
— Call or write for our catalog —
NORTHWEST SCHOOL OF WOODEN BOATBUILDING
251 Otto Street
Port Townsend, WA 98368 • USA
(206) 385-4948

Fifth Annual Southern California Woodworking Conference
Harvey Mudd College
Claremont, California
August 8-12, 1990
Demos-Workshops-Gallery-Trade Show-Auction

Featuring

Garry Knox Bennett
Allan Boardman
Brian Boggs
Arthur Espenet Carpenter
Clead Christiansen
Sheila Dawson
Michael Dunbar
Charles Harvey
Marka Hitt-Burns
Michael Hosaluk
Todd Hoyer
Max Krimmel
Sam Maloof
Kelly Mehler
Rude Osolnik
Don Weber
Cal. Carvers Guild
... and more ...

SCWC
3825 W. 139th St.
Hawthorne CA 90250
(213) 679-2485

LEARN WOODEN BOAT BUILDING AND DESIGN. Two full-time residential programs that offer intensive training in a creative but disciplined environment. V.A. approved. Accredited member, NATTS. Financial aid available. Equal opportunity enrollment. The Landing School, Box 1490F, Kennebunkport, ME 04046. (207) 985-7976.

SIX-MONTH APPRENTICESHIP PROGRAM in woodworking. Intensive hands-on training encompassses design, production, and marketing of fine furniture and cabinetry. Tuition. Maxwell & Kelly Furniture Co., Philadelphia, PA. (215) 988-9065.

CHICAGO SCHOOL OF VIOLIN MAKING. Full-time, 3½-year program under direction of master violin maker. Traditional methods of violin construction and repair taught; for information, write C.S.V.M., 3446 North Albany, Chicago, IL 60618. (312) 478-0505.

AUGUST WORKSHOPS IN WOODWORKING, boatbuilding, sailing and more! For all ages. Free brochure. The Rockport Apprenticeshop, PO Box 539F, Rockport, ME 04856. (207) 236-6071.

SIGN CARVING WORKSHOPS taught by professional woodcarver, T.R. Wolff of American Sign Carvers. 21 Pompton Plains Crossroads, Wayne, NJ 07470. (201) 835-1082.

FINE CABINETMAKING
Courses with master craftsman in long established professional and teaching workshop in beautiful historic area.
For Prospectus call U.K. 0803 862861
Christopher Faulkner
Ashridge Workshops, Dartington, Totnes, Devon TQ9 6EW, England.

RUSS ZIMMERMAN'S HOUSE OF WOODTURNING
Turner's Workshops and Supplies. Call or write for free brochure.
RFO 3, BOX 242
PUTNEY, VERMONT 05346
802-387-4337

For a catalogue describing our two year educational program in the fine art of furniture making, contact:
GENOA
Box 250F
Academy Street
Genoa, NY 13071
Furniture Making Education, Studios and Gallery
315.497.3000
315.889.7291
GENOA does not discriminate with regard to race, religion, color, creed, national origin, sex, sexual orientation, marital status, age or handicap.
GENOA

Glues/Adhesives

HIDE GLUE-ALL GRADES, including glass chipping, 5# and up. Bjorn Industries, Inc., Box 1280, Matthews, NC 28106. (704) 845-2288.

Building? Restoring? Repairing?
use **CHEM-TECH T-88** the epoxy professionals use! Strength and reliability proven in boats and aircraft over 15 years. Introductory offer 1/2 pt. of T-88 $9.95. Technical staff on call to answer your questions. Call or write.
CHEM TECH
4669-F Lander Rd
Chagrin Falls
OH 44022
(216) 248-0770

Finishes

BEHLEN WOOD FINISHING PRODUCTS, WATCO, DEFT, WATERLOX, KWIK, MINWAX. Orange shellac flakes bulk $6.99 per lb (best quality). Harper Hardware — since 1898, 1712 E. Broad St., Richmond, VA 23223. (804) 643-9007.

SPRAY-ON-SUEDE LINING. Finish any project with a soft touch. Free brochure (sample enclosed). Donjer Products, Ilene Court—Bldg. 8F, Belle Mead, NJ 08502. (800) 336-6537.

POLYESTER WOOD FINISH. A complete line of professional products for producing the ultimate piano/high tech finish. Clears, custom colors. Information kit $3. Donald M. Steinert Dept. FW, 800 Messinger Rd., Grants Pass, OR 97527. (503) 846-6835.

Accessories

CARBIDE LATHE CHISELS. World's finest. Free brochure. Unique Tool, HCR Box 3103, Benson, AZ 85602.

CUSTOM HARDWARE.Design and cast your own custom hardware. For information send $1 and SAE to: Pemberton Studio, PO Box 916, Friday Harbor, WA 98250.

BRANDING IRONS. Names, signatures, logos, any size, design. Norcraft Custom Brands, Box 277F, So. Easton, MA 02375. Telephone (508) 238-2163 anytime.

PARKS! Repair parts are now available for all size Parks and Craftsman planers and bandsaws. Parks Repair Parts, Inc., 201 Johnson St., Covington, KY 41011. (606) 581-7511, FAX (606) 581-9642.

SIDE—GUIDE. Professional furniture repairman's simple, effective drill guide prevents mis-aligned dowel holes. Send $7.95 plus $2 S/H to Tom Francis, Box 6155, Augusta, GA 30906.

FREEBORN SHAPER CUTTERS 25% to 35% OFF. Free catalog. (717) 289-4686. Top Shelf Tool Exchange.

SANDPAPER ASSORTMENT 100 sheets, 9X11 brown, tan, red. Manufacturer overruns, $6.95 per 100. Made in USA, money back guarantee. PPD. American Tool, PO Box 1389, Westhampton Beach, NY 11978.

EXTRA FINE FILTER BAGS for dust collection systems. Fabric $12/yd, PPD. Free system plans. Barter Enterprises, Box 102B, Prospect Harbor, ME 04669.

WOOD TURNING TOOLS TOO EXPENSIVE? Why not build your own high-quality carbide tools at a fraction of the cost. Send $5 for plans and information to: Innovative Plans, 23052 Lake Forest Dr., Ste. B-4, Laguna Hills, CA 92653.

CUSTOM BRANDING IRONS
DRILL PRESS or HANDHELD
250 to 800 watts
SEND $1.00 FOR BROCHURE
ENGRAVING ARTS (707) 984-8203
P.O. Box 787 FAX (707) 984-8045
Laytonville, CA 95454

THE FINE GOLD LEAF PEOPLE ™
Genuine, Imitation and Variegated Sheets & Rolls
Brushes, Supplies & Technical Books
IN USA: Three Cross Street
Suffern, NY 10901-4601
1-800-283-5323
IN CANADA: 508 Douglas Avenue
Toronto, Ontario, M5M 1H5
416-787-7331
"WORK WITH THE BEST IN THE BUSINESS"

Publications

INFORMATIVE CATALOG FOR WOODWORKERS, woodcarvers, upholsterers, antique restorers. Many unusual, hard-to-find items. Send $1 to Van Dyke's, Dept. 71, Woodsocket, SD 57385.

NEW! Business guide for woodworkers. HOW TO PROFIT FROM YOUR SKILLS NOW. Free details. Benitez, Ltd., Dept. 103, PO Box 43233, Austin, TX 78745.

THE TOOL CHEST CRAFTSMAN LIBRARY CATALOG
... for both the professional and amateur.
100's OF BOOKS COVERING
- Woodworking – All Aspects
- Home Remodeling & Maintenance
- Tools & Their Uses
- Projects For Home & Recreation
- Contracting

To order your catalog send $2.00 (refundable with 1st order)
To: **THE TOOL CHEST**
Dept. T
45 Emerson Plaza East
Emerson, NJ 07630

Services

ARTISTIC WOODWORKING prints on ALL types of apparel. Send $2.75 for catalog to: Artwood Production, PO Box 8326, Cincinnati, OH 45208.

Miscellaneous

ELECTRONIC SHOPPING—FINE TOOLS and woodworking values on screen. Use your PC for specials and information. Woodware 'Modem' Connection. (203)-458-6163 for catalog and up-to-date BBS.

Pool Table Kits

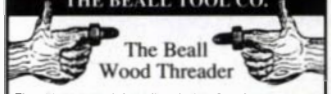
Complete kits or individual components. Plans, slates, pockets, cloth etc. Brochure $1.00.

Continental Billiards
2905-C Peachtree Industrial Blvd.
Buford, GA 30518

SLIPCASES FOR YOUR BACK ISSUES. Bound in dark blue and embossed in gold, these durable cases will protect your back issues of *Fine Woodworking* and help you keep order on your bookshelf (or in your shop). Each case holds at least 6 issues of the magazine--more of our earlier, thinner issues. The cost is $7.95 each, $21.95 for 3, $39.95 for 6. Please add $1.00 for p and h, outside the U.S., add $2.50 each (U.S. currency only, please). PA residents add 6% sales tax. JESSE JONES INDUSTRIES, Dept. FWW, 499 E. Erie Ave., Philadelphia, PA 19134. Charge orders: Min. $15.00 call toll free (800) 972-1914. 7 days, 24 hours.

CABINETMAKERS!
COMPUTERIZE FOR EXTRA PROFIT
PANEL OPTIMIZATION PROGRAM
Professional Panal Layout
on your Macintosh or IBM
30 DAY RISK-FREE TRIAL
SEQUOIA SOFTWARE CO.
P.O. BOX 1556
LAYTONVILLE, CA 95454
(707) 984-8472
$195
DISC MC
VISA COD

THE BEALL TOOL CO.



The Beall Wood Threader

The ultimate wood threading device. Attaches to router & makes perfect threads in 5 right hand sizes and 3 left.
Write or call: Dept.FW, 541 Swans Rd., NE, Newark, OH 43055, 614-345-5045, 1-800-331-4718.

Musical Supplies

HAMMERED DULCIMER PLANS! By noted builder Charlie Alm. Best book on subject. $19.95. Woodworks, Box 428, Dept. FW, Brookston, IN 47923. 800-526-4791.

GUITAR, BANJO MANDOLIN and violin kits. Repair tools, replacement parts, tone woods and finishing supplies. Free 96-page catalog. Stewart-MacDonald, Box 900F, Athens, OH 45701. 800-848-2273.

VIOLIN, GUITAR, banjo, mandolin-making materials, accessories, books. Catalog, $1. International Luthiers Supply, Box 580397, Tulsa, OK 74158.

Plans & Kits

FULL-SIZE PROFESSIONAL PLANS - Catalog $3. Over 200 professionally-designed plans for building fine furniture. Furniture Designs, Inc., CK-70, 1827 Elmdale Ave., Glenview, IL 60025.

MAKE WOODEN TOYS, whirligigs, door harps, doll houses, clocks, music boxes, weather instruments, crafts, furniture with our plans, parts, kits, supplies — Catalog $1. (614) 484-4363 — Cherry Tree Toys, Belmont, OH 43718-0369.

SPINNING WHEEL PLANS, loom & antique funiture designs from England. Send $1 bill for brochure to David Bryant, 4 Grassfield Way, Knutsford, Cheshire, England, WA16 9AF.

SATA FE STYLE FURNITURE. Popular and traditional designs. Professionally created and rendered plans. Catalog $3. ACCENT SOUTHWEST, PO Box 35277, Albuquerque, NM 87190.

Hand Tools

JAPANESE TOOLS SINCE 1888. Free catalog. Tashiro's, 1024 S. Bailey St., Seattle, WA 98108. (206) 762-8242.

TIRED OF BUYING TOOLS then finding out they are not what you need? Professional advice with every purchase. Send $5 for tool catalog and testimonials. John Hymiller Woodworker, 912 Lakeshire Drive, Fairfield Glade, TN 38555. (615) 484-9309.

TOOLS—ANTIQUE & USED—STANLEY. Quality selection of scarce handtools for collectors and woodworkers — planes, scrapers, spokeshaves, saws, chisels, levels, rules, unusual items, etc. Complete, working tools. Satisfaction guaranteed. Prompt, postpaid service. VISA/MC. Current illustrated list—$2. Subscription $8 per year, 5 lists. Bob Kaune, Dept. C790, 511 W. 11th., Port Angeles, WA 98362. (206) 452-2292.

COACHMAKERS HAND TOOLS, exact replicas in birch, maple, ebony, boxwood, and bronze. Norris replica thumb plane $93. Send $1 for full-line catalog. Apricot Tool and Forge, 3025 East Banbury Rd., S.L.C., UT 84121. (801) 943-6905.

Japanese Pull Saws

We have the largest selection of Japanese Pull Saws in the United States. Send $1.00 for a 2 year subscription to our 80 page catalog of fine woodworking tools.

THE JAPAN WOODWORKER
1731 Clement Ave., Suite 100 • Alameda, CA 94501
Phone (415) 521-1810

The Stanley Combination Plane
Covers the major combination planes: Miller, Traut, Stanley 45 and 55. Fully illustrated, with patent information and original instruction manuals for the 45 and 55. 80 pages. $8.50 ppaid.

The Stanley Catalog Collection
Complete reprints of the six most important 19c Stanley catalogs, the 1859, 1867, 1870, 1879, 1888, and 1898. Fully indexed; in one volume. A great reference. 390 pages. $30 ppaid.

Send for our free list of books on antique tools.

ASTRAGAL PRESS
Box 338 Morristown, NJ 07963-0338
(201) 539-5030

FLEETWOOD TOOL SUPPLY
A UNIQUE STORE FOR THE WOOD CRAFTSMAN, PROFESSIONAL AND VALUE CONSCIOUS NOVICE.
QUALITY HAND, POWER AND STATIONARY WOODWORKING TOOLS, BOOKS AND ACCESSORIES.
QUALITY • VALUE • HELPFULNESS
3241 KENNEDY RD. UNITS 7 & 8, SCARBOROUGH ONTARIO, CANADA M1V 2J9
(416) 293-8624 FAX (416) 293-2076

Power Tools

NEW DELTA MACHINERY AND QUALITY USED specials. New TEFC, 3HP, 3450rpm. Special pivot mount single phase motor. U.S. made, replaces Delta 83-651, $265 ppd. Plaza Machinery, RD2, Bethel, VT 05032. (802) 234-9673.

WIDEBELT SANDERS

For the small shop, kits or ready to run, 24" capacity, quick change belts, conveyor feed, rugged, accurate + affordable. Free information.
MILLER WOODWORKING MACHINES
1110 E. QUILCENE RD.
QUILCENE, WA 98376
(206) 765-3806

WOODWORKING MACHINERY
1-800-872-6500
emco•USA Mini Max JET
POWERMATIC, ARTISAN by POWERMATIC
BLUE RIDGE MACHINERY AND TOOLS, INC.
P O Box 536 FW • Hurricane WV 25526
Showroom 2806 Putnam Avenue • Catalog $1.00

Cuts 80% off labor costs!

LINERR LINK

$295
VCS-SK12 Kit

Kit Fits Skil Worm Drive Saws.
Boosts Capacity and Versatility.
- Large 12" Capacity
- Square, Smooth Cuts
- Notches—No Over Cutting

NEW

Progressive Power Tools, Corp
303 N. Rose St
Suite 304
Kalamazoo MI 49007

Call for brochure
1-800-635-5465

Wood

REDWOOD LACE BURL, OTHER WESTERN SPECIES, squares, slabs, whole. Western lumber, figured lumber, rare woods, sample kits. SASE list. Eureka Hardwood Supply, 3346 D St., Eureka, CA 95501. (707) 445-3371.

OREGON BLACK WALNUT— wide boards, thick material, exceptional color. SASE—Goby Walnut Products, 5016 Palestine Rd., Albany, OR 97321. (503) 926-7516.

MESQUITE LUMBER. SASE for prices. Include $2 for sample. H. Nordmeyer, PO Box 68, Knippa, TX 78870.

EXOTIC WOODS wholesale to manufacturers/retailers finest quality cocobolo, bocote, rosewood, kingwood, ceylon satinewood tulipwood, lignum and more. Best prices, SASE Tropical Exotic Hardwoods of Latin America, Box 1806, Carlsbad, CA 92008. (619) 434-3030, FAX (619) 434-5423.

PINK IVORY AND BLACK IVORY. Two of the world's finest hardwoods direct from logger, importer. M.S. Tisdale, 25000 S.W. 207th Ave, Homestead, FL 33031. (305) 248-0593.

HOMESTEAD HARDWOODS, 2111 Messick Rd, N. Bloomfield, OH 44450. (216) 889-3770. Kiln-dried ash, basswood, butternut, cherry, chestnut, curly maple, oak, poplar, sassafras, walnut.

TURNING BLOCKS, BURLS, AND CROTCHES—exotic and domestic hardwoods—write or call for price list. Woodply Lumber, 100 Bennington Ave., Dept. F, Freeport, NY 11520. (516) 378-2612.

RAREST CALIFORNIA BURLS, direct from logger. Huge selection beautifully figured redwood, maple, manzanita, and madrone. (707) 442-1319.

HIGHLAND HARDWOODS, Hardwood Distribution Center, Route 125, Brentwood, NH. Kiln-dried red oak, cherry, maple, ash, butternut, walnut, poplar, birch, pine and hardwood plank flooring. P.O. Box 426, Kingston, NH 03848. (603) 679-1230.

CURLY BIRD'S-EYE and quilted maple, 4/4—12/4. Furniture to musical instrument grade. Bill Largent, San Luis Obispo, CA. (805) 544-9663.

BRAZILIAN ROSEWOOD-wholesale/retail. Variety of sizes and colors. H&B Distributing, 3103 Dieble Ct., Louisville, KY 40220. (502) 459-6167 or (502) 425-1326.

SAW MILL DIRECT. Over 70 species of exotice and domestic lumber including bowl blanks, spindle squares, logs, carving stock and rare wood. Many specials. SASE for free list. $2 for tool catalog. CUT AND DRIED HARDWOOOD, 143 S. Cedros Ave., Solana Beach, CA 92075. (619) 481-0442. FAX (619) 481-2949.

ATTENTION WOODWORKERS: Maple and redwood burl. Figured, quilted, bird's-eye, lace. Any size or thickness available. Quality. Albany, OR. (503) 926-1123.

GUARANTEED CLEAR cocobolo, squares, lumber, cants, bocote, ebony, koa, lignum, cirocote. Kiln-drying available. Tropical Timber: (503) 621-3633.

TIGER MAPLE, FIGURED CHERRY plain-sawn cherry 4/4 to 12/4. Eastwoods Co., RD #1 Box 87A, Hornell, NY 14843. (607) 698-4490.

RED OAK S4S BOARDS—Wholesaler is overstocked on 1 by 2 through 1 by 12 clear red oak boards. 3ft. through 6ft. long. From $2.25/bf. Can ship UPS. All Woods Wholesale, 5065 Colorado Blvd., Denver, CO 80216. (303) 329-3132.

NATIVE CALIFORNIA HARDWOODS
Expressive California Oak, Exotic Pacific Madrone, Golden Tanoak. K/D. Direct from California's largest hardwood lumber mill. Free catalog or send $5.99 for a Sample Pack of all species - add $4 for shipping & handling. Retail/wholesale. Price start at $.79 per board foot.
CAL OAK LUMBER CO.
1000 Cal Oak Rd., Oroville, CA 95965
(916) 534-1426

HARDWOODS
Over 75 Species of Exotic & Domestic Lumber - Turning Blanks - Squares - Veneers.
COLLECTORS SAMPLE KIT:
36 Exotic & Domestic Woods
1/2" × 3" × 6" Sanded Finish
$29.00 Plus $5.00 S & H
WOODWORKERS SUPPLY
5402 S 40th St./Phoenix, AZ 85040
1-800-423-2450

GROFF AND HEARNE LUMBER
Walnut--Cherry and other fine cabinet woods. Boards to 40", matching flitches, slab cuts, kiln dried. Days, nights, weekends, call: 717-284-0001, 215-274-8810, 717-548-3834.
Groff & Hearne Lumber
858 Scotland Road, Quarryville, PA 17566

GILMER WOOD CO.
503-274-1271
Rare & Exotic Woods
- in logs, planks & squares
- over 50 species in stock
- also cutlery, turning & musical instrument woods

2211 NW St. Helens Rd., Portland, OR 97210

FINE VENEER
Highest Quality
Low Prices
Full Length Veneers
Large Selection
Exotic Lumbers
Custom Plywoods
Retail or Wholesale
Area Code 716
655-0206
Call or Write for *FREE* Catalog
certainly wood
11753 Big Tree Rd., E. Aurora, N.Y. 14052
Fax. No. (716) 655-3446
Our wood certainly makes a difference.

ATTENTION:
FLORIDA WOODWORKERS
We have Florida's largest selection of exotic and native hard and soft woods, table slabs, veneers, etc. for the professional and novice. Send $1.00 for list.
HENEGAN'S WOOD SHED
7760 Southern Blvd.(FW), West Palm Beach, Fl 33411
Call (407) 793-1557

QUARTERSAWN WHITE OAK AND FIGURED LUMBER
Curly, Bird's-eye, Quilted, Crotch
800-373-6097 or 215-775-0400
RD #3, Box 3268, Mohnton, PA 19540-9339
TALARICO HARDWOODS

Sandy Pond Hardwoods
TIGER and BIRD'S-EYE
Curly Ash, Curly Oak
Curly Cherry, Curly Birch
LUMBER AND FLOORING
921-A Lancaster Pike, Quarryville, PA 17566
(717) 284-5030

UNICORN
UNIVERSAL WOODS ltd
OVER 90 SPECIES IN OUR LARGE INVENTORY OF QUALITY MATERIAL
EXOTICS–DOMESTICS–MILLWORK
VENEER–MAIL ORDER–FREE CATALOG
4190 Steeles Ave. West, Woodbridge
Ontario Canada L4L 3S8
CALL US AT (416) 851 2308

Flooring
#2 Oak 2-1/4 Strip $.75 BF
15 Species available in Strip or Plank
Harmony Exchange
(704) 264-2314
Materials for Log & Timber Construction

WOOD & TOOL EXCHANGE

Limited to use by individuals only

For Sale

AFRICAN BLACKWOOD LOGS (Dalbergia melanoxylon), imported over 50 years ago. Aged prime wood excellent for knife handles, ornamental turnery, small bowls and objects. 18 logs, 40 to 270 lbs. ea. $5/lb delivered. Call Dick Miller at (602) 577-8080.

FINE WOODWORKING issues #1-80, excellent condition, $200 plus UPS. Jim Jaques, 395 Shippee Rd., E. Greenwich, RI 02818. (401) 884-8496.

FINE WOODWORKING complete set through issue 81, except for issues 1 and 38. Fine condition. (715) 349-2343.

1971 ROCKWELL 14-in. bandsaw, fence, mitre gauge, casters. Excellent condition. $500 or best offer. (312) 404-6919.

INCA #250, 10-in. table saw, stand, mortise table, blades, 1½HP motor, tenon cutter, other accessories, $950. (713) 996-1016.

FINE WOODWORKING, vol. 1 thru 44, plus 1977 Biennial Design Book. Best offer. M. Lundgren, Beach Haven, NJ. (609) 492-4986.

HAPFLO DUPLICATING LATHE, 1984 model with KA-TS3 copying attachment, 48-in. by 2⅜-in. capacity, excel. cond. $5000. (812) 944-8059 or (812) 944-3680.

EBAC LD-4000 lumber drying kiln package with 4000 bd. ft. capacity. Still new in boxes. $4000 invested, asking $3000. (201) 438-2969.

USED BUT IN GOOD CONDITION. Best offer for FWW issues 1—79. UPS collect. F. Verschoor, RR 1 Cornwall, Ont. Canada K6H 5R5. (613) 931-2575.

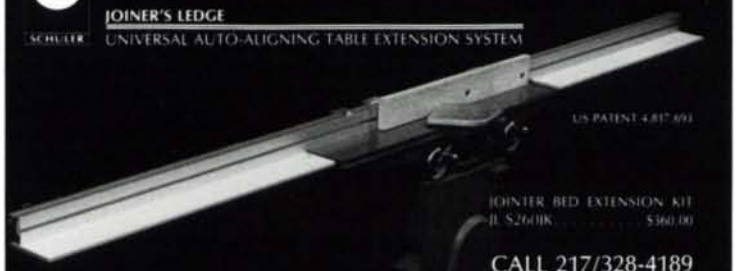
Wanted to Buy

ANY ONE OF THE FOLLOWING BANDSAWS: Hitatchi B-600A, Makita 2116, Ryobi BS-360NR. J. Pineau, 18 Brunelle Rd. S, Apt. #1, Kapuskasing, Ont., Canada, P5N 2T2. (705) 335-6398.

WANTED TO BUY: bladeholding mechanism for Walker-Turner scroll saw. Please call: (502) 228-3113.

WANTED: PROFILE KNIFE GRINDER, any condition. San Francisco, CA. Call David Balick. (415) 822-1161.

OLIVER TABLE SAW Model 88, any condition. Michael, (713) 893-8130. Southern USA preferred.

NOW YOUR COMPACT JOINTER CAN GROW TEN FEET LONG!
JOINER'S LEDGE
SCHULER
UNIVERSAL AUTO-ALIGNING TABLE EXTENSION SYSTEM

CALL 217/328-4189
WE SIMPLY GET IT STRAIGHT.
• PRECISION ALIGNMENT GUARANTEED WITHIN .010"
• SYSTEM ADAPTS TO VIRTUALLY ANY JOINTER.
• INITIAL INSTALLATION TAKES ABOUT ONE HOUR.
• SYSTEM MOUNTED OR REMOVED IN TWO MINUTES.
SCHULER TOOLWORKS LTD PO BOX 547, URBANA, IL 61801 USA

UNIVERSAL DESIGN ADAPTS TO OTHER MACHINES... JOINTERS
TABLE SAWS
ROUTER TABLES
DRILL PRESSES
CUT-OFF SAWS
BANDSAWS
SHAPERS
JOINER'S LEDGE...
MAKES SMALL MACHINES BIG!
READER SERVICE NO. 98

Fine WoodWorking
Attention Retailers
If you would like to carry *Fine Woodworking* in your store, just write or call 1-800-243-7252, and find out how easy it is to set up an account directly with us—no hassles, no risk, attractive terms.
The Taunton Press, Box 355, 63 S. Main St., Newtown, CT 06470

WOODWORKER'S DREAM
EXOTIC & DOMESTIC HARDWOODS
SAWN VENEER AND LUMBER
1/8", 1/4", 1/2", 1", or 2" & Custom Sizes
OVER 30 SPECIES AVAILABLE
SANDED, ROUGH OR RESAWN
NO MINIMUM ORDER • QUANTITY DISCOUNTS
• COMPLETE SAWMILL SERVICES AVAILABLE •
CALL US TOLL FREE (800) 247-6931
PENNSYLVANIA RESIDENTS CALL (215) 759-2064
A DIVISION OF MARTIN GUITAR CO., NAZARETH, PA 18064
READER SERVICE NO. 22

SAW ACCESSORIES THAT PERFORM.
• Rolling Tables (New smaller size added)
• Fences
• Mitre Gages
• Stock Feeder (new and very effective)
• Tenon Jigs
• Laminate Cutting Guides
VEGA
Thoughtfully designed machines
Made in the USA
Route 3, Box 193
Decatur, Illinois 62526
217/963-2232
1-800-963-VEGA
READER SERVICE NO. 111

CREATE Elegant ILLUSION
Create Trompe l'oeil effects. Each video has visual step-by-step instructions coordinated to manufactured paint colors and is detailed in comprehensive 30-70 page booklets.
■ Wall Glazing — *12 finishes* $99.95
■ Stone & Marble — *17 finishes* $99.95
■ Marbleizing on Walls — *7 finishes* $99.95
■ Semi Precious Stones, Tortoise & Inlays — *12 finishes* $99.95
■ Painted Finishes for Fine Furniture — *18 finishes* $99.95
■ Traditional Gilding & Contemporary Metallics — *15 finishes* $99.95
■ Woodgraining, Marquetry & Fantasy Graining — *10 finishes* $99.95
1-hour color. VHS or Beta. Call for order form or order direct.
HANDS-ON WORKSHOPS. Winter-San Francisco. Spring-New York
The Day Studio methods give you the competitive edge, we train your eye not just your hands. Call for 1990 Schedule and brochure.
415-626-9300
1504t Bryant St. ■ San Francisco, CA 94103
Teaching since 1975
THE DAY STUDIO-WORKSHOP, INC.
READER SERVICE NO. 11

by Dick Burrows

Building projects and a sense of accomplishment—We are always pleased to hear about someone building a piece of furniture based on an article in *FWW*. But many people seem a little reluctant to undertake some of the larger, more complex projects.

Gregory Moutsanides of Haines, Oreg., thinks these reluctant woodworkers are depriving themselves of the great sense of accomplishment and confidence that comes from completing a major piece. Greg recently built Ken Baumert's roll-top desk from the article and drawings in *FWW* #79. "I would strongly like to urge other readers, who for various reasons limit their projects, to take a chance on the unknown sometimes. By not being afraid of making mistakes, trying different methods, using your imagination and having patience, you will be greatly rewarded."

After years of rejecting other plans for a roll-top, Greg said he decided to build Baumert's because he felt it represented a balance of beauty, proportion and elegance he hadn't found on other versions. There were a couple of obstacles right off, though. He was concerned that he wouldn't be able to make the interlocking slats as Baumert did because he doesn't own a shaper. He also wasn't in a position to make a major investment in oak as Baumert had, so he opted to work in ponderosa pine, which is relatively plentiful and inexpensive near his home in eastern Oregon.

He said he basically followed Baumert's construction procedures throughout. To construct the slats, he ripped each one on the tablesaw to 1 7/16 in. wide. The socket portion was produced as described in the article, except he ground a ½-in.-dia. V-groove router bit to a steeper angle so he could produce all of the beveled portions. To make the neck of the ball, he used a ⅜-in. core-box bit and ran each slat on its side against his router-table fence. One pass on each side was required.

To make the ball portion, Greg used a ¾-in. straight bit in the router table. Again using a fence, he made a pass on each side to obtain the finished dimension of ⅜ in. The rounded portion of the ball was made with another pass on each side, this time using a ⅜-in. roundover bit with the router table and fence setup. Finally, he smoothed everything out with sandpaper. "The process does involve more set-up time. But it will faithfully produce the slats if you don't have a shaper."

Searching for the perfect workshop—James B. Farnum of Johnson City, Tenn., writes that he is working on a dream that has been 25 years in the making—designing and outfitting a workshop from scratch—and he's looking for information on "the ideal workshop." He admits it would be difficult to come up with one shop plan that would suit everyone, given variables such as type of work being done, budget, skill levels and availability of space, but he thought the subject would generate a lot of reader interest. How about it? Anybody out there got some shop ideas you would like to write about?

Clarification on antimildew treatments—Troy Chemical Corp., has notified us that the Troysan Polyphase AF1 biocide for the antimildew treatment of wood is not available as an additive at paint stores, as indicated in *FWW* #81. The company says that this material is for industrial use only and coating manufacturers incorporate it into some finishes. "The active ingredient in Troysan Polyphase AF1 is 3-Iodo-2-Propynyl Butyl Carbamate. Consumers should either inquire at the paint store whether the lacquer and varnish contain this active ingredient or check the label on the container for this active ingredient," said a company spokesman.

Tilting bandsaw tables—N. Spragg of Manteca, Cal., was a little confused about references to a bandsaw table that tilts to both the left and right in Mark Duginske's article "Machine-Made Mortises and Tenons" (*FWW* #81). We were wrong. The Delta 14-in. bandsaw won't tilt that way. Unfortunately, we misunderstood Mark's method and explained the tenon trimming process erroneously. Mark's bandsaw (in fact an Inca, not a Delta), doesn't tilt that far both ways, and neither does any commercially made model we've found. He trims the tenons by resetting the fence. Two fence setups are used for cutting opposite corners of the tenon. We apologize for the error.

Cleaning chisel guides—Don Ginsler of Toronto, Ont., Canada, writes that as a former employee at Lee Valley Tools Ltd. (which carries both the Eclipse and Veritas honing guides), he agrees with Bill Stankus in "Sharpening Chisels and Plane Blades," *FWW* #81, about the value of these blade guides. But he did point out a possible problem with flat spots on the brass roller of the Veritas guide.

This problem occurs when slurry has entered between the pin and the roller, which flushes out essential lubricating oil, leaving behind the slurry. When the slurry dries, it causes the roller to stick and drag on the stone. To prevent this problem, the guide should be taken apart, cleaned and reoiled after each use.

More woodworking schools—Back in *FWW* #81, we published an updated list of schools offering woodworking programs. We tried to make the list as comprehensive as possible, but unfortunately, some institutions were missed. We continue to update the list as other schools let us know about their programs.

ALABAMA
Southwest State Technical College
925 Dauphin Island Parkway
Mobile, AL 36605-3299

KENTUCKY
Western Kentucky University
Industrial Technology Department
Bowling Green, KY 42101

MAINE
Washington County Technical College
Marine Trades Center
Deep Cove
Eastport, ME 04631

MISSOURI
Washington University
Fine Arts Institute
Campus Box 1031
One Brookings Drive
St. Louis, MO 63130-4899

NEW JERSEY
Kean College of New Jersey
Department of Fine Arts
Morris Avenue
Union, NJ 07083

Geoffrey Noden
145 Watson St.
Trenton, NJ 08610

PENNSYLVANIA
Olde Mill Cabinet Shoppe
1660 Camp Betty Washington Road
York, PA 17402

CANADA
Camosun College
4461 Interurban Road, R.R. #3
Victoria, B.C., Canada V8X 3X1

Sheridan College
Furniture Program, School of Crafts and Design
Faculty of Visual Arts
1430 Trafalgar Road
Oakville, Ont., Canada L6H 2L1 □

Dick Burrows is editor of Fine Woodworking.

PRICE. SERVICE. FREE DELIVERY.

PANASONIC

EY571B
9.6V 3/8 VSR
WITH FREE METAL CARRYING CASE
$139.00

EY503B — 2 SPEED 2.4V SCREWDRIVER
$59.95

EY551B — 7.2V 3/8" DRILL & DRIVER
$59.50

JET TABLE SAWS

CTAS10B
10" BLADE
BIE 50
FENCE
3HP, 1 OR 3PH
$1399.00

JPS10 — 10" BLADE 3/4 HP, 1PH **$359.00**

JTS10 — 10" BLADE 1 1/2 HP, 1PH **$459.00**

JTS12 — 12" BLADE 1 1/2 HP, 1PH **$509.00**

CTAS12S — 12"-5" SCORING SAW 3HP, 1PH OR 5HP, 3PH **$3995.00**

CTAS16S — 16"-5" SCORING SAW 7 1/2 HP, 3PH **$4600.00**

JET BANDSAWS

JBS14
6"CAP.
3/4 HP,
1PH.
$359.00

JBS14-MW— 6" CAP. 1HP, 1PH. **$385.00**

JBS18–12" X 17 1/2" CAP. 2HP, 1PH. **$795.00**

WBS20 — 11 3/4" CAP. 2HP, 1PH OR 3HP, 3PH **$1895.00**

WBS24 — 12 1/2" CAP. 3HP, 1PH OR 5HP, 3PH **$2395.00**

WBS28 — 14 3/8" X 26 3/4" CAP. 5HP, 3PH. **$3195.00**

JET PLANERS

JWP15H
15" CAPACITY
2 SPEED
3HP, 1PH
$999.00

JWP12 — 12 1/2" CAPACITY, 2HP, 1PH **$389.00**

JWP2081 — 20" CAPACITY, 2 SPEED, 3HP, 1PH **$1695.00**

JWP20H1 — 20" X 7" CAPACITY, 3HP, 1PH **$2695.00**

JWP24HWG — 23 3/4 X 11 13/16 CAPACITY, 10HP, 3PH **$7200.00**

JET SHAPERS

SWSS3-1
1/2", 3/4", 1"
SPINDLES
3HP, 1PH
$1845.00

JWS18 — 1/2" SPINDLE 1HP, 1PH **$375.00**

JWS34-1 — 3/4" & 1" SPINDLES 2HP, 1PH **$995.00**

WSS-3 — 1/2", 3/4", 1" SPINDLES 3HP, 1PH OR 5HP, 3PH **$1399.00**

TWSS3 — 3/4", 1", 1 1/4" SPINDLES 3HP, 1PH OR 5HP, 3PH **$2895.00**

STSS2-3 — 3/4", 1", 1 1/4" SPINDLES 7 1/2 HP, 3PH **$4200.00**

JET JOINTERS

JJ6
6"CAP.
3/4 HP, 1PH.
$369.00

JJ4 — 4" CAP. 1/2 HP, 1PH. **$285.00**

JJ8 — 8" CAP. 2HP, 1PH. **$949.00**

JJ12 — 12" CAP. 3HP, 1 OR 3PH. **$2395.00**

JJ14 — 14" CAP. 3HP, 1PH OR 5HP, 3PH **$2995.00**

JJ16—16" CAP. 5HP, 3PH. **$3365.00**

JET SANDERS

JSG130
1" X 30",
1/6 HP, 1PH
$69.95

JSG1—1" X 42" /9" BELT & DISC SANDER 1/2 HP, 1PH **$139.00**

JSG96—6" X 48" /9" BELT & DISC SANDER 3/4 HP, 1PH **$295.00**

JSG6—6" X 48" / 12" BELT & DISC SANDER 1 1/2 HP, 1PH **$475.00**

EHVS80
6" X 89"
BELT
SANDER
1 1/2 HP,
1PH
$545.00

OVS10—SPINDLE SANDER 1HP, 1PH **$1545.00**

BDS499—DRUM SANDER 1HP, 1PH **$645.00**

JDS20—20" DISC SANDER 2HP, 1PH OR 2HP 3PH **$1145.00**

HES6108—6" X 108" BELT SANDER 1 1/2 HP, 1PH OR 2HP 3PH **$1345.00**

JSS6188 6" X 168" STROKE SANDER 1 1/2 HP, 1PH **$1545.00**

JET WIDE BELT SANDERS

JWB37P
37" X 60",
20HP 3PH
$9995.00

JWB13P — 13" X 60", 7.5HP 3PH **$4900.00**

JWB25P—25" X 60", 15HP 3PH **$6995.00**

JWB25PH — 25" X 75", 15HP 3PH **$11,340.00**

JWB37PH — 37" X 75", 20HP 3PH **$12,938.00**

JET DUST COLLECTORS

DC1182
1182 CFM
2HP, 1PH
$409.00

DC610 — 610 CFM 1HP, 1PH **$249.00**

DC1883 — 1883 CFM 3HP, 1PH **$649.00**

DC4159 — 4159 CFM 7 1/2 HP, 3PH **$2295.00**

DC4419 — 4419 CFM 10HP, 3PH **$2499.00**

JET
EQUIPMENT & TOOLS
A World Of Value.

CALL FOR QUOTES ON OTHER JET PRODUCTS. JET HAS NATIONWIDE SERVICE, $2,000,000 PARTS INVENTORY AND THE MOST RELIABLE WARRANTY IN THE BUSINESS. JET IS UNQUESTIONABLY THE BEST VALUE IN WOODWORKING.

SEND $2.00 FOR A COMPLETE SANTA ROSA TOOL CATALOG FEATURING JET AND OTHER MAJOR BRANDS. FREE FREIGHT ON ALL ITEMS SHIPPED IN THE CONTIGUOUS 48 STATES. CALIFORNIA RESIDENTS, ADD APPROPRIATE SALES TAX.

CALL: **800-346-0387** IN CALIFORNIA: **800-464-8665**

QUANTITIES LIMITED AT ABOVE PRICES. ORDERS SHIPPED FROM SANTA ROSA CA, SMYRNA TN, TACOMA WA.
PRICES SUBJECT TO CHANGE WITHOUT NOTICE. COPYRIGHT 1990, SANTA ROSA TOOL AND SUPPLY INC.

VISA MasterCard

SANTA ROSA TOOL AND SUPPLY INC.

SUMMER BONUS! $200 OFF ON ORDERS OVER $3,000.

1651 PINER ROAD · SANTA ROSA, CA 95403 OFFERS EXPIRE 8/31/90

READER SERVICE NO. 27

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

ARKANSAS: **Juried exhibit**–International Turned Objects Show, thru July 23. Arkansas Art Center Decorative Arts Museum, 7th and Rock Streets, Little Rock. Mon. thru Sat., 10 A.M. to 5 P.M.; Sun., 12 to 5 P.M. For info, contact Sarah Tanguy, International Sculpture Center, 1050 Potomac St. N.W., Washington, DC 20007. (202) 965-6066.

CALIFORNIA: **Workshops**–Various workshops including Japanese woodworking, joinery and sharpening. Contact Hida Tool Co., 1333 San Pablo, Berkeley, 94702. (415) 524-3700.
Exhibition–Cardboard Furniture by Brian Gladwell, thru July 1. San Francisco Craft & Folk Art Museum, San Francisco. Featuring approximately 15 pieces of cardboard furniture by the Canadian woodworker. For info, contact Mary Ann McNicholas, Landmark Building, Fort Mason, San Francisco, 94123. (415) 775-0990.
Workshops–Woodworking tools and techniques with Jim Budlong, June 25–July 13; tools and techniques with Michael Burns, July 7–Aug. 10; weekend seminar with James Krenov, July 21–22. College of the Redwoods, 440 Alger St., Fort Bragg, 95437. (707) 964-7056.
Juried exhibition–Artistry in Wood '90, July 6–Aug. 26. The Sonoma County Museum, 425 7th St., Santa Rosa, 95401. For info, contact Wade Belew, Sonoma County Woodworkers Association, Box 4124, Santa Rosa, 95402. (707) 579-0264.
Fair–Wood Fair '90, July 13–15. College of the Redwoods, 7351 Tompkins Hill Rd., Eureka, 95501. (707) 445-6966.
Workshop–Building furniture with hand tools and traditional joinery, July 28–29. For women. Contact Debey Zito, (415) 648-6861.
Exhibit–The Walnut Boutique, thru July 29. Illustrations of walnut including examples of woodworking, photos, text, videos, more. The Chico Museum, 141 Salem St., Chico, 95928. (916) 891-4336.
Workshop–Lumber drying, Aug. 6–10. University of California Forest Products Lab, 1301 S. 46th St., Richmond, 94804. Call Tom Breiner at (415) 231-9487.
Juried conference–5th annual Southern California Woodworking Conference, Aug. 8–12. Harvey Mudd College, Claremont. For info, contact Howard Lewin, 3825 W. 139th St., Hawthorne, 90250. (213) 679-2485.
Exhibit–2nd annual exhibition of turned wood objects by members of the San Diego Woodturners, Sept. 15–16. Julian Town Hall, Julian. For info, contact Nan Bushley, 5065 Sleeping Indian Rd., Fallbrook, 92028. (619) 728-0591.

COLORADO: **Classes**–Woodworking and related classes, year-round. Red Rocks Community College, 13300 W. 6th Ave., Lakewood, 80401. (303) 988-6160.
Workshops–Basic woodworking with Peter Korn and Harv Mastalir, June 25–29; faux and painted finishes with Kathleen Loe, June 25–29; furniture-making with Stephen Proctor, July 2–6, July 9–13, July 16–20; willow furniture with Michael Emmons, July 9–13; marquetry, veneering and inlay with Silas Kopf, July 16–20; furniture with Sam Maloof, July 21–22; chair design and development with Robert Defuccio, July 23–27, July 30–Aug. 3; classic European carving with Nora Hall, July 23–27; advanced carving with Nora Hall, July 30–Aug 3; stool construction with Gary Rogowski, Aug. 6–10; upholstery with Jim Barefoot, Aug. 6–10; wood sculpture with Ellen Driscoll, Aug. 13–17, Aug. 20–24. Anderson Ranch Arts Center, Box 5598, Snowmass Village, 81615. (303) 923-3181.
Juried exhibit–6th annual exhibit sponsored by the Woodworkers Guild of Colorado Springs, Oct. 6–Nov. 11. Deadline for entries: Sept. 28–29. Colorado Springs Pioneers' Museum, Colorado Springs. Contact John Lewis, 918 N. Royer St., Colorado Springs, 80903. (719) 632-8548.

CONNECTICUT: **Workshops**–Various woodworking workshops including woodturning with Rude Osolnik, June 30–July 1. Contact Brookfield Craft Center, Box 122, Route 25, Brookfield, 06804. (203) 775-4526.
Show–4th annual Members Show, thru July 14. Keeney Memorial facility, Wethersfield Historical Society, 200 Main St., Wethersfield. Sponsored by Woodworkers Guild of Connecticut and featuring contemporary and period reproduction furniture, turned bowls, sculptures, more. For info, call Stef D'Ascanio at (203) 651-0466.
Juried exhibit–33rd annual handcrafts exposition, July 19–21. Guilford Green. For info, contact Guilford Handcrafts, Box 589, 411 Church St., Guilford, 06437. (203) 453-5947.
Juried show–14th annual SoNo Arts Celebration, Aug. 4–5. In the waterfront district of South Norwalk. Contact Peter Kanter, SoNo Arts Celebration, Box 569, South Norwalk, 06856. (203) 849-9366.
Exhibit–Wooden Fantasy, Aug. 4–25. Featuring wooden bowls, clocks, toys and folk art by local artisans. The Schoolhouse, Gales Ferry Craft Cooperative, 6 Hurlbutt Rd., Gales Ferry, 06335. (203) 437-1066.
Workshops–Various woodworking workshops, thru August. Contact Guilford Handcrafts, Box 589, 411 Church St., Guilford, 06437. (203) 453-5947.
Juried exhibition–Gilding the Lily, Mar. 24–Apr. 20, 1991. Deadline for slides: Sept. 15. National juried/invitational event. For info, contact Creative Arts Workshop, 80 Audubon St., New Haven, 06510.

DISTRICT OF COLUMBIA: **Exhibit**–Tradition and Innovation: New American Furniture, thru Sept. 3. Renwick Gallery, 17th St. & Pennsylvania Ave. N.W. For info, call (202) 357-2247.

FLORIDA: **Juried show**–5th annual Starke Festival of the Arts, Oct. 27–28. On the streets of downtown Starke. Entries deadline: Sept. 28. For info, contact Nancee Clark, Box 1530, Gainesville, 32602. (904) 372-1976.

GEORGIA: **Exhibit**–American Wildfowl Decoys, thru Aug. 4. Museum of Arts and Sciences, Macon. Contact Museum of American Folk Art, Lincoln Square, Columbus Ave. and 66th St., New York, NY 10023. (212) 595-9533.
Exhibit–Hank Murta Adams: It's Not About Joinery, exhibit of furniture, thru Aug. 18. Great American Gallery, 1925 Peachtree Rd. N.E., Atlanta, 30309. (404) 351-8210.
Juried exhibition and fair–International Woodworking Fair Design Competition at the International Woodworking Machinery and Furniture Supply Fair, Aug. 24–27. Georgia World Congress Center, Atlanta. For info, contact Shirley Byron, International Woodworking Fair, 8931 Shady Grove Court, Gaithersburg, MD 20877.
Workshops–Japanese woodworking by Toshihiro Sahara. One Saturday each month, year-round. Contact Sahara Japanese Architectural Woodworks, 1716 Defoor Place N.W., Atlanta, 30018. (404) 355-1976.
Festival–20th annual fall festival, Oct. 13–14. The Prater's Mill Country Fair, 101 Timberland Dr., Dalton, 30720. (404) 259-5765.

IDAHO: **Festival**–22nd annual Art on the Green, Aug. 3–5. Fort Sherman grounds on the North Idaho College campus. Sponsored by the Citizens Council for the Arts, Box 901, Coeur d'Alene, 83814. (208) 667-9346.

ILLINOIS: **Show**–45th annual National Hardware Show, Aug. 12–15. McCormick Place Complex, 23rd Street and Lakeshore Drive, Chicago, 60616. Sponsored by the American Hardware Manufacturers Association (AHMA). For info, contact William Farrell, AHMA, at (312) 605-1025.
Show–The Chicago area Woodworking World Show, Oct. 5–7. The Metro Center, Rockford. For info, contact the Woodworking Association of North America, Box 706, Plymouth, NH 03264. (800) 521-7623, (603) 536-3768.

INDIANA: **Juried show**–3rd annual Works in Wood, October. Chesterton Art Gallery. Featuring hand-crafted wood furniture and objects. Deadline for submissions: Aug. 1. Contact the gallery, Box 783, Chesterton, 46304. (219) 926-3041.
Festival–Chautauqua of the Arts, Sept. 22–23. Along the streets of Madison. For info, contact Dixie McDonough, 119 W. Main St., Madison, 47250. (812) 265-5080.

IOWA: **Juried show**–International Woodcarvers Congress, June 21–24. Davenport Art Gallery, 1737 W. 12th St., Davenport. For info, call Larry Yudis at (319) 359-9684.
Classes–Woodcarving classes, June thru July. Vesterheim, Norwegian-American Museum, 502 W. Water St., Decorah, 52101. (319) 382-9681.
Juried exhibit–Octagon Annual, Nov. 11–Dec. 30. Entry deadline: Sept. 1. Octagon Center for the Arts, 427 Douglas, Ames, 50010. (515) 232-5331.

KENTUCKY: **Workshops**–Woodturning and joinery instruction, thru October. One day to one week. Contact Jim Hall, Adventure in Woods, 415 Center St., Berea, 40403. (606) 986-8083.

LOUISIANA: **Competition**–Louisiana Wildfowl Carvers and Collectors competition and auction, Aug. 17–19. University of New Orleans. For info, contact LA Wildfowl Carvers and Collectors Guild, c/o Offshore Navigation Co., Box 23504, Harahan, 70183.
Juried competition–Lafayette Art Association annual national juried competition of two- and three-dimensional art, Apr. 1–30, 1991. Slides deadline: Jan. 15, 1991. For prospectus, contact Marta Fielding, Lafayette Art Gallery, 700 Lee, Lafayette, 70501.

MAINE: **Class**–Design and build, June 18–29. Shelter Institute, 38 Centre St., Bath, 04530. (207) 442-7938.
Workshop–The Arts of the Sailor, August. Rockport Apprenticeshop, Box 539F, Rockport, 04856. (207) 236-6071.
Workshops–Various woodworking workshops, thru Aug. 31. Haystack Mountain School of Crafts, Box 87, Deer Isle, 04627. (207) 348-2306.

MARYLAND: **Juried show**–27th annual Havre de Grace Art Show, Aug. 18–19. Tydings Memorial Park. Sponsored by the Soroptimist International of Havre de Grace. For info, contact the art show, Box 174, Havre de Grace, 21078. (301) 879-4404.
Show–Summer art show featuring works by the faculty and students from the Rhode Island School of Design and Southeastern Massachusetts University, thru Sept. 15. Meredith Gallery, 805 N. Charles St., Baltimore, 21201. (301) 837-3575.

MASSACHUSETTS: **Fair**–25th annual ACC Craft Fair, June 22–24. Eastern States Exposition, West Springfield. For info, contact American Craft Enterprises, Box 10, New Paltz, NY 12561. (914) 255-0039.
Juried exhibit–Handmade for the '90s, June 30–Sept. 9. The Berkshire Museum, 39 South St., Pittsfield, 01201. (413) 443-7171.
Workshops–One- or two-day workshops including bandbox making and making hand tools, thru June. Old Sturbridge Village, 1 Old Sturbridge Village Rd., Sturbridge, 01566. (508) 347-3362.
Workshops–House building, June 25–July 13, July 30–Aug. 17, Aug. 27–Sept. 14; carpentry for women, July 16–20; timber framing, July 23–27; finish carpentry, Sept. 24–28; cabinetmaking, Oct. 1–5. Washington. Contact Will Beemer, Heartwood, Johnson Hill Rd., Washington, 01235. (413) 623-6677.
Workshops–Various summer workshops, July 5–Aug. 24. Nantucket Island School of Design & the Arts, Box 1848, Nantucket, 02554. (508) 228-9248.
Show–Treasure Boxes, thru July 14. Ferrin Gallery, 179 Main St., Northampton, 01060. (413) 586-4509.
Workshops–Various three- to six-day woodworking workshops, thru Oct. 6. Including carpentry with Lance Hodes, Aug. 16–19; rustic furniture with Daniel Mack, Oct. 6. Williamsburg. Contact Horizons Craft Program, 374 Old Montague Rd., Amherst, 01002. (413) 549-4841.
Show–11th annual Doll House and Miniature show and sale, Aug. 19 and workshops, Aug. 18. Sheraton Hyannis, Route 132, Hyannis. For info, contact Ronald Levesque, Box 279, Cataumet, 02534. (508) 564-4500.
Workshop–Traditional timber framing with Jack Sobon and Dave Carlon, Sept. 26–30. Hancock Shaker Village, Hancock. Contact Jack Sobon, Box 201, Windsor, 01270. (413) 684-3223.
Classes–Woodworking classes, throughout most of the year. Boston Center for Adult Education, 5 Commonwealth Ave., Boston, 02116. (617) 267-4430.

MICHIGAN: **Seminar**–Selling and Understanding Hardwood Lumber, Aug. 6–8. Marriott Inn, Grand Rapids. For info, contact Anthony Weatherspoon, Forest Management Division, Michigan Dept. of Natural Resources, Box 30028, Lansing, 48909. (517) 335-3332.

MINNESOTA: **Juried exhibition**–8th annual Upper Midwest Woodcarver's Exhibition, July 21–27. Fairgrounds in Blue Earth. Entries by July 21. For info, contact Harley Schmitgen, 311 E. 14th St., Blue Earth, 56013. (507) 526-2777.
Show–The Twin Cities Woodworking Show, Sept. 28–30. Minnesota State Fairgrounds, Snelling & Como Avenues, St. Paul, 55108. Contact The Woodworking Show, 1516 S. Pontius Ave., Los Angeles, CA 90025. (213) 477-8521.

MISSOURI: **Exhibit**–Crafted Statements, July 6–Aug. 11. Featuring lathe-turned and hand-carved objects including vessels, sculptural pieces and furniture. Curated by Albert LeCoff and Craig Nutt. Craft Alliance, 6640 Delmar Blvd., St. Louis, 63130. (314) 725-1151.

NEW HAMPSHIRE: **Classes**–Classes in fine arts and studio arts. Manchester Institute of Arts and Sciences, 114 Concord St., Manchester, 03104.
Classes–Various craft classes, including woodworking, year-round. Contact The Hand & I, Box 264, Route 25, Moultonboro, 03254. (603) 476-5121.
Fair–32nd annual Canterbury Fair, July 28. Canterbury Center, Canterbury. For info, call (603) 783-4649.
Workshops–Various violin-crafting workshops, thru Aug. 17. UNH Violin Craftsmanship Institute, Brook House, 24 Rosemary Lane, Durham, 03824. (603) 862-1088.
Retreat–Woodworking retreat, July 22–26. Waterville Valley Resort & Conference Center, White Mountain National Forest. Contact WANA, Box 706, Plymouth, 03264. (800) 521-7623.
Juried show–National Rocking Chair Show, Sept. 15, 1990–Jan. 15, 1991. Hanover. For info, contact Lynne DiFrancesco, Rubens and Locke, 40 S. Main St., Hanover, 03755. (800) 333-3448, (603) 643-4327.

NEW JERSEY: **Workshops**–Half-hull model making with Ken Sasset, June 23–24; carving ball-and-claw feet and cabriole legs with Mack Headley, Jr., June 30–July 1; cabinetmaking with David Van Hoff, July 6–11; cedar/canvas canoe building with Horace Strong, July 14–18; hand-carved signs with Ray Halacy, July 20–22; making and using wooden handplanes with David Finck, Aug. 3–7; gilding with June Fette, Aug. 10–12; 18th-century chairmaking with Eugene Landon, Aug. 15–21; making an acoustic guitar with Dick Boak, Aug. 24–31. For info, contact Peters Valley Craft Center, Layton, 07851. (201) 948-5200.
Exhibit–Recent work of Mary Lou Higgins, thru July 7. Including art furniture. Sheila Nussbaum Gallery, 358 Millburn Ave., Millburn, 07041. (201) 467-1720.
Juried fair–20th annual Peters Valley Craft Fair, July

VIDEO "JAPANESE WOODWORKING"

Featuring Jay Van Arsdale
VHS 70 mins $29.95
+ $3 (S&H)

Canada, Hawaii & Alaska add $6
VISA & MC accepted

Doctors for Japanese Woodworking Tools, Jay and Hida will answer your questions and advise you. Please write us!

Send $3 for Full line Japanese Tool Catalog.

HIDA JAPANESE TOOL INC.
1333 San Pablo Ave.
Berkeley, CA 94702
Tel (415) 524-3700
Fax (415) 524-3423

READER SERVICE NO. 301

Wood-Mizer®

World's Largest Manufacturer Of Portable Sawmills

OWN YOUR OWN SAWMILL
Four Models To Choose From
BUY DIRECT
1 800 553 0219
In Indiana call: (317) 271-1542
FREE 44-page catalog or use your MasterCard or VISA to order our 50-minute demonstration video–$10.00
Wood-Mizer Products, Inc. • Dept. Z40
8180 W. 10th St., Indianapolis, IN 46214-2430

READER SERVICE NO. 122

12 SHOWS THIS FALL!

★ *The* Woodworking Shows ★
machinery
tools • supplies

- Baltimore
- Columbus
- Detroit
- Louisville
- No. California
- Oregon
- Pittsburgh
- Rochester
- San Diego
- Seattle
- So. California
- Twin Cities

Call for free brochure
Monday - Friday 8:00 - 5 Pacific Time
1-800-826-8257, In Calif. 213/477-8521

READER SERVICE NO. 90

Safe and Easy

Fast, non-toxic, water-based products for a natural-looking, durable finish. Finishing made safe and easy.

NEW!

WIPE-ON WOOD FINISHING KIT

Everything you need to finish a 100+ sq ft project, instructions by **Michael Dresdner,** and a FREE wood stain sample.
Introductory price $24.95
plus $3.50 S/H
(800) 899-5263

Clearwater Color Co.
Box 340, Sellersville, PA 18960
Dealer Inquiries Accepted

READER SERVICE NO. 101

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
Monday through Friday
8 AM to 4:30 PM

Complete this coupon and be on your way to a world of woodworking resources

International Woodworking Machinery and Furniture Supply Fair—U.S.A.
August 24–27, 1990

Mail this form to: IWF C/O CEG
1350 E. Touhy Ave., P.O. 7207
Des Plaines, IL 60018 U.S.A.
(708) 390-2420, FAX: (708) 635-1571

You may use a photocopy of this form.
[Please type or print]

Name _____

Company _____

Street Address _____

City/Postal Code/State/Country _____

Telephone (____) _____ P2

Compare thousands of products. Discover new techniques and materials. Meet with technical experts. Participate in hands-on demonstrations. Find out what will work for you. IWF '90 is the largest and most important woodworking event in the Western Hemisphere—the event manufacturers, importers, and distributors use to unveil new products, processes, and materials—and will give you the resources to refine your craft. So plan to attend. Complete this coupon for more information today!

A Cut Above

IWF 90

Friday–Monday
August 24–27, 1990
Georgia World Congress Center
Atlanta, Georgia

READER SERVICE NO. 55

28–29. Outdoors. Contact Peters Valley Craft Fair, Layton, 07851. (201) 948-5200.

NEW MEXICO: **Workshops**–Everything about a tablesaw with Max Wilson, July 14; varnishing with Skip Hanson, Aug. 11. Contact Albuquerque Woodworkers' Association, Box 36133, Albuquerque, 87176-6133.
Classes–Woodworking classes, beginning Aug. 13. Northern New Mexico Community College, El Rito, 87520. (505) 581-4501.

NEW YORK: **Classes**–Various woodworking classes. Constantine, 2050 Eastchester Rd., Bronx, 10461. (212) 792-1600.
Classes–Woodworking classes at all levels, including gilding, June 23; tablesaw techniques, June 30; stenciling with bronze powders, July 7; portable power tools, July 14. Contact The Craft Students League, 610 Lexington Ave. at 53rd St., New York, 10022. (212) 735-9732.
Classes–Finishing and refinishing, June 23; tool sharpening, June 30; constructing a flat-bottom skiff, July 7–8, 14–15, 21–22, 28–29; constructing a Nova Scotia dinghy, Aug. 18–26. Shipyard Museum, 750 Mary St., Clayton, 13624. (315) 686-4101.
Workshops–Hand-tool workshops with Robert Meadows, June 23–24, July 21–22, Aug. 18–19. The Luthierie, 2449 W. Saugerties Rd., Saugerties, 12477. (914) 246-5207.
Festival–1st Albany Wooden Boat Fest, June 23–24. Corning Preserve on the banks of the Hudson River. Sponsored by North River Boatworks and the City of Albany. Contact North River Boatworks, 6 Elm St., Albany, 12202. (518) 434-4414.
Juried show–14th annual American Crafts Festival, June 30–July 8. Lincoln Center, New York City. Contact American Concern for Artistry and Craftsmanship, Box 650, Montclair, NJ 07042. (201) 746-0091.
Competition–International Art Competition, Aug. 10–31. Marcuse Pfeifer Gallery, New York City. Slide deadline: June 30. Multimedia competition, including wood and furniture. Contact I.A.C., Box 1058, Lodi, NJ 07644. (201) 646-0222.
Juried show–Chautauqua Crafts Festival '90, July 6–8, Aug. 10–12. Bestor Plaza, Chautauqua Institution, Chautauqua. Sponsored by the Chautauqua Crafts Alliance. For info, contact Gale Svenson, Chautauqua Crafts Festival '90, Box 89, Mayville, 14757.
Juried festival–16th annual Fall Festival Art and Craft show, Oct. 6–7. Outside. Entry deadline: July 21. Contact Fall Festival Art Committee, Box 808, Ellicottville, 14731. (716) 938-6794.
Juried show–Craft Art from Western New York 1990, Oct. 6–Nov. 25. Buffalo. Deadline for slides: July 16. Open to artists having lived in western New York state. Contact Burchfield Art Center, Rockwell Hall, State University College at Buffalo, 1300 Elmwood Ave., Buffalo, 14222-1095.
Show–The Upstate New York Woodworking Show, Oct. 5–7. Riverside Convention Center, 123 E. Main St., Rochester, 14604. For info, contact The Woodworking Show, 1516 S. Pontius Ave., Los Angeles, CA 90025. (213) 477-8521.
Exhibit–The Doghouse, thru Oct. 14. Cooper-Hewitt Museum, 2 E. 91st St., New York, 10128. (212) 860-6868.
Meetings–New York Woodturners Association, first Tuesday of each month. Woodturning techniques and exhibits also. The Crafts Student League, YWCA, 610 Lexington Ave., New York City.

NORTH CAROLINA: **Workshops**–Woodworking with Skip Johnson, June 25–July 6; furniture from the source with Brad Smith, July 9–20; furniture with Lauren McDermott, July 23–Aug. 8; design in wood with Leo Doyle, Aug. 13–24. Penland School, Penland, 28765. (704) 765-2359.
Classes–Five- and six-day woodworking classes. Ladderback chairmaking, June 25–30; Swedish woodenware, July 9–13; Advanced Swedish woodenware, July 16–20; Windsor chairmaking, July 30–Aug. 4; Swiss cooperage, Aug. 13–18. Contact Country Workshops, 90 Mill Creek Rd., Marshall, 28735. (704) 656-2280.
Symposium–International Symposium on Tooling for the Wood Industry, July 26–27. N.C. State University. Contact College of Forest Resources, Box 8005, Raleigh, 27695-8005. (919) 737-3181.
Show–The Carolina Woodworking World Show, Sept. 21–22. M.C. Benton Convention Center, Winston-Salem. Contact the Woodworking Association of North America, Box 706, Plymouth, NH 03264. (800) 521-7623, (603) 536-3768.

OHIO: **Classes**–Sack-back Windsor with Boyd Hutchison and Kevin Malong, July 9–13; making a Shaker box with John Wilson, July 9–13; production spindle turning with Palmer Sharpless, July 9–13; turning for Windsor chairmakers with Boyd Hutchison and Ernie Conover, July 14–15, July 21–22; carved bowls with Al Stirt, July 16–20; continuous-arm Windsor with Boyd Hutchison, July 16–20; writing-arm Windsor with Boyd Hutchison, July 23–27; general woodturning techniques with Rus Hurt, July 23–27; hand-tool joinery with Ernie Conover, July 23–27. Conover Workshops, 18125 Madison Rd., Parkman, 44080. (216) 548-3481.
Show–The Greater Columbus Woodworking Show, Sept. 14–16. Ohio Expositions Center, 632 E. 11th Ave., Columbus, 43211. Contact The Woodworking Show, 1516 S. Pontius Ave., Los Angeles, CA 90025. (213) 477-8521.

OREGON: **Show**–Multimedia show featuring work by woodworker/furnituremaker Tom Farr, July 21–Aug. 18. Made in Jefferson Gallery, 3259 Jefferson Scio Dr. S.E., Jefferson, 97352. (503) 327-2543.
Show–First Hardwood Craft show, July 21. Hardwood Industries Inc., Bend. For info, contact Ken Matthews, 16974 Cagle Rd., Lapine, 97739. (503) 536-1970.
Classes–Various summer tool-making and woodworking classes, thru September. Including woodcarving with Richard Butz, July 23–27. Oregon School of Arts and Crafts, 8245 S.W. Barnes Rd., Portland, 97225. (503) 297-5544.
Juried show–14th annual Artistmarket Place, Sept. 1–3. Streets of downtown Portland. For information, contact Catherine Wygant, 7017 S.E. 84th Ave., Portland, 97266. (503) 774-0919.

PENNSYLVANIA: **Educator symposium**–The Use of the Lathe: Ideas for the Classroom, June 22–24. George School, Newtown. Instructors include Allen Androkites, Leo Doyle, Albert LeCoff, Rude Osolnik, Mark Sfirri, Palmer Sharpless, Del Stubbs. Contact The Wood Turning Center, Box 25706, Philadelphia, 19144. (215) 844-2188.
Festival–Pocono State Craft Festival '90, June 23–24. Shawnee Inn Resort. Contact Pennsylvania Designer-Craftsmen, Box 718, Richboro, 18954. (215) 860-0731.
Workshops–Bleaching and chemical finishing with Prew Savoy, June 23; Colonial Day featuring demonstrations of crafts, Aug. 4; touch-up and repair of furniture with Jonathan Kemp, Aug. 18; spindle turning with Palmer Sharpless, Aug. 25–26; shellac finishes with Don Williams, Sept. 15. Olde Mill Cabinet Shoppe, 1660 Camp Betty Washington Rd., York, 17402. (717) 755-8884.
Juried exhibition–Contemporary Philadelphia Artists, thru July 8. Philadelphia Museum of Art, Ben Franklin Pkwy., Box 7646, Philadelphia, 19101-7646. (215) 236-4465.
Juried exhibitions–Pull Up A Chair: A Contemporary Seating Exhibition, Aug. 11–Sept. 23. National competition. Also, national juried exhibition of contemporary crafts, Oct. 6–Nov. 4. Deadline: July 6. For info, contact Lynn Berkowitz, Luckenbach Mill Gallery, 459 Old York Rd., Bethlehem, 18018. (215) 691-0603.
Juried show–Studio Days '90, Sept. 21–30. Open to

SUNHILL

QUALITY • CONSISTENCY • INTEGRITY

At Sunhill, we've been supplying machinery to the wood working industry for over ten years. We know that receiving good value for your dollar is important to you. That's why Sunhill is committed to providing you with superior quality machines and dependable service at affordable prices.

WITH SUNHILL, YOU KNOW WHAT YOU'RE GETTING

- We work closely with only a few Taiwanese manufacturers whose machinery we judge to be of Sunhill quality.
  Champ Fond shapers • Jun Shiau (Sheng Shing) sanders • Chu Ting planers and jointers
  Kuang Yung saws • Chang Iron planers • Comatic power feeders • CKM moulders. • Rexon power tool
- We consistently carry the same machines from the same makers, not less expensive substitutes.
- Our machines carry the actual manufacturers label, and we do not overrate the horse power on our motors.
- All Sunhill machines come with our one year warranty.

In today's market for woodworking machinery, quality is no longer a question of where it's made, but rather, who makes it.

A FEW NEW PRODUCTS FOR 1990

JUN SHIAU (SHENG SHING)
44" AND 52" WIDE BELT SANDERS

MOODEL	SDM-44	SDM-52
MAX. WORKING WIDTH	44"	52"
MAX. WORKING HEIGHT	5-7/8"	5-7/8"
MAIN MOTOR	25 HP	30 HP
CONVEYOR MOTOR	2 HP	2 HP
TABLE ADJUST MOTOR	1/4 HP	1/4 HP
FEED SPEED	12-60 FPM	12-60 FPM
BELT SIZE	44" X 60"	52" X 60"
WEIGHT	2530 lbs	3080 lbs

CHU TING
CT - 108 EDGE SANDER

1. ABRASIVE BELT SIZE ..... 6 x 108 inch
2. TABLE SIZE ..... 37 x 7 3/4 inch
   .....19 x .12 inch
3. MOTOR ..... 2 HP 1 Phase
4. MOTOR CONTACT WHEEL ..... 7 x 6 inch
5. OUST OUTLET ..... 4 inch
6. MACHINE SIZE Approx. ..... 64 x 22 x 44 inch
7. NET WEIGHT Approx. ..... 492 lbs

For a complete catalog or more information write

CALL TOLL FREE
1-800-544-1361

SUNHILL
1000 ANDOVER PARK EAST
SEATTLE, WASHINGTON 98188
(206) 575-4131 • FAX (206) 575-3617

VISIT US IN ATLANTA AT IWF '90, BOOTH 5044. FEATURING A NEW FINGER JOINT SYSTEM AND BACK KNIFE LATHE.

READER SERVICE NO. 61

BUILD YOUR OWN QUEEN ANN FURNITURE

with our wide variety of stock legs

-OR-
JUST ASSEMBLE
OUR COMPLETE KITS

SOLID
CHERRY
WALNUT
MAHOGANY
OAK

Matching coffee table available

FREE BROCHURE
(no minimum required)

Adams Wood Products, Inc.
974 Forest Dr, Dept Q5
Morristown, TN 37814 • Phone (615) 587-2942

READER SERVICE NO. 10

The WALTER A. WOOD Supply Co. Inc.

4509-4517 ROSSVILLE BLVD.
CHATTANOOGA TENNESSEE 37407

NATIONAL WATS 1-800-476-1415
(615) 867-1033

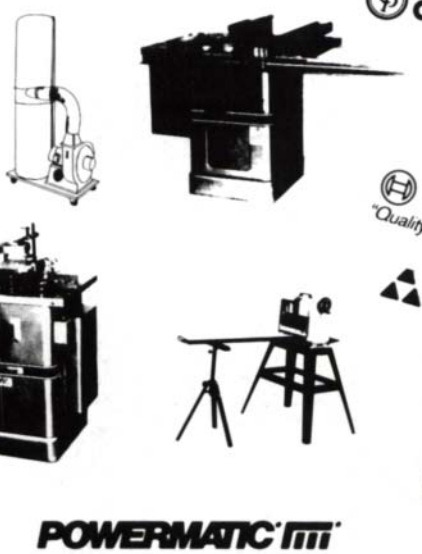
$ $ SAVE MONEY $ $

Call Us Before You Buy

CALL TOLL FREE NATION WIDE 1-800-476-1415

We Have A Complete Inventory of the Following Lines

BLACK&DECKER™
PORTER+CABLE
Milwaukee Amstar
STANLEY
PERFORMAX PRODUCTS, INC.
POWERMATIC
Chicago Pneumatic
Sioux
BOSCH "Quality You Can Hold On To"
DELTA
Elu
JET EQUIPMENT & TOOLS A World Of Value



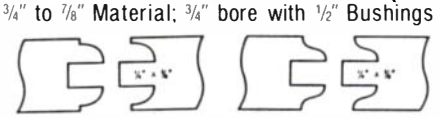
READER SERVICE NO. 56

SALE ON

NEW SHAPER CUTTER SETS FROM FREEBORN TOOL CO. SPOKANE, WA

A. DOUBLE SIDED COPE AND PATTERN SETS (6 Cutter Sets)

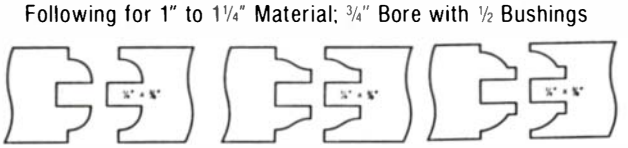
For 3/4" to 7/8" Material; 3/4" bore with 1/2" Bushings



MC-50-210 **$335** MT-50-210 **$350**
MC-50-230 **$335** MT-50-230 **$350**

For 1 1/4" Bore sets - Carbide **$410**; Tantung **$440**

Following for 1" to 1 1/4" Material; 3/4" Bore with 1/2 Bushings



MC-50-310 **$335** MT-50-310 **$350**
MC-50-320 **$335** MT-50-320 **$350**
MC-50-340 **$335** MT-50-340 **$350**

For 1 1/4" Bore sets - Carbide **$410**; Tantung **$440**

B. SINGLE SIDED COPE & PATTERN SETS (6 pc)

Now in 8 styles; for 3/4" to 1 1/8" Material
For 3/4" Bore in Carbide **$255**; in Tantung **$275**
For 1 1/4" Bore in Carbide **$330**; in Tantung **$345**

C. RAISED PANEL SHAPER CUTTERS

Now in 9 styles for 3/4" or 5/8" Material
For 3/4" Bore in Carbide **$115**; in Tantung **$125**
For 1 1/4" Bore in Carbide **$140**; in Tantung **$145**

To order call 1-800-243-0713; Inquiries 606-255-5444
MANNY'S WOODWORKERS'S PLACE
602 South Broadway, Lexington, Kentucky 40508
Hours Mon.-Sat. 9-5:30/VISA, MC, Checks, add $3 for COD

READER SERVICE NO. 201

STEVE WALL LUMBER CO.

Quality Hardwoods and Woodworking Machinery For The Craftsmen and Educational Institutions

				UPS Specials
Ash	4/4	Select	1.90	$53.00
Basswood	4/4	Select	1.30	$43.00
Birch	4/4	Select	1.60	$49.00
Butternut	4/4	Select	1.60	$49.00
Cherry	4/4	Select	2.25	$60.00
Hickory	4/4	Select	1.20	$41.00
Mahogany (Genuine)	4/4	Select	2.60	$67.00
Maple (Hard)	4/4	Select	1.45	$46.00
Maple (Soft)	4/4	Select	1.25	$37.00
Pecan	4/4	Select	1.20	$41.00
Poplar	4/4	Select	1.20	$37.00
White & Red Oak	4/4	Select	1.80	$55.00
Walnut	4/4	Select	2.50	$62.00
Cedar (Aromatic Red)	4/4	1C+Btr.	1.25	$40.00
White Pine	4/4	F.G.	.80	$35.00

Above prices are for 100' quantities of kilndried rough lumber sold by the Bd. Ft. FOB Mayodan, NC.
Call for quantity discounts. Other sizes and grades available.

Above prices are 20 bd. ft. bundles of clear kilndried lumber 3"-10" wide • 3'-7' long (Random widths & lengths) Surfaced 2 sides or rough. Delivered UPS prepaid in the Continental U.S.

Send $1.00 For Lumber and Machinery Catalog

Call For Best Prices On
DELTA Mini Max

STEVE H. WALL LUMBER CO.
BOX 287 • MAYODAN, N.C. 27027
919-427-0637 • 1-800-633-4062 • FAX 919-427-7588

READER SERVICE NO. 160

DE, DC, MD, NJ, PA, VA, WV. Contact Chester Spring Studio, Chester Springs. (215) 827-7277.
Workshops–Woodcarving workshops, thru Sept. 28. Bird carving, relief carving, sculpting with wood, woodcarving, clay sculpture. Woodcarving show, July 7–8. Sawmill Center for the Arts, Cooksburg, 16217. (814) 677-3707.
Exhibition–Lathe-Turned Objects: Trends, Transitions, Tradition, thru July 15. Woodmere Art Museum, Chestnut Hill. Featuring objects made between 1700 and 1990. For info, call Woodmere Art Museum: (215) 247-0476.
Show–The Pittsburgh Tri-State Woodworking Show, Sept. 21–23. Pittsburgh ExpoMart, 105 Mall Blvd., Monroeville, 15146. Contact The Woodworking Show, 1516 S. Pontius Ave., Los Angeles, CA 90025. (213) 477-8521.
Festival–7th annual Penn's Colony Festival, Sept. 22–24. Route 528, Prospect. For info, contact Penn's Colony Festival, 603 E. End Ave., Pittsburgh, 15221. (412) 241-8006.

RHODE ISLAND: **Exhibit**–Tomorrow's Heirlooms Today, Sept. 5–9. Featuring contemporary furniture of particleboard and medium-density fiberboard. Warwick Mall, Providence. For info, contact PB/MDF Institute, 18298 Premiere Court, Gaithersburg, MD 20879. (301) 670-0604.

TENNESSEE: **Juried exhibition**–Woodturning: Vision and Concept II, Oct. 24–Dec. 8. Entries deadline: June 30. In conjunction with exhibit, 4th annual American Association of Woodturners Symposium, including demonstrations and seminars by regional and national turners, Oct. 25–27. Contact Arrowmont School of Arts and Crafts, Box 567, Gatlinburg, 37738. (615) 436-5860.
Workshops–Various woodturning workshops, thru Aug. 10. Contact Arrowmont School of Arts and Crafts, Box 567, Gatlinburg, 37738. (615) 436-5860.
Show–Smoky Mountain Artistry in Wood, Oct. 6–7. Rodeway Inn , Knoxville. Contact Gary Falin, 693 Wright Rd., Alcoa, 37701.

TEXAS: **Class**–Timber framing, Sept. 10–16. Contact Wynter Chauvin, Red Suspenders Timber Frames, Route 7, Box 8383, Nacogdoches, 75961. (409) 564-9465.

UTAH: **Juried exhibit**–The New Utah Furniture: Contemporary Concepts, Sept. 22–December. Nora Eccles Harrison Museum of Art, Utah State University, Logan, 84322. (801) 750-1412.

VERMONT: **Workshops**–Joinery: mortises and tenons with Chris Bretschneider, July 21–22; joinery: dovetails with Chris Bretschneider, Aug. 11–12; Shaker oval boxes with John Wilson, Sept. 5–6. Vermont State Craft Center at Frog Hollow, Middlebury, 05353. (802) 388-3177.

VIRGINIA: **Exhibit**–Furniture by Wendell Castle, thru Aug. 19. Virginia Museum of Fine Arts, Richmond. For info, contact Rochester Institute of Technology, 1 Lomb Memorial Dr., Box 9887, Rochester, NY 14623. (716) 475-5064.
Competition–7th annual International Creative Marquetry Show (ICMS), Oct. 30–Nov. 21. The Hofheimer Library, Virginia Wesleyan College, Norfolk. Slides deadline: Aug. 1. Judging by local artists. For details, contact Suzanne Cartwright, 63 Church Lane, Sproughton, Ipswitch, Suffolk, IP8 3AY, England, or Joyce Howell, Virginia Wesleyan College, 1584 Wesleyan Dr., Norfolk, 23502.

WASHINGTON: **Classes**–Boatbuilding classes, including galvanized deck and rigging hardware, July 7; art of marine survey, July 16–20; caulking, Aug. 11. Northwest School of Wooden Boatbuilding, 251 Otto St., Port Townsend, 98368. (206) 385-4948.
Classes–Various boatbuilding classes, thru June. Center for Wooden Boats, 1010 Valley St., Seattle, 98109. (206) 382-2628.
Exhibitions–Vignette mixed-media show, thru June 30; work by Michael Davock, thru July 29; country show featuring furniture accessories, July 5–Sept. 2; curly colorations by Michael Neiman, Aug. 2–Sept. 30. Northwest Gallery, 202 First Ave. S., Seattle, 98104. (206) 625-0542.
Classes–Various woodworking classes, year-round. Contact Port Gamble Klallan Tribe, Box 280, Kingston, 98346. (206) 638-2794.
Juried show–Clock show, Oct. 25. Slide deadline: Sept. 1. Also, woodworking and furniture by area artists on display, year-round. Artwood, 1000 Harris Ave., Bellingham, 98225. (206) 647-1628.
Meetings–Northwest Woodworkers Guild, last Wednesday of each month. Contact Kirk Kelsey, 744 N. 78th, Seattle, 98103. (206) 789-2142.

WEST VIRGINIA: **Workshops**–Augusta Heritage Arts workshops, July 8–Aug. 10. Davis & Elkins College, Elkins, 26241-3996. (304) 636-1903.
Workshops–Woodturning with Palmer Sharpless, July 23–27; white-oak basketry with Aaron Yakim, July 23–27; woodworking for women with Marie Hoepfl, July 27–29; Shaker oval boxes wtih John Wilson, Oct. 5–6. Crafts Center, Cedar Lakes, Ripley, 25271. (304) 372-7005.

CANADA: **Class**–Building the Nova Scotia skiff, Sea Urchin, June 23–30. For info, contact Wooden Boat Society, Box 787, Duncan, Vancouver Island, B.C., V9L 3Y1. (604) 746-5789.
Classes–Various woodworking classes including bird carving, woodcarving, wood sculpture, willow chairmaking and more. Beginning July 2. Contact the Haliburton School of Fine Arts, Box 339, Haliburton, Ont., K0M 1S0. (705) 457-1680.
Exhibit–Turned vessels by Ted Hodgetts, July 5–29; Art Gallery of Peterborough, 2 Crescent St., Peterborough, Ont., K9J 2G1. (705) 743-9179. Aug. 9–26; Durham Art Gallery, Box 1021, Durham, Ont., N0G 1R0. (519) 369-3692; Sept. 1–Oct. 31; Fieldcote Memorial Park and Museum, Box 7099, Ancaster, Ont., L9G 3L3. (416) 648-8140.
Workshops–Beginners' woodturning with Ian Waymark, July 16–18; intermediate woodturning with Jason Marlow, Aug. 20–22. Tools 'n Space Woodworking, 338 Catherine St., Victoria, B.C., V9A 3S8. (604) 383-9600.
Juried exhibit–Dimensions, last three weeks in September. Slides by July 1. 10th Street Gallery, 328 10th St. N.W., Calgary. Open to residents of Alta., B.C., Sask., Man. Contact Southern Alberta Woodworkers Society, Box 6753, Station D, Calgary, Alta., T2P 2E6. (403) 230-7991.
Meetings–Canadian Woodturners Assoc. meetings, throughout the year. Second Tuesday of each month. Contact Bob Stone, Box 8812, Ottawa, Ont., K1G 3J1. (613) 824-2378.

ENGLAND: **Exhibit**–Parnham at Smith's Gallery, June 26–30. Smith's Gallery, 56 Earlham St., WC2. Featuring furniture designers and makers. Also, woodworking courses, beginning July 15. Contact Laetitia Powell, Parnham, Beaminster, Dorset, DT8 3NA. (0308) 862204.
Exhibits–Art in Action, July 19–22, Waterperry House, Oxon.; British Craftsmanship in Wood, Aug. 4–12, Thirlestaine Long Gallery, Cheltenham Gentleman's College; Waywood's annual exhibition, Sept. 8–9, Oxford. For information on all three, contact Waywood, Eynsham Park Sawmill, Cuckoo Lane, N. Leigh, Witney, Oxford. OX8 6PS. (0993) 882748.

SWITZERLAND: **Tour**–Woodworkers' tour, Sept. 7–16. For information, contact Drew Langsner, Country Workshops, 90 Mill Creek Rd., Marshall, NC 28753. (704) 656-2280.
Tour–Woodworking/woodcarving tour, Sept. 25–Oct. 8. Contact Wayne Barton, Alpine School of Woodcarving, 225 Vine Ave., Park Ridge, IL 60068. (708) 692-2822.

INTERNATIONAL TOOL CORPORATION
1939 TYLER STREET, HOLLYWOOD, FL 33020
VISA & MASTERCARD ACCEPTED
COD ADD $4.00
1-800-338-3384
(IN FLA 1-800-221-6767)
QUANTITIES LIMITED
PRICES SUBJECT TO CHANGE WITHOUT NOTICE
FAX US YOUR ORDER
1-305-927-0291
OPEN MON-FRI, 7AM TO 4PM EST
VISIT OUR SHOWROOM

PORTER+CABLE 7310
PROFESSIONAL POWER TOOLS
5.6 AMP LAMINATE TRIMMER
$85.00

100	7/8 HP ROUTER	$ 95
314	4 1/2" TRIM SAW	125
330	SPEED BLOCK FIN. SANDER	54
345	SAWBOSS 6" CIRCULAR SAW	99
351	3x21 BELT SANDER	125
361	3x24 BELT SANDER	167
363	4x24 BELT SANDER	179
504	3x24 XHD BELT SANDER	329
505	1/2 SHEET FIN. SANDER	105
555	BISCUIT JOINER	164
520	3 HP ROUTER	314
621	3/8" VSR DRILL	92
690	1 1/2 HP ROUTER	119
5116	OMNI JIG	263
6931	PLUNGE ROUTER BASE	76
7334	RANDOM ORBIT FIN. SANDER	120
7538	3 1/4" HP PLUNGE ROUTER	226
9118	PORTA-PLANE KIT	185
9637	VAR. SPEED TIGER SAW KIT	138
9647	TIGER CUB RECIP SAW	116
9850	12 V CORDLESS DRILL KIT	136
97310	LAMINATE TRIMMER KIT	190

Milwaukee 6246
JIG SAW
$115

0228-1	3/8" VSR PISTOL DRILL	$ 97
0234-1	1/2" MAGNUM HOLE SHOOTER	109
0382-1	7.2 V CORDLESS DRILL KIT	91
6012	1/3 SHEET FIN. SANDER	105
6014	1/2 SHEET FIN. SANDER	108
6016	1/4 SHEET FIN. SANDER	47
6140	4 1/2" ANGLE GRINDER	91
6256	TOP HANDLE JIG SAW	123
6365	7 1/4" CIRCULAR SAW	108
6511	2 SPEED SAWZALL W/CASE	118

DELTA
40-150
15" SCROLL SAW
$129

31-460	4" BELT 6" DISC SANDER	$135
32-100	PLATE JOINER	445
11-950	BENCH TOP DRILL PRESS	149
31-050	1" BELT SANDER	69

BOSCH ROUTER BITS ARE 40% OFF OF LIST PRICES!

BOSTITCH
N80S STICK NAILER
2" -3 1/2" CAPACITY
$394

T28-5	FINISH STAPLER 1 3/16" CAP	$299
N50FN	FINISH NAILER 1" - 2" CAP	324
N60FN	FINISH NAILER 1" 1/4- 2" 1/2	335
T36-50	STAPLER 16 GAUGE 1/2" CRN	305
MII-812	T-NAILER 9/16-2 1/4"	429

****SPECIAL****
BUY ANY TOOL AND RECEIVE A STANLEY 25' X 1" POWERLOCK TAPE FOR
$8.95
HURRY...QUANTITIES ARE LIMITED

RYOBI

T525IU	10" MITER SAW	$178
L1323ALS	3 1/4" PLANER KIT LONG SHOE	109
BT2500	10" TABLE SAW	279

HITACHI
C8FB
8" COMPOUND MITER SAW
$465.00

C12FA	12" MITER SAW	$329
TR8	1 1/2 HP PLUNGE ROUTER	117
F20A	3 1/4" PLANER	95
SB-75	3 x 21 BELT SANDER W/BAG	129
SB8T	3 x 24 BELT SANDER W/BAG	139
SV12SA	1/4 SHEET FIN. SANDER	48
DTC10	7.2V 2 SPEED CORDLESS DRILL	79
DRC10	SAME AS ABOVE BUT W/CLUTCH	85
DV10D	CORDLESS HAMMER DRILL	119
D10VC	3/8" VSR DRILL	69
C7SA	7 1/4" CIRCULAR SAW	69

Panasonic Cordless

EY571B	9.6V VS W/KEYLESS CHUCK	$134
EY6205B	12V VS 15 MIN CHRGE KEYLESS	210
EY6200B	12V 2 SPD, 1/2" CHUCK 15 MIN	199

FREE FREIGHT
& SAME DAY SHIPPING
ON MOST ORDERS

BOSCH
3 1/4 HP VAR. SPEED
1611EVS PLUNGE ROUTER
$225.00

1158VSR	3/8" VSR DRILL	$ 58
1272	3x24 BELT SANDER	162
1273	4x24 BELT SANDER	167
1273DVS	4x24 BELT SANDER	185
1347A	4 1/2" MINI GRINDER	84
1580VS	VS VAR. ORBIT JIG SAW	99
1581VS	TPO HANDLE JIG SAW VS	129
1601	1 HP ROUTER	95
1604	1 3/4 HP ROUTER	119
1608	LAMINATE TRIMMER	80
1609K	TRIMMER INSTALLERS KIT	159
1611	3 HP PLUNGE ROUTER	209
1651/54	7 1/4" BUILDERS SAW	97
1922K	ORB. CORDLESS JIG SAW KIT	150
3050VSRK	CDLS DRILL 9.6V 2 BAT/CASE	128
3258	3 1/4" PLANER	119

freud JS100
$158
BISCUIT JOINING MACHINE

LU72M010	10"x 40T ATB CARBIDE	$ 36
LU82M010	10"x 60T TC CUT OFF CARB	45
LU84M008	8"x 40T ATB COMBO CARBIDE	38
LU84M011	10"x 59T ATB COMBO CARBIDE	41
LU85M010	10"x 80T ATB CUT OFF CARB	56
LU85M014	14"x 108T ATB CUT OFF CARB	97
LM72M010	10"x 24T ATB RIPPING CARB	37
LU73M010	10"x 60T ATB CUT OFF CARB	43
LU87M010	10"x 24T THIN KERF RIP	39
LU88M010	10"x 60T THIN KERF CROSSCUT	46
LU89M010	10"x 72T TC NON FERROUS	64
LU98M010	10"x 80T TCG SUPERIOR	69
LU78M010	10"x 80T ATB CROSSCUT	69
TK206	10"x 24T ATB	21
TK306	10"x 40T ATB	27
TK906	10"x 50T COMBO	29
PS203	7 1/4"x 24T ATB CARBIDE	19
PS303	7 1/4"x 40T ATB CUTOFF	23
DS308	8"x 18T DADO SET CARBIDE	107
WC104	4 PIECE CHISEL SET	39
WC106	6 PIECE CHISEL SET	52
WC110	10 PIECE CHISEL SET	79
DB107	7PC BRAD POINT SET	19
CS106	6PC CARVING SET	73
CS112	12 PC CARVING SET	129
FRT2000	ROUTER TABLE	169
EB100	EDGE BANDING SYSTEM	229
FB-107	7 PC FORSTNER BIT SET	49
FB-100	16 PC FORSTNER BIT SET	169

READER SERVICE NO. 36

Protect Your Back Issues

SLIPCASES FOR YOUR BACK ISSUES. Bound in blue and embossed in gold, each case holds at least 7 issues of *Fine Woodworking* (a year's worth), and costs $7.95 ($21.95 for 3, $39.95 for 6). Add $1.00 per case for postage and handling. Outside the United States, add $2.50 each (U.S. funds only). PA residents add 6% sales tax. Send your order and payment to the address below, or call toll-free, 1-800-972-5858, and use your credit card (minimum $15). Jesse Jones Ind., Dept. FWW, 499 E. Erie Ave., Philadelphia, PA 19134. (No P.O. boxes, please).

12" VS WOOD LATHE
OVERARM ROUTER

MODEL #46-541S
• Single Phase, 3/4 HP Motor.
MODEL #43-502
• Single Phase, 2 HP Motor.
Limited Quantities!
FREE FREIGHT
TOOL CRIB OF THE NORTH
DIVISION OF acme Electric
P.O. BOX 1716
Grand Forks ND 58206-1716
1-800-358-3096

READER SERVICE NO. 203

Rated #1

Saw shown with Optional Motor Cover

Rated # 1 by WOOD® Magazine

* Less electrics

GENERAL Tools

Built to last a lifetime

* **10" Table Saw** standard fence **350-1**	$1180
* with 50" Beisemeyer fence **350-T50**	$1320
* with 50" Paralock or Excalibur **350P50/E5**	$1385
* **15" Bandsaw** enclosed stand **490-1**	$795
* **Variable Speed Lathe 160-2**	$1040
Variable Speed Lathe 1hp **260-1**	$2065
* **8" Jointer** enclosed stand **480-1**	$1395
* **15" Drill Press** 6 Speed **34-01**	$499
* **3/4 " Spindle Shaper 2800-B**	$1295
* **1 1/4" Spindle Shaper SS032**	Call
* **14" Radial Arm Saw V154**	Call
* **Dowel Machine** 3/8"-11/4" **DM-032**	$635

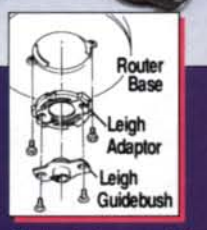
To Order or get Information:

SISCO SUPPLY Inc.
102 Kimball Ave
So. Burlington, Vt.
05403

802-863-9036

READER SERVICE NO. 9

NEW! The Leigh Universal Template Guidebush System



Simplify Your Router Set-up - and Save Money!

Now, you don't have to struggle to find the right combination of guidebushes and adaptor plates, or buy different adaptor plates for every router in your shop. The Leigh Universal Template Guidebush System works with virtually all popular plunge router models. With just two adaptor plates, we've designed a system that lets you mount our new precision Leigh Guidebushes to A.E.G., Bosch, Elu, Freud, Hitachi, Makita, or Ryobi routers. Leigh Guidebushes are accurate to .002 inches, and feature deep steel barrels for secure template routing. They're the perfect companion for your Leigh jig!

Bonus Feature!

Leigh adaptor plates also accept commonly available Porter Cable and Black & Decker guidebushes. A unique added feature prevents turning during installation or removal, a familiar headache when mounting these guidebushes. Ask your dealer for details.

LEIGH

Leigh Industries Ltd. PO Box 357 Port Coquitlam BC Canada V3C 4K6

Sleeveless

DRUM SANDER

Uses regular sandpaper– no pre-made sleeves to buy!

Lifetime Guarantee

USE ON:
Drill press, motor, lathe, combo-tools, radial saw, drills.

Twist of key tightens sandpaper to drum. Rubber backing insures long sandpaper wear.

1" x 3" long	$14.95
2" x 3" long	$16.95
2 1/2" x 3" long	$17.95
3" x 3" long	$18.95
1" and 2 1/2" above	**$29.95**
Set of 4 above	**$59.95**
3/4" x 3" long	$15.95
2 1/2 x 4 1/2" long	$22.95
3" x 4 1/2" long	$24.95
2 1/2" x 6" long	$27.95
3" x 6" long	$29.95

Add $2.50 per order for shipping.

AVAILABLE WITH:
* 1/2" bore with 1/2", 3/8", or 1/4" shaft
* 1/2-20 RH threads (except 3/4" x 3")
* 5/8" bore (except 3/4" x 3" and 2" x 3")

MC, Visa, Check or Money order to:
SINGLEY SPECIALTY CO. INC.
P.O. BOX 5087F, GREENSBORO, N.C. 27403
CALL: (919) 852-8581

READER SERVICE NO. 12

HARTWOOD, LTD.

We stock the best available **Appalachian** and **Exotic** hardwoods, **veneers** and **plywood**.

Exceptional widths and thicknesses in stock.

Turning and carving blocks.

Call or write for our free price list and newsletter.

Let us introduce you to one of the largest lumber selections anywhere.

P.O. Box 323, Dept. 1B, East Golden Lane
New Oxford, PA 17350 **FAX: (717) 624-4365**
Phone: (717) 624-4323 or (717) 334-9301

READER SERVICE NO. 83

LENEAVE QUALITY—SINCE 1957

NORTHSTATE 15" PLANERS

- **Model 310: *$779***
- Powerful 3 hp motor
- Cast iron construction
- Magnetic switch
- 1 year warranty
- Dust hood
- Anti-kickback
- Stand included

- **Model 315: *$849***
- Same features as the Model 310 plus:
- Table extension
- 2 speeds

NORTHSTATE PLANERS

- 20", 5 hp: ***$1,350***
- 24", ***$2,795***
- 5 hp & 7-1/2 hp

NORTHSTATE 8" CABINET SHOP JOINTER

- Heavy cast iron const.
- 2 hp, single phase
- 9" x 67" bed
- 3 knife cutter head
- Dual tilt fence
- Magnetic controls
- **SALE: *$795***
- **6" jointer: *$350***
  12" jointer: *$1,895*
- **Delta 8" jointer: *$1,295***

RAISED PANEL DOOR MACHINE

- Requires 6 sq ft space
- Set-up time reduced by 80%
- Easy top side adjustments
- All cutters fully guarded
- Cutters included
- Safe, easy operation

- ***Freeborn & Freud Shaper Cutters avail.***

NORTHSTATE WIDE BELT SANDER

- Best buy in the industry!
- Variable speed
- Platen head
- Dual motors
- Heavy cast iron & steel
- Plate construction
- 10, 15, & 20 hp
- 25" List: $8,650
- ***SALE: $5,895,*** 15 hp
- 37" List: $12,900
- ***SALE: $8,888,*** 20 hp
- Phase converter avail.

NORTHSTATE DUST COLLECTORS

- **2 hp, 2 bag: $325**
- **3 hp, 4 bag: $489**

MAJOR BRANDS OF PNEUMATIC TOOLS ON SALE. Call for Specials.

EMGLO

- AM78-HC4V, 1-1/2 hp twin tank: ***$297***

NORTHSTATE 10", 12", 14" CABINET SHOP SAWS

- 3, 5, 7-1/2 hp motors
- Magnetic controls
- Cast iron top
- Uni-lock fence
- VERY HIGH QUALITY
- ***$1,125*** w/std fence
- ***$1,225*** with 50" rip fence

- **Free freight on portable tools**
- **HTC BASES AVAIL**

NORTHSTATE CABINET SHOP SHAPER

- 3 hp/1 ph, 5 hp/3 ph
- 2 speed-reversible
- 2 spindles: 3/4", 1-1/4"
- 1/2", 1" available
- Router collets avail.
- Cast iron table
- Spring hold down & miter gauge
- Extra heavy duty
- 1 year warranty
- ***$1,095***
- FREE FREIGHT
- **Tilt spindle model avail.**

We try not to be undersold, tell us our competitors' prices. "Prices Subject to Change"

PORTER CABLE

555: Plate Jointer: ***$159***
330: Sander: ***$54***
360: Sander: ***$174***
505: Sander ***$108***
351: Sander: ***$124***
352: Sander: ***$124***
363: Sander: ***$179***
362: Sander: ***$184***
361: Sander: ***$165***
7548: VS jigsaw: ***$124***
9627: Rec. Saw: ***$125***
518: Router: ***$330***
520: Router: ***$315***
690: Router: ***$121***
630: Router: ***$110***
314: Saw: ***$119***
315: Saw: ***$112***
9118: Plane Kit: ***$185***
97310: Lam. Trim Kit: ***$185***
7334: Orbital Sander: ***$118***

HITACHI

C15FB: Mitre Saw: ***$380***
C8FB: Comp.Mitre: ***$465***
TR-12: Pl. Router: ***$175***
F20A: Plane: ***$99***
CC14: Chop saw: ***$196***
D10D: Cordless Drill: ***$109***
CB75F: Re/band-saw: ***CALL***
M12V: 3 1/4 hp, vs router: ***$248***

DEWALT

7749: Radial Arm Saw: ***$595***
7770-10: Radial Arm Saw: ***$776***
7790: Radial Arm Saw: ***$996***
1765: Belt/Disc Sander: ***$389***

All Dewalt Ind. radial arm saws available

- ***Freeborn Shaper Cutters***
- ***Mini-Max Machinery***
- ***Adjustable Clamps***

UNIQUE Raised Panel Door Machine

- A Raised Panel Door Machine that machines all five components with only one operator!
- Eliminates Pre-Bandsawing of arches
- Produce a complete door in less than 2 minutes

DELTA SPECIALS

46-541: Lathe: **Call for promo price**
43-375: Shaper: ***Call for rebate special***
Unisaws - All models - Call for rebate specials
40-601: Scroll Saw: ***$678***
31-730: Belt/Disc Sander: ***$995***
37-350: 8" Jointer w/stand: ***$1,290*** after rebate
34-444: 10" Contr. Saw: ***$595***
34-445: 10" w/Unifence: ***$769***
28-283S: 14" Bandsaw: ***$677***
28-246: Bandsaw w/access: **Call for acces.special**
17-900: 16-1/2" Drill Press: ***$375***
43-122: Shaper: ***$599***
33-990: 10" Radial Arm Saw: ***$560***
34-985: Stock feeder: ***Call for special***
34-994: Stock feeder: ***Call for special***
34-995: Stock feeder: ***Call for special***
Complete Delta line available.

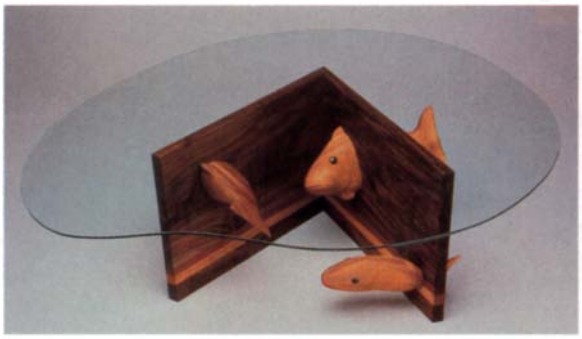
We try not to be undersold, tell us our competitors' prices.

LENEAVE MACHINERY & SUPPLY COMPANY
305 West Morehead St., Charlotte, NC 28202 (704) 376-7421; Toll free outside NC ***800-326-3431***

Photo: John Black

Women in the Woods

Nine furnituremakers from Washington and Oregon were featured in the "Women in the Woods" show held recently at the Made in Jefferson Gallery, Jefferson, Oreg. The cherry settee above is one of a series of similar benches made by Eddee Edson of Seattle, Wash., in the past year. Beth Yoe, of Portland, Oreg., reinterpreted Chinese "cracked ice" lattice work within the back of her Charles Rennie Mackintosh-inspired maple chair, shown in the photo at right.



Jennifer Schwarz of Seattle, Wash., had several pieces in the "Women in the Woods" show that combined figurative carving within more traditional furniture forms. She livened up her simple, walnut-and-purpleheart coffee table, above, by adding three mahogany fish "swimming" below the surface. Portland, Oreg., furnituremaker, Vickie Hughes, made her hall table at right with a Carpathian-elm-burl-veneered top supported on maple rails and black-lacquered legs. Each leg is capped with a sterling silver dome and supported by a chased silver foot.

Woodworking conference

The fifth annual Southern California Woodworking Conference (SCWC) will be held Aug. 8-12, 1990 at Harvey Mudd College in Claremont, Cal. The conference, put together by Flo Bishop and Howard Lewin, co-directors, has become an annual event that features woodworking instructors from all over the country.

I attended the 1989 conference and was impressed by the scope of the four-day program. About 25 instructors, including some of today's best-known woodworkers, such as Art Carpenter, Gary Bennett, Michael Dunbar, Rude Osolnik, Richard Raffan and Bob Stocksdale, conducted more than 115 open-forum seminars and 27 hands-on workshops covering a wide range of topics.

Woodturning was emphasized as 13 of the 27 workshops were conducted by turners that included Clead Christiansen, Todd Hoyer and Bonnie Klein. Younger participants also had a chance to get their hands dirty in toy-making workshops by Sheila Dawson or a stool workshop by Don Weber (shown in progress in the left photo on p. 108). There was so much offered that in spite of 12-hour days, I wasn't able to see and do everything.

This year's conference will feature many of the same instructors, as well as three or four new additions (not yet announced). Also, there will be more emphasis on hands-on classes, and the demonstrations will concentrate on the steps involved in

Photos this page unless otherwise noted: David Brown

WHOLE EARTH ACCESS

CALL TOLL FREE
7 DAYS A WEEK
(800) 829-6300

FREE FREIGHT ON ALL PORTABLE TOOLS
IN CONTINENTAL USA · FOB BERKELEY · VISA MC

PORTER+CABLE

5" Random Orbit Sander
7334 **119.**

NEW! SAW BOSS 6" Circular Saw
345 **99.**

Speed-Bloc Finishing Sander **55.**

Milwaukee

3/8" VSR Drill
0222-1 **99.**

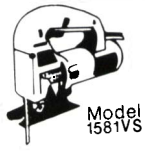
2 Speed Sawzall
6511 **124.**

Makita

VS Cordless Driver/Drill w/Clutch Kit
6093DW **135.**

7¼" Framers Saw w/hypoid gears
5077B **139.**

BOSCH



Model 1581VS
Variable Speed Variable Orbit Jigsaw **135.**

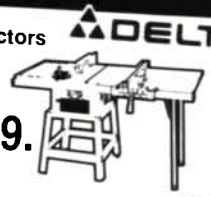
3 HP Plunge Router
1611 **198.**

HITACHI

1/2" Plunge Router
TR12 **175.**

NEW! 8½" Compound Miter Saw
C8FB **499.**
FREIGHT INCLUDED

DELTA



10" Contractors Saw w/30" Unifence
Model 34-445
(table optional) **769.**

RYOBI

10" Portable Planer
355.
Model AP10
FREIGHT INCLUDED

SKIL

12 V. VSR Cordless Drill Kit
Model 2735:04 **135.**

PORTER CABLE

7556	2-Spd. rt. angle dril	185.
303	Pro 7" paint remover	155.
304	Pro 7" disc sander	125.
305	Pro 7" disc polisher	125.
320	Abrasive plane	109.
367	3¼" plane	150.
9118	Porta-plane kit	209.
9652	Versa-plane kit	315.
7310	Laminate trimmer	95.
7312	Offset base lam. trimmer	124.
7319	Tilt base lam. trimmer	109.
7399	Drywall cutout unit	78.
100	7/8 HP router	98.
518	3 HP microprocssr, 5spd.	339.
536	1½ HP speedmatic	195.
537	1½ HP spdmatic, d-handle	209.
630	1 HP router	119.
690	1½ HP router	125.
691	1½ HP router, d-handle	135.
555	NEW! plate joining machine	165.
505	½ Sheet pad sander	112.
352	3"x21" dustless belt sander	129.
360	3"x24" dustless belt sander	175.
362	4"x24" dustless belt sander	185.
503	3"x24" wormdrive belt sander with bag	369.
314	4½" Trim saw	125.
315-1	7¼" Top handle saw	115.
548	Heavy duty bayonet saw	195.
7548	VS, var. orbit, d-handle jigsaw	129.
7648	VS, var. orbit jigsaw	139.
9637	NEW! Full VS Tigersaw Kit	155.
9629	Var. spd Tiger saw w/case	135.
7523	Pos. clutch screwdriver	155.
7542	TEKS Driver	125.
7545	VSR Drywall driver	109.
621	3/8" VSR Drill	95.
7511	3/8" VSR Drill	109.
7514	1/2" VSR drill	119.
666	3/8" T-Handle drill	120.
9647	Tiger Cub all purp. saw kit	119.

SKIL

77	7¼" worm drive saw	145.
5825	6½" Worm drive saw	155.
5510	5½" Trim saw	99.
5790	10¼" Circular saw	275.
5865	8¼" Worm drive circular saw	164.

FREUD

LM72M008	8"x24T Rip	32.
LM72M010	10"x24T Rip	37.
LU73M010	10"x60T ATB	43.
LU81M010	10"x40T thin kerf	42.
LU82M010	10"x60T TCG	45.
LU84M008	8"x40T combination	39.
LU84M011	10"x40T combination	39.
LU85M008	8"x64T ATB fine cut-off	49.
LU85M010	10"x80T ATB fine cut-off	59.
LU85M014	14"x108T ATB fine cut-off	109.
LU85M015	15"x108T ATB fine cut-off	109.
LU87M010	10"x24T thin kerf	39.
LU88M010	10"x60T thin kerf	49.
LU91M008	8½"x48T ATB miter saw blade	39.
LU98M010	10"x80T TCG	69.
PS203	7¼"x24T gen. purpose	17.
PS303	7¼"x40T fine cut	24.
SD308	8" Dado set	115.
EB100	Edge bander	269.
EC900	5 pc. shrper cutler set	279.
88-100	9 pc. router bit set	99.

FREUD cont'd

90-100	15 pc. router bit set	169.
FB-107	7 pc. forstner bit set	49.

MILWAUKEE

0239-1	1/2" drill, keyless chuck	135.
0224-1	3/8" Magnum holeshooter	114.
0234-1	1/2" Magnum holeshooter	115.
0375-1	3/8" close-quarter drill	129.
0379-1	1/2" close-quarter drill	149.
1676-1	Hole-hawg kit	230.
3002-1	Electricians rt. ang. drill kit	185.
3102-1	Plumbers rt. ang. drill kit	189.
5397-1	3/8" VS hammer drill kit	145.
8975	Heat gun	59.
5680	2 hp router	220.
5925	3"x24" dustless belt sander	219.
5936	4"x24" dustless belt sander	225.
6012	1/3 Sheet pad sander	109.
6014	1/2 Sheet pad sander	115.
6215	16" Electric chainsaw	185.
6226	2 speed bandsaw w/case	265.
6246	Single speed jigsaw	130.
6256	Variable speed jigsaw	140.
6507	Var. sp. sawzall w/case	129.
6365	7¼" top handle circular saw	115.
6377	7¼" wormdrive saw	175.
6405	8¼" circular saw	129.
6539-1	Cordless screwdriver	69.
6543-1	VSR Screwshooter	145.
6750-1	VSR Drywall driver	95.
6754-1	VSR Magnum drywall driver	119.
6798-1	Adj. clutch screwshooter	109.

HITACHI

F20A	3¼" Plane	99.
TR6	Laminate trimmer	95.
TR8	¼" Plunge router	119.
CR10V	VS, Var. orbit recipro saw	129.
M12V	NEW! 3HP VS plunge rtr	255.
D10D	3/8" 9.6 v. cordless driver/drill	115.
W6V1	0-4000 drywall screwgun	79.
C10FA	Deluxe 10" miter saw	289.
C15FB	Deluxe 15" miter saw	389.*
F1000A	12" Planer/6" jointer combo	1599.*
CB75F	Band saw	1699.*
R100	Dust collector	559.*
P100F	12" Planer	1159.*

RYOBI

RA200	8" portable radial arm saw	259.
L120UK	3-5/8" Planer kit	99.
R500	2¼" HP plunge router	159.
R150K	1 HP plunge router kit	99.
TR30U	Laminate trimmer	79.
B7075K	3"x21" Belt sander kit	119.
S500A	Finishing sander, 1/6 sheet	36.
TS251U	10" Miter saw	185.
TS380	14" Miter saw	345.
RE600	3 HP Electronic VS Plunge Router	215.
JP155	6 1/8" VS Joint Planer	330.

MAKITA

6302	1/2" Drill	125.
6012HDW	2-Spd. cordless driver/drill kit	125.
6510LVR	3/8" Drill, heavy duty	79.
9207SPC	7" Electronic sander/polisher	155.
3612BR	1/2", 3HP Plunge router	195.
2708W	8" Table saw/carbide blade	259.
9401	4"x24" Dustless belt sander	169.
9900B	3"x21" Dustless belt sander	145.
LS1020	10" Miter saw	249.
3380	Jointer/spliner	299.
3303	HP Plunge router	159.
3304	1 hp electronic plunge router	189.
4023	3x21 belt sander	195.

Call ELU for products not listed

KANGO

950S	2" Rotary hammer	799.

BLACK & DECKER

2690	7¼" Builder's saw cat	112.
2700	7¼" Worm drive saw	139.
7790	12" DeWalt cont. radial arm saw	945.*
7770-10	10" DeWalt cont radial arm saw	759.*
HBSE75S	3x21 VS Belt Sander	155.
EZ502	Cordless screwdriver	59.
OFS50	1HP plunge router	169.
SCR2-2	Drywall screwdriver	95.
EZ1381	½" VSR cordless driver/drill	145.

BOSTITCH

N60FN	Finish Nailer	339.

NORTON

85960-9	Multi-oilstone	119.

ADJUSTABLE CLAMP

		EA.	BOX/12
#50	'PONY' clamp fixture	7.95	89.00
#52	'PONY' clamp fixture	6.25	69.00
		EA.	BOX/6
3/0	6" JORGENSEN h/screw	8.95	49.95
2/0	7" JORGENSEN h/screw	9.95	53.50
#0	8" JORGENSEN h/screw	11.95	62.95
#1	10" JORGENSEN h/screw	12.95	69.95
#2	12" JORGENSEN h/screw	14.95	79.95
3712	12" Steel bar clamp	6.50	37.50
3724	24" Steel bar clamp	7.75	45.00

LEIGH

D1258-12	12" Dovetail jig, blind & through	259.
D1258-14	24" Dovetail jig, blind & through	309.

LAMELLO

Junior	Std. hand joining machine	CALL
Top-10	Deluxe hand joining machine	CALL
Standard	NEW, hand joining machine	CALL
Plates	# 0,#10,#20, 1000/box	29.

BOSCH

1582VS	VS, Var orbit jigsaw w/clic	135.
3238VS	VS, Var orbit std duty jigsaw	105.
1654	7¼" Builders circular saw	99.
1500	16 gauge shears	229.
1942	Heavy duty heat gun	75.
3268	Std. duty heat gun	65.
3528	3¼" Power plane	129.
1600	2½ HP, D-Handle router	259.
1604	1¾ HP, Router	119.
1606	1¾ HP, D-Handle router	140.
90300	3¼ HP Production router	349.
1609K	Laminate trimmer installer's kit	169.
1609	Off set base laminate trimmer	119.
9164VSR	⅜" Mighty Midget VSR drill	105.
1631K	2 spd Panther Recipro Saw	129.
1611EVS	3HP VS plunge router	235.
1608T	NEW!! tilt base laminate trimmer	109.
1632VSK	VS, Var orbit Panther recipro saw	135.
1530	14 gauge nibbler	299.
1166VSR	½" Mighty Midget VSR drill	115.
1158VSR	⅜" VSR drill	69.
1198VSR	½" VSR hammer drill	135.
11203	1½" Rotary hammer	449.
11212VSR	¾" VSR bulldog SDS rotary hammer	195.
11304	Brute breaker hammer	1299.*
11305	Demolition hammer	695.
1272D	3"x24" dustless belt sander	175.
1273D	4"x24" dustless belt sander	179.
1273DVS	4"x24" VS, dustless belt sander	189.
3270D	3"x21" dustless belt sander	135.
1347A	4½" mini grinder, ⅝"arbor	89.

DELTA

34-761	10" 1½ HP Unisaw	1289.*
32-100	NEW! Stationary Plate Joiner	399.*
34-782	10" Unisaw, w/unifence 3HP	1695.*
34-783	10" Unisaw, w/unifence 3HP	695.*
43-375	2 Spd. wood shaper	1579.*
33-050	Sawbuck	569.
33-990	10" Radial arm saw	549.*
11-950	8" bench drill press	135.
17-900	16.5" Drill press	359.*
28-283	14" Wood band saw w/¾ HP motor encl. steel std	675.*
34-444	10" Contractors saw	619.
28-245	14" wood banc saw w/std. ½ HP motor	495.*
43-122	Shaper, light duty, 1HP, 1PH	599.*
22-661	NEW! DC-33 13" Planer	1099.*
37-154	6" long-bed jointer w/electricals	999.*
37-350	8" long-bed jointer w/electricals	1350.*
31-730	6" Belt, 12" disc w/electricals	995.*
34-985	Production stock feeder	575.*

CALL FOR QUOTES ON MACHINES NOT LISTED

DAVID WHITE

LP6-20	Sight Level Package	229.

PRICES EFFECTIVE FOR MAIL & PHONE ORDERS ONLY. **822 ANTHONY ST., BERKELEY, CA. 94710** ERRORS SUBJECT TO CORRECTION.

READER SERVICE NO. 74

Don Weber of Mendocino, Cal., teaches John Webster, Porterville, Cal., drawknife techniques, while David Furey, Riverside, Cal., shapes a leg for his three-legged stool.

completing specific projects, rather than just showing disparate techniques.

The on-campus accommodations provided quite palatable, all-you-can-eat meals and a room. While not exactly the Hilton, the rooms were conveniently near classes and the "quad," where instructors and participants shared pizzas, songs and conversations at the end of the long days.

For info, contact SCWC, 3825 W. 139th St., Hawthorne, Cal. 90250; (213) 679-2485.

—Charley Robinson

Confessions of a pack rat

I'm a pack rat. I save everything. There, I've said it. Once you admit it, you're halfway to being cured. But I'm going to take it a day at a time. Today I'm going to start not saving anything. I'm not going to add that little piece of wood under the workbench to my enormous bin of clamp pads; that small chunk of exotic wood will not go into the box labeled "stock for wooden jewelry"—I've never made any wooden jewelry anyway. And I certainly don't need any more bits of veneer to repair joints I've cut badly, and I don't need any plywood scraps for backing boards on the drill press. Today I will not save the sawdust from under the jointer, the tablesaw and the bandsaw, mix it with crank-case oil and make coarse, medium and fine sweeping compound.

Temptation is everywhere, especially under the bandsaw where you can find fantastically shaped cutoffs that are often more interesting than the part you made. One thing I don't save anymore is bench-plane shavings—those beautiful, multicolor, multitexture curls of wood that have to be useful for something. I tried some as decorative mulch in the garden, and it looked great. But the next morning, I discovered that the evening winds had redistributed that beautiful mulch all over the neighborhood.

To rid yourself of a bad habit, it is best to have a specific goal. My goal is to have room for two people in my workshop at the same time. When people want to tour my workshop, they have to go in one at a time, while from the doorway I yell directions and point out things of interest.

Even though my accumulation of stuff ends up in the workshop, it doesn't always start there. My sources are many and varied, and nothing is safe from the grab. I have coffee cans stacked so high that every so often, for no apparent reason, they tumble down and create a terrible cacophony. However, I've learned to put the full cans at the bottom of the pile. One such can holds my "special" hinges—special in that no two match. When I find a use for them, I'm going to write an article about "things to make that need only one hinge."

Another container labeled "possible feet for little boxes" is full of various-size plastic bottle caps, caps from toothpaste tubes, wooden thread spools and old V-belts. Speaking of thread spools, they're very versatile. Run a bolt through the center and you have a drawer/door pull for a utility project, or slip one over a drill bit and you have a depth stop. Thread spools glued end to end become a file handle or a holder for pencils, drill bits, small files, etc.

Carpet scraps are another versatile item. They can be used on top of sawhorses or on the workbench as project protectors, polishing pads, paint or finish daubers, and holders for small parts while sanding. While that's all well and good, I have enough scraps to recarpet my whole house.

Some functions are served by a variety of different objects. For glue spreaders, I have saved broken hacksaw and bandsaw blades, Popsicle sticks, expired credit cards and plastic handles for foam brushes, not to mention the traditional artist's palette knife and mini paint roller. My many pointed tools, needle files, drill bits, pencils and small cleaning brushes are far overshadowed by the holding devices I have for them: old distributor caps, glued-together cubes of corrugated cardboard, chunks of Styrofoam, cigar tubes and hardware cloth rolled into a cylinder. I needn't look far before I find a container for mixing glue with sawdust or for making up a batch of glue or epoxy: bubbled packing plastic, spray-can caps and screw-top lids work great, although I frequently use the bottom of an empty soft-drink can.

If you think that everything possible has been covered, you don't know the extent of my affliction. I use broken bandsaw blades in a coping saw or scroll saw, or I bond them together into a rasp; plastic jugs serve as various-size funnels or a portable-drill holster; lengths of garden hose protect handsaw teeth; spray-can nozzles replace ones that get clogged; Popsicle sticks are mini sanding blocks; old inner tubes are clamping bands. And there are the usual things everyone has: nuts, bolts, screws, nails, other hardware, wood, tools, etc.

Today as I relinquish my status as a world-class pack rat, not only will I not save anything, I will take some positive action. I'll retract my standing request from older friends for empty pill bottles, and from golfing friends for old golf balls to put in varnish to expel the air from the can. Out with the trash go those old lawn-chair frames that I planned to make into wind chimes, those old wooden toilet seats that would have made nice oval picture frames, ...

—Dario Biagiarelli, Kirkville, Ky.

The Radi-Plane is available in two models, the maple-bodied roundover model, shown here, and a chamfering plane with a walnut body.

Product reviews

Radi-Plane, *L.A. Mathers Co., 3362 E. McAllen Road, Stockton, Cal. 95205.*

The Radi-Plane offers a neat, reasonably priced (about $20) way to put a small radius on the edges of wood, especially when the project is too small to warrant setting up your router or when you have problems finding small-radius roundover router bits. You could, of course, sand the proper radius, but I've always found that job tedious and inconsistent. The well-designed hard-maple body of the Radi-Plane is about 6 in. long with a 90°-angle brass sole and two concave-shape cutters, which are set individually so that the front cutter makes about 80% of the cut and the back cutter provides a clean finish cut. Blade adjustments are made by turning set-screws with an Allen wrench. Depth adjustment is a bit awkward at first because the adjustment screws turn counterclockwise to lower the cutter, which is opposite what you might expect. However, the lateral adjustment screws work well and as expected. The instruction sheet provides good drawings and a clear explanation of how to set up and use the plane; unfortunately, it provides no guidance for disassembly and sharpening.

I avoid a deep starting cut at the end of a board by placing the plane about 2 in. from the end and planing back toward the end. To help reduce tearout, change the direction you are working so that you plane with the grain. Also, tilting the plane slightly to one

Fresh Solutions to Old Problems – Satisfaction Guaranteed

At Last! A Comfortable Dust Mask That Really Works

Light, cool, easy-breathing and totally effective, our **Dustfoe® 66** mask fits any face and seals almost perfectly. Soft rubber gasket and exhalation valves keep filter dry and won't fog safety glasses. Comes with 6 filters. OSHA/NIOSH approved for dusts and mists.

DF66	**Dustfoe Dust Mask**	**$24.95**
DFF	**Pack of 5 repl. Filters**	**6.95**

Take the Danger Out of Wood Finishing with HYDROCOTE® water-base Finishing Products

Non-toxic, non-flammable, environmentally safe HYDROCOTE® lacquers & polyurethanes are fast-drying, superbly durable and easy to apply by either brushing, wiping or spraying.

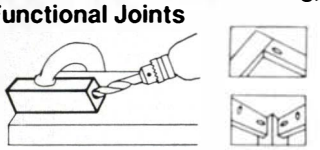
Hand starter kit contains one quart each Gloss & Satin lacquer, quart Sanding Sealer, pint Flow-Out, and half-pint each Rubbing & Polish compounds. Spray kit contains one gal. each of Satin, Gloss, & Sealer, one quart Reducer/Flow-Out, half-pint each Rubbing & Polish compounds.

Poly Starter kit provides one quart each Satin and Gloss interior polyurethane.

All kits include application guide.

19.61.08	**Hand Starter Kit**	**$29.95**
19.61.10	**Spray Starter Kit**	**79.95**
19.61.14	**Poly Starter Kit**	**24.95**

Pocket Hole Drill Guide Makes Quick Work of Strong, Functional Joints



Flush, offset, and right-angle screw assembly is neat and nearly automatic with our simple 3/8" pocket hole guide. Features hardened steel bushing for long wear. Works with standard-length 3/8" bits. Self-positioning; sets up in seconds with one C-clamp. User's guide included.

07.52.11 Pocket Hole Guide $12.95

Change Grits on Your Finish Sander in Seconds with Stikit

3M's new Stikit sandpaper eliminates awkward clamps and guarantees a tight fit with no paper slippage. Just cut or tear paper to size and slap it on 3M's custom backing pad – lift a corner and peel off to change. No-fill silicon carbide paper works on wood, metal and finishes. 10-yard roll makes 90 4" sheets. Conversion facing adapts other sanders up to half-sheet size.

15.61	**Stikit (4-1/2" x 10 yd.)**	**$12.95**
	(Specify 80, 100, 120, 150, 180, 220, or 320 grit)	
15.61.01	**Backing Pad for Makita BO4510 Palm Sander**	**5.95**
15.61.02	**Backing Pad for Porter Cable Palm Sander**	**5.95**
15.61.04	**Conversion Facing**	**3.95**
15.61.06	**Two-Roll Dispenser**	**14.95**

Turn Your Router into a Shaper with Freud's Affordable Router Table

Raised panels, sliding dovetails, joinery and edge treatments can all be done safely, efficiently and creatively with this well-designed table. Features a phenolic drop-in sub-base plate for fast and accessible router mounting, 30" x 21" melamine-coated work surface with mitre guide rail, adjustable fence, starter pin and guard for freeform work.

10.20.01 Freud Router Table $169.95

Make Your Own Drop-in Router Sub-Base with our Phenolic Resin Board

Phenolic resin board is the ideal material for custom drop-in sub-bases. Stiff, strong, slick and scratch resistant, it can be cut, drilled, sanded and shaped with your woodworking tools. Our 9" x 11-7/8" blank can be fitted to any router using your sub-base as a template for cutting and drilling. Great for jigs and templates, too.

10.20.05 Phenolic Resin Board $10.95

GUARANTEE

If an item you receive is not satisfactory, return it postage prepaid within 30 days and the purchase price will be refunded.
Prices are valid through Sept. 30, 1990.

Sam Maloof's Oil/Varnish & Oil/Wax Wood Finishes

Now for the first time the rich warmth and beauty of Sam Maloof's world-renowned custom finishes are yours for the asking. Poly/Oil, a mixture of polyurethane with tung and linseed oil, provides a hard, deep, durable finish for any interior woodwork. For chairs and other often-handled pieces, topcoat with Oil/Wax for an irresistably warm satin look and feel.

19.52.02	**Qt. Poly/Oil Satin**	**$9.95**
19.52.03	**Gal. Poly/Oil Satin**	**32.95**
19.52.06	**Qt. Oil/Wax**	**9.95**
19.52.07	**Gal. Oil/Wax**	**32.95**

FOR FASTEST SERVICE
Visa, MasterCard, or Discover Users
Order Toll Free 24 hours
800-241-6748 *(Orders Only)*

Or send check, money order, or charge card number & exp. date with your name & address.
Include shipping charges as follows:

If your order totals:	*Add for shipping*
Up to $30.00	*$3.00*
$30.01 to $60.00	*$4.00*
$60.01 to $90.00	*$5.00*
Over $90.00	*$6.00*

highland hardware

1045 N. Highland Ave, Dept F82
Atlanta, GA 30306 (404) 872-4466

Mail $2 for a copy of our comprehensi e tool catalog and the next two issues of Wood News, our informative tool newsletter (free with order).

INDEX TO ADVERTISERS

Accuset Tool	27
Acme Electric Tools	37, 104
Adams Wood Products	103
Airstream Dust Helmets	93
American Clamping Corp.	5
AmMax Tools	7
Ashman Technical	93
Auton Co.	90
Aviation Supply	9
Axminster Power Tool	36
Ball & Ball	90
Bartley Collection	94
Rudolph Bass	6
Berea Hardwoods	30
Better Built	33
Black & Decker	2
Blume Supply	28
Boulter Plywood	6
Calculated Industries	33
Carver Tripp	11
Cascade Tool	29
Classified	95 - 97
Clayton Enterprises	10
Clearwater Color	101
Maurice L. Condon	101
Constantine	10
Counselor Profiles	30
Craft Supplies USA	31
Day Studio	97
Delmhorst	10
Delta	9
Dollar Trading Co.	32
Dremel	15
Dust Boy	33
Ebac	16
Econ-Abrasives	23
Elmer's Wood Products	32
Fine Homebuilding	19
Michael Farr Cabinets	15
Floral Glass & Mirror	29
Forrest Manufacturing	26
Freeborn	30
Freud	13
Frog Tool	33
Furnima	23
Furniture Designs	23
Garrett Wade	94
Glass & Mirror Craft	93
Grizzly Imports	25, 29
Gulf Central Tool	22
HTC Products	31
Haney Industries	5
Harper Hardware	6
Hartwood Ltd.	105
Hida Japanese Tool	101
Highland Hardware	109
Home Lumber	6
Horton Brasses	15
Hydrocote	36
Imported European Hardware	93
Incra Jig	27
International Tool Corp.	27, 104
IWF '90	101
Japan Woodworker	93
Jesse Jones Industries	104
K & S Specialty Wood	94
Keller Dovetail	15
Kuster Mfg.	93
Laguna Tools	12
Laser Machining	33
Leigh Industries	31, 33, 105
LeNeave Supply	105
Lie-Nielsen Toolworks	33
Lignomat	30
Lobo Power Tools	23
Manny's Woodworker's Place	103
Manufacturers Service	32
Maple Ridge	5
Martin Guitar	97
Mason & Sullivan	36
McFeely Hardwoods	93
Midwest Dowel Works	29
MLCS	22, 91
Neuway Air Systems	36
Northland Woodworking	10
Nyle Corp.	94
Parks Repair Parts	5
Paxton Hardware	93
Penn State Industries	18
Performax Products	28
Powermatic	111
Rio Grande Univ.	15
Ross Industries	5
600 Group	5
Santa Rosa Tool	99
School of Classical Woodcarving	33
Schuler Toolworks	97
Seven Corners Ace Hardware	21, 94
Singley Tool	105
Sisco Supply	105
Skycroft Tools	94
Sunhill Enterprises	102
Tarheel Filing Co.	20
The Taunton Press	34, 35, 92
Tech Paper	30
Tool Crib of the North	37, 104
Tools on Sale	21, 94
Transpower	90
Vega	97
Steve Wall Lumber	103
Wedge Innovations	17
Whitechapel Brasses	5
Whole Earth Access	23, 107
Wilke Machinery	8
Williams & Hussey	16
Walter A. Wood Supply	103
Wood-Mizer	101
Woodcraft Supply	15
Woodstock Intl.	31
The Woodworking Shows	101
Workbench Tool	10

side effectively reduces the depth of cut and helps control tearout. A second pass completes the cut. If you still have problems, reduce the depth of cut by readjusting the cutters. To produce uniform results on thin flexible material, slightly bow the stock so the plane can ride on the convex side.

Although the plane feels comfortable, there are no finger holds and large jobs can make your hands sore. Once you get the feel of the plane, however, it produces good results, even if your fingers do get tired. Radi-Plane is available from numerous mail-order sources, including Trendlines, 375 Beacham St., Chelsea, Mass. 02150, and Leichtung Work Shops, 4944 Commerce Parkway, Cleveland, Ohio 44128.

—Mike Coldiron
The Woodworkers Club of Austin, Tex.

A plate-glass bottom on the Donnell sanding plane provides a flat surface for fine finish-sanding.

The Donnell Sanding Plane, *Ken Donnell, 672 Norlene, Grass Valley, Cal. 95949.*

A sanding plane is convenient for sanding pieces smooth and flat. At the heart of the Donnell sanding plane is a dependably flat backing surface: a piece of ¼-in.-thick plate glass with eased edges. The 2¾-in. by 13½-in. glass is glued to the underside of a piece of ¾-in. medium-density fiberboard (MDF). Two spring-steel clips that secure the sandpaper at either end and a comfortable hardwood handle are attached to the top of the MDF.

Donnell, who designs and manufactures tools and other products for instrument-makers, has a background as a stringed-instrument designer, maker and repairman. He originally designed the sanding plane for leveling the metal frets on the neck of a guitar or other fretted instrument. However, this well-made tool is great for all sorts of finish-sanding jobs or for any situation where a perfectly flat, smooth finish is desired. The extra weight and flatness of the glass make the Donnell sanding plane a pleasure to use. The clips make changing paper fast and convenient (easier than changing paper on some electric palm sanders), and they hold the paper in place, even during hard-pressure sanding with rough paper. Donnell's sanding plane is available for $35 from Woodworker's Supply of New Mexico (in its catalog as a glass plane), 5604 Alameda Place N.E., Albuquerque, N.M. 87113. *—Sandor Nagyszalanczy*

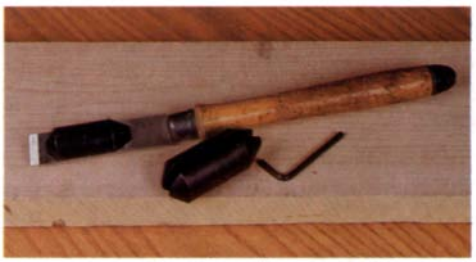
Jiggit Bandsaw Dovetail Jig, *Jiggit Co., Box 1687, Plattsburgh, N.Y. 12901.*

The Jiggit Bandsaw Dovetail Jig, made of ¼-in. PVC plastic, clamps to a bandsaw table and facilitates cutting through dovetails by holding the work at the flare angle of the pins. The fixture's base is about 10 in. by 12 in. with an overhanging table surface that looks just like a gable roof with a 2-in-12 pitch. In dovetail terms, that translates to a 1-to-6 pitch for the angle of the tails. A notch that runs in about 6 in. from one end of the fixture's peak allows the "rooftop" table surface to straddle the sawblade. Thus, a workpiece is presented to the blade on the sloping left side of the table so that one side of each pin is cut, and then it's presented on the right side of the table so that the pins' other sides are cut. The waste between pins is removed by making multiple cuts at both angles, and the length of the pins is controlled by setting the fixture's stop block behind the blade. To get the best fit, you should trim to the finished depth with a sharp chisel held vertically or you should slightly undercut to the center of the board. This allows the faces of the boards to butt together tightly. After the pins have been cut in this way, the pin stock is used to lay out the tails on the mating piece. The fixture is removed before bandsawing the waste from between the tails. Again, clean up the cuts with a sharp chisel, undercutting slightly for a tight fit.

After cutting dovetails for some small boxes, I found that using this fixture had several advantages over my usual method. I ordinarily cut the angled pin sides by hand with a dovetail saw and then remove the waste between them by making multiple cuts on the bandsaw with the table set at 90° to the blade. This must be done with the inside of the workpiece (the wide side of the pins) up so you don't saw into the flared sides of the pins accidentally. This usually results in some tearing out beyond the ends of the sawcuts, even when the stop line has been scribed. With the Jiggit, the work proceeds faster because the pins are sawn and the waste is removed in a single operation, and the finished product is superior because the cutting is done with the outside of the workpiece up, which means tearout occurs on the inside surface of the joints being cut. This reduces clean-up time significantly in a limited production situation.

I think this bandsaw fixture has definite advantages for the woodworker who wants to cut dovetails, but who hasn't the confidence to cut them completely by hand. It can also be a time-saver for the craftsman who wants a streamlined method for achieving a hand-cut look in a limited production run. The Jiggit Bandsaw Dovetail Jig is available for $49.95 from Trendlines, 375 Beacham St., Chelsea, Mass. 02150, or from the Jiggit Co. at the address given above.

—David Ray Pine, Mt. Crawford, Va.



Taming of the skew is accomplished with Stabilax, an attachment that provides easier and safer results with this difficult-to-use tool.

Stabilax, *Beech Street Toolworks, 440 Beech St., Los Angeles, Cal. 90065.*

The Stabilax, made from cold-rolled-steel bar stock with a black oxide finish, works like training wheels for your skew. When locked onto your skew turning chisel with a ⅜-24 Allen-drive setscrew, the Stabilax attachment gives improved support to the tool, thereby making it easier to handle and reducing catches. It's available for 1-in.- and 1½-in.-wide skews, but the Stabilax can also be clamped to a scraper that's used at an angle. The smaller unit, 1⅛ in. dia. by 2¾ in. long, has a ¼-in. slot and weighs about 7 oz., while the larger model, 1½ in. dia. by 3½ in. long, has a 23/64-in.-wide slot and weighs approximately 16 oz.

I found the Stabilax worked very well. Because the large round contact surface centers the downward force, the action is very smooth, which makes it easy to roll beads. The manufacturer's claim that the Stabilax's additional weight helps reduce vibration is true, but it seemed too heavy at times. With more use, the extra weight would probably go without notice.

I always worry when my students use skew chisels because of the inevitable dig ins and spoiled projects, but the safety benefits of the Stabilax are real. The consensus of the dozen high-school woodworking students that tested the Stabilax was that it reduced vibration and catches; however, it is necessary to readjust the tool rest a little farther from the work than normal. While the machine work on this tool is well done, I felt that $28.45 (including delivery) was a bit high. But perhaps that is the mark of inflation.

—Jerry Blanchard, Carmel, Cal.

Notes and Comment

Got an idea you'd like to get off your chest? Know about any woodworking shows, events or craftsmen of note? Just finished a great project? If so, we'd like to hear about them. How about writing to us? And, if possible, send photos (preferably with negatives) to Notes and Comment, Fine Woodworking, ***Box 5506, Newtown, Conn. 06470-5506.***

THE ARTISAN'S SAW

Casters Set and Stock Pusher shown on Model 63 are Optional.

Artisan's Saw also available with 50" cutting capacity

Strikingly different. A new standard for the industry.

As "the" producer of top end industrial woodworking machines since 1921, Powermatic now focuses their engineering expertise and resources for the craftsman, contractor and home hobbyist.

- Industrial Quality Vega Fence System provides unsurpassed rigidity for accuracy & speed
- T-Slot Miter Gauge for increased accuracy and flexibility in stock width capabilities
- Built-In Dust Shroud for shop cleanliness
- Cast Iron Grate Extensions provide ruggedness for increased accuracy and longevity
- Unitized Wiring System readily removed for portability
- The Powermatic Name for value and service

You'll find no better quality or value . . . anywhere. For just a little more than you'd spend on a run-of-the-mill machine.

Talk to your Powermatic distributor today. For those who want the **best**: the Powermatic 10" Artisan's Saw. Truly a new standard for the industry.

The Artisan's Choice

POWERMATIC

A Division of DeVlieg-Bullard, Inc.
McMinnville, Tennessee 37110
800/248-0144 □ 615/473-5551
TELEX - 554455
FAX # 615/473-7819

READER SERVICE NO. 66

People With Places For Things

Do you know these people? They were living fictitiously in Milwaukee, Wisc., in 1963—in the then-childhood eyes of creator Gayle Marie Weitz, who is with her friends in the group photo. Drawing on her recollections of a second-grade social-studies project of stereotypical persona, Weitz's life-size wooden cabinets portray people she had to interview: a businessman, housewife, baby, teenage boy and girl, grandparents and waitress. Not only does each character look as you might expect, but each opens in an appropriate spot to reveal pictorial expressions of thoughts and dreams, as shown below in the housewife's coupons, the teenage boy's comics and the waitress' dreams of Marilyn Monroe and Hollywood.

Photos: Jess Smith