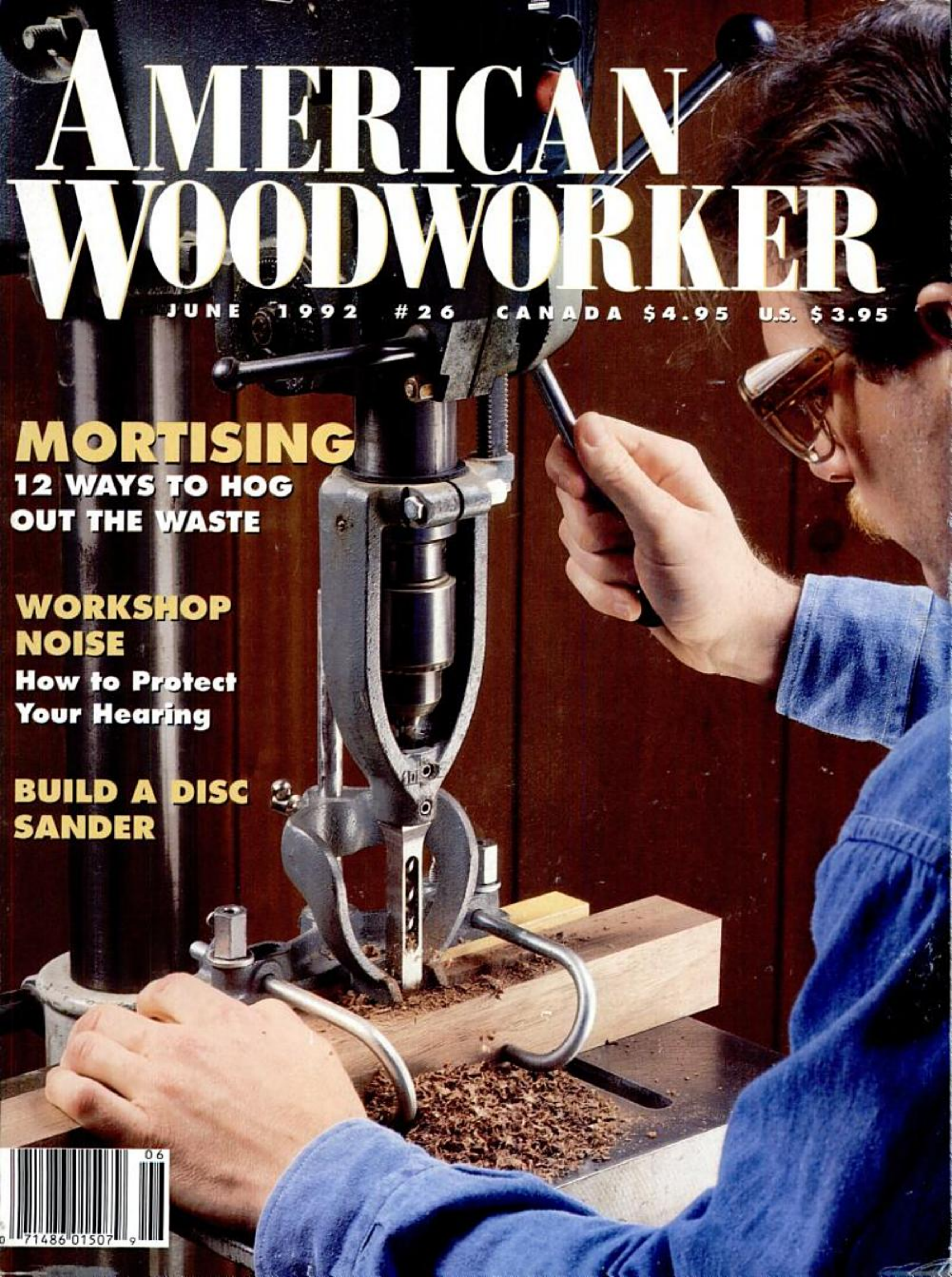




# AMERICAN WOODWORKER

JUNE 1992 #26 CANADA \$4.95 U.S. \$3.95

**MORTISING**  
12 WAYS TO HOG  
OUT THE WASTE

**WORKSHOP  
NOISE**  
How to Protect  
Your Hearing

**BUILD A DISC  
SANDER**





# AMERICAN WOODWORKER

Issue No. 26  
May/June 1992  
Cover Photo: Mitch Mandel

## C O N T E N T S



Page 45 Slanted dovetails



Page 48 Hearing protection



Page 28 Library step stool



Page 36 Pennsylvania tall clock

## F E A T U R E S   A N D   P R O J E C T S

**A Plane That's Fancy** By Mario Rodriguez  
*This Rosewood Showpiece Is Also a Workhorse*.....**18**

**Mortising by Machine** By Simon Watts  
*Attachments and Specialty Machines Make the Job Easy*.....**24**

**Sharpening a Hollow Mortising Chisel**.....**27**

**Library Two-Step** By Forrest Boley  
*Build This Portable Stairway to Extend Your Reach*.....**28**

**Cabinetmaker's Mallet** By Simon Watts  
*A Striking Success Made From Scrapwood*.....**31**

**Technicolor Turnings** By Howard Lewin  
*The Secret Ingredients Are Dyed Dowels and Glue*.....**32**

**Pennsylvania Tall Clock** By Phil Gehret  
*Part 2: Building the Bonnet*.....**36**

**Making a Shop-Built Pin Router**.....**41**

**New-Wave Table** By Glenn Hughes  
*Shaker It Ain't*.....**42**

**Angled Dovetails** By Michael Podmaniczky  
*A New Slant on an Old Joint*.....**45**

**The Dangers of Workshop Noise** By Dave Sellers  
*Listen Up! Those Machines Can Hurt Your Hearing*.....**48**

**Shop-Built Disc Sander** By Ernie Conover  
*Convert Your Lathe With This Simple Tilting Table*.....**52**

**Woodworking Vises** By Jim Barrett  
*Get a Grip on Your Work*.....**54**

## D E P A R T M E N T S

**A Word From the Editor**  
*AW's Craftsmanship Award*.....**3**

**Letters**  
*Your Comments on Our Color*.....**4**

**Q&A**  
*How to Pattern Saw a Polygon*.....**8**

**Tech Tip**  
*Storing Green Wood*.....**12**

**Calendar**  
*Workshops, Seminars, Etc*.....**58**

**Just Finishing**  
*Choosing and Using Brushes*....**62**

**Toolbox**  
*Testing the Leigh Mortising Jig*....**66**

**Gallery**  
*Five Artists Show Their Stuff*....**70**

**Final Pass**  
*Bicycling for Charity*.....**72**



## Exclusively Performax Precision Drum Sanders

5 YEAR  
ANNIVERSARY

**Our Customers Say:** "You know you really oughta tell people that the Performax really does what you say it'll do."



So After 5 Years of Ads, Here Goes: It really is rigid. It really does sand 44" wide in two passes. It really is precise. It really is affordable. It really does have new and really improved abrasive fasteners. It really is the best drum sander money can buy. It really will exceed your expectations.

**A REALLY BIG THANK YOU  
TO ALL WHO MADE  
THIS ANNIVERSARY POSSIBLE.**

For a Free Brochure and the Dealer Nearest You Call  
**1-800-334-4910**  
or (612) 895-9922  
or write: PERFORMAX PRODUCTS, AW01  
12211 Woodlake Drive, Burnsville, MN 55337

CIRCLE NO. 102 ON PRODUCT INFORMATION FORM

## HARTWOOD, LTD.

We stock the best available *Appalachian* and *Exotic* hardwoods, veneers and plywood.

Exceptional widths and thicknesses in stock.  
Turning and carving blocks.

Let us introduce you to one of the largest lumber selections anywhere.

**freud** complete line of tools and accessories.

Call or write for our free price list and newsletter.

**HARTWOOD, Ltd.**

East Golden Lane, P.O. Box 323 New Oxford, PA 17350

Phone: (717) 624-4323 or (717) 334-9301

FAX: (717) 624-4365



CIRCLE NO. 28 ON PRODUCT INFORMATION FORM

## Lie-Nielsen TOOLWORKS INC.

Route 1, Warren, ME 04864 (207) 273-2520

NEW Bronze Scraping Plane \$115.

Free Brochure of Heirloom Quality Tools



CIRCLE NO. 4 ON PRODUCT INFORMATION FORM

# AMERICAN WOODWORKER

### EDITOR AND PUBLISHER

David Sloan

### ART DIRECTOR

Michael Mandarano

### MANAGING EDITOR

Kevin Ireland

### ASSISTANT MANAGING EDITOR

Fiona Wilson

### ASSISTANT EDITORS

Ellis Valentine

Dave Sellers

### COPY EDITOR

Nancy Wallace Humes

### ASSISTANT ART DIRECTOR

Glenn Hughes

### DESIGN DIRECTOR

Karen Culliton Garofalini

### PRODUCTION COORDINATOR

M. N. Lhuillery-Peischl

### DESIGN SHOP

Phil Gehret

Fred Matlack

### CONTRIBUTING EDITORS

Ernie Conover

Mike Dunbar

Roger Holmes

W. Curtis Johnson

Simon Watts

### ADVERTISING DIRECTOR

Don Schroder

### ADVERTISING REPRESENTATIVES

East

Renée James

West

Doreen Brill

Classifieds

Diane M. Wallbillich

### ADVERTISING SALES OFFICES

33 E. Minor St., Emmaus, PA 18098

PHONE: (215) 967-5171

FAX: (215) 967-8956

### ADVERTISING PRODUCTION COORDINATOR

Diane M. Wallbillich

### PRESIDENT, MAGAZINE DIVISION

John Griffin

### CIRCULATION MANAGER

Alan Bayersdorfer

### SUBSCRIPTION SERVICE MANAGER

Bob Nichter

### CUSTOMER COMMUNICATIONS

(800) 441-7761

AMERICAN WOODWORKER (ISSN 8750-9318) is published six times a year in January, March, May, July, September, and November by Rodale Press Inc., 33 E. Minor St., Emmaus, PA 18098, (215) 967-5171. ©1992 by Rodale Press, Inc. J.I. Rodale, Founder; Ardath Rodale, Chairman of the Board; Robert Teufel, President of Rodale Press; John Griffin, President of the Magazine Division. **SUBSCRIPTION RATES:** U.S. one-year, \$23.70; two-year, \$47.40. Single-copy, \$3.95. Canada, one-year, \$30; two-year, \$60 (Canadian funds) GST #R122988611. Foreign, one-year, \$35; two-year, \$70 (U.S. funds). U.S. newsstand distribution by Eastern News Distributors, Inc., 1130 Cleveland Rd., Sandusky, OH 44870. **SECOND-CLASS POSTAGE:** paid at Emmaus, PA and additional mailing offices. **POSTMASTER:** Send address changes to AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. **CONTRIBUTOR GUIDELINES:** available upon request. We treat unsolicited material with care, but can't assume responsibility for loss or damage. Send a stamped, self-addressed envelope for return of material.

## MLCS Ltd.

### CARBIDE TIPPED ROUTER BITS

PROFESSIONAL PRODUCTION QUALITY SPECIAL OFFER — 50% to 75% BELOW COST!

- 1/4" Diameter Shanks x 1-1/4" Long • Two Flute Thick High Quality Tungsten Carbide Tips • 1/2" Ball Bearing Pilot
- One Piece Construction (Not assemblies) • Professional Size • Piloted Bits are Supplied Complete with 1/2" Ball Bearings



#### COVE

|      |      |         |
|------|------|---------|
| #340 | 1/8" | \$12.00 |
| #341 | 1/4" | \$13.00 |
| #342 | 3/8" | \$14.00 |
| #343 | 1/2" | \$15.00 |



#### ROUND OVER

|      |       |         |
|------|-------|---------|
| #350 | 1/8"  | \$11.00 |
| #351 | 3/16" | \$11.00 |
| #230 | 1/4"  | \$12.00 |
| #353 | 5/16" | \$14.00 |
| #354 | 3/8"  | \$15.50 |
| #355 | 1/2"  | \$17.00 |



#### ROMAN OGEE

|                  |        |         |
|------------------|--------|---------|
| #231             | 5/32"  | \$17.00 |
| #232             | 1/4"   | \$18.00 |
| <b>CLASSICAL</b> |        |         |
| #490             | 1-1/4" | \$22.50 |
| #491             | 1-1/2" | \$25.00 |



#### SLOT CUTTER

|      |      |         |
|------|------|---------|
| #366 | 1/8" | \$14.00 |
| #368 | 1/4" | \$14.00 |

#### RABBETING

|      |      |         |
|------|------|---------|
| #370 | 3/8" | \$14.00 |
|------|------|---------|



#### DOVETAIL

|                  |      |     |         |
|------------------|------|-----|---------|
| #403             | 3/8" | 9°  | \$ 7.50 |
| #405             | 1/2" | 14° | \$ 8.50 |
| #409             | 3/4" | 14° | \$10.50 |
| (For Leigh Jigs) |      |     |         |
| #402             | 3/8" | 8°  | \$12.00 |
| #404             | 1/2" | 8°  | \$12.00 |



#### STRAIGHT

|      |       |         |
|------|-------|---------|
| #470 | 1/4"  | \$ 7.00 |
| #471 | 5/16" | \$ 7.00 |
| #472 | 3/8"  | \$ 7.00 |
| #473 | 7/16" | \$ 7.00 |
| #474 | 1/2"  | \$ 7.00 |
| #476 | 9/16" | \$ 7.00 |
| #478 | 5/8"  | \$ 8.00 |
| #479 | 3/4"  | \$10.00 |



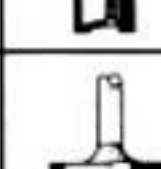
#### BULL NOSE

|      |      |         |
|------|------|---------|
| #460 | 1/4" | \$14.00 |
| #461 | 3/8" | \$15.00 |
| #462 | 1/2" | \$16.00 |
| #464 | 3/4" | \$21.00 |



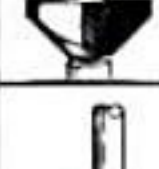
#### CORE BOX (ROUND NOSE)

|      |      |         |
|------|------|---------|
| #415 | 1/4" | \$10.00 |
| #416 | 3/8" | \$11.00 |
| #417 | 1/2" | \$14.00 |
| #418 | 3/4" | \$15.00 |



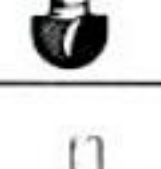
#### TONGUE & GROOVE

|             |          |         |
|-------------|----------|---------|
| #545        | Straight | \$29.00 |
| #546        | Wedge    | \$29.00 |
| (not shown) |          |         |



#### RAISED PANEL

|             |      |         |
|-------------|------|---------|
| #385        | 25°  | \$25.00 |
| #387        | Cove | \$25.00 |
| (not shown) |      |         |
| #390        | Ogee | \$28.00 |
| (not shown) |      |         |



#### BEADING

|      |       |         |
|------|-------|---------|
| #450 | 1/8"  | \$11.00 |
| #451 | 3/16" | \$11.00 |
| #233 | 1/4"  | \$13.00 |
| #453 | 5/16" | \$14.00 |
| #454 | 3/8"  | \$15.50 |
| #455 | 1/2"  | \$17.00 |



#### FLUSH TRIM

|      |      |         |
|------|------|---------|
| #500 | 3/8" | \$ 7.00 |
| #502 | 1/2" | \$ 7.50 |



#### EDGE BEADING

|      |       |         |
|------|-------|---------|
| #530 | 3/16" | \$15.00 |
| #531 | 5/16" | \$15.50 |



#### SOLID CARBIDE

|              |       |         |
|--------------|-------|---------|
| Flat Bottom  |       |         |
| #601         | 1/8"  | \$ 9.00 |
| #602         | 3/16" | \$12.00 |
| #603         | 1/4"  | \$12.00 |
| Round Bottom |       |         |
| #608         | 1/8"  | \$10.00 |
| #609         | 3/16" | \$13.00 |
| #610         | 1/4"  | \$14.00 |

When ordering any 3 or more, deduct \$1.00 each.  
All prices postage paid. PA residents add 6% for state sales tax.

### FREE CATALOG

To order by MasterCard or Visa — Toll Free 7 Day  
24 Hour Order Service Call 1-800-533-9298 or send check to

**MLCS Ltd., P.O. Box 4053 AK, Rydal, PA 19046**

CIRCLE NO. 18 ON PRODUCT INFORMATION FORM



# LETTERS

## On Color

**EDITOR'S NOTE:** *Our mail box runneth over with letters about our first color issue. So far, it's about 10 to one in favor of the switch to color. Here's a sampling of what you readers had to say.*

I'm so happy to see AW in color! I feel that with color we can only appreciate even more the fine quality of workmanship throughout your magazine (especially the "Gallery" section). AW was good before. Now with color, you've just polished it up. Great job! I've just renewed for two years.

Mario Calcagini  
Montreal, Canada

Yesterday, I read, from cover to cover, your first color issue. This morning, I extended my subscription for two more years. That, I think you will agree, is the most effective way for me to tell you how well you are all doing.

Brian Tandrow  
Simi Valley, CA

...I cannot find one facet of improvement. I looked to see if you had been bought out by The National Enquirer...

Gerald S. Silsbee  
Santa Ana, CA

I believe the changes have resulted in a totally different magazine. One which has not been improved, but diminished. Whereas in the past, AW had an element

of the artistic, now it appears nondescript; where it was special, now it appears generic; and where it was uncommon, now it gets lost among all of the other monthlies.

...The black-and-white magazine... represented that niche of woodworkers... who wanted something out of the ordinary from their woodworking magazines. Not anymore.

Therefore, please cancel my subscription. I sincerely regret having to write this letter, but I feel that AW is simply no longer the same periodical to which I had subscribed, and to the arrival of which I had eagerly awaited.

Edward J. Berns  
North Haven, CT

## Twin-Blade Caution

I found Bob Moran's article, "Tenons on the Tablesaw" quite informative (AW, #24). There is, however, one item of danger that I think should be considered. Several years ago, I did not have a stack dado for my Rockwell Unisaw, so I took two 10-in. carbide saw blades to my local machinist and had him make a spacer washer to enable me to cut  $\frac{1}{16}$ -in. thick tenons, much in the manner suggested by Mr. Moran.

To make a special wooden table insert for the tenoning setup with the spacer, I cranked the two blades all the way down, put in a properly shaped plywood table insert, clamped a 2 x 4 over the top of it, and prepared to raise the blade up through the insert to cut the appropriate slots. When I turned on the motor, I was greeted with the unpleasant smell of burning rubber and the squeal of slipping belts.

Examination disclosed that the outside saw blade had come in contact with the head of a screw holding the sawdust-deflection chute near the blade. In ordinary operations, the 10-in. blade would be to the right of the screw and would clear the head. But the  $\frac{1}{16}$ -in. spacer and the additional

blade had placed the blade over the screw. I was very fortunate that the saw was off when I cranked the blades down. Needless to say, had the blades been running, there would have been substantial damage when they hit the screw.

W.G. Gilbert, III  
Dillon, MT

### Erratum:

Pennsylvania Tall Clock:  
Part 1 (AW, #25)

The section drawings on page 37 are switched. The top drawing should be labeled Section BB. The bottom drawing should be labeled Section AA.

## A Message That Stuck

...your editorial on making do with what you have (AW, #12) really gave me a kick in the a--. It changed me from someone saying, "I could do this if I had this tool" to someone who now says, "What is the best way to do this with what I have?" Thank you.

Martin Wale  
Pointe Claire, Canada

## Workshop Allergies

Within the past year, I developed an allergy that I thought would prevent me from working wood any more. It seems that every time I go to my shop, my face gets very red, much like sunburn, and burns and itches for several days afterward. I've tried everything from Benadryl to Calamine lotion, and have found that the only thing that relieves the irritation is a topical steroid that I was given for a bee sting.

Because I develop these symptoms even if I'm not working with wood, I assumed that I had developed an allergy to wood dust and would therefore have to stop woodworking. But a friend of mine who has the same problem noticed that the symptoms didn't occur when he worked in someone else's shop. I have also discovered that I can work all day in another shop without annoyance, but I can't work in mine for even an hour without getting itchy and red. My friend speculates that we may be allergic to microscopic dust mites that have infested our shops.

I'd be very interested in hearing from any readers who might have



# LETTERS

more information about this or who have had a similar experience. If the problem is dust mites, how can one get rid of them?

Scott Ackerman  
Pittsburgh, PA

## Library Ladder-Chair Plans

**EDITOR'S NOTE:** In response to a request for library ladder-chair plans last issue, readers sent in a slew of sources. Full-sized plans are available for \$15 from Furniture Designs, 1827 Elmdale Ave., Glenview, IL 60025, (708) 657-7526. Plans also appeared in the February, 1988 issue of Popular Mechanics magazine.

## Eric Sloane

Reading your "Tribute to Eric Sloane" (AW, #24) warmed the cockles of my heart. His simplistic approach to complicated subjects prompted several friends and me to form the Eric Sloane Book Collectors Club. The purpose of the club is to propagate the works of Sloane, to bring to the public's attention his "awareness" of our American heritage, and to buy, sell, and trade books written by Eric Sloane.

We invite AW readers to join us in our endeavor to promote this great American and his works. For information, send a S.A.S.E. to: The Eric Sloane Book Collectors Club, Box 19374, Raleigh, NC 27619.

Cus Stufureac  
Raleigh, NC

## Neglected Lumbermaker

Re: "Backyard Lumbermaking" (AW, #21). The article was great, but the author neglected the Haddon Lumbermaker. It's been available for many years. My friend and I each have one. This [chainsaw attachment] is lightweight, compact, and comes with very good instructions. It costs \$59.95 from Woodcraft Supply, 210 Wood County Industrial Park, Box 1686, Parkersburg, WV 26101, (800) 542-9115.

Gary Butler  
Philadelphia, PA

What's on your mind? We value your comments, complaints and corrections. Send your letters to: "Editor," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098.



## BRUSS

SQUARE DRIVE LO-ROOT FEATURES ZINC PLATED

| ITEM CODE | SIZE    | 100 PKG. | 500 PKG. | 1000 PKG. |
|-----------|---------|----------|----------|-----------|
| FH17      | 8X3/4   | \$1.74   | \$6.96   | \$12.75   |
| FH18      | 8X1     | \$1.96   | \$7.46   | \$14.29   |
| FH20      | 8X1-1/4 | \$2.13   | \$8.30   | \$15.65   |
| FH21      | 8X1-1/2 | \$2.29   | \$8.98   | \$17.20   |
| FH22      | 8X1-3/4 | \$2.55   | \$10.35  | \$19.47   |
| FH23      | 8X2     | \$2.68   | \$11.04  | \$22.08   |
| FH25      | 8X2-1/2 | \$3.00   | \$12.60  | \$24.42   |

TO ORDER SEND CHECK OR MONEY ORDER. ADD \$4 FOR SHIPPING AND HANDLING IN CONTINENTAL U.S. IF ORDER TOTALS LESS THAN \$40. MICHIGAN RESIDENTS ADD 6% SALES TAX. CATALOG FREE WITH FIRST ORDER. OR SEND \$2 TO:


**ORDERS MON-FRI 7AM-5PM**


1-800-536-0009 • SERVICE 616-243-9412

BRUSS FASTENERS DIVISION OF ICC  
P.O. BOX 86307, GRAND RAPIDS, MI 49518-0307

CIRCLE NO. 42 ON PRODUCT INFORMATION FORM

## Walnut Case!



## KIT SALE-50% OFF!

*Incredible Value-Even Includes Movement*  
America's finest clock kits. Pre-cut, shaped and ready for you to assemble and finish! Complete kits include quartz movement, ivory metal dial, convex glass and brass finish dial ring. **Finished value over \$50!** Size 6-1/4"H x 5"W x 2-1/8"D.

Order #170112 (Reg. \$19.90)

**SALE ONLY \$9.95** (Sale Ends 6-30-92)

For UPS shipping & handling, add \$3.75;  
Wisc. residents add 5.5% sales tax.

**FREE CLOCK KIT CATALOG INCLUDED!**

Call or Write Today

**1-800-236-7300**

**The American Clockmaker**

Dept. 92 Box 326, Clintonville, Wisconsin 54929

CIRCLE NO. 101 ON PRODUCT INFORMATION FORM

## ALL FREUD ITEMS:

- SAW BLADES
- ROUTER BITS
- POWER TOOLS

**CALL TODAY & SAVE  
UP TO 50%**

ALSO: ATRO AND HAUBOLD  
PINNERS AND STAPLERS

**T.A. INDUSTRIAL**  
ALBURTIS, PA 18011  
215-682-1838

CIRCLE NO. 302 ON PRODUCT INFORMATION FORM

## COMING THIS FALL!

★*The*  
**Woodworking Shows★**  
machinery  
tools • supplies



|                   |                  |
|-------------------|------------------|
| • Baltimore/Wash. | • No. California |
| • Chicago         | • Portland       |
| • Columbus        | • Seattle        |
| • Denver          | • So. California |
| • Detroit         | • Twin Cities    |

• And More!

Call for free brochure  
Monday - Friday 8 am - 5 pm Pacific Time  
1-800/826-8257 or 310/477-8521

CIRCLE NO. 20 ON PRODUCT INFORMATION FORM

## ATTENTION DEALERS!

We manufacture and distribute select woodworking tools and accessories to dealers nationwide. We offer a large selection of dust collection accessories, hose and many other unique items. For a catalog and additional information, contact Woodstock International, Inc. at (206) 734-3482.

**WOODSTOCK**  
INTERNATIONAL  
WOODWORKING TOOLS AND ACCESSORIES

P.O. BOX 2027 Bellingham WA 98227 U.S.A.



# Q & A

## Sawing Polygons

**Q** I'm trying to build a few 12-sided planters. I've cut the sides without any problems, but when I try to cut out the 12-sided polygons for the bottoms with a miter gauge on the tablesaw, they never come out even. There must be a good way to do it. What's the trick?

Gerald Hunt  
Rochelle, IL

**A** The key to cutting even-sided polygons is not a miter gauge, but a good pattern. To make a pat-

tern, draw the 12-sided polygon out clearly on your stock. (See drawing.)

Next, cut near the layout lines on a tablesaw or bandsaw. Sand carefully to the lines on a disc sander to get the polygon sides even.

If you're making several polygons, I recommend a technique called *pattern sawing*. The drawing shows how to do this. Make a small pattern of the desired polygon shape, and then use it as a template to run against an auxiliary tablesaw fence to cut the actual polygons. With this setup, you can change the size of the polygons you are cutting by adjusting how far the fence overhangs the saw blade, and you can easily produce as many polygons as you like.

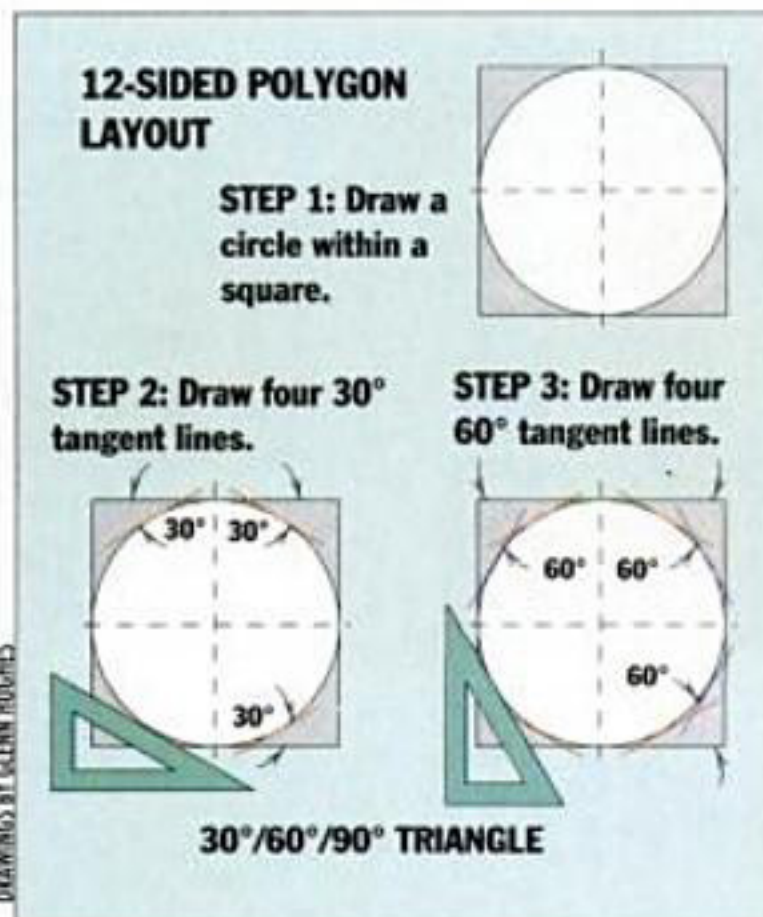
For safety, screw a handle to the pattern, stand at the side of the saw when cutting, and allow enough room for cutoff waste to pass between the saw blade and the regular saw fence.

Bill Bigelow  
Woodworking instructor  
Surry, NH

craftsman who owned your plane.

Old planes have attracted a surprising amount of attention. In fact, the study of old planes has its own term, *Rhykenology*. There are dozens of studies and several newsletters on old planes. To learn more about old planes, I'd recommend you read *A Guide to American Wooden Planes and Their Makers*, by Emil and Martyl Pollak (available from Astragal Press, Box 239, Mendham, NJ 07945). To contact other collectors, join the Early American Industries Association, Box 2128, Empire State Plaza Station, Albany, NY 12220. The nearest collectors group in your area is Pacific Northwest Tool Collectors, 24575 Butler Rd., Elmira, OR 97437.

Mike Dunbar  
Contributing editor



## Identifying an Old Plane

**Q** I have several old, wooden planes, including one that is 16 in. long with two stamped imprints on it that say "Salough," and "A. Monty." A friend said the plane was quite valuable. How can I find out the plane's true value and get more information on old planes in general?

Russell Bissett  
Roy, WA

**A** At 16 in. long, your plane is a jack plane (also called a fore plane) and was commonly used to smooth lumber on the workbench.

Wooden planes are priced the way old coins are—the value depends on their rarity and condition. (See AW, #24, Q&A for information on restoring old planes.) Some rare wooden planes are quite valuable. The record auction price for a wooden plane is \$8,500. However, the majority are common and sell for \$10 to \$50.

Your plane was made by A. Monty in Quebec, Canada, and is worth about \$25 to \$35. Neal Salough was the

## "Tone" Woods

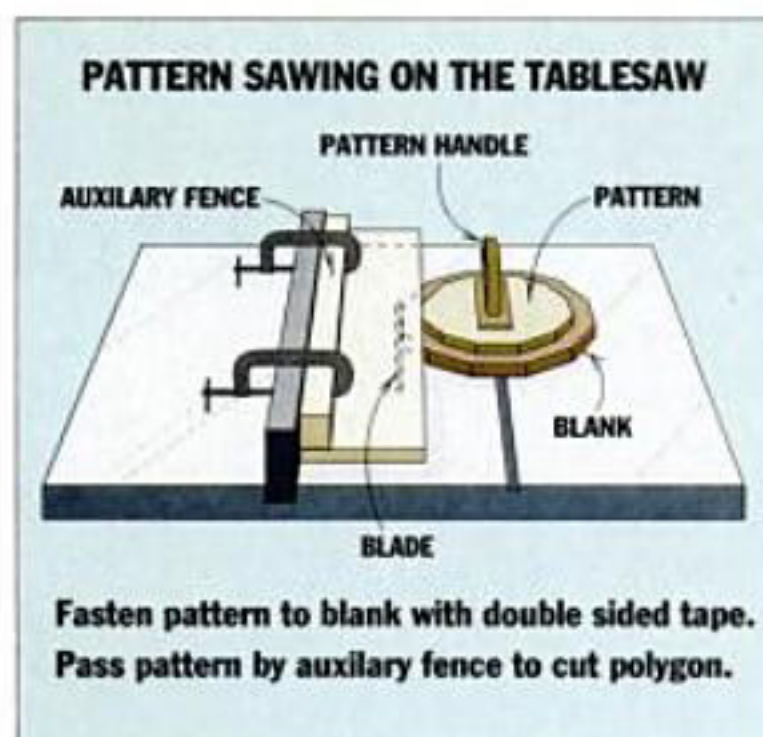
**Q** I'm restoring a 1925 floor-model Majestic radio, and it looks as if I'll have to completely rebuild the cabinet. Is there a preferred species of wood to use to enhance the sound of the speaker?

Floyd Palensky  
Enumclaw, WA

**A** The "tone woods" used in musical-instrument construction are not appropriate for a speaker because an instrument radiates sound in a different way than a speaker does.

In guitarmaking, for example, a light wood is chosen for the top piece (soundboard) to vibrate and amplify the sound made by the strings. Dense woods, such as maple, koa, and rosewood are used for the back and sides for their ability to deflect the vibrations out through the sound hole.

In the case of a radio cabinet or speaker enclosure, the speaker amplifies the sound quite well without any help from the wood. A light tone wood, such as spruce, redwood, cedar, or pine would produce a lot of unwanted vibrations.





# Q & A

Density and stability are the most important properties for the wood in your radio cabinet. A high-grade, lumber-core plywood or medium-density fiberboard (MDF) at least  $\frac{3}{4}$  in. thick would be my choice. You can cover either of these materials with a decorative wood veneer, or you could buy plywood with a hardwood veneer surface ready for finishing.

You could also use a dense, solid hardwood. Rosewood lumber will be next to impossible to find, but solid, imported hardwoods such as padauk, morado, imbuia, shedua, purpleheart or wenge should be available. Red or white oak or curly maple would work well as domestic choices.

Dick Boak  
Editor/Publisher  
Guitarmaker Magazine  
Nazareth, PA

## Bleaching Out Rust Stains

**Q** *I have a solid-walnut table that was stored in a barn with a plastic bag lying on it. The roof leaked, and now the tabletop is stained black where the bag lay. I've sanded through the finish but the stain remains. Can the tabletop be bleached or do I have to sand until the stain is gone?*

Howard Tritz  
Leadville, CO

**A** I doubt that the plastic bag caused the stain. The chances are that the rain picked up some metal residue coming through the roof or perhaps from dust on the table. The table probably stayed wet under the plastic long enough for the metal-contaminated water to work its way through the finish. If this is what happened, the stain is a rust stain and can be bleached out with oxalic acid.

To bleach it, first make sure all the old finish is removed. Make a mixture by stirring at least two heaping table-spoons of oxalic-acid crystals (avail-

able at some paint stores and most pharmacies) into a pint of warm water. Brush the solution over the entire tabletop, not just over the stains. Otherwise, you might create lighter spots with the bleach. Let the wood dry until only the oxalic-acid crystals remain. Thoroughly wash the crystals off the wood with a hose, or with a well-soaked sponge or cloth. Add a mild alkali such as borax or a small amount of household ammonia to some clean water, and wash the tabletop again to neutralize any remaining acid. If traces of the stain remain, repeat the procedure.

Bob Flexner  
Finishing consultant  
Norman, OK

## Broken Blades

**Q** *I bought a new scroll saw, and I'm having a lot of trouble with its blades breaking. Do you have any suggestions to cure this problem?*

Albert Harris  
Kennebunk, ME

**A** Incorrect blade tension is the major cause of blade breakage on both parallel-arm and C-arm type scroll saws. You can improve blade life and the cutting performance of your saw by following this rule of thumb:

Unplug the saw and insert a new blade in the top and bottom blade holders. Use your thumb as a tension gauge by placing it against the teeth in the middle of the blade as you slowly turn the tensioning knob. Push the blade back (not sideways) toward the rear of the saw, applying moderate pressure (so the teeth leave an impression in the ball of your thumb but don't cause any pain). The blade is correctly tensioned when you can't deflect it backward more than  $\frac{1}{8}$  in. If you pluck the blade like a guitar string, it should make a medium-pitched sound.

Another hint to prolong blade life is to change blades when you switch from cutting softwoods to hardwoods. The resin buildup on the blade from cutting softwoods will generate excessive heat when cutting hardwood and cause premature breakage.

Chuck Olson  
Product manager  
Olson Saw Co.  
Bethel, CT

Got a woodworking question for the experts? Send it to "Q&A," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098.

## WHERE TO FIND IT

**A complete selection of fretwork patterns and supplies** is available from Reidle Products, Box 661, Richland Center, WI 53581, (608) 647-2777.

**Premium-quality European paints** with high-intensity colors (no fillers or extenders) are available from Fine Paints of Europe, Box 104, Blooming Grove, New York 10914, (914) 496-8989

**Highly figured veneers from wood burls, stumps, and crotches** are available from Certainly Wood, 11753 Big Tree Rd., Rt. 20A, East Aurora, NY 14052, (716) 655-0206.

**Handmade, hand-painted Mexican tiles** for countertops and coffee tables are available from Artesanos Imports, Drawer G, Santa Fe, NM 87504, (505) 983-5563.

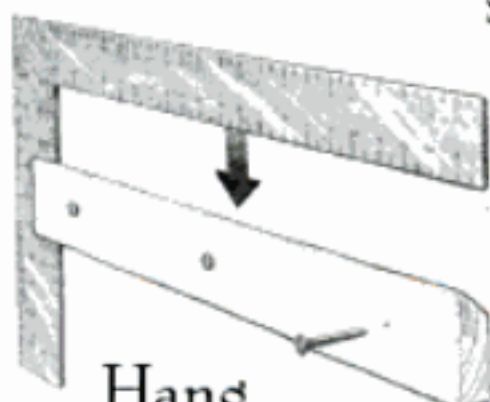


# TECH TIPS

## These Knobs are Not for Turning

Wooden knobs—the kind with a single screw—often become loose and twist in the hand. To cure this, I drill a pilot hole in the back of the knob and insert a small brad or nail with the point protruding  $\frac{1}{8}$  in. or so. When this nail bites into the drawer front, the knob will never turn again. If your bits aren't small enough to drill the pilot hole, cut the head off the nail or brad and use it as a drill.

*Robert Campbell*  
Somerset, PA



## Hang That Square

The accuracy of framing squares is not improved by dropping. To protect my squares and to store them conveniently, I devised a holder. I cut a piece of 1 x 3 the same length as the inside of the longer leg of the square and sawed a 45° bevel along one edge. I then nailed the strip to the wall within easy reach of my bench.

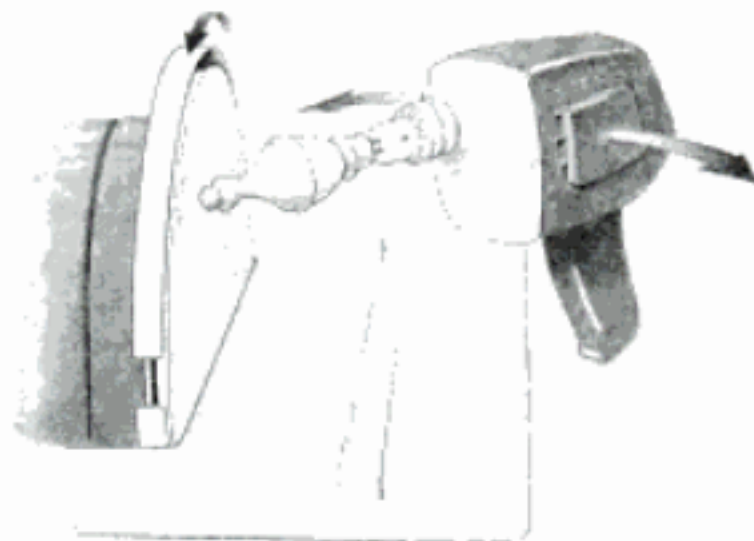
*Jim Alder*  
Pearland, TX

## Red Is for Danger

Saws don't care what they cut. As a reminder, I've highlighted the danger zones near my saw blades with bright-red warning strips. I painted a band 6 in. long on each side of the blade of my radial arm saw. I then made a new insert for my tablesaw and painted that

red, too. Finally, I masked off the rip fence and spray painted it 3 in. in front and 4 in. behind the blade as a reminder to use a push stick when I get that close.

*Charles Hirsch*  
Brookville, OH



## Rounding Ends of Turnings

The quickest and easiest way for me to round the end of a finial after turning it between centers is to chuck it in a drill and sand it round on my disc sander with the drill running.

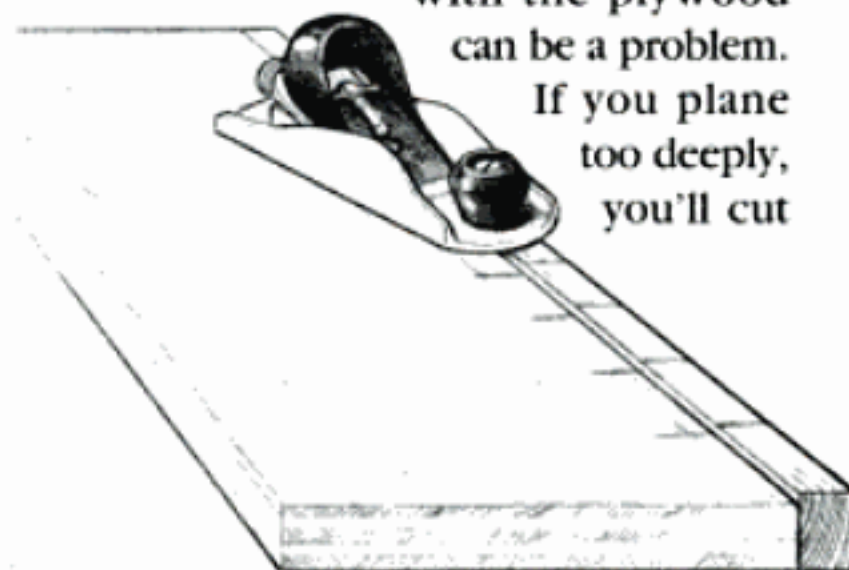
*David Johnson*  
Apple Valley, MN

## Trimming Wood Edging

Solid-wood strips are often glued to the edges of plywood shelves or tabletops.

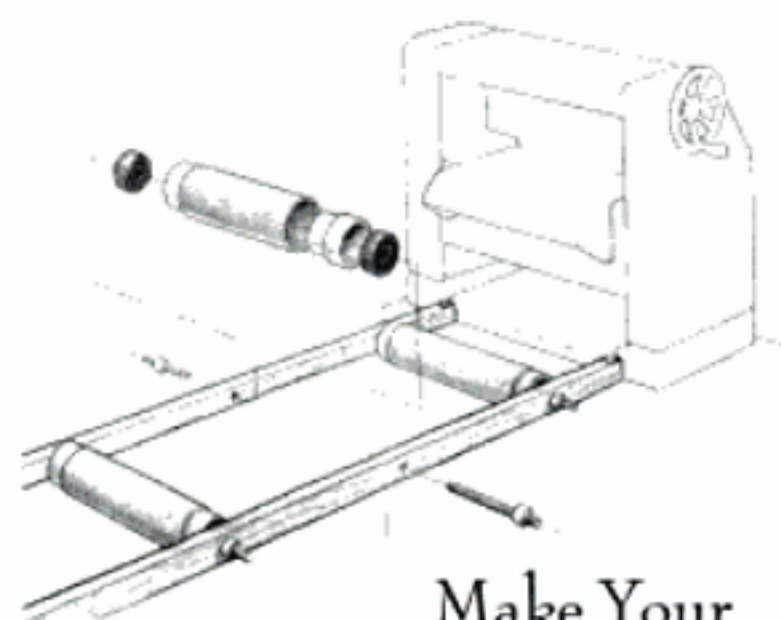
But planing them flush with the plywood can be a problem.

If you plane too deeply, you'll cut



through the face veneer on the plywood. To avoid this, I draw several short pencil lines across the glue joint, as shown. I watch these lines and stop planing immediately when they disappear.

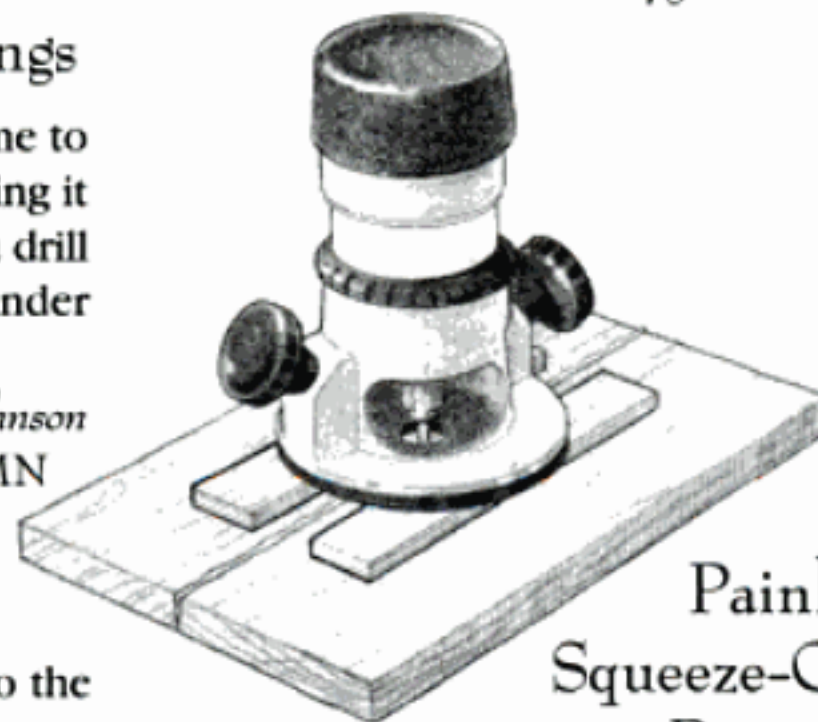
*James Schenfield*  
Dayton, OH



## Make Your Own Outfeed Rollers

I made outfeed rollers for my planer from old-fashioned steel roller skate wheels, which have the same diameter as the outside of 1½-in. plastic drain pipe. The drawing shows how I adapted the wheels to 2-in. plastic pipe. The ball-bearing roller skate wheels run very smoothly.

*Robert Schroeder*  
Sheboygan Falls, WI



## Painless Squeeze-Out Removal

I've come up with a method to remove hardened glue lines. Attach two strips of Plexiglas or ¼-in. plywood to the base of a router with double-stick tape. Chuck a ½-in. wide straight bit into the router and set the depth so the bit barely grazes the surface of the stock. Run the router along the glue line and you're in business.

*Ben Erickson*  
Eutaw, AL

## Checkmating the Checks

Anyone who works with green wood knows how rapidly it can dry out—checking along the way. My solution is to put the freshly cut chunks in plastic garbage bags, and then add wet saw-



LIMITED TIME OFFER\*

## After you've looked under the hood, drive home an even better deal.

Get to your participating Delta Distributor between now and July 31, and cut the best deal you can on any Delta Unisaw® 10" Tilting Arbor Saw. When you do, he'll present you with a certificate good for any one of the three Unisaw Accessory Packages listed below. Retail values up to \$270.

Select the package that best suits your needs. Fill in the certificate, mail it to Delta and we'll ship you the package of your choice. Absolutely free.

See your Delta Distributor for complete details.

### PACKAGE I

10" x 18 FT C-T Rip Blade  
10" x 50 ATB C-T Combination Blade  
10" x 80 ATB C-T Thin-Kerf Combination Blade  
Work Support Roller Stand

### PACKAGE II

Mobility Kit for Unisaw with 52" Unifence® Saw Guide  
Unifence Auxiliary Cut-Off Fence

### PACKAGE III

C-T 6" Dado Head Set  
Dado Head Table Insert  
Mobility Kit for Unisaw

\* Offer good only from participating distributors in the continental U.S., Alaska, Hawaii and Canada, from April 1 thru July 31, 1992. To qualify, machines must be purchased with motors.

**DELTA**

# TECH TIPS

dust. I seal the bag with the ties provided and set it in a cool place. In hot weather, you might add a couple of handfuls of salt to discourage mold.

*Boles Derenda*  
West Seneca, NY

when my wife flips the switch, I'm alerted to rejoin the rest of the world.

*Scott W. Ball*  
San Antonio, TX

## New Use for Old Welcome Mat

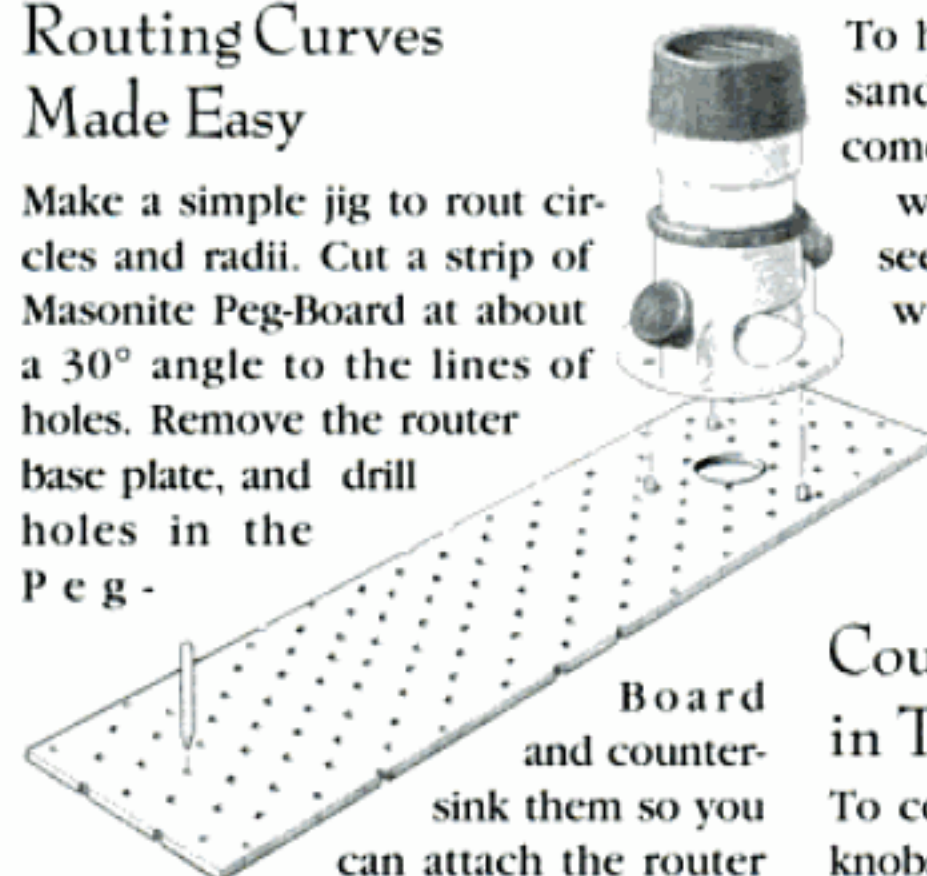
To hold small pieces of wood while sanding, I place an all-rubber "welcome" mat on the bench. It also helps when routing or carving. If the mat seems to be losing its grip, wash it with soap and water. The non-slip rubber mats sold for bath tubs also work pretty well.

*William Rabinowitz*  
Chestnut Ridge, NY

## Routing Curves Made Easy

Make a simple jig to rout circles and radii. Cut a strip of Masonite Peg-Board at about a 30° angle to the lines of holes. Remove the router base plate, and drill holes in the

P e g -



Board and countersink them so you can attach the router with the same base-plate screws. Run a nail or awl through one of the Peg-Board holes to establish a pivot point. If you need some odd radius, drill an extra pivot hole to suit.

*Robert Tupper*  
Canton, SD

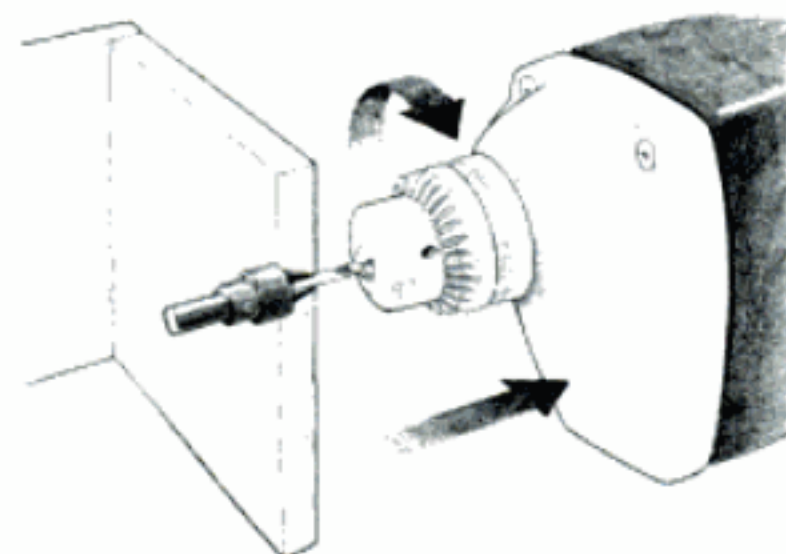
## Dinner-Time Signal

With machines running and ear protectors in place, it's pretty hard to get a woodworker's attention, even for dinner. An unexpected tap on the shoulder can be dangerous. I installed a light socket and red bulb at eye level, and



## Countersinking in Tight Corners

To countersink for screws on drawer knobs or handles, I first drill the shank hole from the outside of the drawer. Next, I push the drill part of a combina-



tion countersink through the hole from the inside, chuck the bit in the drill from the outside, switch the drill to reverse, and pull the rotating countersink to the correct depth.

*Paul Wagstaff*  
Flemington, NJ

Know a better way of doing something? Designed a clever jig? Send your woodworking tips, along with a sketch or a snapshot to: "Tech Tips," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. We'll pay you \$50 if we publish your tip.



# MAKING A SMOOTH PLANE

B Y M A R I O R O D R I G U E Z





Recently, I came across an engraving of a beautiful coffin-shaped smooth plane with a closed handle and a back end that was cut down, *razee* style.

It looked substantial and solid, but sleek with an appealing 19th-century character. Though such planes were traditionally intended for producing the final smooth finish on a piece, they also were commonly used for more general planing tasks.

I called Tom Witte, an antique-tools dealer, to inquire about obtaining this kind of smooth plane. Tom told me there weren't many around and that I'd have to pay more than \$250 to get one. At that point, I figured I'd try to make one. I've made planes before, but I've usually had an example to work from. This time, I had only overall dimensions.

I already had a thick antique iron, 2¼ in. wide with a chip breaker that I'd picked up from Tom. If you can't locate an antique iron, Ulmia makes a good substitute. (See Sources.) These irons are a bit thinner than the antique versions, but they work as well.

Planes of this type were commonly made of beech, apple, boxwood, or rosewood. I chose to make mine of rosewood because of its weight and looks. The wood you select should be stable and dense. (See Sources.)

I modified the original plane design in two ways. My first modification was to laminate the plane from two blocks of wood (after making all the interior

cuts) instead of working from a single block. I did this because I didn't have a piece of rosewood wide enough for a solid block. Also, laminating made hollowing out the cavity an easier task.

The second design modification was to mortise a full handle into the back of the plane instead of glue a closed handle onto the top and bottom of the *razee* cut. Since many antique planes have broken handles, I figured I'd make the handle more durable. Also, a full handle helps hide the lamination seam on the back of the plane.

### Special Tools

There are three special tools that are useful in planemaking. They're not necessary, but they will make certain operations easier. The first tool is a pair of single-cut files or rasps. Planemakers call them floats. These floats are used almost exclusively in planemaking for flattening the bed and cleaning up the abutment. (See Fig. 1.) I made my own floats, and if you're serious about planemaking, you should, too. (See sidebar, Making Planemaker's Floats, page 23.)

Another useful tool is a detailing file. This file is handy for finishing the handle and removing chisel marks on both the inside and outside of the plane. (See Sources.)

The third tool is a pair of ½-in. wide skew chisels (one skewed left, the other skewed right) for getting into the corners. You can make a skew chisel by regrinding the angle of a

spare straight chisel, or you can buy one. (See Sources.)

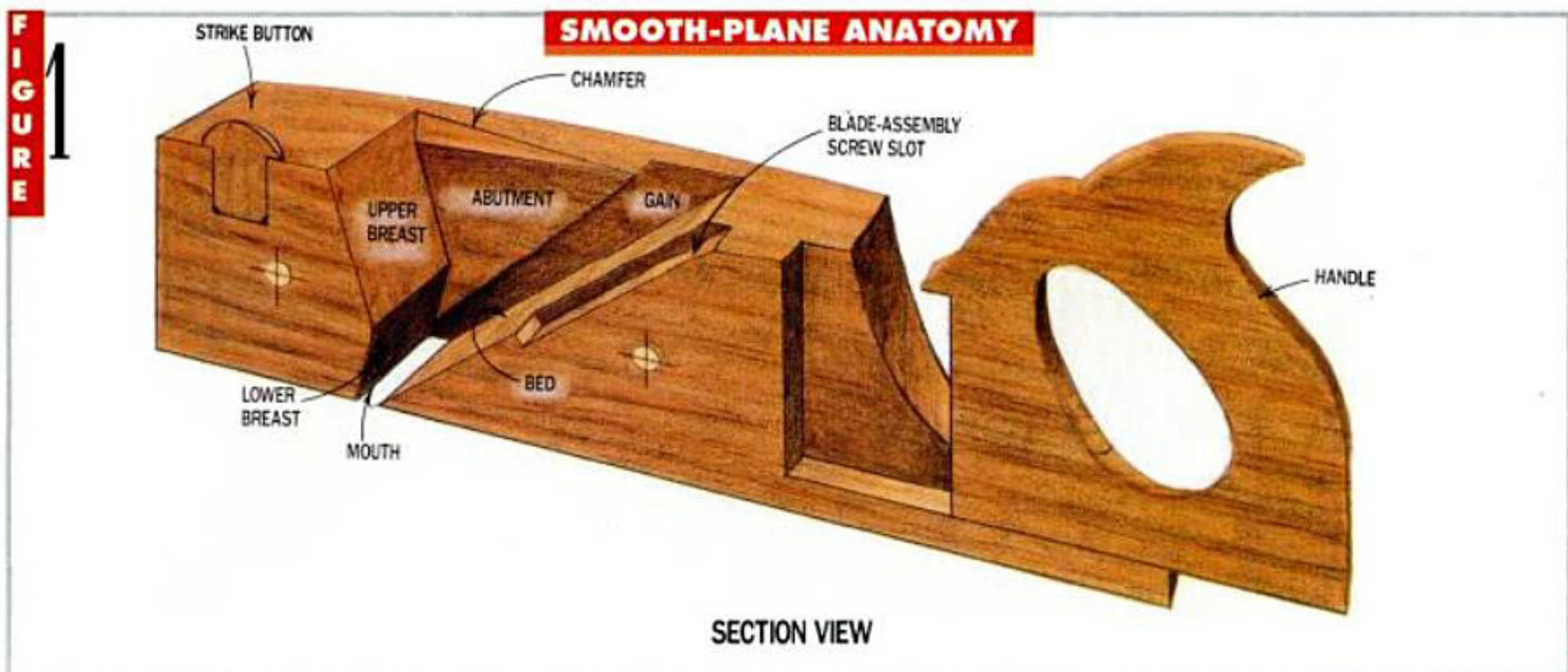
### Making the Plane Body

Choose two pieces of wood that are straight grained and stable, measuring 1½ in. by 2¾ in. by 10¼ in. To align the two halves of the plane while you shape it, mark out and drill two ¼-in. holes in each half for registration dowels. (See Fig. 2.) Fit these holes with dowels. These dowels will also help register the two sides during glue-up. (You won't see these registration holes in the photos because I drilled them after I shaped the cavity.)

Next, with a marking knife and a sliding bevel, lay out the body halves, as shown in Fig. 2, with the grain running front to back. Try to match the pieces for grain pattern and color to minimize the visibility of the glue line.

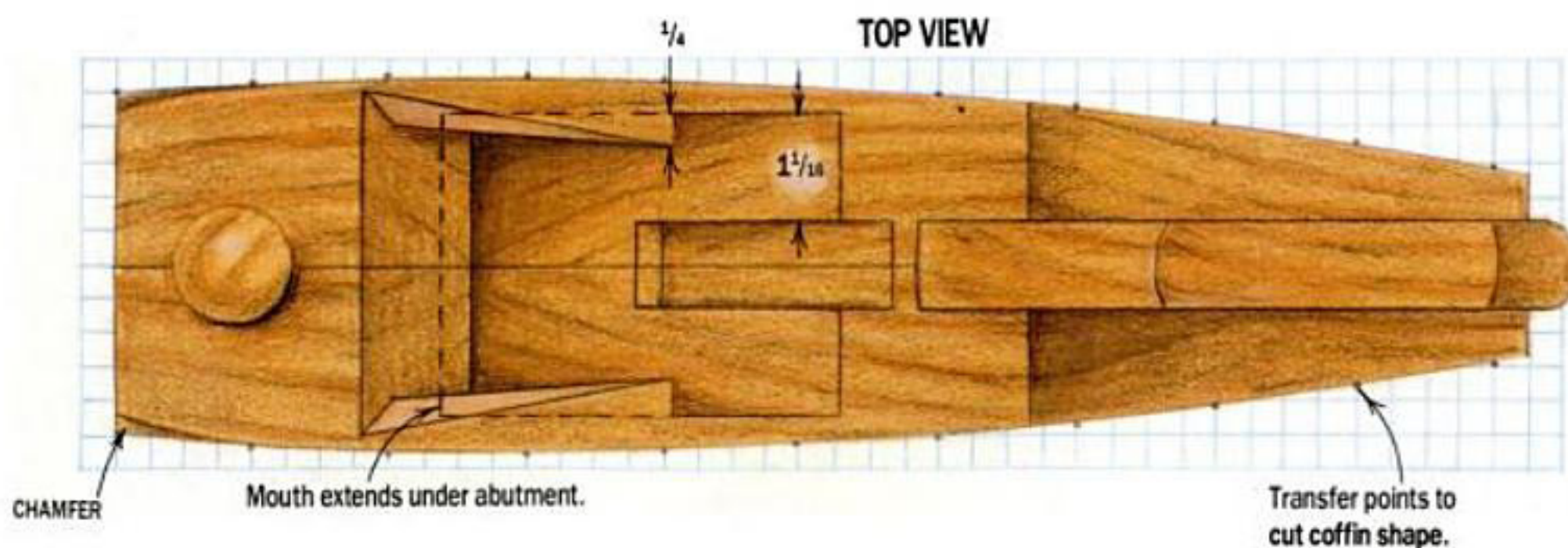
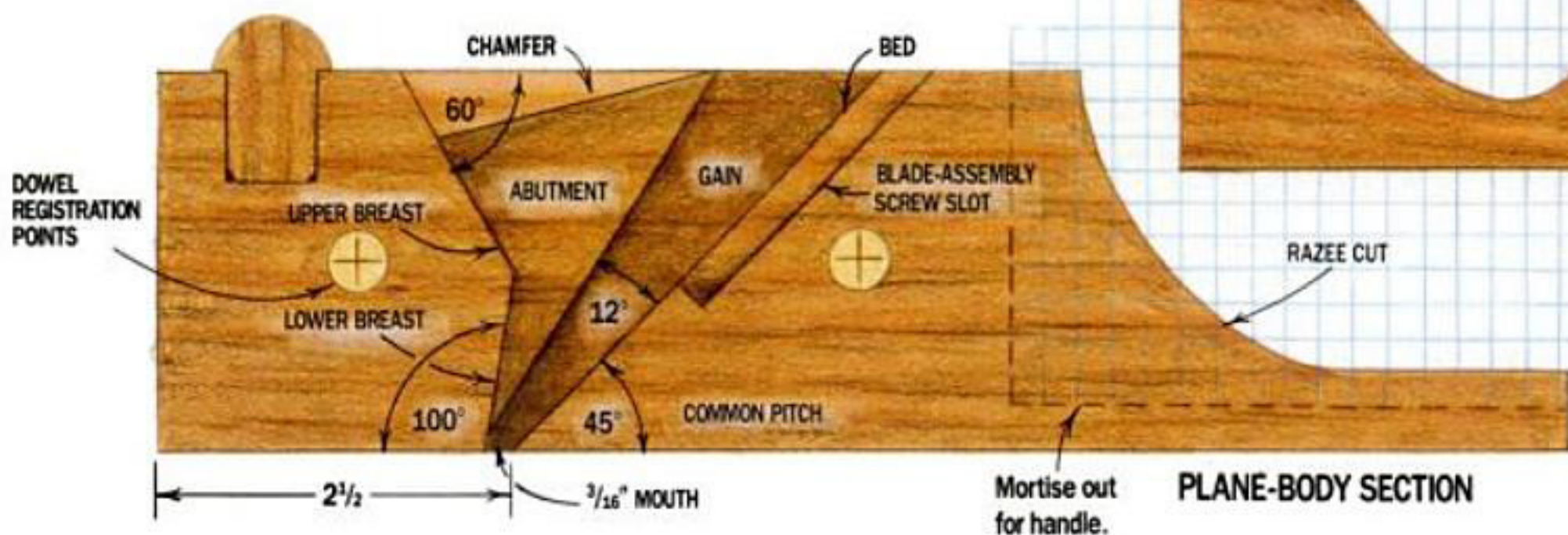
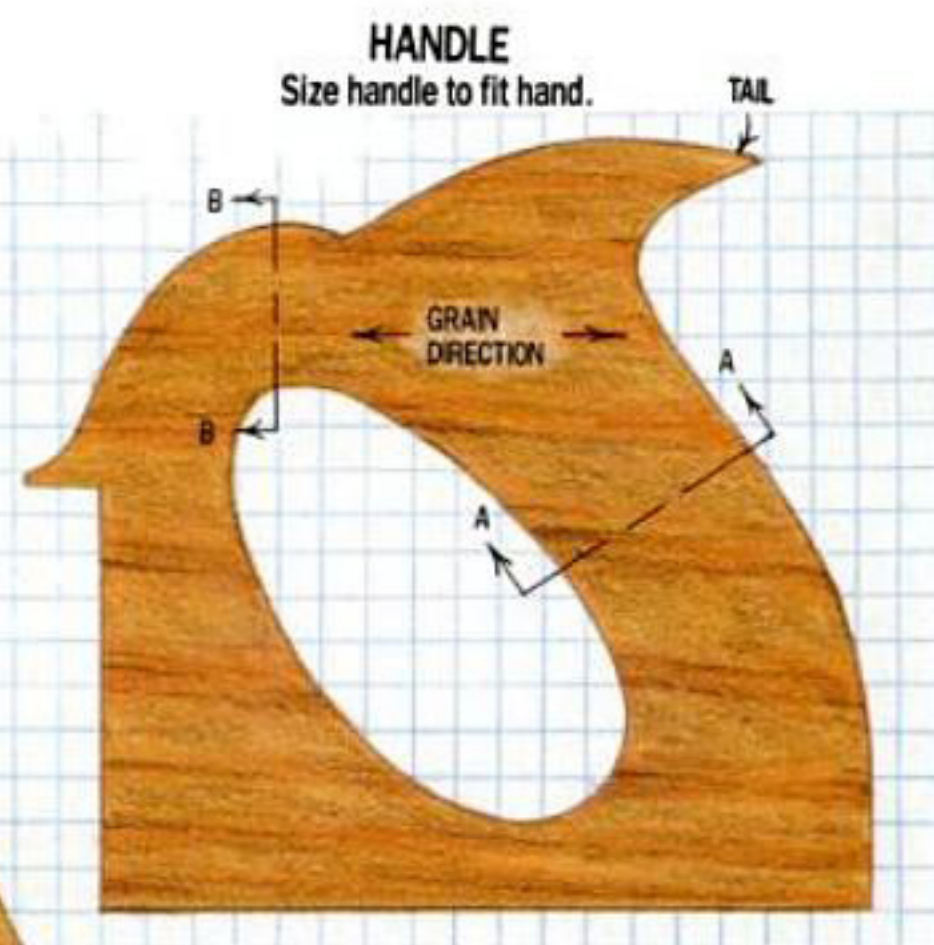
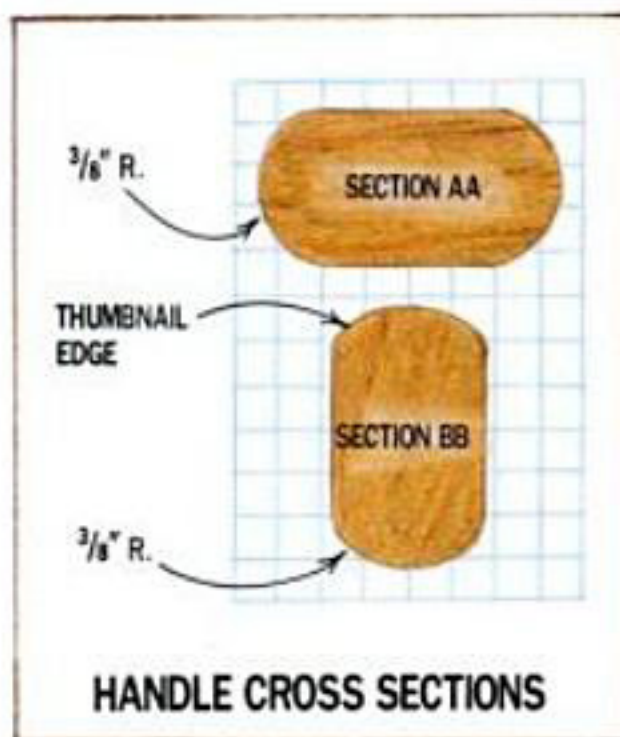
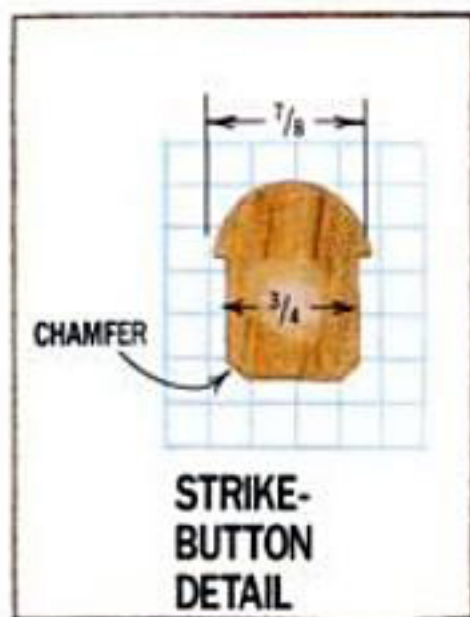
To lay out the halves, start by marking out the bed at 45° 2½ in. from the front end, or toe, of the plane. (A bed angled 45°—the common pitch for a bench plane—is thought to be best for planing softwoods; angling the bed to 50°—the York pitch—is considered better for planing hardwoods. I've found my plane works well on both.) Next, mark the lower and upper breast line, leaving the mouth ⅜ in. in front of the bed cut. (See Fig. 2.) Keep the mouth small—it can easily be enlarged later. Mark the cut where the abutment and the gain meet. (See photo.)

To remove the waste between the marked lines, saw along the lines with



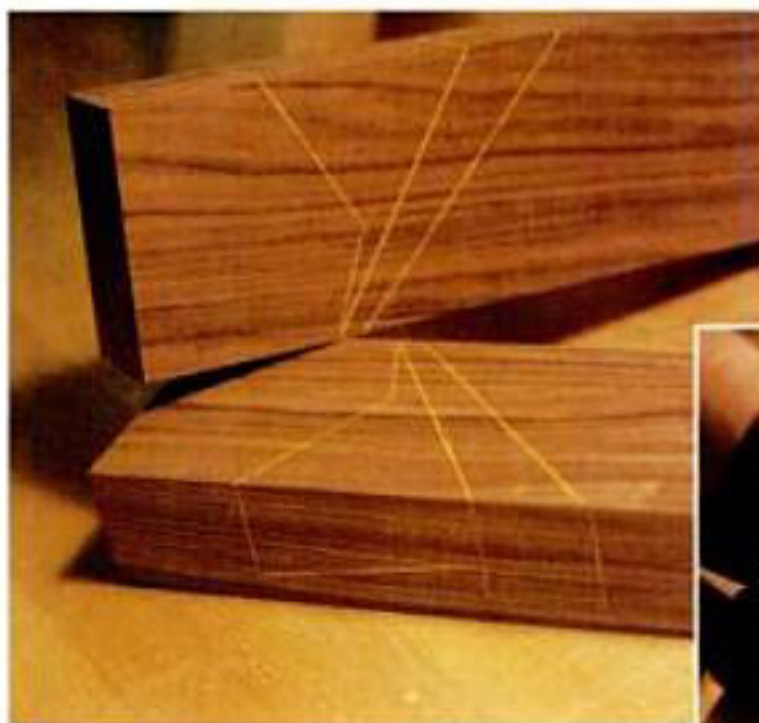


# SMOOTH-PLANE BODY



ONE SQ. =  $\frac{1}{4}$  IN.





Lay out the cuts on the two halves of the plane body with a pencil and a sliding bevel. Remove the waste from the iron cavity with a dovetail saw and chisels.

Check to see that the cuts are perpendicular to the plane sides and that they are the correct depth.



a dovetail saw. Next, make several saw cuts between the lines, and chip the waste out with chisels. File the surfaces smooth. It's important that the saw cuts be perpendicular to the plane sides. I used a guide block to ensure that the cuts were perpendicular.

It's equally important that these cuts be made to the correct depth. The cuts that make up the gain (see Figs. 1 and 2) will be the deepest— $1\frac{1}{16}$  in. deep (or barely half the width of your iron). The wall of each gain is parallel to the outside face of each plane side. Using a small adjustable square, check the depth of the gain frequently. (See photo.) Remember, it's best to keep your cuts on the shallow side. You can deepen them later if you need to.

Unlike the gain, the wall of the abutment is not parallel, but instead is at an angle to the outside face of the plane. (See Figs. 1 and 2.) The abutment is  $\frac{1}{4}$  in. thicker than the gain at the top, and it tapers to the same thickness as the gain at the bottom (down by the mouth). It's important that the abutment tapers because any protrusion into the mouth opening hinders the evacuation of shavings and causes the plane to choke. Check frequently that the two halves match up.

Remove the waste and clean up the saw cuts with chisels and files (the floats work well for this). Work on each abutment first and then each gain. Leave the gains on the fat side since it's easy to bring them down to their final thicknesses after the plane is glued and you're fitting the blade.

**Make a mock-up of the wedge** and check the fit of the blade with the mock-up wedge in each half. Make sure the gain on each side is properly sized so the blade and the wedge fit with no gaps. If it's too small to fit a wedge tightly, adjust the gain.

### Mortising for the Handle

Before you cut the mortise for the handle, tape the two halves of the body together and bandsaw the razee cut on the back end of the plane. (See Fig. 2.) With the body still taped together, file, sand, and scrape the curve smooth.

To cut the handle mortise, remove the tape from the two halves, and with a dovetail saw and paring chisels, work on each half of the mortise separately.



Glue up the two halves of the plane, making sure the clamps are spaced to apply even pressure.

(See photo and Fig. 2.) Make sure the mortise is square because the handle fits directly into this mortise without any shoulders to hide gaps.

This is a good time to lay out and cut the slot in the plane halves for the blade assembly's protruding screw. (See Fig. 2.) Using the dovetail saw and chisels, be sure to cut the slot wide enough to allow some lateral adjustment of the blade.

### Gluing Up the Body

Since rosewood is resinous, I glued up the body with epoxy to ensure a good bond. (See AW, #1, March/April, 1988, page 6.) Be sure the clamps are spaced to apply even pressure. (See photo.) Though I didn't use the glue blocks, you might try placing them (one on each side of the plane) between the plane and clamps to evenly distribute the clamping pressure.

Once the glue has completely dried, try fitting the iron in the cavity. You may need to file the gains a bit for the blade to slide in. Once the iron slides in, you'll need to ensure it sits flat against the bed. If it rocks, the plane will chatter. Use files and chisels to flatten the bed.

### Making the Handle

Cut the handle from solid  $\frac{7}{8}$ -in. stock (with the grain running horizontally). The dimensions of my handle are shown in Fig. 2. You can adjust these dimensions to fit your hand size.

To remove the waste from the cen-

Cut the mortise for the handle while the plane is still in two halves. Do this with a dovetail saw and paring chisels.







ter of the handle, drill out two  $\frac{3}{4}$ -in. holes to establish the inside ends of the grip. (See photo.) Use a jig saw or coping saw to finish the interior cut.

You can use a router with a  $\frac{3}{8}$ -in. round-over bit to round the grip part of the handle. (See photo and Fig. 2, Section AA.)

The contour of the tail on the handle is not half-round, but instead is more of a subtle thumbnail shape. (See Fig. 2, Section BB.) Shape this tail by hand. Use a fine-detail file or rasp to keep your shaping crisp and clean, then finish up the handle with fine sandpaper.

Make sure both the razee cut and the handle are sanded smooth. Glue the handle in the mortise.

### Making the Wedge

There are two important things a wedge must do. First, it must fit well between the abutments and the blade to hold the blade solidly to the bed. Second, it must provide easy and smooth clearance for shavings or the plane will choke.

Shape the wedge so the prongs flare out slightly at their ends. (See photos and Fig. 3.) When you insert the wedge into the plane, first place one prong in and pull the other prong inward slightly to fit within the opening. This ensures that the wedge fits snugly against the gains and prevents shavings from getting behind the prongs and clogging the mouth.

Some antique blades will require a slot cut into the underside of the wedge to provide additional clearance for the blade-assembly screw. (See photo.)



To cut the hole in the handle, first drill out two holes to establish the inside ends of the grip, then use a jig saw or coping saw to finish the interior cut. Shape the grip with a  $\frac{3}{8}$ -in. round-over bit in a router.

### The Strike Button

The purpose of the strike button (see Fig. 2) is to provide a single point of contact for the occasional hammer blow necessary to loosen the wedge. First, drill a  $\frac{3}{4}$ -in. dia. hole  $\frac{3}{4}$  in. deep at the front end of the plane. (See Fig. 2.) Turn the strike button on a lathe, sand it, and glue it in place with epoxy. I made the strike button from rosewood, but you can substitute a small, bronze, round-head bolt.

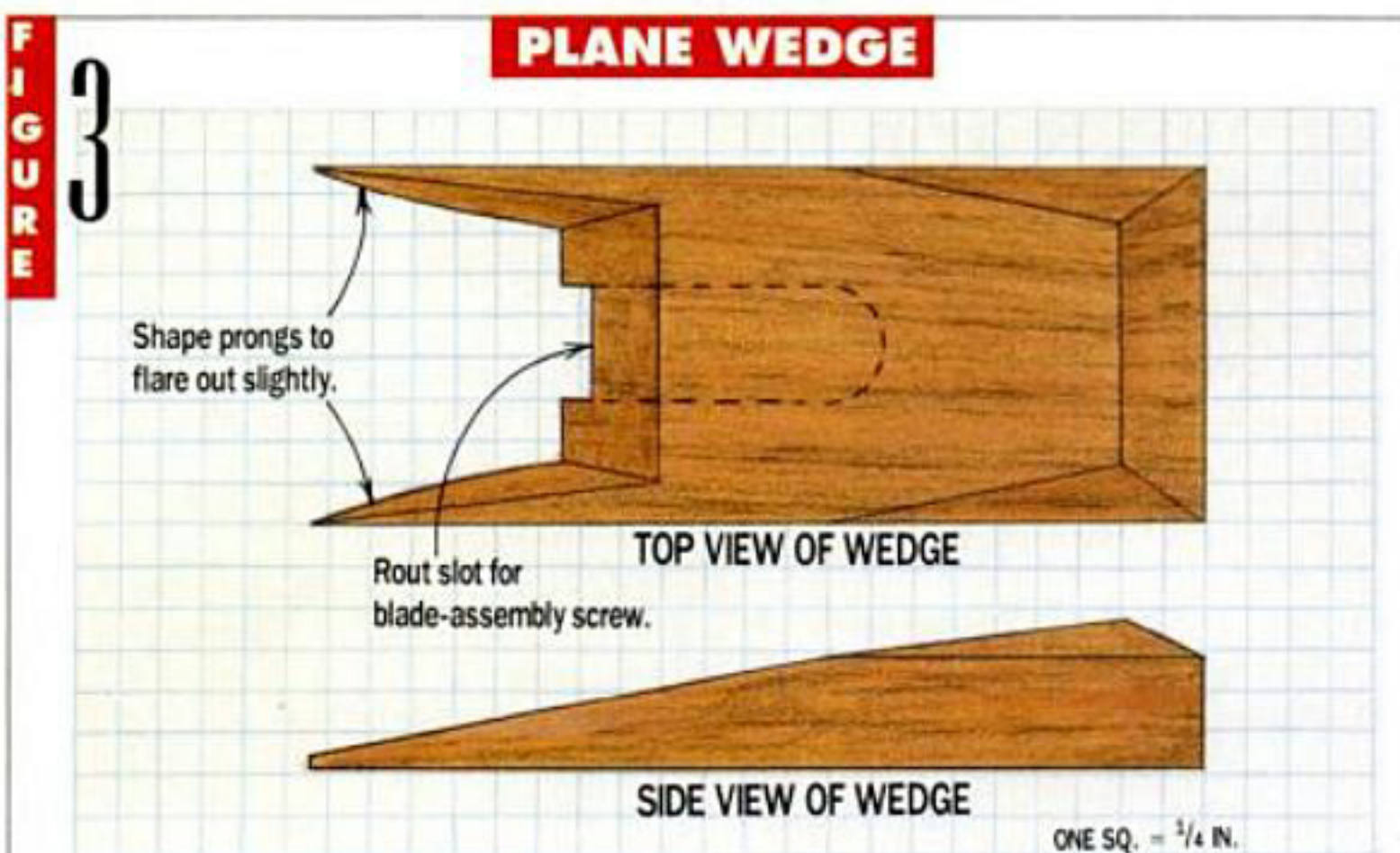
### Cutting the Coffin Shape

To cut the coffin shape in the plane, use the pattern provided in Fig. 2, transferring the points to the top of the plane. Cut out the coffin shape on the bandsaw, using the points as a guide. Make sure you cut on the outside of the line. Next, file and scrape down to the line, checking with a square to make sure the sides remain perpendicular to the sole.

### Finishing the Sole

Now it's time to open the mouth to get the space between the mouth and the iron just right. To open the mouth, first mark and score the opening on the lower breast side. With files and skew chisels, slowly open the mouth, leaving a  $\frac{1}{16}$ -in. to a tight  $\frac{1}{8}$ -in. opening just in front of the blade.

To true up the sole of the plane, sand it down on a piece of sandpaper glued to a flat surface or piece of plate glass. Pass the plane over the paper until the sole is flat and evenly sanded, then progress to finer grits. Keep sanding until the sole is glassy smooth.



Shape the wedge so the prongs at the end flare out slightly. This ensures a snug fit against the gains and prevents any shavings from getting in behind them and clogging the mouth.



## SOURCES

Planemaking tools and supplies are available from the following sources:

**Rosewood and other hardwoods:** Tropical Exotic Hardwoods of Latin America, Box 1806, Carlsbad, CA 92018, (619) 434-3030.

**Ulmia 54-mm plane irons with chip breaker:** Willow Pond Tools Inc., Box 544, Pembroke, NH 03275, 603-485-2321.

**Antique irons and chip breakers:** Tom Witte Antique Tools, Box 399, Front St. W., Mattawan, MI 49071 (616) 668-4161.

**Detailing file:** Woodcraft, 210 Wood County Industrial Park, Box 1686, Parkersburg, WV 26102, (800) 225-1153.

**Skew chisels:** Garrett Wade, 161 Ave. of the Americas, New York, NY 10013, (800) 221-2942.

## MAKING PLANEMAKER'S FLOATS

If you're going to get serious about planemaking, I recommend that you make a pair of planemaker's floats. Floats are single-cut files designed to remove wood rapidly. If kept sharp, they leave a smooth, flat surface. This is what you need on the inside surfaces of your plane to guarantee a good bed for the blade and a tight fit for the wedge.

You'll need one edge float (the teeth are along the edge of the file) and one flat-sided float (the teeth are on a flat side of the file). Both floats are about  $\frac{3}{16}$  in. thick and are tapered for an easier fit into the inner surfaces of the plane.

Any small scrap of unhardened tool steel will work. An old fine file will also work, but you must anneal or soften the steel to cut the teeth.

Lay out the teeth about  $\frac{3}{16}$  in. apart. Secure the float blank in a vise so the top edge (the edge in which you'll cut the teeth) is horizontal. Using a triangular mill file, cut V-shaped grooves of equal depth along the length of the float from tip to tang. As you work backward toward the tang, be sure to cut the

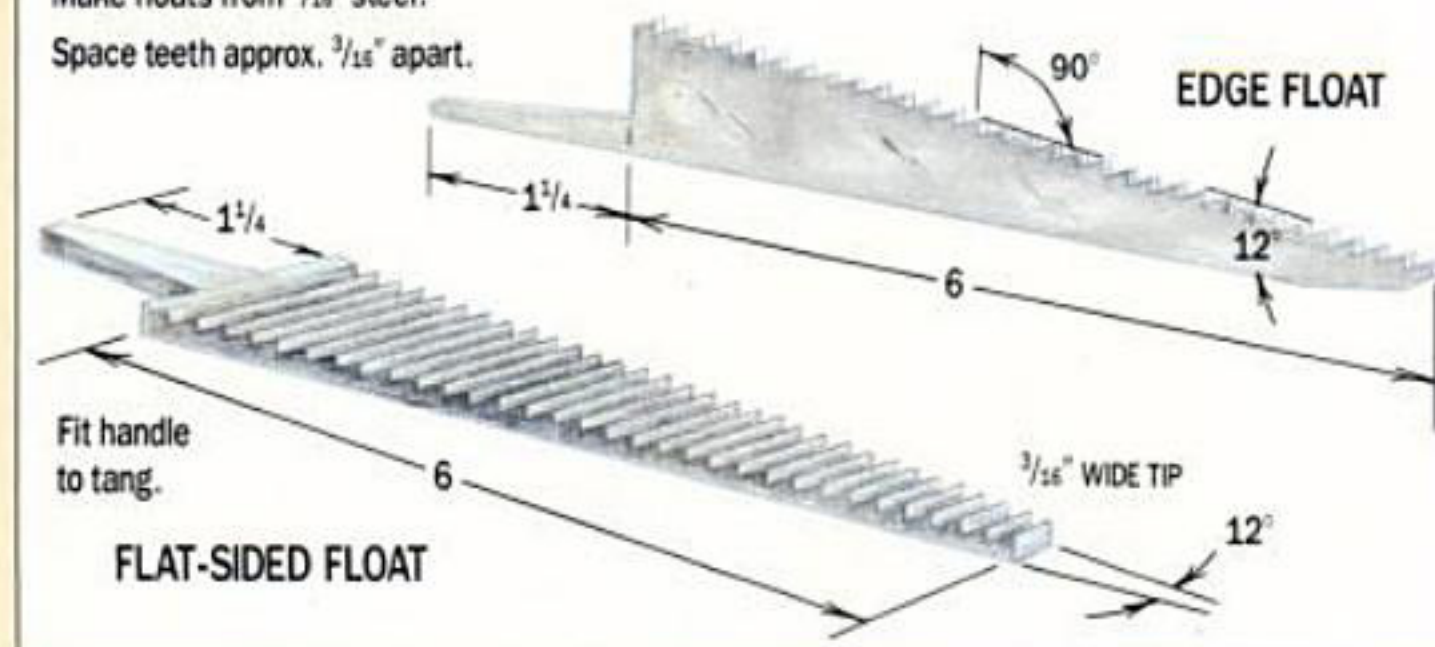
back edge of each groove so it's vertical (perpendicular to the floor), as the drawing shows. Your angles can be a bit off and your spacing

erratic, but keep all the teeth the same height.

The completed float is not hardened, but is instead kept soft. Add a handle if you like, and sharpen regularly with a mill file. I can make about two planes before I need to resharpen a float.—M.R.



Make floats from  $\frac{3}{16}$ " steel.  
Space teeth approx.  $\frac{3}{16}$ " apart.



## Finishing the Plane

The plane will require nothing more than a coat of 50/50 boiled linseed oil and some turpentine. Apply the finish with a rag, and then wet sand with 400-grit wet/dry paper. After the finish on the plane dries, apply a good coat of paste wax. After time and with plenty of use, the plane will develop a beautiful patina.

## Testing the Plane

The blade profile on a smooth plane should be honed flat, though you may wish to round the corners a bit to prevent the blade from leaving ridges at the edge of the cut.

Set your chip breaker approximately  $\frac{1}{16}$  in. behind the cutting edge of the blade (I find that it needs to be set back this far on wooden planes). Make sure the blade assembly is bedded down well and is making solid contact, or the plane will chatter and choke.

Set your blade to project slightly past the sole with a small mouth opening before the blade. You can fine-tune the extension of the blade by lightly tapping the back of the blade with a mallet. You can back it off by tapping the strike button.

I find my plane works best if I shoot it straight ahead. It's more apt to choke if I angle it. If the plane does choke or cut unevenly, try backing the iron off a bit. If that doesn't work, try moving the chip breaker a little farther back. As a last resort, open the mouth *slightly* with files, then try it again. Keep making small adjustments until the plane produces a clean, full-width shaving.

I thought that my finished smooth plane would end up as part plaything and part showpiece. However, I find myself reaching for it each working day. ▲



## MARIO RODRIGUEZ

is a teacher and professional furniture maker in New York.





This mortising attachment has been improved by the addition of a pair of wooden fences and a sturdy hold-down. These are especially useful when operating the larger hollow chisels.

# MORTISES BY MACHINE



**W**hen faced with the job of cutting mortises, there are quite a few options. These range from the most basic—chopping mortises out with hand tools—to the more technical—feeding parts into an industrial chain-mortising machine that turns mortises out by the thousand.

Between these two extremes is a wide choice of options. Some familiar machines—routers and drill presses—can readily be adapted to cut mortises. Other machines are specifically designed with mortises in mind. I'll touch very briefly on hand methods,

*A Dozen Ways  
to Hog Out the  
Waste*

**BY SIMON WATTS**

and then I'll describe the various machines that do the same job.

Any machine involves some setup time. If you have only a few mortises to deal with, it's often quicker to mark them out individually, drill out the waste, and chisel to the lines. If you don't have a drill press, a self-centering doweling jig speeds the work and keeps holes square to the surface.

## **Hollow-Chisel Mortising**

If you already own a drill press, consider buying a hollow-chisel mortising attachment to go with it. This attach-



ment consists of a sturdy cast-iron frame, or yoke, which clamps to the quill of the drill press. (See photo.) Into this yoke fits a square hollow chisel that's pushed down into the work while a rotating bit inside removes the waste. You can cut mortises up to  $\frac{3}{4}$  in. across, 3 in. deep, and any length you want.

A hollow-chisel mortiser cuts square-ended mortises that need minimal cleanup with a chisel. However, this method is relatively slow, and the hollow chisels are expensive, tricky to sharpen, and take time to set up. An even bigger consideration for a busy shop, the mortising attachment ties up the drill press.

If you go the hollow-chisel route, make sure that the mortising attachment you select fits your drill press—it's the diameter of the quill that matters. Along with the attachment itself, you'll need to order hollow chisels and bits. Make sure that the shanks of these chisels also fit the yoke—usually a  $\frac{3}{4}$ -in. dia.

Large chisels take considerable effort to withdraw—especially from hardwood. If the chisel remains embedded in the wood, the cast-iron yoke is likely to slip down the quill. If this happens, the rotating bit is pulled up inside the chisel, causing severe damage to both bit and chisel—even splitting the steel, as shown in the photo.

Slippage occurs when the bolt that clamps the yoke to the quill has not been sufficiently tightened. I've found that the standard bolts supplied with mortising attachments are often inadequate and shear off when threatened with even moderate torque. The solution is to replace them with a stronger bolt before they fail. Stainless-steel bolts are an option, but high-tensile bolts are better. You want at least a grade three (look for five ridges on the head of the bolt) or, better yet, grade eight with six or seven ridges.

All of the hollow-chisel mortising attachments come with a hold-down, a fence, and two adjustable curved retaining bars that keep the work against the fence. For heavy cuts, I've found these ready-made devices wanting, so I improvise my own.

What works best is to have a fence and counterfence clamped securely to the drill-press table. (See photo, previous page.) A third block, slightly offset,



This hollow chisel split when the rotating bit was pulled up inside the chisel as the chisel was being withdrawn from the wood.

acts as a hold-down. A shop vacuum (reversed) blows the chips away to reveal the guide marks. The air flow also helps cool the chisel.

Hollow chisels (with matching bits) are available in widths from  $\frac{1}{4}$  in. to  $\frac{3}{4}$  in. However, I'd limit the larger chisels to a substantial drill press. I've found the  $\frac{5}{16}$ -in. and  $\frac{3}{8}$ -in. sizes to be the most useful. Two parallel, narrow mortises make a stronger joint than one wide mortise.

Unless the hollow chisel is supported on all four sides, it will wander off the vertical. This is especially important at the ends of the mortise, so cut these first, and then remove the wood in between.

The limits of the mortise can either be set with stop blocks clamped to a fence or marked with a couple of pencil lines or knife cuts. The depth-of-cut is

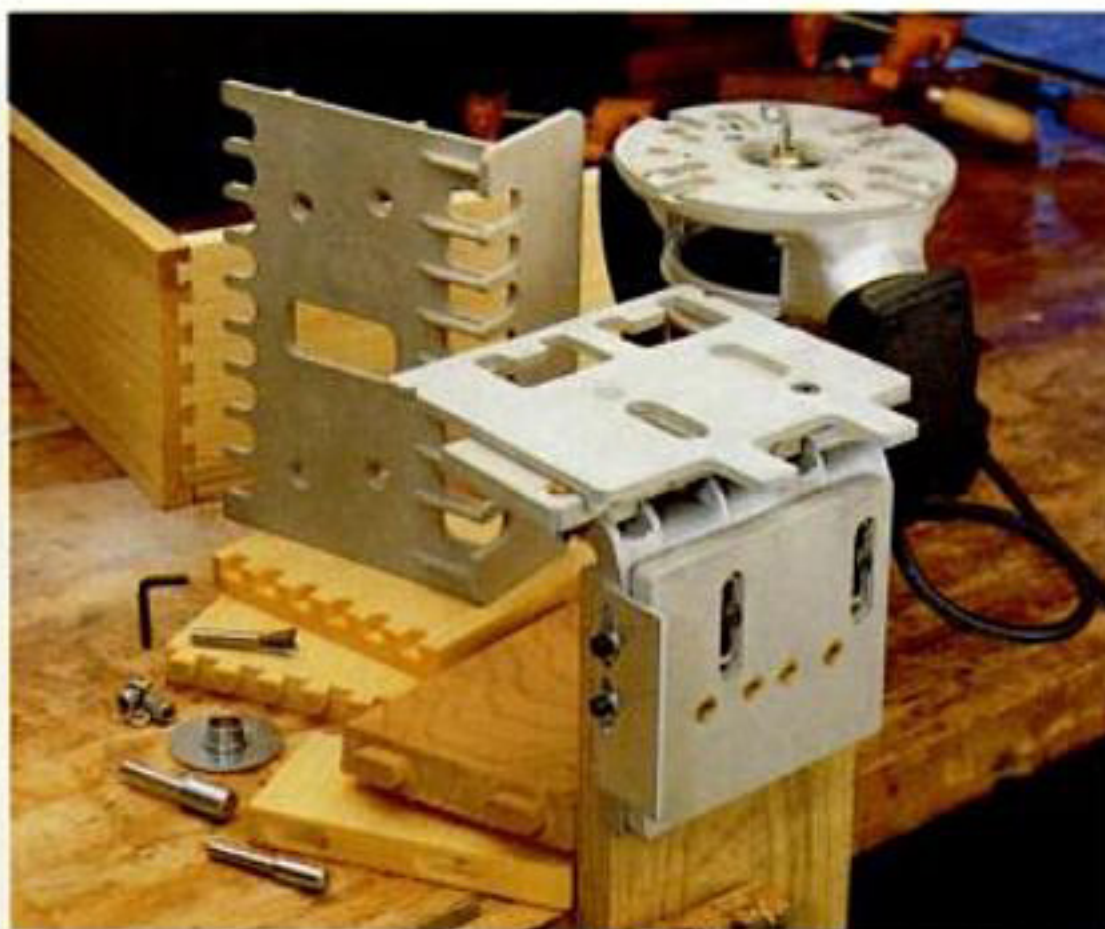


This 14-in. drill press is fitted with a conventional hollow-chisel mortising attachment.

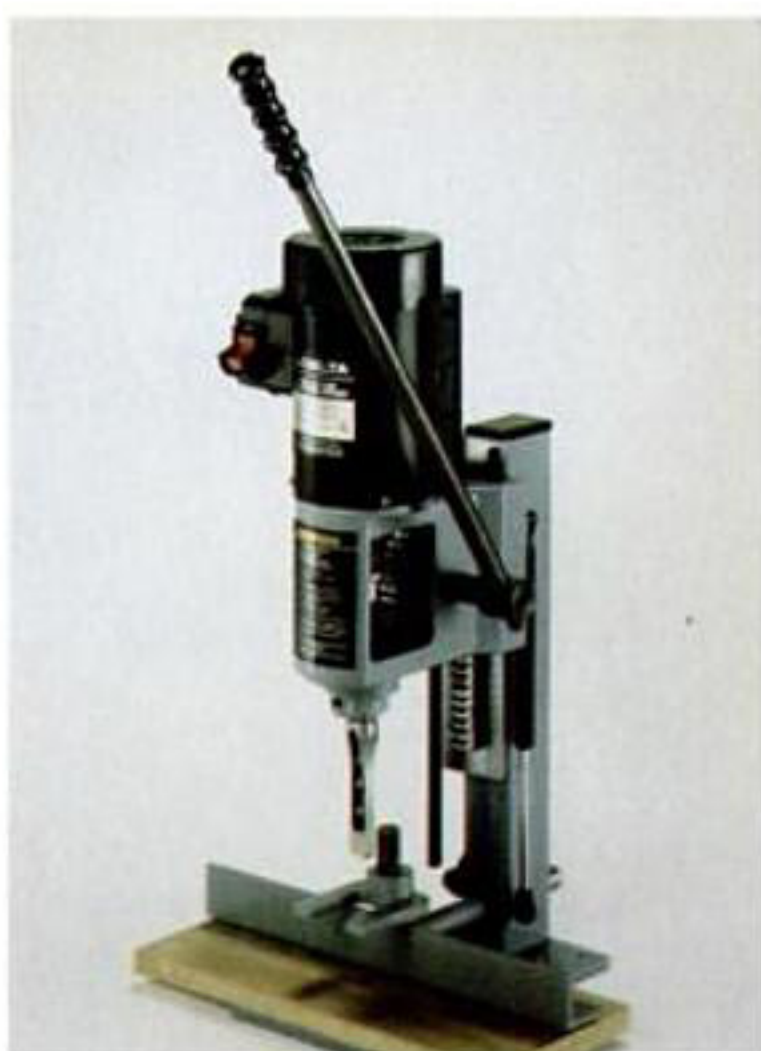




▲ The RouterMaster is a sturdy mounting carriage for a heavy-duty router.



▲ The Jointmaster Joinery System cuts dovetails as well as mortises and tenons.



▲ This benchtop hollow-chisel mortiser is imported from England by Delta. It takes chisels from 1/4 in. to 1/2 in.

set with the depth stop that's provided on most drill presses. For a haunched mortise, simply slip a wood spacer block under the depth stop when making the shallower cuts.

A **benchtop mortiser** is a good alternative to a hollow-chisel mortising attachment. This is a portable hollow-chisel mortiser that takes up little space, does an excellent job, and doesn't tie up the drill press. It is less tiring to operate than a drill press is because the lever arm is longer and the action smoother. It also comes with a sturdy hold-down that needs no modification. A further advantage is that it readily converts to a small drill press should the need arise.

The one drawback is the 3,400-rpm motor that directly drives the cutter. High speed can cause the larger chisels to overheat and turn blue. The manufacturer claims this does not hurt the temper of the chisels, but I have not verified this and don't know anyone who has.

Whatever mortiser you use, it's essential to keep both the hollow chisel and the bit sharp. A simple, effective method to do this is described in the sidebar, *Sharpening a Hollow Mortising Chisel*, page 27.

### Router Mortising

Routers are widely used for mortising. Compared to hollow-chisel mortisers, a router is faster and the sides of the mortise are smoother. However, the mortises have rounded ends. Unless you choose to round the tenons, each mortise must be squared with a chisel.

Cutting mortises with a hand-held router and a single fence is tricky. If you don't feed the router correctly, it will be thrown away from the work and make a ragged cut—or worse.

A better method for cutting is to mount the router in a router table and lower the work onto the rotating bit. To do this safely and accurately, you need a fence and counterfence as well as front

and back stops that define the limits of the mortise.

An alternative to these two methods is to mount a plunge router in a shop-built jig (see AW, #23) or build a router-powered slot mortiser. (See AW, #13.)

For routing mortises, up-cut spiral-flute bits work better than straight bits. The spiral flutes draw the chips up and out of the mortise. If you have a choice, I recommend bits with a 1/2-in. dia. shank—they're less likely to flex than bits with a 3/4-in. shank.

There are a number of jigs, fixtures, and attachments on the market that enable you to cut mortises—and various other joints—with a regular router. (See Sources.) These attachments range from the \$25 Rig-A-Mortis, which cuts only mortises, to the \$1,495 Multi-Router, a versatile machine appropriate for a small-production shop.

The first step up from Rig-A-Mortis is Porter Cable's \$60 Morten Mortise and Tenon Jig. This consists of a steel template, a ball-bearing pilot bit, and hardwood work stop. It cuts a mortise and matching tenon of only one size.

The Jointmaster Joinery System, at about \$100, comes with a special base plate, and it cuts dovetails as well as mortises and tenons. (See photo.)

The \$600 MatchMaker (formerly the Wirth Machine II), powered by a 2 1/2-HP to 3-HP router, is a versatile horizontal boring machine. It can cut mortises and tenons, dovetails, and duplicate patterns with speed and accuracy.

At the high end is the RouterMaster



▲ The Multi-Router is a versatile machine that cuts a variety of wood-working joints with precision.



## SOURCES

Hollow-chisel mortising attachments are available from most mail-order tool companies. Mortising jigs and specialty mortising machines are available from:

- ▶ **Benchtop mortising machine:** Delta International, 246 Alpha Dr., Pittsburgh, PA 15238, (800) 438-2486.
- ▶ **Rig-A-Mortis:** Tool Aid, 6950 Eric Lane, Wheatland, CA 95692, (916) 633-2242.
- ▶ **Morten Mortise and Tenon Jig:** Porter Cable, 4825 Highway 45 N., Jackson, TN 38305, (901) 668-8600.
- ▶ **Jointmaster:** Leichtung Workshops, 4944 Commerce Parkway, Cleveland, OH 44128, (800) 321-6840.
- ▶ **MatchMaker:** Woodworker's Supply, 5604 Alameda Place N.E., Albuquerque, NM 87113, (800) 645-9292.
- ▶ **Multi-Router:** JDS Co., 800 Dutch Square Blvd., Columbia, SC 29210, (800) 382-2637.
- ▶ **RouterMaster:** Garrett Wade, 161 Ave. of the Americas, New York, NY 10013, (800) 221-2942.

for \$1,200, a heavy-duty router mounting carriage that travels on an adjustable radial arm. This converts the router into a precise joint-cutting and shaping system.

### Other Mortising Options

Horizontal boring machines are ideal for cutting mortises. When equipped with a sliding table, clamps, and stops, these machines still produce the fastest, most accurate mortises, although the resulting mortises have rounded ends.

Horizontal boring machines are often incorporated into combination machines such as the Shopsmith, Robland, Kity, Felder, and Total Shop. For clean, accurate cutting, the choice

of bit is crucial. A quality end-mill cutter would be my first choice.

**If you have the floor space**—and don't mind a bit of tinkering—there are two other options worth considering. You could look around for a vintage drill press and dedicate it only to mortising. It might require a general tune-up as well as some modifications such as longer handles, for example.

The other possibility is to hunt up an industrial mortising machine. These are massive, cast-iron affairs widely used in production shops years ago. Composite materials and new fastening methods are making them obsolete, so sometimes you can get one for a reasonable price. Industrial floor models have either a hand-operated or foot-

operated chisel. The work is clamped to a cast-iron sliding table equipped with adjustable stops.

Before making a final choice, don't forget to explore the second-hand market. Firms that handle used woodworking machinery are listed in the yellow pages. ▲



**SIMON WATTS**  
*teaches wooden boatbuilding around the country and is a contributing editor of AW.*

## SHARPENING A HOLLOW MORTISING CHISEL

**A**sk five people how to sharpen hollow chisels and you'll get five different answers. Here's one way that works well for me. Buy a small cone-shaped grinding wheel and check that the tip matches the hollow chisel. To get a picture of the interior geometry, press the end of the chisel into modeling clay (or Play-Doh®).

To sharpen the chisel, reduce the speed of the drill press to near 500 rpm, and put the grinding wheel in the chuck. Holding the hollow chisel vertically, press the business end up against the stone, using only moderate pressure. Dip the chisel in water at the first sign of overheating. Continue sharpening until you feel a distinct burr on all four sides. (A lathe works equally well for this operation.)

You'll see that a small area is untouched by the grinding wheel. Clean up these areas with a small triangular file. Lay the chisel on an oil-



▲  
To sharpen a hollow chisel, hold the end up against a cone-shaped stone until you feel a burr on the outside edges.

stone or water stone—about 1,200-grit—and gently hone each of the four flat surfaces until the burr has gone. This will work for any hollow chisel from 1/4 in. up to 3/4 in.

You can also get a cutter designed specifically for sharpening hollow chisels (available from Record Tools, North America, 1915 Clements Rd., Pickering, Ontario, Canada L1W 3V1, 800-267-8367). It looks like a metal countersink with an attached pilot. You put the hollow chisel in a vise, insert the cutter in the chuck of a brace, and rotate it, using only moderate pressure. Clean up the inside corners of the chisel and hone as described previously.

The bit inside the chisel must also be kept sharp. If dull, it will clog up and wear more rapidly. The only way to sharpen these bits is with a small triangular file. If a bit has been damaged when pulled up into the hollow chisel, replacing it is about your only option.—S.W.



## LIBRARY

# TWO-STEP

*A Portable Stairway to Extend Your Reach*



**P**icture the perfect home library with shelves of old books bound in leather. Such a room wouldn't be complete without a handsome library stool like this one. Of course, books aren't the only things stored on high shelves, making this stool useful in the kitchen, den, or any room.

I designed the stool with plain lines and basic mortise-and-tenon construction. (See drawing.) It's a good project for learning basic joinery skills. To make the stool appear more graceful, I arched the braces that fit under the front lip of each tread. The same shallow curve is carried over to the front of the treads themselves; and there is a smaller arc cut into the bottom of the sides to define the stool's four "feet."

The long, slender handle that's mounted along the right side (left side for lefties) functions as a stair railing, giving you something to grab as you step up. It's also handy when moving the stool.

I made the stool out of cherry. All the stock is  $\frac{3}{4}$  in. thick. I locked the through tenons with wedges made of walnut for contrast. For visual interest, I chamfered the projecting brace tenons.

### **Making the Side Pieces**

The L-shaped side pieces are the first parts to make. (See drawing.) These pieces are glued up from two 7-in. wide boards. It's easier to cut the mortises and tenons on each 7-in. board before gluing them together and before making other parts of the stool.

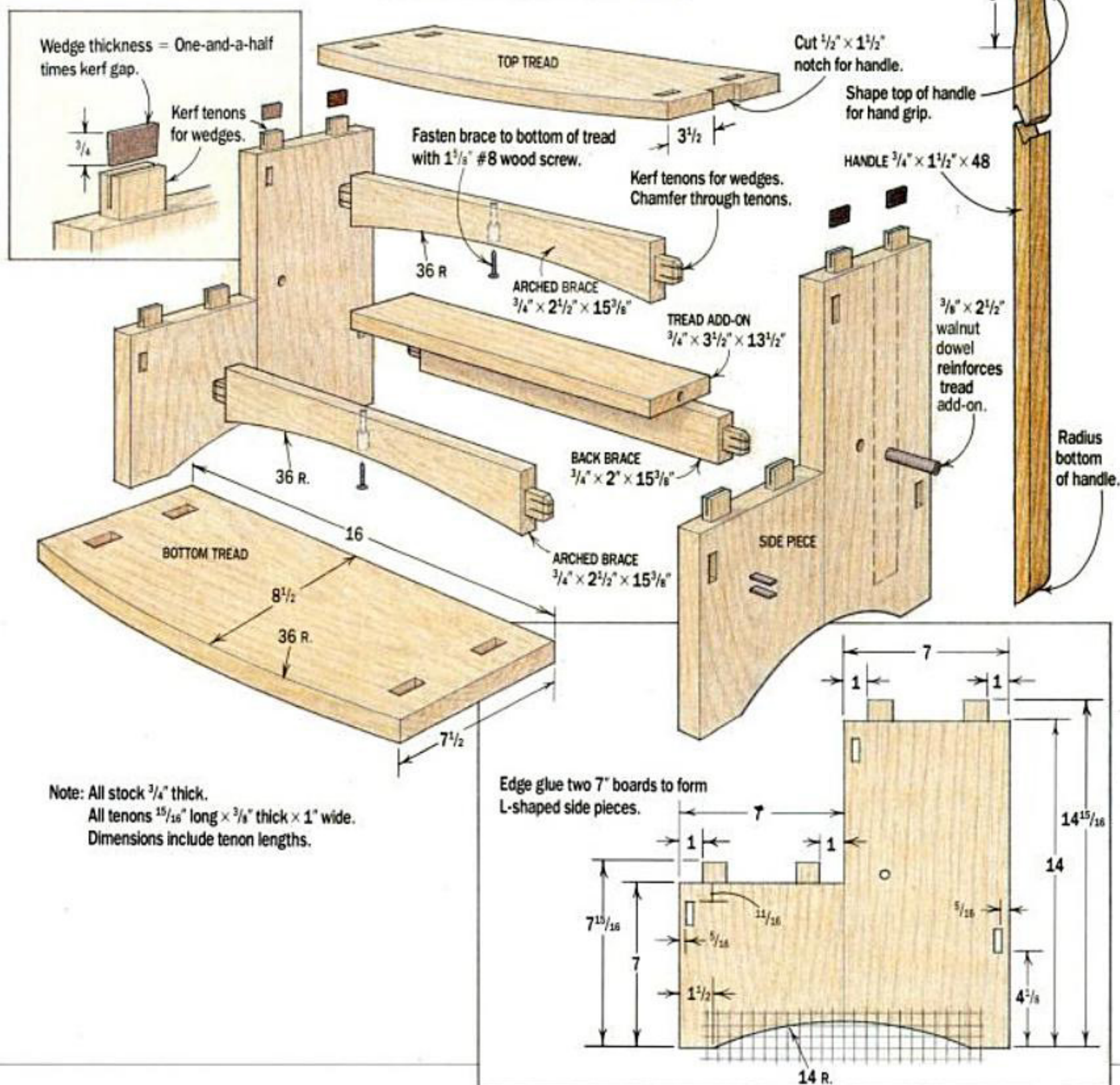
Start by cutting the boards for the side pieces to length, allowing extra for tenons, and then lay out and cut the mortises for the braces in the boards, as shown in the drawing.

**To rough out the mortises**, I used a  $\frac{3}{8}$ -in. dia., two-flute, spiral cutter (available from Woodworker's Supply Inc., 800-645-9292). This type of cutter is usually used in a router, but I chucked it in a drill press set to the highest spindle speed. A Forstner bit will work well for this, too, but I prefer the spiral bit for the very accurate,

**BY FORREST BOLEY**



## LIBRARY TWO-STEP



smooth, flat-bottomed holes it makes.

Because the spiral bit cuts aggressively, I clamped the workpiece against a temporary fence to hold it and to locate the mortise. I bored overlapping holes to hog out most of the waste, and then cleaned the sides and ends of the mortise with chisels.

Next, I cut the tenons in the top of each side piece. Usually, you cut a mortise first and fit the tenon to the mortise. In this case, I cut the tenons first and marked the location of the mortises in the treads with them.

I like to cut the tenons on my table saw. You can also cut them with hand



To cut the brace mortises, author used a  $\frac{3}{8}$ -in. dia. two-flute spiral cutter chucked in a drill press to bore overlapping holes, then cleaned up the mortises with chisels.

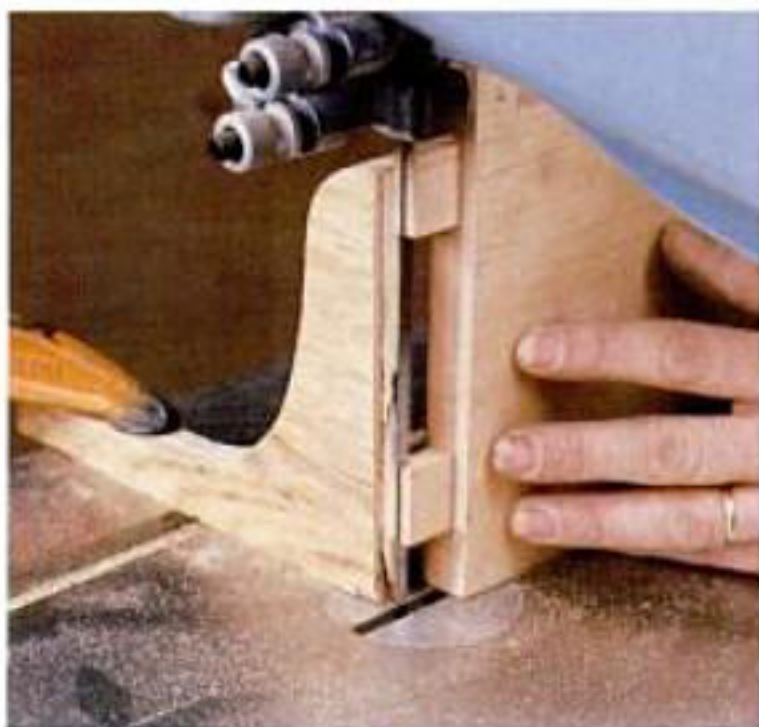
tools or rout them on a router table. (See AW, #18.)

I cut the tenon cheeks first with my Delta tenoning attachment. (See AW, #24 for a shop-built tenoning jig.) I cut both cheeks in a single pass by mounting two identical carbide blades on the arbor of my table saw. (See AW, #24.) I installed homemade Lucite spacers to separate the blades to cut perfect  $\frac{3}{8}$ -in. thick tenons.

Next, I cut the tenon shoulders and edges on the table saw, using an auxiliary wooden fence screwed to the miter gauge.

Before gluing up the side pieces, cut





▲  
To bandsaw kerfs in the tenons, author used a resawing pivot fence to guide the cut.

kerfs for the tenon wedges. On the bandsaw, I bandsawed the kerfs parallel to the width of the tenon (not its thickness) to within  $\frac{1}{8}$  in. of the tenon shoulders, as shown in the drawing and photo. You could also cut the kerfs by hand with a dovetail saw.

Now edge glue the side-piece boards to form the stool's L-shaped side pieces. (See drawing.) To form the stool's feet, scribe and bandsaw a 14-in. radius arc centered at the bottom edge of each side piece.

### Making the Braces and Treads

Cut the three braces to size, allowing enough length for the  $\frac{3}{8}$ -in. by 1-in. tenons on their ends. (See drawing.) Cut two kerfs for wedges in each brace tenon. For variety in visual detail, I cut the kerfs across the tenons' thickness (rather than across the width), as shown in the drawing. You'll bandsaw a gentle radius on the bottom edge of the braces later.

Cut the treads to rough size, but don't cut the radii on them yet. To make the bottom tread safer to step on, I extended its back edge by gluing on a  $3\frac{1}{2}$ -in. wide tread "add-on" to the back edge. (See drawing.) The add-on will support your foot at the back of the tread.

Bandsaw 36-in. radius arcs on the bottom edge of the two front braces and the front edge of the two treads. The rear brace remains straight. You can make these gentle arcs by scribing them with a pair of trammel points and bandsawing the arcs freehand. (See AW, #23 for more on bandsawing curves.)

As the drawing shows, each arched brace is fastened to the tread above it with a central screw. Drill and counter-bore the holes for these screws.

To locate the tread mortises, dry assemble the side pieces with the braces. Draw the tenons fully home in their mortises with clamps across the side pieces. Flip the stool upside down and lay out the top tread mortises by making a pencil mark around the tenons. Repeat this procedure with the bottom tread, fitting the tread add-on between the sides.

Before disassembling the dry-fitted stool, use a sharp pencil to mark around the ends of the brace tenons where they project beyond the plane of the side pieces. (See photo.) The line will indicate where to cut a chamfer around the tenon ends.

Now cut the mortises in the treads the same way you mortised the side pieces. Since the tenons are already cut, these mortises need to be located very accurately. That means you should work to the *inside* of the mortise layout marks.

To complete the top tread, cut a notch on one side of the tread to accept the handle, as shown in the drawing. I bandsawed the notch and cleaned it up with a flat file.

Chamfer the ends of the brace tenons to the line previously marked. I used a block plane to cut the chamfers, but you could just as well use a chisel.

I bandsawed the tenon wedges from a block of walnut, orienting the block so the grain runs from the thick (top) end to the thin end of the wedge. (See drawing.) I made the top of the wedge about one-and-a-half times as thick as the tenon kerf (or about  $\frac{1}{16}$  in. thick). To do this, I adjusted my miter gauge to a  $1\frac{1}{2}^\circ$  to  $2^\circ$  angle, then made repetitive cuts on the bandsaw, flipping the walnut block over after each pass. This produced wedges with a  $3^\circ$  to  $4^\circ$  bevel, which is about right for the kerfed tenons.

Make the handle from  $\frac{3}{4}$ -in. by  $1\frac{1}{2}$ -in. by 48-in. stock, and cut out the simple shape, including a radius on the bottom end, as shown in the drawing.

### Assembly and Finishing

Glue and clamp the parts of the stool, and set the wedges. Tap the

wedges in the tread mortises just enough to snug up the joint. The wood at the edge of the tread can split out if you tap too hard. When the glue is dry, trim the tread tenons flush with the tread, and trim the brace wedges to match the tenon chamfer.

Fasten the handle to the side of the stool with brass screws driven from the inner surface of the side piece.

To secure the treads to the braces, drive a  $1\frac{5}{8}$ -in. #8 wood screw up through the hole in the bottom edge of each arched brace into the bottom of the treads. Finally, reinforce the tread add-on by drilling a  $\frac{3}{8}$ -in. hole



▲  
Mark the brace's tenon ends for chamfering by dry assembling the stool and tracing around the tenon with a sharp pencil. Remove the tenon from the mortise, and chamfer to this line with a block plane.

through each side piece and into the end grain of the add-on. Glue a contrasting walnut dowel (available from Midwest Dowel Works, 4631 Hutchinson Rd., Cincinnati, OH 45248, 513-574-8488) into the holes. Trim the dowels flush.

I finished my stool with six coats of pure tung oil. I thinned the first coat 50/50 with mineral spirits and the second coat with one part mineral spirits to three parts tung oil. The remaining coats were full strength. ▲



**FORREST BOLEY**  
is a retired astrophysicist from New Hampshire.



# SCRAW-WOOD MALLET

BY SIMON WATTS

A mallet is an essential tool for any woodworker. I use a mallet frequently when cutting mortises and dovetails by hand, and for fitting joints and knocking them apart. Not only must the weight of the mallet be correct for the job, but the size and shape of the head, the handle type, and even the species of wood all need careful consideration.

My mallet weighs 1.9 pounds. If you prefer something lighter, reduce the overall dimensions in the drawing by 10 or 15 percent. The four flat sides of the head taper slightly toward the handle. This makes it much easier to strike surfaces with the flat of the mallet rather than with a corner.

I have little use for round-headed mallets, and none at all for round handles. In my opinion, they're useful only when playing croquet with pygmies. Mallets with turned

handles tend to twist in my hand, and I can't tell which way the head is pointing by feel—I have to look.

The handle of this mallet is rectangular in cross section and has chamfers cut in the edges. These chamfers are stopped at both ends, so I can feel the location of my hand on the mallet. I can also tell the orientation of the mallet head with my eyes shut.

Some woods commonly used for mallets, such as maple and ash, are too hard for my taste. I prefer a softer wood, such as elm or beech. My favorite wood for mallet heads is willow, but because I couldn't find any, I combined some thin slices of walnut with cherry to make my mallet.

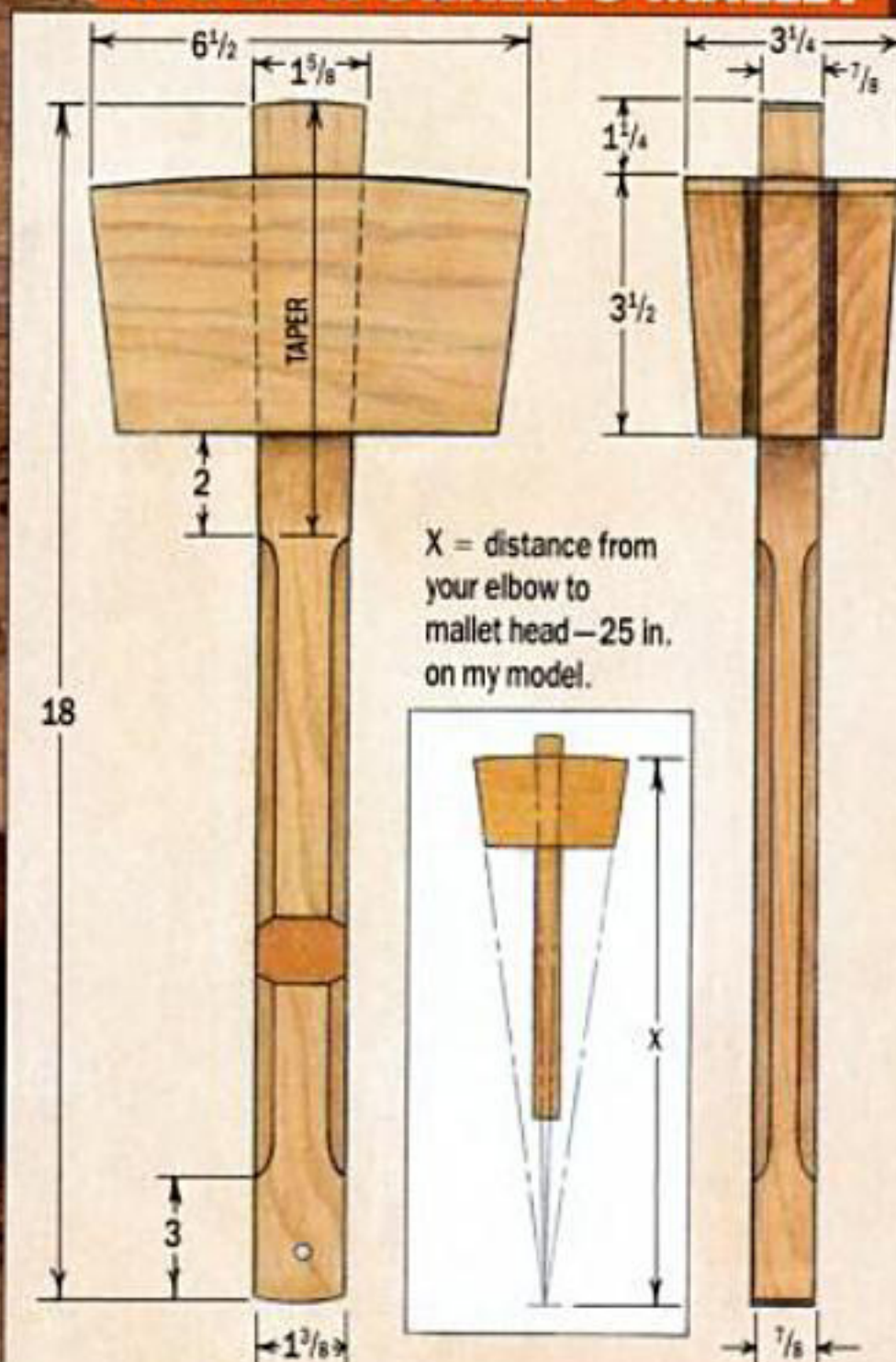
The construction is simple. I began by laminating the head out of four pieces of  $\frac{7}{8}$ -in. stock to avoid having to chop out a tapered mortise in a solid block. I made the han-

dle first, and then glued up the head using the handle as a spacer. I removed the handle and removed the squeezed-out glue from the mortise. When the glue had set, I bandsawed the head to shape and cleaned up the surfaces on a disc sander.

When using a mallet, always strike the chisel or other tool with the end of the head, not its side. The ends are harder because they are end grain. I strike with the sides when fitting or taking joints apart because the softer side grain is less apt to dent finished surfaces.

With frequent use, mallets will need truing up on a disc sander. For this reason, I don't finish the mallets but, instead, leave the wood bare. Unfinished handles feel better and are less apt to cause blisters. ▲

**SIMON WATTS**  
is a contributing editor of *AW*.



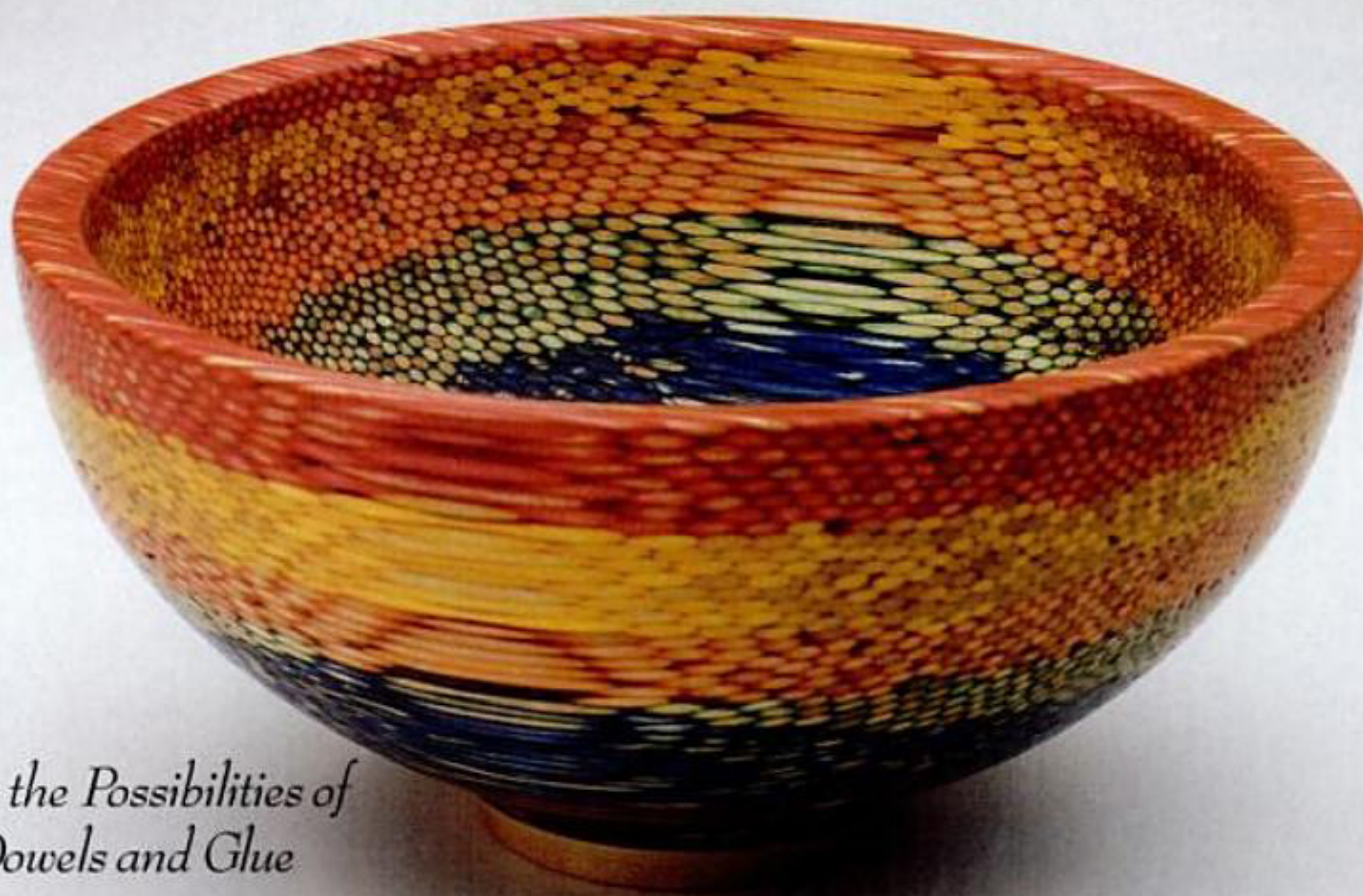
STEP 1: Glue up head, using handle as spacer.

STEP 2: Remove handle and clean up glue squeeze-out from mortise.

STEP 3: Bandsaw to shape and clean up on disc sander.

DRAWINGS BY FRANK ROHRBACH





*Explore the Possibilities of  
Dyed Dowels and Glue*

# TECHNICOLOR TURNINGS

BOWLS COURTESY OF IRVING LIPTON COLLECTION

PHOTOS BY GEORGE TAKAMORI

I am always searching for exciting woods and other materials to turn on the lathe. One discovery was Parallam, a laminated construction timber made from veneer strips. The colors and texture were fascinating. But Parallam is difficult to obtain, so I decided to make my own laminations and add a twist by using colorfully dyed dowels instead of veneers.

Foot-long sections of  $\frac{1}{8}$ -in. dia. maple or white-birch dowels are perfect for the job. These light-colored woods accept dyes well and show off the brilliance of the chemical tints. Further, the tiny diameters let the dowels nest tightly together when they're glued and clamped to form fairly solid blanks for both spindle

**BY HOWARD LEWIN**

and bowl turning. But it takes a lot of dowels—about 3,000—to form a 5-in. thick, 12-in. square turning blank.

Anyone who's had a glue-up go awry when clamping up a few furniture components can imagine the potential nightmare of juggling quarts of glue and thousands of dowels. The job actually isn't that bad with a simple clamp/press form that holds the glued dowels. I'll describe later how to make it. The form also enables you to mix

various-colored dowels randomly or in more definite rows or patterns, depending on the design you want. (See photos.)

## Coloring the Dowels

The dying process itself is simple. Batches of dowels are crosscut to length, soaked in dye vats for a day, and then spread out on wire racks to dry. Wear gloves throughout this messy job. I forgot my gloves once when working with red dyes and I couldn't get the color off my hands. Later, I went to the bank and noticed the teller staring at my hands. I said, "It doesn't hurt." She almost passed out cold, thinking I was bleeding.

I use aniline dyes (available at finish-



ing- and woodworking-supply stores) because of their intense colors. The dyes are available in powder or liquid form, but I've found the best color penetration and fastest drying time comes with the powdered dyes dissolved in methanol (methyl alcohol).

The process is straightforward: In a plastic container with an airtight lid (such as a restaurant-sized pickle jug), mix dye powder with methanol until the color looks right; insert a dowel into the mix to check the color. Once you have the color you want, tightly close up the container until you're ready to use the dye mixture. It is essential that you keep this mixture securely capped because methanol is very volatile and will evaporate quickly if the container is not airtight.

To dye the dowels, place them in a separate plastic container that has an airtight lid. I've discovered that large Tupperware containers accommodate the 12-in. dowels nicely. Pour in the dye mixture until it barely covers the dowels. You'll find that the dowels float in the dye, so place an old dish or pan over them to keep them submerged. (Be sure the lid still fits.) The dowels will absorb some of the dye in the first few hours of soaking, leaving the top dowels exposed. To ensure consistent color as they soak, add dye to the container to cover the top dowels, and then let the batch sit for at least 24 hours.

After removing the dowels from the dye, let them air dry on chicken-wire racks for at least a day. You don't want to risk problems from gluing dowels that aren't thoroughly dry.

### Gluing Up a Turning Blank

To glue up a blank for turning a bowl, I use a form I built that has sides sloping at 60° to secure the dowels during glue-up. (See photos, next page.)

You could make a straight-sided form, but the sloping sides save dowels and money. Most of my forms are sized for gluing up 12-in. by 12-in. turning blanks. The forms are simply held together with screws (see photo, next page) for easy removal of the sides.

You'll need some kind of a press to clamp the dowels in the form. As you can see in the photo on the next page,



BOWLS COURTESY OF IRVING LIPTON COLLECTION

*These forms were turned from laminated blocks of dyed dowels. All sorts of effects are possible by arranging the dowels in various layers and patterns.*



VASES COURTESY OF IRVING LIPTON COLLECTION





The clamping form consists of a 3/4-in. plywood box wide enough to hold 12-in. dowels. The sides unscrew so the blank can be removed. Use waxed paper between the dowels and the form to prevent the blank from sticking.

mine is made of some 2 x 6 boards bolted together. Pressure comes from a car jack. Test the form by filling it with dowels to determine how many you'll need for the blank. Most woodworking glues will work, but I prefer Weldwood Plastic Resin glue (available at most hardware stores and woodworking-supply stores). Weldwood fills gaps, is easy to mix, and will absorb some color from the dyed dowels. There is a drawback with this type of glue. A 70° minimum temperature must be maintained for the glue to cure properly. To be safe, I keep the temperature at the glue line about 80° by surrounding the press and form with six 100-watt light fixtures. (See photo.)

You'll need about 4½ pounds of glue powder for each 3,000-dowel turning blank. Before mixing the glue, line the form with waxed paper and attach one of the removable sides to the form. Oiling or waxing the form will *not* prevent the gluey turning blank from sticking. Waxed paper will. Trust me!

I mix the glue in its original container, gradually adding warm water until the adhesive is very thick and the lumps are gone. I then add more water to thin the mixture until it's somewhat soupy. An electric drill with a paint-mixing attachment works well for this. After letting the glue mixture stand for about 10 minutes to ensure the powder is thoroughly dissolved, I pour the glue into a flat-bottom container with 2-in. high sides. Next, I put on gloves and immerse handfuls of dowels into the glue, stirring them into the mixture. The dowels must be covered with glue. Don't be stingy! The more glue you use, the more gaps are filled



To laminate spindle-turning blanks, author glues dowels in a cylindrical shape and secures them with metal hose clamps.



A car jack is used to compress the dowels while the glue dries. Lights help maintain the 70° F needed for the glue to cure.

and the less apt the turning blank will be to fly apart on the lathe. A delaminating dowel turning blank can be very dangerous. Place the glue-soaked dowels into the clamping form.

### Clamping the Dowels

When all the glue-soaked dowels are packed tightly in the waxed-papered form, put on its other removable side. Place the form in the press, cover the dowels with another sheet of waxed paper and a square of plywood, insert the jack, and pump away. The more pressure, the better—you should be able to see glue squeezing up and around the plywood square under the jack. Glue squeezed out around the sides of the dowels will be trapped in the form and help fill voids. After three or four hours, remove the sides of the form to let air and heat penetrate faster. Because of the amount of glue involved, I usually maintain the clamping pressure and leave on my heat/light setup for at least 16 hours.

To glue up a cylindrical blank for turning a vase or goblet, I use large-diameter hose clamps (see photo), which can be found in most hardware stores. Four clamps will hold a 12-in. tall piece, and each clamp must be tightened enough to cause glue to squeeze out before the piece is put under the heat/light setup previously described. Curing times are directly proportional to the diameter of the turning blank.

After the glue has cured, remove the jack (or hose clamps) and tip the glued turning blank out of the form. *Wear gloves! The dried glue is sharp!* You may have to drop the blank on the floor or rap it with a hammer to free it from the form. Remove as much waxed paper from the turning blank as you can, and scrape away any globs of glue. Dowel turning blanks can be flattened on a jointer; the rough ends of spindle blanks can be cut off with a radial arm saw or flattened with a disc sander.

### Turning Dowel Blanks

Except for a few details, turning the glued-up dowel blanks involves the same tools and techniques you would use when working with solid wood.

I like to glue the dowel blanks to a





Center the glue block on the blank to minimize waste. The faceplate screws to the glue block.

scrap glue block that can in turn be screwed to a faceplate. Use hardwoods for glue blocks. Do *not* use plywood or pine. Plywood has voids, and you'd be gluing a 30-pound blank to 1/16-in. veneer! As for pine, it's soft and cannot stand much turning pressure.

Because making these dowel blanks takes a lot of time and effort, it's especially important to center the glue block on the blank accurately to minimize the amount of waste.

The method that works for me is to locate the center of the dowel blank by drawing diagonal pencil lines from corner to corner. I cut the glue blocks with a hole saw that's about 4 in. in diameter. The hole saw makes a round block with a center hole that's ideal for inserting a punch point. This point can then be aligned with the X from the crossing diagonals to center the glue block accurately. Once the block is centered, trace its circumference with a pencil as a guide for remounting it after you apply glue. (See photo.)

To avoid the curing times required by most glues, I use a cyanoacrylate adhesive called Super-T and Hot Shot accelerator (available from most woodworking suppliers) when joining the dowel blank and the glue block. I put glue on the dowel blank and accelerator on the glue block, and put them together within the circle I marked on the dowel blank. I rap the glue block with a hammer several times to make sure there is good contact. Do *not* put paper between the glue block and the dowel blank! Many a turning has become airborne because of this common bit of bad advice.

Now you're ready to attach the faceplate to the glue block. Again, you can

use the center hole in the blank to help you align the faceplate. If the bowl is going to be square, it may be too long to fit on the inboard center, so you'll have to turn it on the outboard side. If you are going to make a round bowl, cut off the blank's corners on a bandsaw. Put on a Plexiglas face shield and you're ready to turn!

### Grain Direction When Turning

As you cut into the blank, think of the dowels as the vascular vessels of a tree. Turning glued-up dowel blanks either perpendicular or parallel to the lathe bed is the same as turning any solid-wood blank, with one exception: When turning downhill, against the dowels (against the grain), there's a lot more tear-out than with solid wood.

If you turn with the grain perpendicular to the lathe bed, as you would on a dowel blank, the outside cuts must be made uphill (from the faceplate to the lip). Going downhill on the outside of the form causes severe tear-out because the dowels do not support each other; going uphill, they do.

When turning the inside of the form, cut toward the center, gradually working out to the rim. If you turn with the grain (dowels) parallel to the lathe bed, you should cut downhill, just as in spindle turning.

Once you've turned the shape you want, turn away the screw holes or part off the glue block. I usually leave the glue block on to contrast sharply with the dyed dowels and to create a small foot for the bowl.

After sanding the bowl to 220-grit paper, I apply Minwax Antique Oil Finish to bring out the colors. I allow this to dry for 24 hours, and then I apply two coats of sealer and two coats of semigloss lacquer. After at least 24 hours, I rub out the final coat with #0000 steel wool, apply a thin coat of Trewax (clear), and buff with a clean, soft cloth.

I'm still experimenting with the endless possibilities of glued-up dowel blanks. I've even made turning blanks out of the shavings from my dowel-



Author mounts the dowel blank on the lathe with a glue block. He turns the bowl's foot from this glue block.

blank turnings. The turnings that result are exciting. All I've given here are guidelines to the more difficult processes of this technique. You have lots of room for creativity when you make your own version of dyed-dowel turnings. ▲

**WARNING:** Working with dyes and solvents like methanol can be dangerous. Check the labels on the products you buy for the manufacturers' safety recommendations. Methanol is extremely flammable! Work in a well-ventilated area, away from any possible ignition source! Always wear a dust mask and gloves when turning laminated bowls to protect yourself against toxic dust.



**HOWARD LEWIN**  
is a woodworker and teacher in California.



# PENNSYLVANIA TALL CLOCK

## Part 2: *Building the Bonnet*

This is the second part of a two-part article on reproducing an 18th-century Pennsylvania tall clock. In Part 1 of the article (AW, #25), I described how I built the base and waist assemblies of the clock. In this article, I'll explain how I made the bonnet—the upper assembly that houses the works and the dial. The base and waist assemblies must be completed before you can build the bonnet.

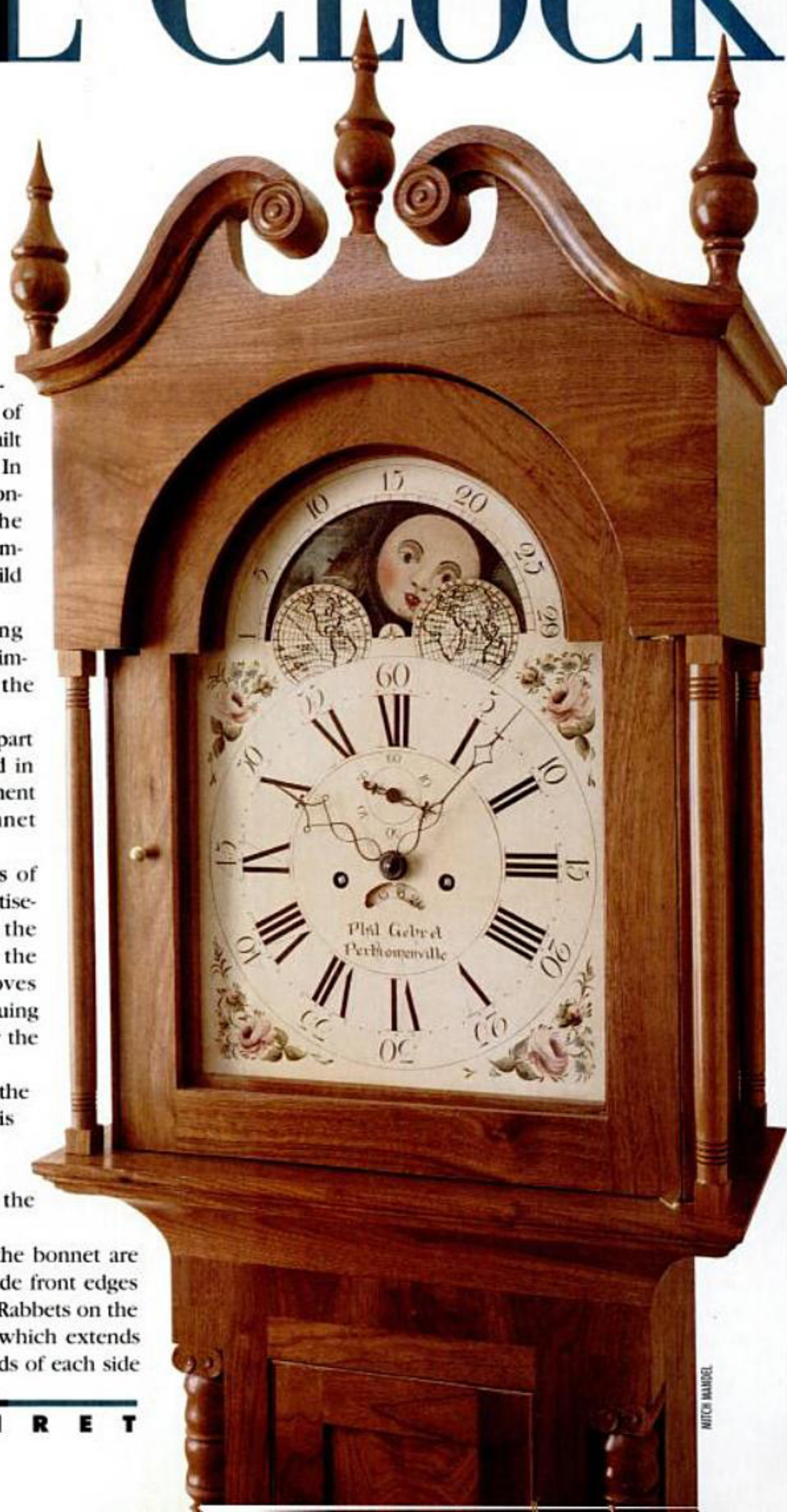
The bonnet rests on the cove molding around the top of the waist. The bonnet simply slides on and off to allow access to the works—gravity holds it in place.

The dimensions provided in this second part are for the movement and dial I specified in Part 1. If you purchased a different movement and dial, you'll need to modify the bonnet dimensions to fit your parts.

**Base frame**—The base frame consists of three pieces of 3/4 walnut joined with mortise-and-tenon joints. The two side pieces of the frame are grooved to house the sides of the bonnet. (See Fig. 1.) I milled these grooves before gluing the frame together. After gluing the frame, I drilled four 1/2-in. dia. holes for the four turned spindles.

A 3/8-in. by 7/8-in. molding is glued around the edge of the base frame. (See Fig. 1.) This molding projects 1/8 in. below the bottom edge of the base frame to hide the seam between the bonnet and the waist when the completed bonnet is in place on the clock.

**Bonnet sides and top**—The sides of the bonnet are made from 3/4 walnut. Rabbits on the inside front edges house the dial frame and door. (See Fig. 1.) Rabbits on the back inside edges house the poplar back, which extends the full length of the clock. The bottom ends of each side



BY PHIL GEHRET



**FIGURE 1**

**STEP 1: Assemble the base frame, sides, and top.**

Diagram illustrating the assembly of the base frame, sides, and top for a wooden structure. The components and their dimensions are as follows:

- TOP:** Dimensions 18" (width) and  $8\frac{3}{8}"$  (height). Rabbet  $\frac{3}{8}" \times \frac{3}{4}"$  for sides.
- SIDES:** Dimensions  $23\frac{5}{8}"$  (height) and  $8\frac{5}{8}"$  (width). Rabbet  $\frac{3}{8}" \times \frac{3}{4}"$  for back. Rabbet  $\frac{3}{8}" \times 1\frac{1}{4}"$  for dial frame and door. Notch sides for blocking.
- BASE FRAME:** Dimensions  $19\frac{3}{4}"$  (width) and  $2\frac{1}{4}"$  (height). Rabbet  $\frac{1}{4}" \times \frac{3}{4}"$  for sides. Drill  $\frac{1}{2}"$  dia. holes for spindles.

Assembly instructions:

- Screw top to sides.
- Screw sides to base frame through slotted holes.
- Join base frame with mortise-and-tenon joints.
- All stock  $\frac{3}{4}"$  thick.

Technical drawing of a wooden finial. The drawing shows a side view of the finial against a grid background. The total height is labeled as  $7\frac{1}{4}$ . The finial has a pointed top, followed by a section with a diameter of  $\frac{9}{16}$  DIA., a wider section with a diameter of  $1\frac{1}{2}$  DIA., and a base section with a diameter of  $\frac{5}{8}$  DIA. The base of the finial has a diameter of  $\frac{3}{2}$  DIA. A small dimension of  $\frac{3}{4}$  is indicated for the base section. The drawing is labeled "SIDE" on the left. A note at the bottom states "ONE SQ. =  $\frac{1}{2}$  IN."

ONE SQ. =  $\frac{1}{2}$  IN.



fit into the grooves in the base frame.

After milling the rabbets, I rounded over the front outside edge of each side with a round-over bit. I then cut a  $\frac{3}{4}$ -in. wide notch in the front of each side piece for the  $\frac{3}{4}$ -in. thick blocking behind the scroll board. (See Fig. 1.)

The top of the bonnet is a piece of  $\frac{3}{4}$ -in. poplar rabbeted on all four edges for the back, sides, dial frame, and blocking, as shown in Fig. 1.

**Assembling base frame, sides, and top**—I screwed the sides to the base frame from underneath (two screws in each side). Next, I glued the top to the sides, reinforcing the rabbet joints with two screws driven into each side piece. (See Fig. 1.) Dovetails are an option instead of rabbet joints. On many original tall clocks, the top joins the sides with through dovetails.

**Dial frame**—The dial frame is a  $\frac{1}{2}$ -in. thick rectangular frame that overlays the dial face. (See Fig. 1.) I joined the frame with mortise-and-tenon joints. After gluing up the frame, I marked out and cut the arch at the top of the frame. I then glued it into the rabbets in the sides and top. The bottom edge butts against the top of the base frame.

**Scroll board and sides**—The scroll board started as a 1-in. by 14-in. by 20-in. piece of walnut. It's joined to the scroll-board sides with half-blind dovetails. (See Fig. 1.) The scroll moldings were glued to the scroll boards, and the top of the scroll board was bandsawn to match the curves of the scroll moldings.

Before cutting the scroll board to length, it's important to measure the width of the bonnet assembly from side to side (18 in. on my clock). The scroll board has to be 2 in. longer than this measurement. After cutting the scroll board to length, I laid out and cut the half-blind dovetails.

On the back of the scroll board, I glued the  $\frac{3}{4}$ -in. thick walnut blocking between the scroll board and the dial frame. (See Fig. 2.) I then cut out the  $7\frac{1}{4}$ -in. radius arch in both the scroll board and the blocking.

## Making the Scroll Moldings

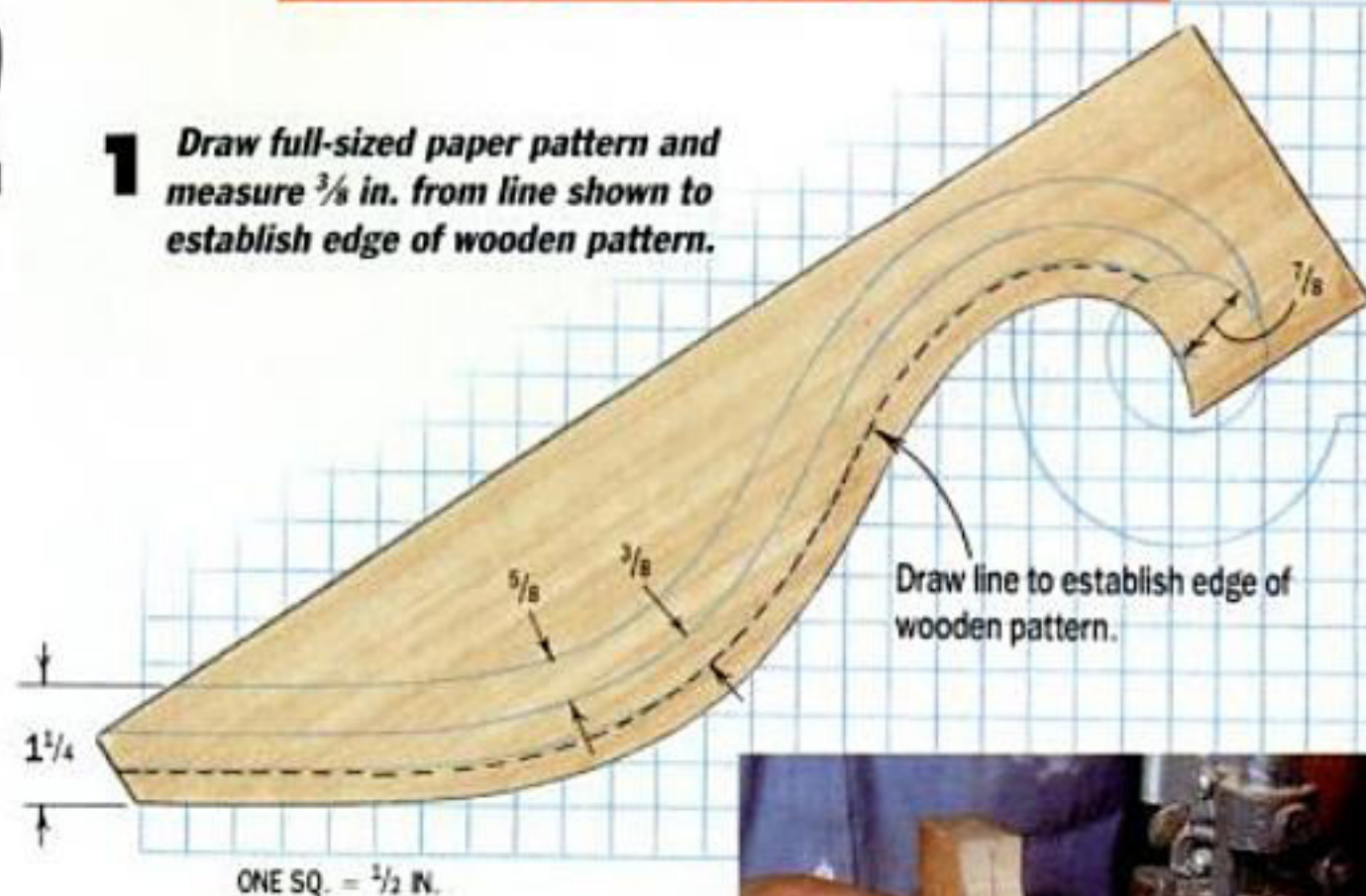
The original scroll moldings were probably made with a scratch stock

## MAKING THE SCROLL MOLDINGS

FIGURE

2

- 1 Draw full-sized paper pattern and measure  $\frac{3}{8}$  in. from line shown to establish edge of wooden pattern.







After gluing on the scroll molding and rosettes, author cuts the scroll board to match the curve of the molding.

(see AW, #6, January/February, 1989, page 20) and gouges. To save time, I used a pattern-routing technique to make the curved scroll moldings and the straight-return moldings. (See Fig. 2.)

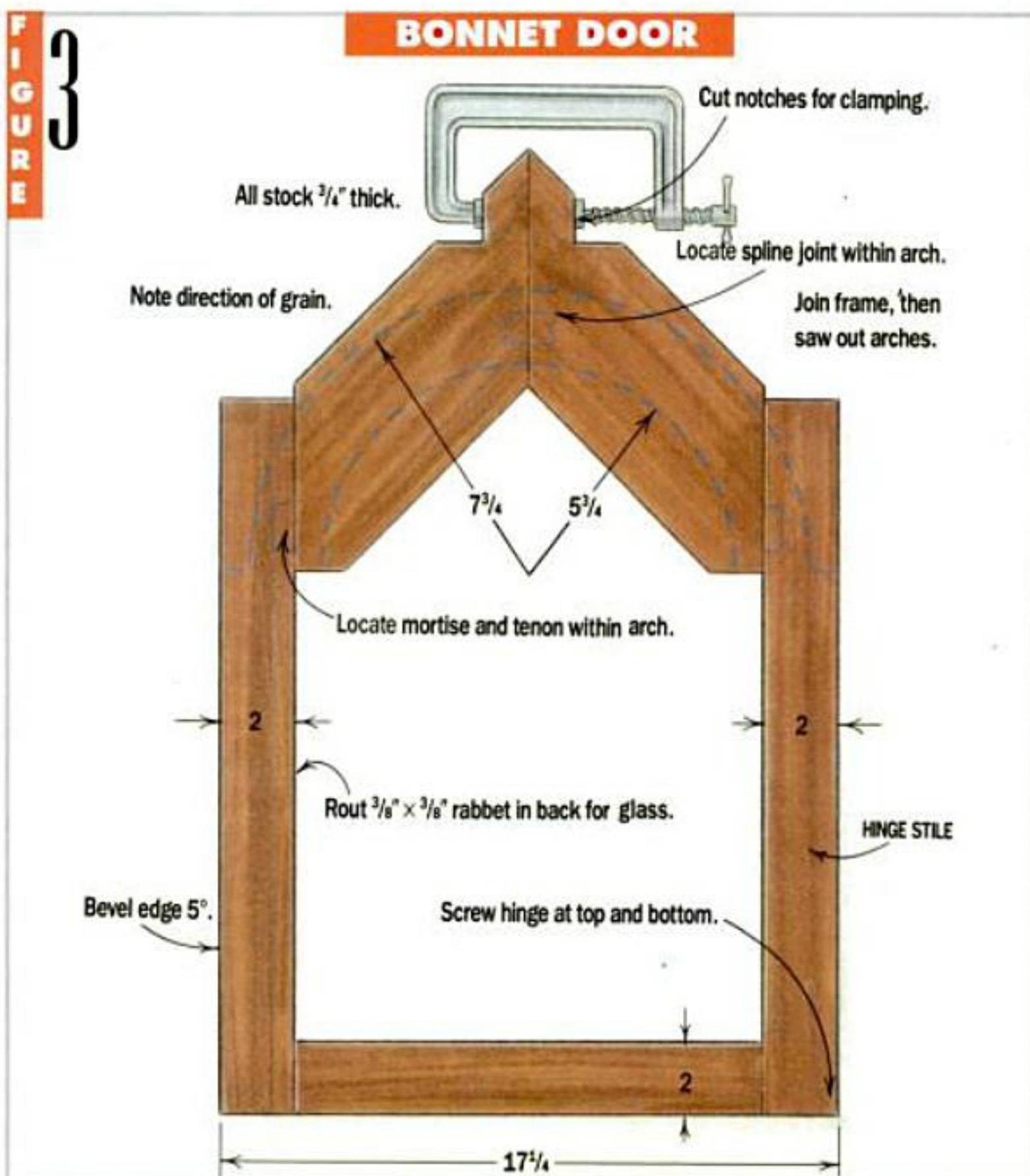
Since I don't have a pin router in my shop, I improvised one. I rigged up a wooden arm with a pin that extends above the bit in my router table. This setup works like a pin router (albeit, upside down) for cutting patterns of all sorts. (See sidebar, A Shop-Built Pin Router, page 41.) I'll now explain how I made the moldings. (See Fig. 2.)

**Making the patterns**—The first step in making the scroll molding was to make a full-sized paper pattern of the molding. Next, I established a line to indicate the edge of the pattern. (See Fig. 2.) I traced this line onto a piece of scrap pine that measured 1 in. by 3½ in. by 15 in. On the bandsaw, I cut out this curved pattern. I then resawed the pine pattern down the middle to make two mirror-image patterns—one for the left molding and one for the right. (See Fig. 2.)

I screwed these curved patterns to pieces of ¾ walnut. To make the straight-return moldings, I screwed straight pieces of scrap about 12 in. long to some ¾-in. walnut. These straight pieces served the same purpose as the curved patterns—to guide the router for cutting the moldings.

**Routing the moldings**—As shown in Fig. 2, I used two different bits to rout the scroll moldings—a 1½-in. dia. core-box bit and the ½-in. point-cutting ogee bit (Sears Craftsman, part #9HT 26323) I used to make the spirals on the columns for the waist.

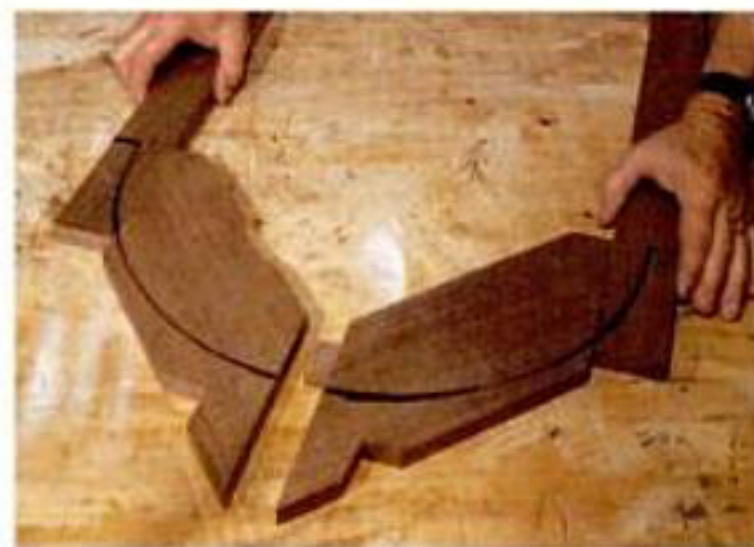
The first routing step formed the cove in the molding. I set up the router with



Author slips the finished spindles into their holes before screwing the scroll-board assembly to the bonnet sides.

the core-box bit and installed a ½-in. dia. dowel in the wooden arm of the router table. (See Fig. 2.) I made several passes, raising the bit after each pass until I completed the cove. I cut the cove on all four pieces of molding—the curved and straight pieces.

After completing the cove cuts, I switched to the point-cutting ogee bit and installed a ¾-in. dia. dowel in the router-table arm. (See Fig. 2.) One pass



To make sure the joints fall within the arch, author traced the arch on the stock before cutting the mortises. Notches make clamping easier.

rounded over the bottom edge of the molding, as shown in Fig. 2.

After routing the molding profiles, I cut out the top edges of the moldings on the bandsaw and cleaned up the moldings with sandpaper.

The top ends of the curved moldings were cut out to accommodate the 1½-in. dia. turned rosettes. (See Fig. 2.) I cut these concave curves on the bandsaw and then trued up the curves





The door glass fits into a  $\frac{3}{8}$ -in. rabbet and is held in place with glazier's points and putty.



The door hinges are flat brass pieces that screw to the door.

with a  $1\frac{3}{4}$ -in. dia. sanding drum on the drill press.

**Completing the scroll board—**After finishing the moldings, I glued them to the scroll board.

Next, on the lathe, I turned two  $1\frac{3}{4}$ -in. dia. cylinders  $1\frac{7}{8}$  in. long. I then turned a rosette on one end of



The door hinges pivot on brass escutcheon pins. It's easier to drive the pins if you hold them with a pair of pliers.

each cylinder. I oriented the stock so the face grain runs across the diameter of the rosette. I glued the completed rosettes to the scroll board and scroll moldings. I then marked the areas to be cut out directly below the curved moldings and rosettes.

On the bandsaw, I sawed the top of the scroll board to match the curve of the moldings. I also sawed out as much of the marked areas as I could on the bandsaw. I had to finish up some of the cuts with a saber saw.

I cleaned up the cuts with files and sandpaper, and mitered the ends of the scroll-board moldings where the

curved moldings and the straight-return moldings meet. I also drilled four  $\frac{1}{2}$ -in. dia. holes for the tops of the turned spindles.

I glued the scroll-board dovetails together and slid the assembly onto the bonnet sides. At the same time, I slipped the ends of the finished spindles into their holes. (See photo, previous page.) I fastened the assembly by screwing through the bonnet sides from the inside, driving the screws into the scroll-board sides.

Finally, I drilled the  $\frac{1}{2}$ -in. dia. holes for the turned finials and glued them in place.

## Making the Door

The door is made from  $\frac{3}{4}$ -in. walnut. (See Fig. 3.) I sawed out the arches after the door was assembled.

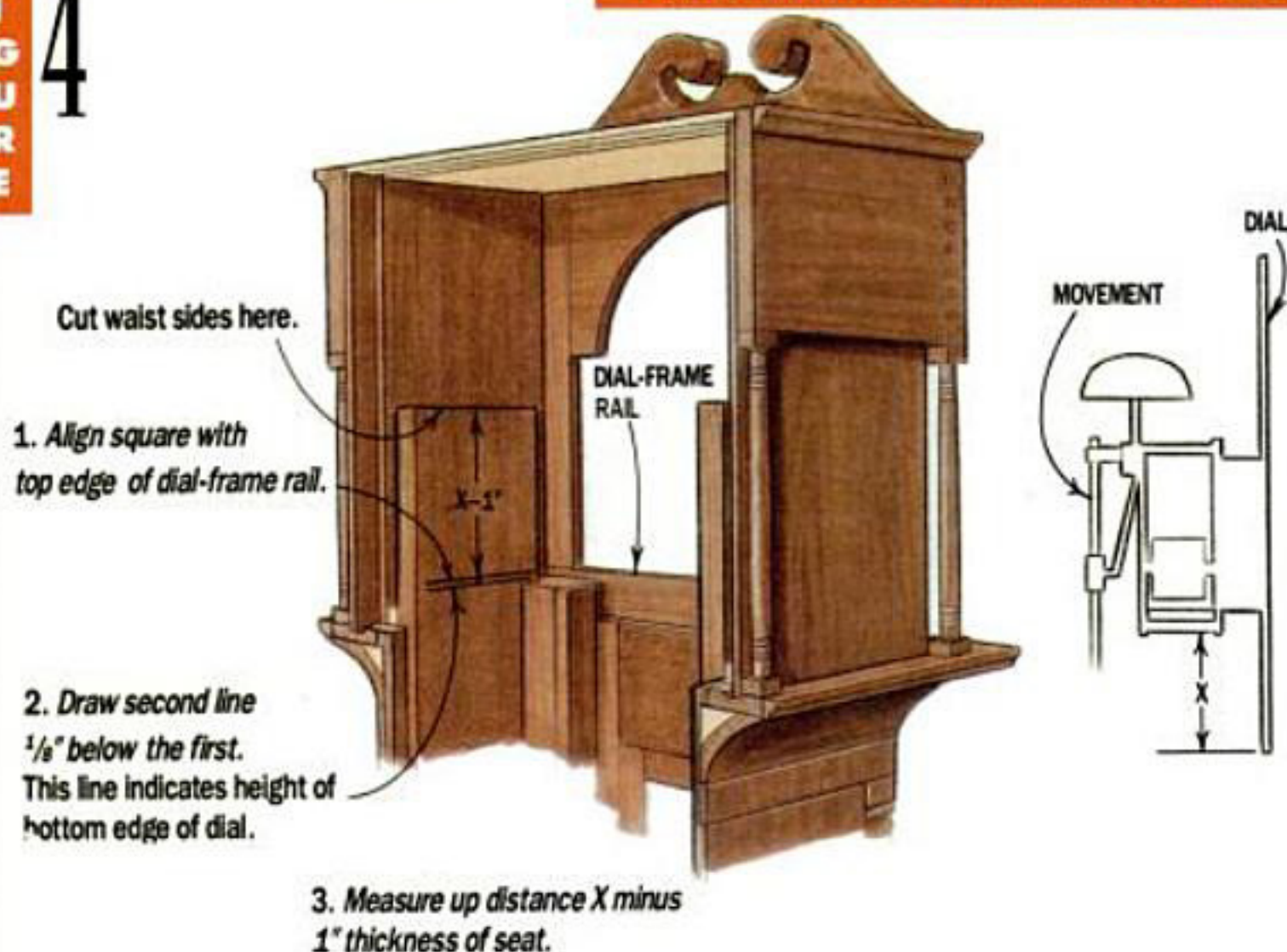
I joined the rails and stiles with mortise-and-tenon joints and used a spline joint at the top of the arch. To make sure that the joints fell within the arch, I made a paper pattern that indicated exactly where the arch would be located.

After sawing out the arches, I routed a  $\frac{3}{8}$ -in. by  $\frac{3}{8}$ -in. rabbet around the back side of the door opening to house the glass.

A local glass shop cut a piece of single-strength glass for the door. After finishing the door, I installed the glass in the rabbet with glazier's points and putty

## FIGURE 4

### TRIMMING THE WAIST SIDES



To locate the bottom edge of the dial, align a square with the top edge of the dial frame's bottom rail and draw a pencil line across the waist side. The dial's bottom edge must be  $\frac{1}{8}$  in. below this line.



## A SHOP-BUILT PIN ROUTER

**H**ere's a low-cost way to turn your router table into a pin router for cutting duplicate shapes from a pattern made of wood or hardboard.

Here's how it works. A wooden arm clamped to the router table suspends a pin directly



above the router bit. You fasten the pattern onto the top of the workpiece with screws or double-sided tape, and guide the pattern against the pin to make the cut. The pattern can be the same size as the finished workpiece or offset.

In addition to routing duplicate shapes, pattern routing can be used to cut inlays and irregularly curved moldings like the scroll moldings on the tall-clock bonnet described in the accompanying article.—P.G.

Turn a router table into a low-cost pin router. A wooden arm, clamped to the router table, suspends a pin above the bit for pattern cutting of all sorts.

## Trimming the Waist Sides

The waist sides are longer than necessary and must be trimmed to final length now that the bonnet is complete. The goal is to trim the waist sides to locate the bottom edge of the dial  $\frac{1}{8}$  in. below the top edge of the dial frame's bottom rail. (See Fig. 4.)

To determine where to cut, mount the dial on the movement and measure the distance between the bottom of the movement and the bottom edge of the dial (4 in. on my clock).

With the bonnet in place on the clock, align a square with the top edge of the dial frame's bottom rail and draw a pencil line across the waist side. (See Fig. 4.) Draw a second line  $\frac{1}{8}$  in. below this line to mark the position of the dial's bottom edge. From this line, measure up 4 in. (the distance from the dial edge to the bottom of the movement) and subtract 1 in. to account for the thickness of the seat board on which the movement sits. Draw a line at this point and saw off the waist sides.

## Installing the Seat Board and Movement

The movement sits on a 1-in. thick board made from poplar. The seat board is cut out to accommodate the pendulum and the cables. It's screwed



Two hook-shaped bolts secure the movement to the seat board. The seat board is cut out for the pendulum and slotted for the cable. The dial mounts on posts at far right.

to the tops of the waist sides. The movement is secured to the seat board with two hook-like bolts that came with the movement.

To position the seat board on the waist, I installed the movement on the seat board. With the bonnet in place, I moved the seat board forward until the dial touched the back of the dial frame. When it did, I screwed the seat board to the waist sides.

Next, I installed the cables, weights, pendulum, and hands. I then called my local clockmaker to help me "set the beat." If you aren't familiar with mechanical clocks, I suggest you consult a clockmaker who can show you how to set the beat and get your movement running properly. After my clock kept perfect time, it still took some fiddling to get the date wheel and moon dial running properly. But that's part of the charm of mechanical clocks. ▲



**PHIL GEHRET** is a cabinetmaker in the AW Design Shop. The first part of this article appeared in AW, #25. To order that issue, call (800)441-7761.



Walnut strips screwed to the waist sides keep the bonnet from tipping forward as it's removed. Note that the back is notched to accommodate the bonnet's base frame.

The door hinges are simply flat brass pieces that screw to the door, as shown in the photo. After finishing the bonnet, I installed the door on the bonnet by nailing through the hinge holes with brass escutcheon pins. (See photo, previous page.)

The original clock had no latch to secure the door. I installed a magnetic catch in the dial frame and door to keep the door from opening by itself.

That about does it for the bonnet. To keep the top-heavy bonnet from tipping forward when I slide it off the clock to get to the works, I screwed two  $\frac{3}{4}$ -in. strips of walnut to each side of the waist. (See photo.) The sides of the bonnet's base frame slide under these strips, and the strips keep the bonnet from tipping forward.





MITCH MANDEL

# NEW-WAVE TABLE

*Parts normally hidden beneath a tabletop are put on display in this glass-top coffee table.*

I've always enjoyed designing with glass. I like the hard, clean lines, the slightly blue-green translucence, and the way it catches and refracts light from certain angles. These are a few of the qualities of glass that, to me, give a piece of furniture a distinctly contemporary feel.

I find that working on a transparent tabletop frees my creativity and encourages me to experiment with sculptural forms usually unseen. The glass also has the effect of putting the surface beneath it on display, like framing a painting.

I've made several of these tables, some from beautiful natural-edged slabs of redwood, others from red maple. The table shown here has a leopard-wood subtop pierced by four tiger-maple legs. Each leg is topped with a faux-marble birch sphere, which supports the glass.

This table is not hard to build, and it lends itself to a number of design variations with the same simple joinery. You could change the overall size, the style of the legs, or if you don't care for my wavy one, a plain, rectangular subtop will do.

Before you start making the base of this table, order the glass from a glass shop. Request ½-in. plate glass with polished edges and bumped corners. It'll weigh about 75 pounds and cost close to \$150. Sometimes you can buy used glass for less.

BY GLENN HUGHES



## Making the Subtop

Start by planing, jointing, and gluing up as you normally would any tabletop, then cut the 45° bevel on each end. I used the crosscut box on my table-saw to cut the bevels.

Before cutting the curves in the edges, mark out and drill 1-in. dia. holes for the legs on a drill press.

Now draw the wavy edges on the subtop. First make a simple template by enlarging the grid in Fig. 1 and drawing it onto thin plywood, cardboard, or 1/8-in. Masonite. Cut the curves on the subtop. I used a saber saw for this step with a medium to fine blade, and I tilted the saber-saw base 30°.

Make the battens that attach to the underside of the subtop. (See Fig. 1.) The purpose of these battens is to ensure that the subtop remains flat during changes in humidity. I made the battens from 1 1/2-in. hard maple.

Finish the subtop and battens separately. On highly figured wood such as this, I prefer to use Waterlox, a tung-oil-based varnish. It gives the high-gloss finish I want and makes the figure of the wood jump out.

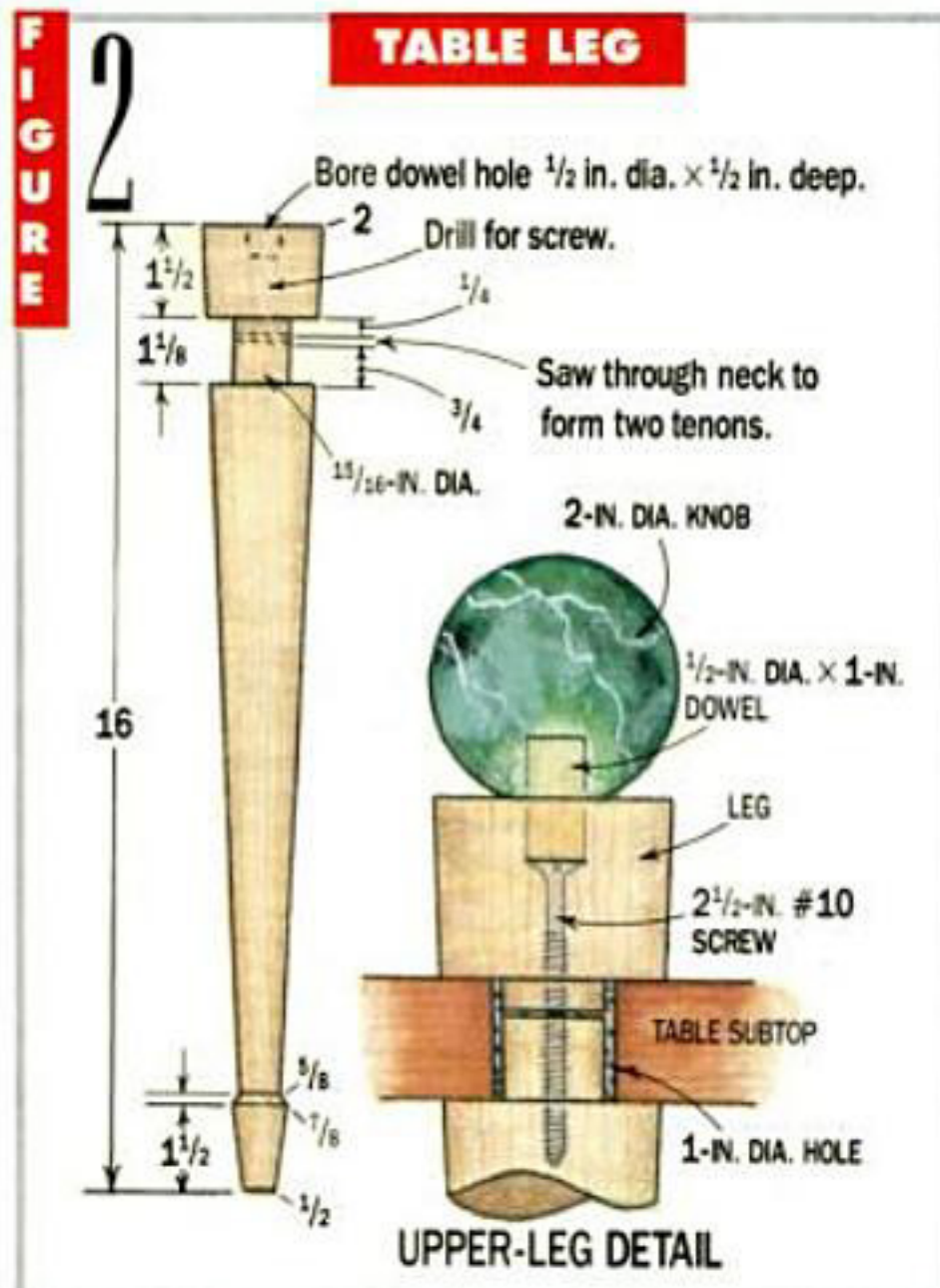
Attach the battens to the underside of the subtop. Be sure to make slotted screw holes to allow for seasonal cross-grain movement.

## Turning the Legs

The legs on this table appear to pierce right through the subtop. Each leg is actually two pieces (not counting the sphere on top)—a top and bottom. (See Fig. 2.) Each piece has a tenon that fits into a hole in the subtop.

It's easiest to turn each leg in one piece. Turn a small-diameter "neck" near the top of each leg. (See Fig. 2.) This neck establishes the diameter of the tenons. After you've turned the leg, you'll saw through the neck, creating the two leg pieces.

I made a wooden screw chuck to mount the legs on the lathe for turning. (See Fig. 3.) I marked the centers of the leg blanks and drilled a pilot



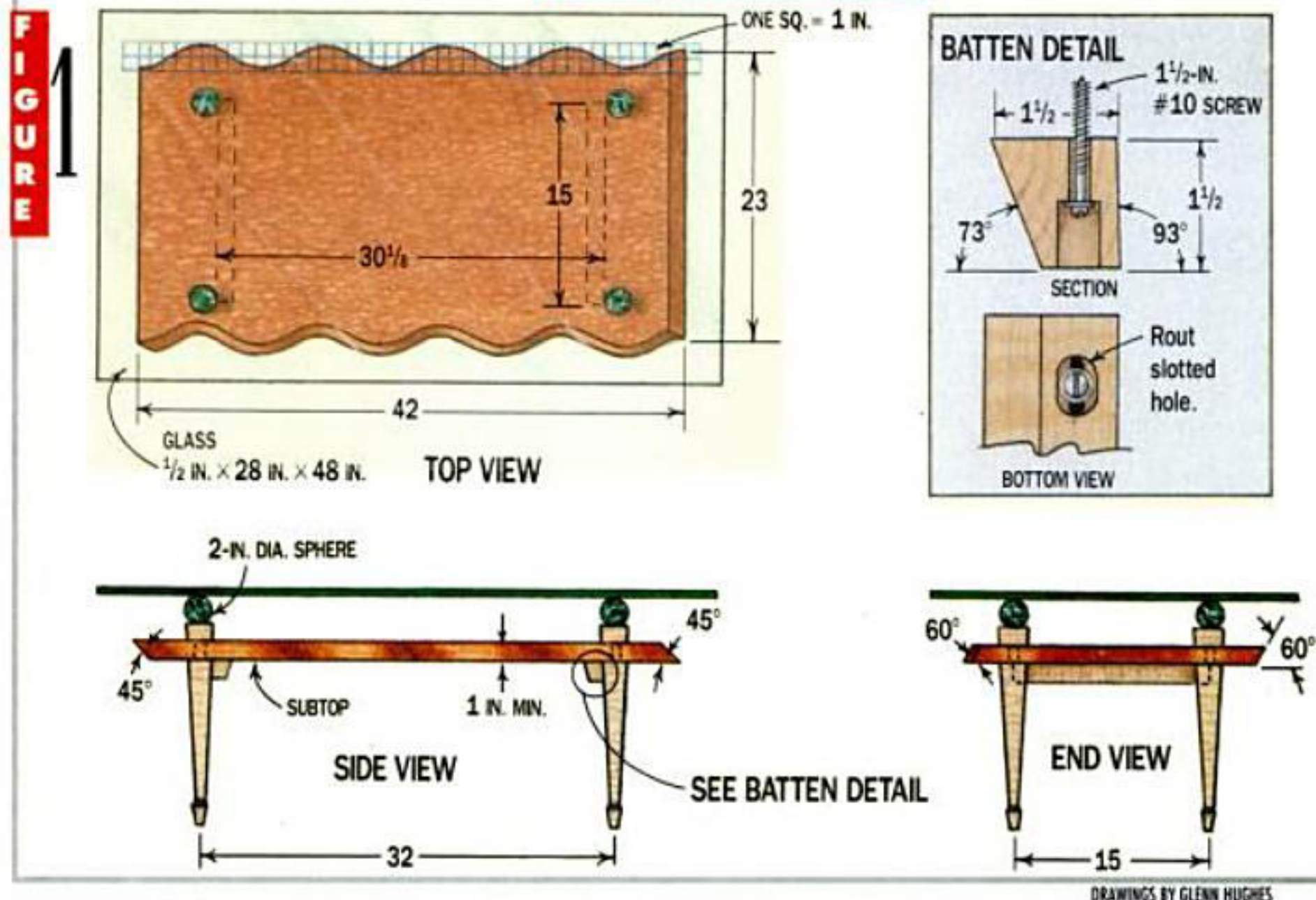
hole in the top end of each blank for a 2 1/2-in. #10 wood screw. I then drilled a 1/2-in. dia. counterbore 1/2 in. deep on the same center. (See Fig. 2.) A 1/2-in. dia. "spigot" on the screw chuck fits into this counterbore to center the blank for turning.

Turn each leg and finish it on the lathe. (Don't get any finish on the neck area that forms the tenons.) Saw each leg into two pieces, as shown in Fig. 2.

tenon on the leg top into the hole. Run the screw into the hole and draw the two sections up tight. Try to get enough glue into the hole to form a good bond, but not enough to squeeze out as the screw is tightened.

## The Spheres

For the spheres that mount at the tops of the legs, I bought 2-in. dia. hardwood knobs (available from



## Assembly

Set the subtop on its four legs and insert the stub tenons of the upper pieces into the subtop. Before mixing any glue, drive a 2 1/2-in. #10 steel screw through each leg top and into the leg bottom to make sure that the two halves of all the tenons pull snugly together. After checking, remove the screws along with the leg tops.

Mix the epoxy. Unlike yellow glue, epoxy needs a little space between the parts to form the best bond. To allow for this, the tenons are smaller in diameter than the holes into which they fit.

Gluing one leg at a time, pour enough epoxy into the leg hole to cover the tenon on the leg bottom. Place the

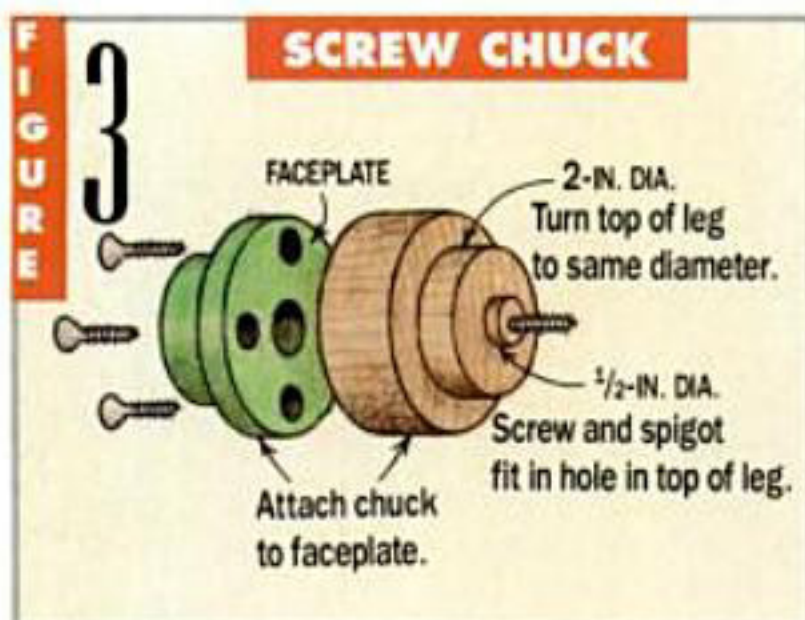
tenon on the leg top into the hole. Run the screw into the hole and draw the two sections up tight. Try to get enough glue into the hole to form a good bond, but not enough to squeeze out as the screw is tightened.

## The Spheres

For the spheres that mount at the tops of the legs, I bought 2-in. dia. hardwood knobs (available from



Woodworker's Supply, 5604 Alameda Place N.E., Albuquerque, NM 87113, 800-645-9292). The advantage of using knobs instead of balls is that knobs are slightly flat on one side and have predrilled screw holes. The holes will have to be enlarged to  $\frac{1}{2}$  in. You'll need to exactly center the knob before drilling the larger hole. To do this, I clamped a piece of scrap to the drill-press table and drilled a shallow hole



A wooden screw chuck holds the leg blank securely and serves as a reference for sizing the leg.



in it with a 1-in. Forstner bit. I set the sphere in this hole when drilling.

You could paint the spheres, finish them clear with Waterlox, or turn them from a different type of wood. I chose to marbleize mine. (See sidebar.) I like the way the marbleizing contrasts with the natural wood of the rest of the table. When the spheres are finished, glue them in place with short dowels. Again, I used epoxy, but yellow glue would do.

Finally, gently position the glass on the wooden spheres, and the table is finished. I recommend using small clear-rubber discs between the surfaces of the glass and spheres (available from any glass dealer). This prevents scratches on the glass and the finish from coming off the spheres where the two surfaces touch. ▲

**GLENN HUGHES**  
is assistant art director of *AW*.

## MARBLEIZING THE SPHERES

Creating a faux-marble finish takes a bit of practice. If you start with something small, such as the spheres on this table, you'll find it easier to learn the technique.

The concept is simple. First build up a background coat of several shades of one color superimposed on each other—from dark to light. After that, paint white veins on this background to simulate marble.

For marbleizing these spheres, you'll need a dark primer, mineral spirits, varnish, and three colors of paint: black, white, and dark green (or any dark color of your choice for this third paint).

Many people use water-based paint for faux finishing because it dries faster. I prefer oil-based mediums because they're more chip resistant, but either type of paint will do a good job. For the small surfaces of these spheres, I chose Testor's brand enamel (available from model-supply shops) because it comes in small quantities and a large selection of colors.

To apply the paints, you'll need a few brushes, rags, and feathers. You'll find these supplies at an art store. —G.H.



STEP 1: Apply two coats of a primer to each sphere with a brush. Follow with a base coat of black paint.



STEP 2: Thin the dark-green paint with mineral spirits and smear it over the black base coat with a rag or sponge.



STEP 3: Mix a bit of white paint with the green for a slightly lighter shade of green. Apply it with a feather in wide, angular lines, barely dabbing the feather on the surface.



STEP 4: Mix a lighter shade of green and repeat Step Three, going in the opposite direction.



STEP 5: Delicately paint thin, jagged white lines sparingly around each sphere with a feather. Look at a piece of marble to observe how these lines run.



STEP 6: Finish with two coats of clear varnish or lacquer.





*A New Slant  
on an Old Joint*

A good use for angled dovetails is in this sturdy, ash toolbox.

MITCH MANDEL

# ANGLED DOVETAILS

BY MICHAEL PODMANICKY

The interlocking fingers of a dovetail joint make it enormously strong—and durable. Any museum of furniture is sure to have plenty of fine examples in drawers, chests, and boxes. If you look further, you may find a few samples of a different, but related, joint—the sloping or slanted dovetail. Here, one or both boards lean outward but still meet at a right angle. You're likely to find this joint in old dough troughs, drawers with canted fronts, cradles, and boxes with sloping sides.

Slanted dovetails are not much harder to make than the conventional version. Success depends on accurate marking and precise cutting to the lines. This, in turn, requires sharp

tools suited to the job. Meticulous attention to detail and careful execution will produce a solid, durable joint.

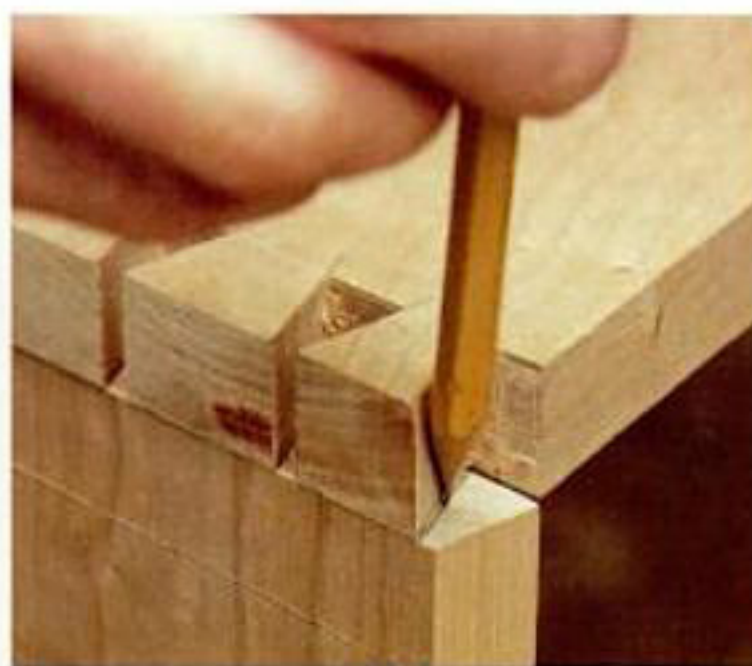
There are two variations of the slanted-dovetail joint: One version has a sloped side and a vertical side, and the second type has both sides leaning at the same angle. Since the first joint is easier to make, I'll describe it first. I'll also point out where and how techniques for the two joints differ.

## Single-Slanted Dovetails

The layout for slanted dovetails can be derived easily from a conventional-dovetail layout. Below is an example of how to do this. First lay out a set of standard through dove-







Mark the pins directly from the tails with a chisel-edged pencil.

Keep the centerline of the pins parallel to the grain fibers.

tails at the end of a piece of scrap wood. (See Fig. 1.)

Next, set a bevel gauge and draw your desired sloping line. A second line, parallel to the first, represents the thickness of stock. By drawing a series of parallel lines across the board, you can project the conventional-dovetail layout onto the sloping line.

The points at which these lines cross the sloping ones give you the layout for slanted dovetails. This construction works just as well for any angle you choose to draw.

Note that the centerlines of the tails and pins all run parallel to the grain fibers. If you make the centerlines perpendicular to the edge, the short grain weakens them.

With this simple graphic device, you can lay out dovetails with any angle of slope you want. After a bit of practice, you will be able to skip this step and lay out slanting dovetails directly on the edge on which they will be cut.

The only real difference between laying out slanted dovetails and regular dovetails is that the slanted tails are not symmetrical around their centerlines. This means that you must use two settings of the bevel gauge—one for each side of the tails. I find it quicker and more accurate to use two bevel gauges with different settings.

When joining slanted and vertical boards, you must start with wider stock for the slanted boards. That's assuming that you want the top and bottom edges of both boards flush.

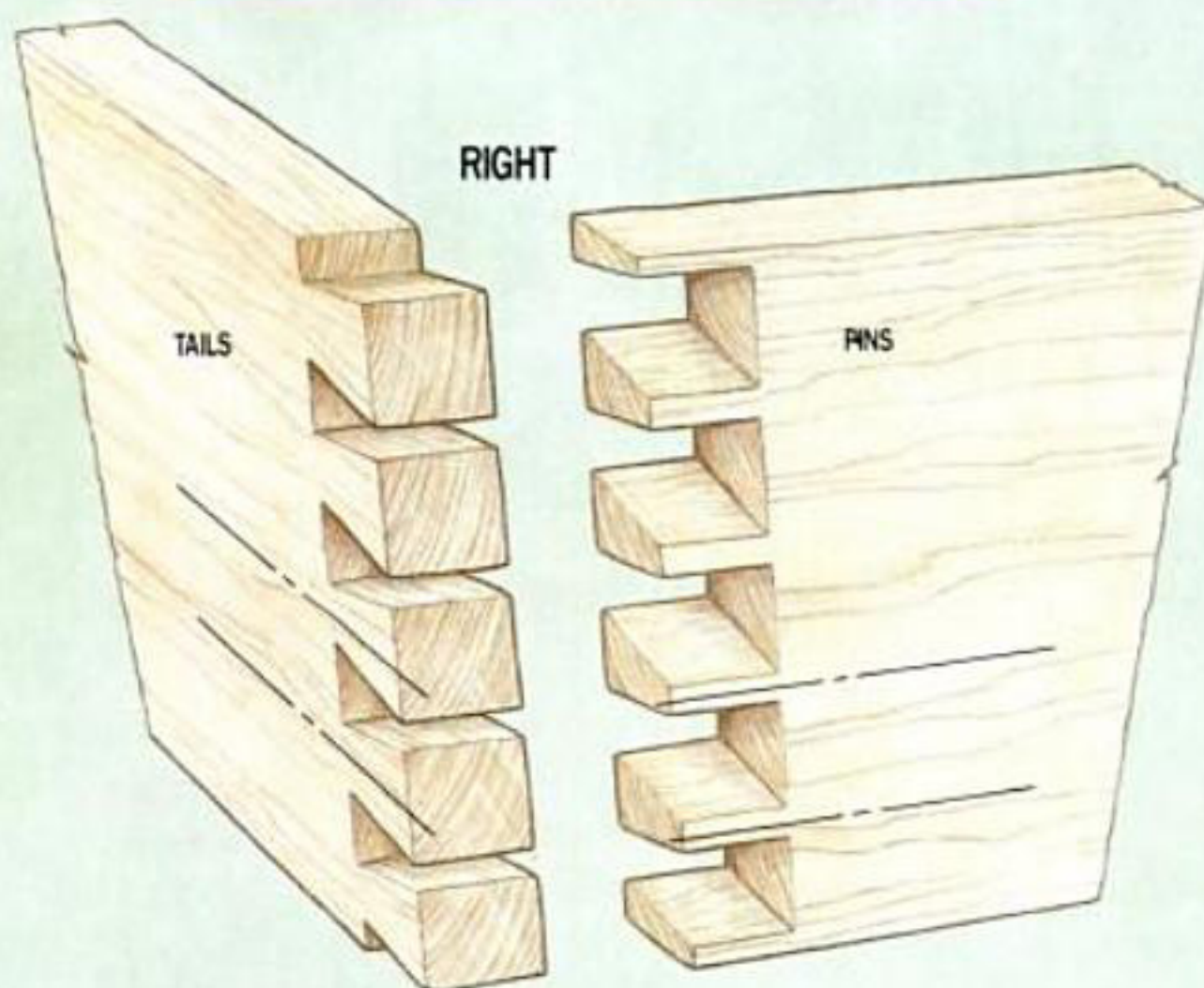
Cutting and fitting slanted dovetails is exactly the same as for conventional dovetails. (See AW, #19.) After marking the tails (see photo), saw them and remove the waste with a chisel. Next, mark the pins directly from the tails with a chisel-edged pencil, as shown in the photo.

The final step is to cut out the waste with a coping saw, and then chisel to the gauge marks. Depending on the accuracy of your marking and cutting, you may have to pare the pins with a chisel to get a good fit, as shown in the photo on the next page.

Clamping the completed joint is much easier if you've cut the tails in the vertical boards instead of the slanted boards. That way you can use pipe

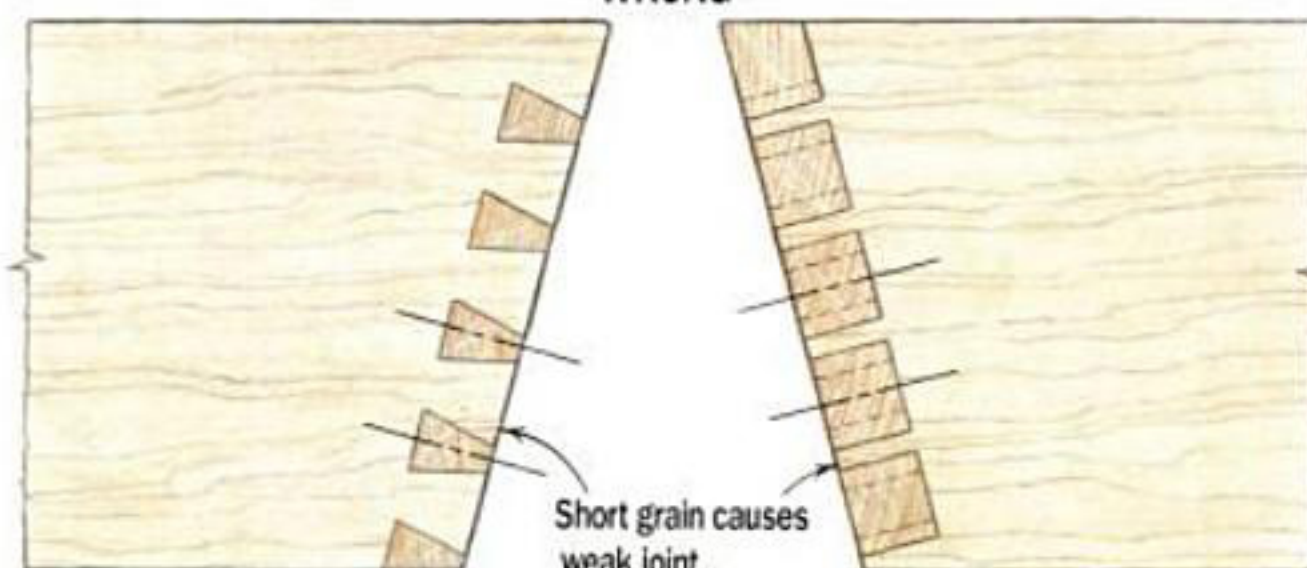
## FIGURE 2

### DOUBLE-SLANTED DOVETAILS



Centerlines of tails and pins must run parallel to grain fibers.

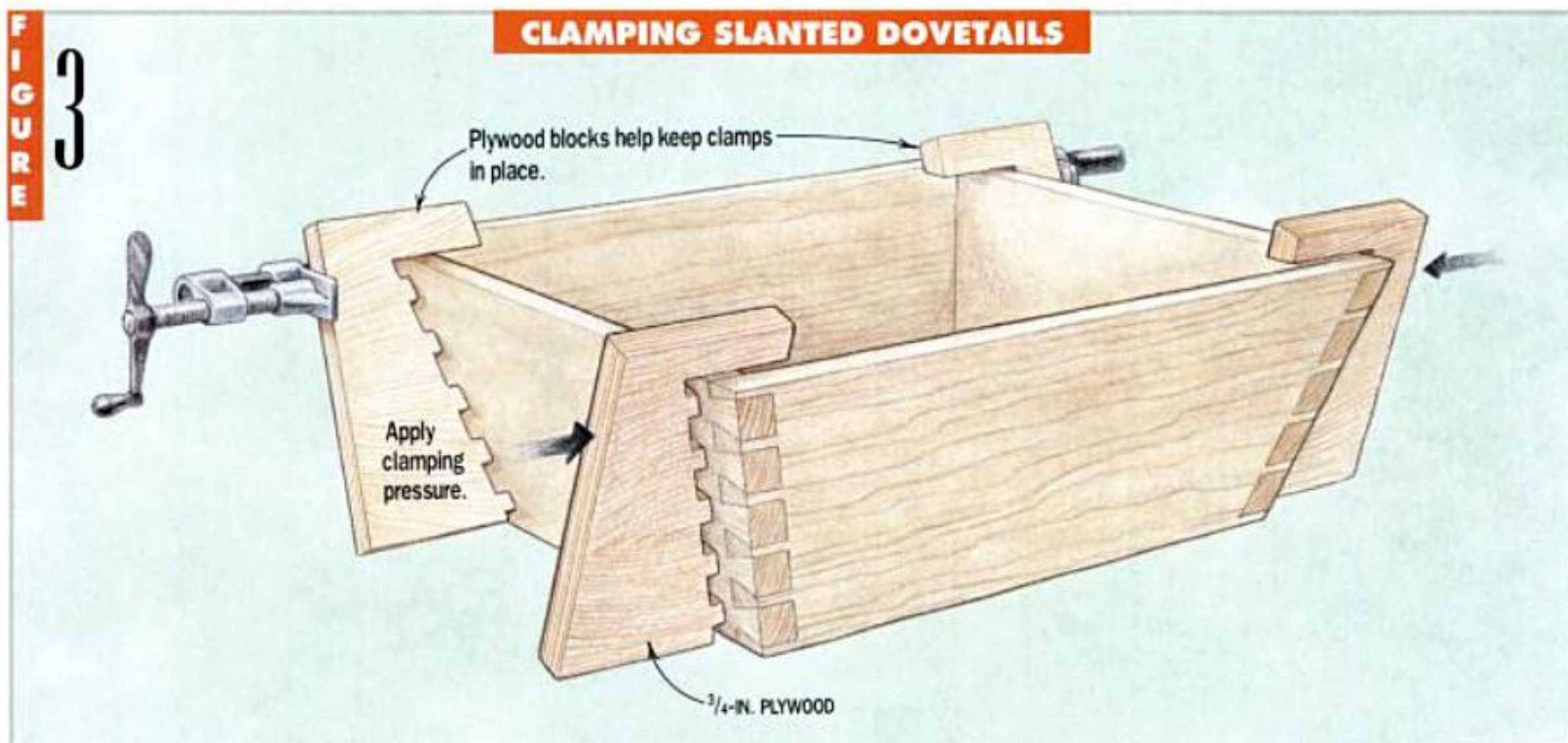
WRONG



Short grain causes weak joint.



## CLAMPING SLANTED DOVETAILS



or bar clamps in the usual way. Cutting the tails in the slanted boards makes clamping more awkward. (See Fig. 3.)

### Double-Slanted Dovetails

When two adjacent sides are slanted, things get a little more complicated. Instead of sawing the tails square to the surface of the board, they, too,

as they are when only one side of the box is slanted. (See Fig. 2.)

Once you've got the idea and have completed the layout, cutting this joint is not hard. The steps are exactly the same as in the layout for single-slanted dovetails. The essential thing is to take the time to be accurate—both in marking and sawing to the lines.

There are two minor puzzles that need explanation. First, to have the pins flush on the outside, they must be slightly longer than the thickness of the board. This is because they pass through the tails at an angle and are not square to the corner. For example, the pins in Fig. 2 must be about  $\frac{1}{16}$  in. longer than the thickness of the board. For a steeper angle, increase the length of the pin.

The other point is more important but a little harder to visualize. In plan view (a horizontal section), the two sides appear to meet at  $90^\circ$ . However, the two planes meet at an angle slightly

more than a right angle. This effect becomes more noticeable as the angle of slant increases.

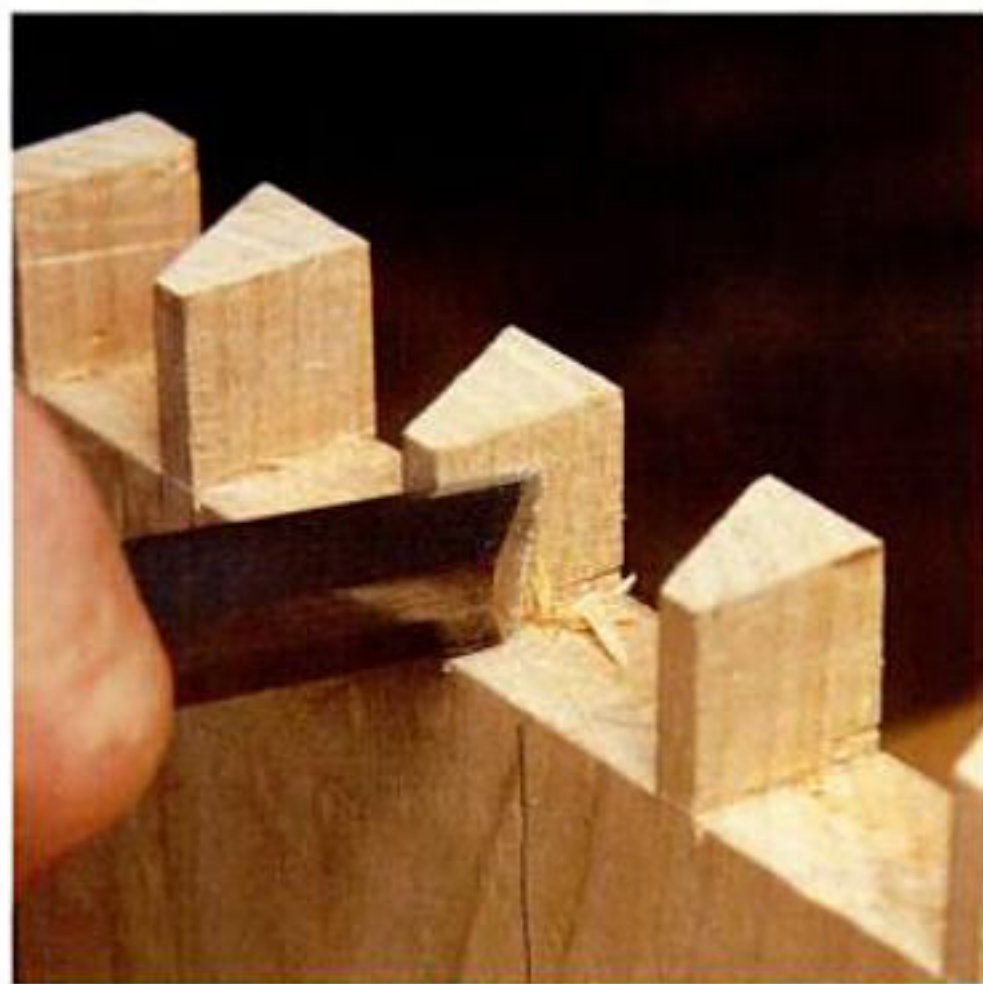
If you have difficulty grasping this notion, hold a couple of short boards at right angles to each other. Start with both boards vertical and hold a square in the corner. Gradually lean them out and watch as the angle between the two planes increases.

"So what?" you may ask. Well, the result is a small gap on the inside of the joint where the two slanting sides meet. With an angle of  $10^\circ$  or less, this effect is marginal and can be ignored. At  $15^\circ$  or  $20^\circ$ , it cannot be ignored. The best way to correct it is to cut the outside shoulder back by a distance equal to the width of the gap.

Clamping a box with sloping sides can be awkward, even when turned upside down. The clamps slip off as soon as pressure is applied. One way to solve the problem is to make up four  $\frac{3}{4}$ -in. plywood wedges and notch them as shown in Fig. 3. This keeps the clamps in place when pressure is applied and it also protects the wood from the clamps.



**MICHAEL PODMANICZKY**  
is a furniture conservator at the Winterthur Museum, Winterthur, Delaware.



After a trial fit, pare the pins as necessary with a sharp chisel.

must be cut at an angle, as shown in Fig. 2. This angle must be the same as the angle of slant— $15^\circ$  to the vertical in the drawing.

For strong joints, the centerlines of the pins must also be parallel to the grain—not at right angles to the corner

more than a right angle. This effect becomes more noticeable as the angle of slant increases.

If you have difficulty grasping this notion, hold a couple of short boards at right angles to each other. Start with both boards vertical and hold a square





JIM MEEHAN

# WORKSHOP NOISE

## LISTEN UP!

*Woodworking Machines Can Damage Your Hearing*

**F**or more years than I care to admit, I've noticed I have a problem understanding conversations when there's a lot of background noise. I can hear the sounds of speech OK, I just can't make out some of the words. I had always chalked this up to too many rock concerts a few decades ago. But now I realize that working with loud woodworking machinery during those years also could have contributed to my mild hearing loss.

Loud noise can be so harmful that the Occupational Safety and Health Administration has established strict Hearing Conservation Programs to protect workers in industry. But what about woodworkers in small production shops where OSHA

**BY DAVE SELLERS**

doesn't look, or home-based woodworkers with a garage full of big, noisy power tools?

To find out whether woodworkers are at risk and what protection is available, I talked to top audiologists—professionals in the field of hearing conservation. I learned that mild hearing loss is not uncommon. In a recent survey of industrial-arts teachers, 54 percent said they may have lost some hearing because of their occupation.

The bottom line is that if you work with modern power tools like routers, planers, and radial arm saws (see sidebar, *Rating the Machines.*),

you should be wearing earplugs, earmuffs, or other devices to protect your hearing. (See sidebar, *Types of Hearing Protectors*, page 50.)

### How Much Risk?

The type of damage we're talking about is called *noise-induced hearing loss*. It's caused by *cumulative* exposure to loud noises over a long period of time, and it's permanent. (See sidebar, *Anatomy of the Ear*, page 50.) It also can sneak up on you, since there's usually no immediate indication of harm to your ears when you're working with loud machinery.

"Hearing loss is a slow, insidious progression—by the time you're aware of it, it's too late, and the damage has



been done," explains Elliott Berger, manager of Acoustical Engineering for Cabot Safety Corp. That's why it's important to choose a type of hearing protector you can wear comfortably and use consistently.

### How Loud is Loud?

How quickly hearing loss occurs depends on the *intensity* of the noise, as measured in decibels (dB), and *how often* the exposure occurs. (See sidebar, Rating the Machines.)

As an indication of the danger, OSHA recommends workers in industry wear hearing protection when noise equals or exceeds an average of 85 dB for eight hours or more. When noise levels reach an average of 90 dB for eight hours or more, OSHA mandates hearing protectors by law. Without hearing protection, the allowed exposure is four hours at 95 dB, and the time decreases by half for each additional five dB.

To find out how loud woodworking machines are, I used a sound-level meter to measure the intensity of several common machines in the AW Design Shop. Most machines were loud enough to damage your ears with prolonged exposure.

Also, some machines, like the router and tablesaw, produced more of the high-frequency (high-pitched) noise that's likely to cause hearing damage. (See sidebar, Anatomy of the Ear.)

How can you tell if the noise level in your shop might be harming your ears? If you have to raise your voice to be heard within three feet, the noise level is probably above 85 dB. If you have to shout, the noise level is likely above 90 dB.

### Signs of Hearing Loss

If you notice sounds are muffled or softer after working around noisy machines, it's a warning that your ears have been overexposed to noise. Another warning sign is *tinnitus*, a constant ringing or buzzing sensation in your head immediately following noise exposure. This can become permanent with repeated overexposure.

"Even if your hearing seems OK now, it doesn't mean you don't need hearing protection," says Alice Suter, audiologist and principal author of

OSHA's Hearing Conservation Standard. "It means you've been lucky so far, or you may have beginning hearing loss that you're not aware of yet."

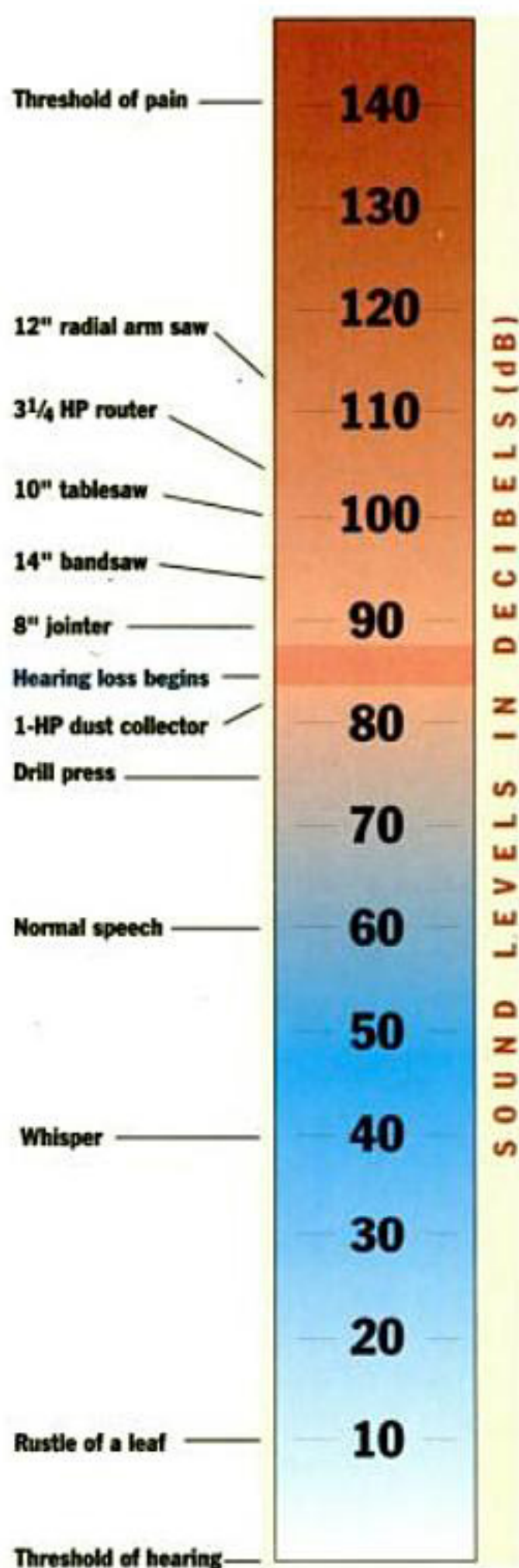
While it may be uncomfortable at first to wear hearing protection, you may find it not only saves your ears, but makes it easier to understand what people are saying in the shop. That's because when overall sound levels are reduced, the ear can hear more efficiently. The effect is similar to the improved vision that sunglasses provide in bright light.

### Get Tested

Noise-induced hearing loss cannot be cured, but it can be detected and further damage prevented. If you've worked around noisy machinery for a length of time or suspect you have experienced some hearing loss, many audiologists suggest you get tested. A standard test called an *audiogram* indicates if you have a problem and acts as a basis for comparison with future tests. ▲

**DAVE SELLERS**  
is assistant editor of AW.

## RATING THE MACHINES



The scale at left shows sound-level measurements for common woodworking machines. The measurements were taken at head height while the machines cut wood. The sound-level meter measured the intensity of sound in *decibels* (dB) and was designed to respond to sound much as our ears do. A sound level of about 85 dB is considered to be the threshold for possible hearing loss. Hearing protectors are recommended at this level.

To compare the readings, understand that the decibel scale is *logarithmic*. That's a mathematical way of compressing a wide range of sound intensities into a more convenient numerical range from zero dB (the threshold of hearing) to above 140 dB (the threshold of pain). A logarithmic scale gets confusing because you can't directly compare decibel values the way you can compare values on a linear scale.

If the intensity of any sound level on the decibel scale is doubled, it increases by three decibels. That means two tablesaws running at 100 dB each would measure 103 dB, *not* 200 dB. Also, any change of 10 dB represents a tenfold difference in intensity. Thus, 90 dB is 10 times more intense than 80 dB and 10 times less intense than 100 dB.

Our ears are a poor judge of actual sound intensity. For example, we perceive a 10-dB increase to be about twice as loud, when it's really 10 times as intense.—D.S.

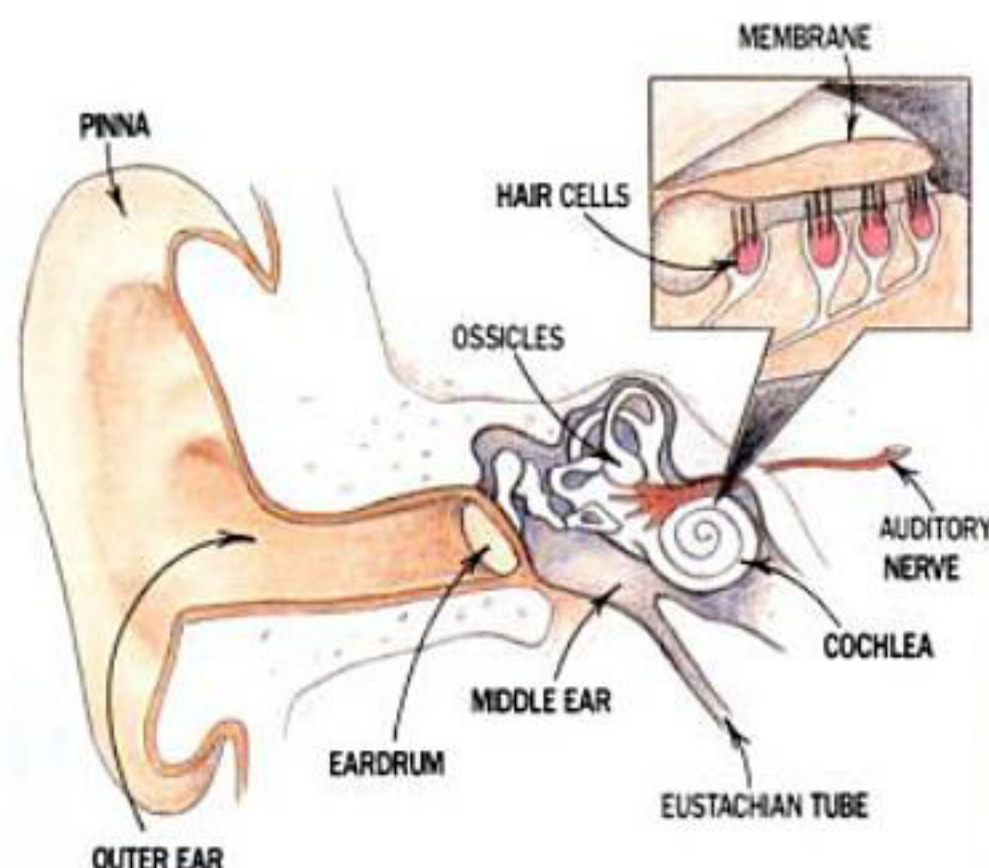


## ANATOMY OF THE EAR

The parts of the human hearing apparatus are shown in the drawing. The outer ear collects sound waves and sends them to the eardrum, which transfers the sound vibrations to the three tiny bones (ossicles) of the middle ear. The eardrum and ossicles amplify the vibrations and pass them on to the spiral chambers of the cochlea in the inner ear. There, the vibrations move a membrane that stimulates tiny hair cells, generating a nerve impulse the brain senses as sound.

Loud noises can overstimulate the hair cells, causing them to send impulses temporarily even after a noise has subsided. That's one cause of tinnitus. If loud noise continues for too long, the hair cells are permanently damaged, which causes hearing loss.

The shape and size of the ear canal tends to accentuate high-frequency sounds, and the hair cells that sense these sounds are damaged first. Because the consonants of speech—such as the s, sh, or f sounds—are mostly high-frequency sounds, people with a slight hearing loss can often hear words but miss the consonants, making the words sound garbled.—D.S.



## TYPES OF HEARING PROTECTORS

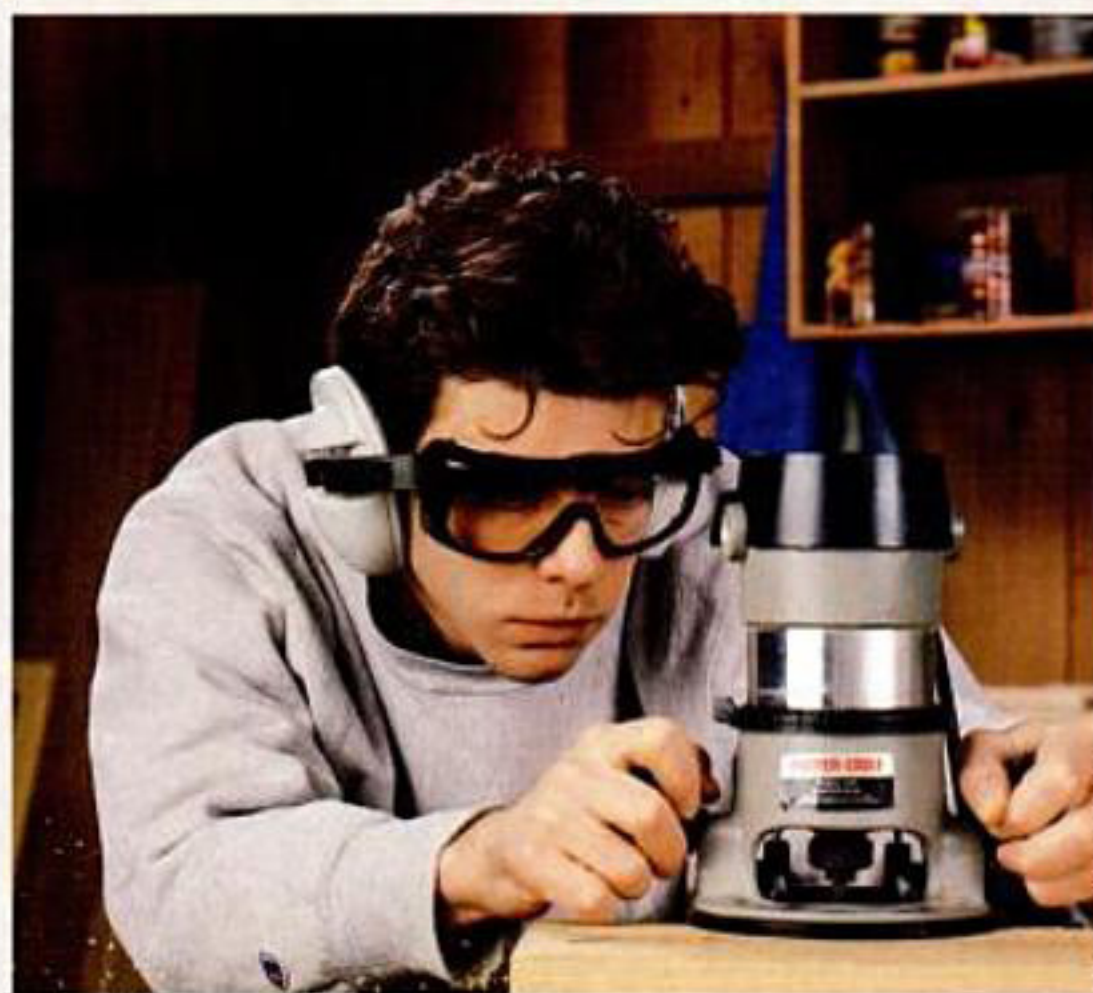
There are several different types of hearing protectors to choose from, as shown on the next page. Whichever type you choose, to be effective, you must learn to fit it correctly. Your hearing protector may feel uncomfortable at first, but give yourself a chance to get used to it like you would a new pair of shoes.

### Getting the Right Fit

Julia Royster, an audiologist and consultant in industrial hearing conservation says, "Where air can go, sound can go." That means you must get an airtight seal between a hearing protector and your ear to prevent damage.

One way to check is the "hummm test." To do this test, fit a hearing protector in one ear and hum. If the hearing protector is correctly fitted, the humming will sound deeper and louder in that ear. Test both ears.

Test earplugs by inserting them, and then cupping your hands over your ears in a noisy area. If the earplugs are fitted correctly, you won't notice much difference in outside noises.



This earmuff/safety-glasses combination gives double protection in one device. Called Intego, it's from Racal Health and Safety Inc.

Wearing safety glasses can break an earmuff's airtight seal because the glasses' temple piece has to fit around your ear. Racal Health and Safety Inc. (see Sources) addresses this problem by offering a combination earmuff/safety-glasses product. (See photo.)

### Ratings

Hearing protectors are rated according to the amount of noise they block

out, or *attenuate*. This *noise-reduction rating* (NRR) is printed on your hearing protector packaging and generally ranges between 20 and 30 dB of attenuation. However, like the Environmental Protection Agency's gas-mileage ratings for new cars, the NRR is measured under ideal laboratory conditions, so the real amount of protection is somewhat less than the printed rating.

A rule of thumb for "de-rating" the NRR is to subtract a minimum 10 dB to get an idea of the actual attenuation. Don't let small differences in the NRR affect your product choices. Elliott Berger, manager of Acoustical Engineering

for Cabot Safety Corp., estimates that differences of less than four or five decibels are not significant. "The main value of the NRR to the consumer is that it indicates the product has been specifically designed and tested as a hearing protector," says Berger. There are some products on the market that claim to protect your hearing, but if they lack the NRR, they may not offer the protection you need.—D.S.



| TYPE                                                                                                                               | DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                    | PROS AND CONS                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p><b>EARMUFFS</b></p>                           | <p><b>Earmuffs</b> have soft, foam-filled plastic cushions that fit over the outer ear to seal against the head. They're a good choice for many woodworkers because they can be taken off and put on quickly. That's convenient for the intermittent exposure in many shops where machines run only a few minutes at a time. \$12 to \$20/pr.</p>                                                              | <p><b>PROS:</b><br/> Fit wide range of head sizes and shapes.<br/> Create a good seal with little effort.<br/> Hang around neck.<br/> More sanitary than earplugs.</p> <p><b>CONS:</b><br/> May be bulky, heavy, confining.<br/> Uncomfortable to wear for long periods.<br/> Most expensive.<br/> May not be compatible with safety glasses.</p>      |
|  <p><b>SEMI-AURAL DEVICES</b></p>                | <p><b>Semiaural devices</b> (also called canal caps) consist of soft, flexible pod-shaped tips or caps on a light headband. They're good for intermittent use. \$5 to \$6/pr.</p>                                                                                                                                                                                                                              | <p><b>PROS:</b><br/> Easy to put on and take off.<br/> Headband fits over head or under chin.<br/> Lightweight.<br/> Hang around neck when not in use.<br/> Can be worn with safety glasses.</p> <p><b>CONS:</b><br/> Offer less protection than other styles.<br/> Pods may be uncomfortable after long periods of time.</p>                          |
|  <p><b>FORMABLE-FOAM AND FIBER EARPLUGS</b></p> | <p><b>Formable-foam earplugs</b> are made of compressible foam and are the most comfortable protector to wear for extended periods. When inserted in the ear, they expand to provide a snug fit, and they are washable for reuse. Available with cord and carrying case. \$.20 to \$1.35/pr.</p> <p><b>Disposable earplugs</b> are made of refined mineral fiber with a thin plastic sheath. \$.10-.15/pr.</p> | <p><b>PROS:</b><br/> Most protection if fitted properly.<br/> One size fits all.<br/> Good for long periods of constant noise.<br/> Inexpensive.<br/> Can be carried in pocket.<br/> Can be worn with safety glasses.</p> <p><b>CONS:</b><br/> Harder to get a good seal.<br/> Take time to get used to.<br/> Not convenient for intermittent use.</p> |
|  <p><b>PREMOLDED EARPLUGS</b></p>               | <p><b>Premolded earplugs</b> are made from a flexible material that is shaped to fit the ear canal. Some have different-sized flanges to fit a variety of ear-canal sizes. Others must be individually fitted to size. Available with cord and carrying case. \$1 to \$3/pr.</p>                                                                                                                               | <p><b>PROS:</b><br/> Good for long periods.<br/> Inexpensive.<br/> Can be carried in pocket.<br/> Stay cleaner than formable-foam earplugs.<br/> Can be worn with safety glasses.</p> <p><b>CONS:</b><br/> More difficult than foam plugs to fit.<br/> May require distinct sizing.</p>                                                                |

## SOURCES

Hearing protectors are available from most mail-order tool catalogs. For information about specific brands and local distributors, contact the sources below:

- ▶ **BILSOM INTERNATIONAL**, 109 Carpenter Dr., Sterling, VA 22170, (800) 733-1177.
- ▶ **CABOT SAFETY CORP.**, 5457 W. 79th St., Indianapolis, IN 46268, (800) 225-9038.
- ▶ **PELTOR INC.**, Peltor Park, 63 Commercial Way, East Providence, RI 02914, (800) 327-6833.
- ▶ **DIRECT SAFETY CO.**, 7815 S. 46th St., Phoenix, AZ 85044, (800) 528-7405.
- ▶ **RACAL HEALTH AND SAFETY INC.**, 7305 Executive Way, Frederick, MD 21701, (800) 682-9500.





Convert your lathe to a disc sander with this simple tilting table.

# SHOP-BUILT DISC SANDER

BY ERNIE CONOVER

*A Sanding Accessory for the Lathe*

I am not particularly fond of sanding machines. I prefer hand planes and scrapers because they produce a cleaner surface and no dust. However, the disc sander is useful for certain types of woodworking. It's especially good for sanding a flat surface at a precise angle to another surface. I also use it on end grain, to break edges, and cut radiuses on corners.

The old-style disc sander—often found in pattern shops—is a slow-speed, cast-iron machine with a 14-in. or 16-in. steel disc. The adjustable table tilts both ways and can be set to a quarter of a degree. Such a machine was far too expensive for me, so I looked at my alternatives—buy an inexpensive commercially made disc sander or build one. I decided to build my own. Rather than start from scratch, I adapted my variable-speed lathe to the purpose. I picked my lathe because it's not used much, the spindle is at a comfortable working height, and its bearings are rugged enough to stand the strain of sanding. Most important, I can change the speed to suit the diameter of the disc, the grit, and the type of wood I'm sanding.

The shop-built disc sander consists of three parts: the disc, called a platen; the tilting table; and the base. (See drawing, next page.) I made my disc sander to fit my lathe, which has wooden ways and no gap near the headstock. If you have a gap-bed lathe, you'll have to make the base wider because part of the base will overhang the gap in the bed.

Selecting your platen size is the first step. Diameters of 9 in., 12 in., 15 in., and 16 in. are the most common. For my lathe, I made two platens: a 9-in. metal version and a 14-in. wooden one. I like the 14-in. platen for sanding large pieces of stock.

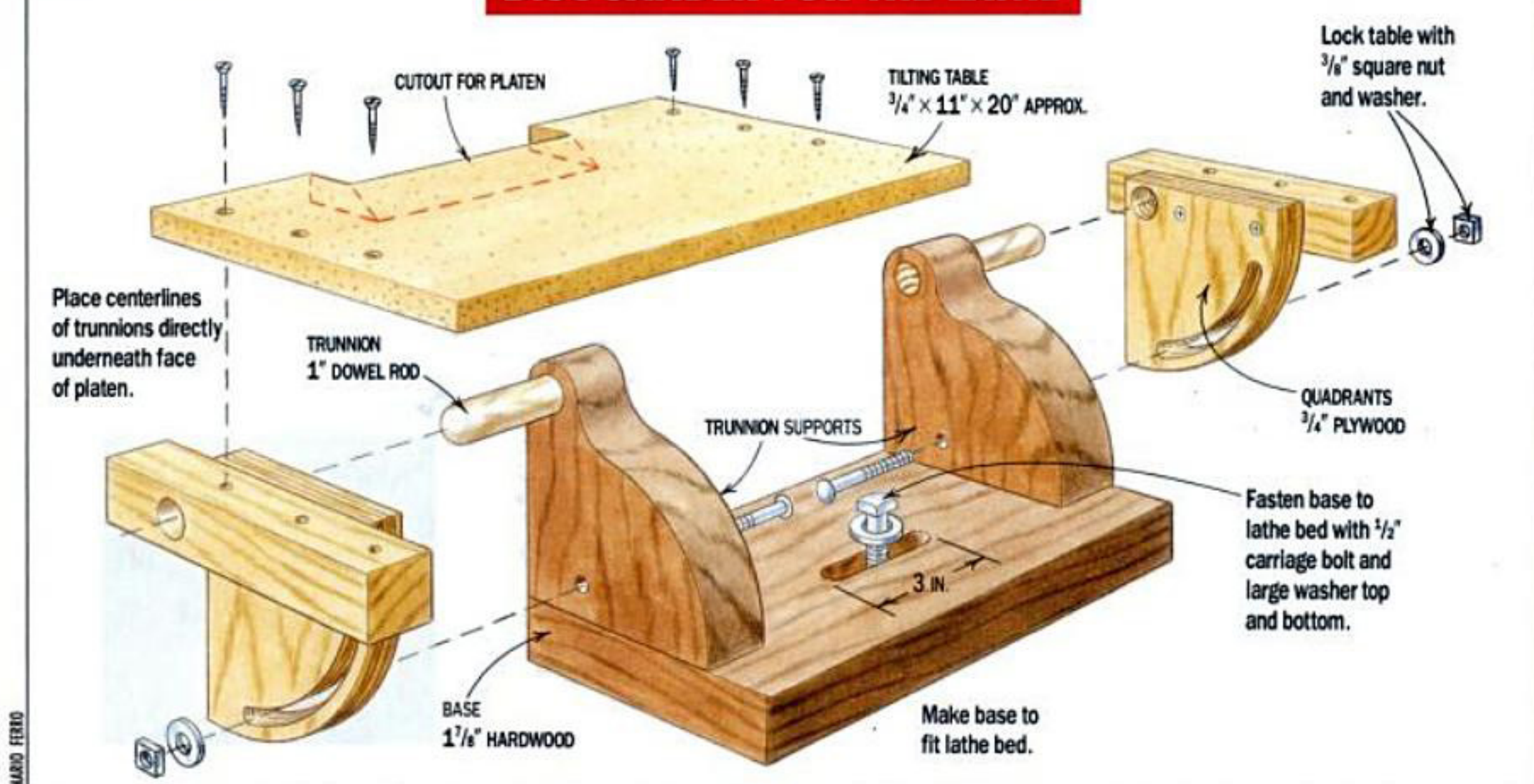
## Making the Platen

Platens can be wooden or metal. Metal is more expensive than wood but is easier to keep clean. Medium-density fiberboard—called MDF—is another possibility for a platen.

To make a steel platen, weld a steel disc to a nut with threads that match the one on your lathe headstock. Both platen and nut must then be "faced" in an engine lathe until they



## DISC SANDER FOR THE LATHE



are square to the axis of the spindle. I could do this work myself because the spindle threads on both my wood and metal lathes match. A machine shop could charge \$50 to \$100 to do this.

**To make an MDF platen**, band-saw a disc of MDF to the chosen diameter, center it on the lathe faceplate, and attach it with 1/2-in. #12 sheet-metal screws. You'll need to true the platen once it's mounted on the lathe, but set it aside for now and start on the table.

### Making the Table

Make the sanding table out of 3/4-in. MDF and the rest of the pieces from scrap plywood or hardwood. Overall sizes are shown in the drawing, but you must adjust the actual dimensions to suit your lathe. Note that the centerline of the trunnions is directly below the face of the platen.

I made the two quadrants out of 3/4-in. plywood and cut the curved slots with a saber saw. I drilled two 3/8-in. holes at the ends of the slots first to start the saw cuts. A coping saw is slower but will work as well.

I used biscuit joinery to assemble my table and base, but you could equally well fasten them with glue and drywall screws—they hold well in both wood and MDF.

Notch out the table for the biggest platen you plan to use. You can still



▲  
Cutting sandpaper discs from sheets is less expensive than buying adhesive-backed precut sanding discs.

use smaller platens by sliding the table away from you until the corner of the table notch barely clears the platen's edge. This is why the base is slotted instead of drilled with a single hole.

### Truing the Platen

If the platen wobbles, the work jumps constantly and is sanded only at the high spot. To true up the platen, screw the faceplate onto the lathe spindle and mount the sanding table on the lathe to use as a tool rest. Run the lathe at a moderate speed and scrape the surface of the platen with a round-nose scraper. Take small cuts in sweeping, lateral passes, and check the platen for flatness with a framing square or straightedge. Finally, give both the platen and table several coats of shellac, lacquer, or sanding sealer, and then you are ready to sand.

### Using the Sander

To set the angle between table and platen on my sander, I use a machinist's protractor. For most work, setting a bevel off a draftsman's protractor is accurate enough.

You can buy adhesive-backed, precut sanding discs in 9-in., 10-in., 12-in., and 15-in. sizes (available from Econ-Abrasives, Box A865021, Plano, TX 75086, 214-377-9779). For a 9-in. disc, it's cheaper to make your own. Buy garnet paper, stick it to the platen with spray photo-mount adhesive, and trim it to the correct size with a bench knife, as shown in the photo. When replacing sanding discs, remove the faceplate from the lathe with the platen attached. Clean the face of the platen with mineral spirits or sandpaper. If an MDF platen gets really gummed up, put it back in the lathe and scrape it clean with a scraper. ▲



**ERNIE CONOVER**  
is a contributing editor of AW. He also teaches woodworking and is a consultant to tool manufacturers.



# WOODWORKING

## VICES

*Get a Grip on Your Work*

For hundreds of years, woodworkers have relied on bench vises as a third hand to hold stock. Today, there is a wide variety of woodworking vises from which to choose. Some are stone simple—not much different from their predecessors of a 100 years ago. A few are marvels of modern design for special work-holding purposes. Each type of vise evolved to hold stock in a different way for different woodworking tasks.

In this article, I've divided all woodworking vises into two basic categories: wooden-jaw bench vises and metal-jaw bench vises. I'll discuss the different types of vises and what you'll need to know to choose the right ones for your shop. (See Sources.)

### Wooden-Jaw Bench Visers

There are four basic types of wooden-jaw vises: face vises, tail vises, shoulder vises, and leg vises. (See Figs. 1 and 2.) The vise's name refers to the placement of the vise on the bench as well as to the design of the vise.

Wooden-jaw vises evolved through the needs of woodworkers doing traditional cabinetmaking, largely with hand tools. Traditionally, wooden-jaw vises were built into a wooden bench, and that remains true today. You can't bolt a wooden-jaw vise on your bench. Instead, you'll have to buy the hardware and build the vise into the bench. (See sidebar, *Wooden-Vise Hardware*, page 57.) Of course, you can always buy a new workbench



British-made Record vises are among the best-known metal-jaw vises. They come in three sizes, each with integral jaws, screw, guide rods, and lever-operated quick-release mechanism.

that comes with wooden-jaw vises installed, or you can build your own bench from scratch.

Some wooden-jaw vises grip boards on top of the bench with the use of bench dogs—small metal or wooden posts that fit into dog holes in the benchtop and vise, and stick up above their surfaces. The stock is then held in place between the bench dogs. (See Fig. 1.) By placing the bench dogs into

different dog holes, you can grip boards of almost any size.

### Metal-Jaw Bench Visers

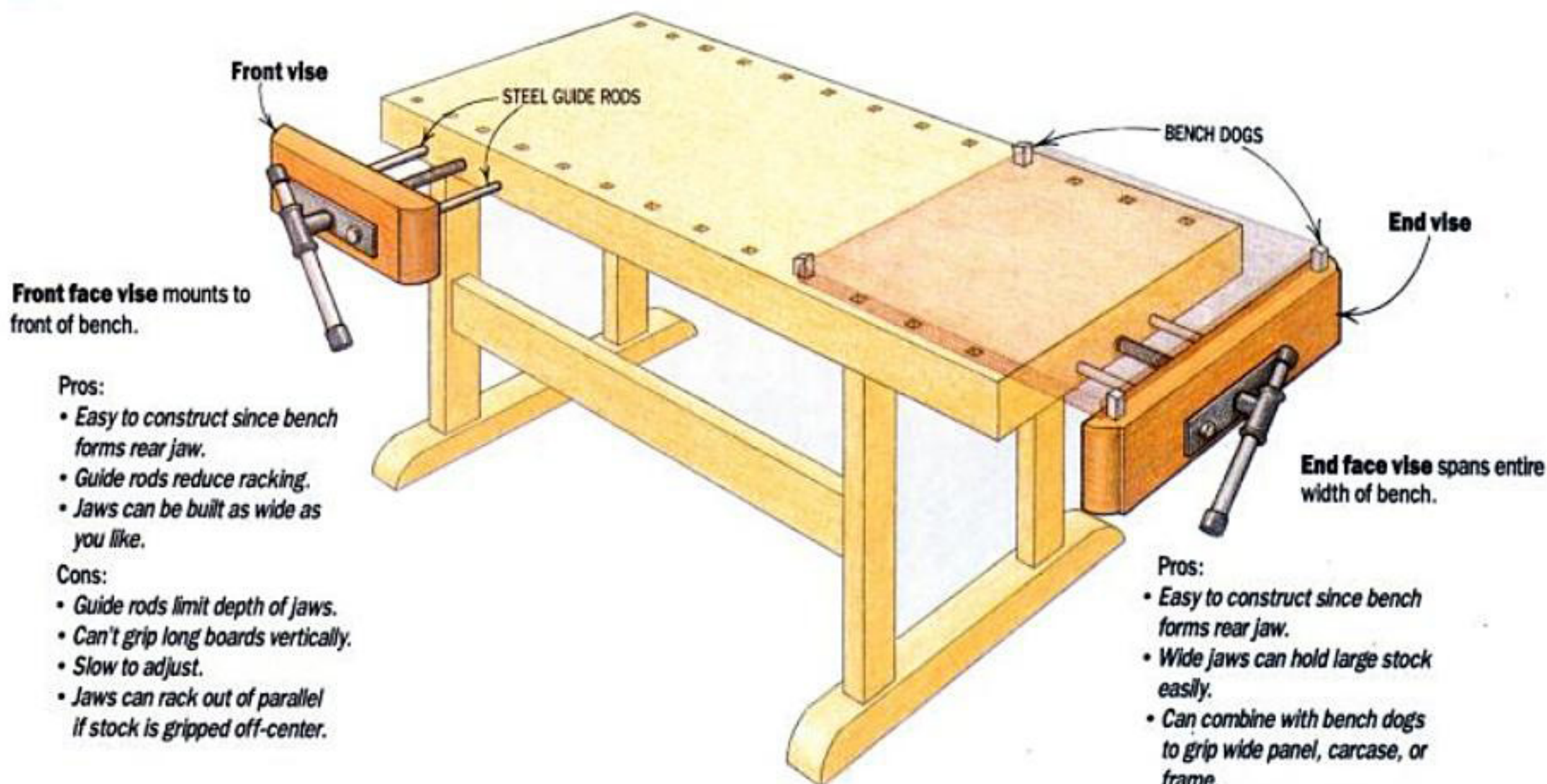
If building a bench with wooden-jaw vises seems like too much trouble, a metal bench vise is a perfect alternative. Often called a woodworker's bench vise in mail-order catalogs, these vises come preassembled with integral guide rods and bench screws,

B Y J I M B A R R E T T



# WOODEN-JAW BENCH VISES

**FACE VISES** have steel guide rods and a movable, rectangular jaw that closes flush with the benchtop.



**Front face vise** mounts to front of bench.

**Pros:**

- Easy to construct since bench forms rear jaw.
- Guide rods reduce racking.
- Jaws can be built as wide as you like.

**Cons:**

- Guide rods limit depth of jaws.
- Can't grip long boards vertically.
- Slow to adjust.
- Jaws can rack out of parallel if stock is gripped off-center.

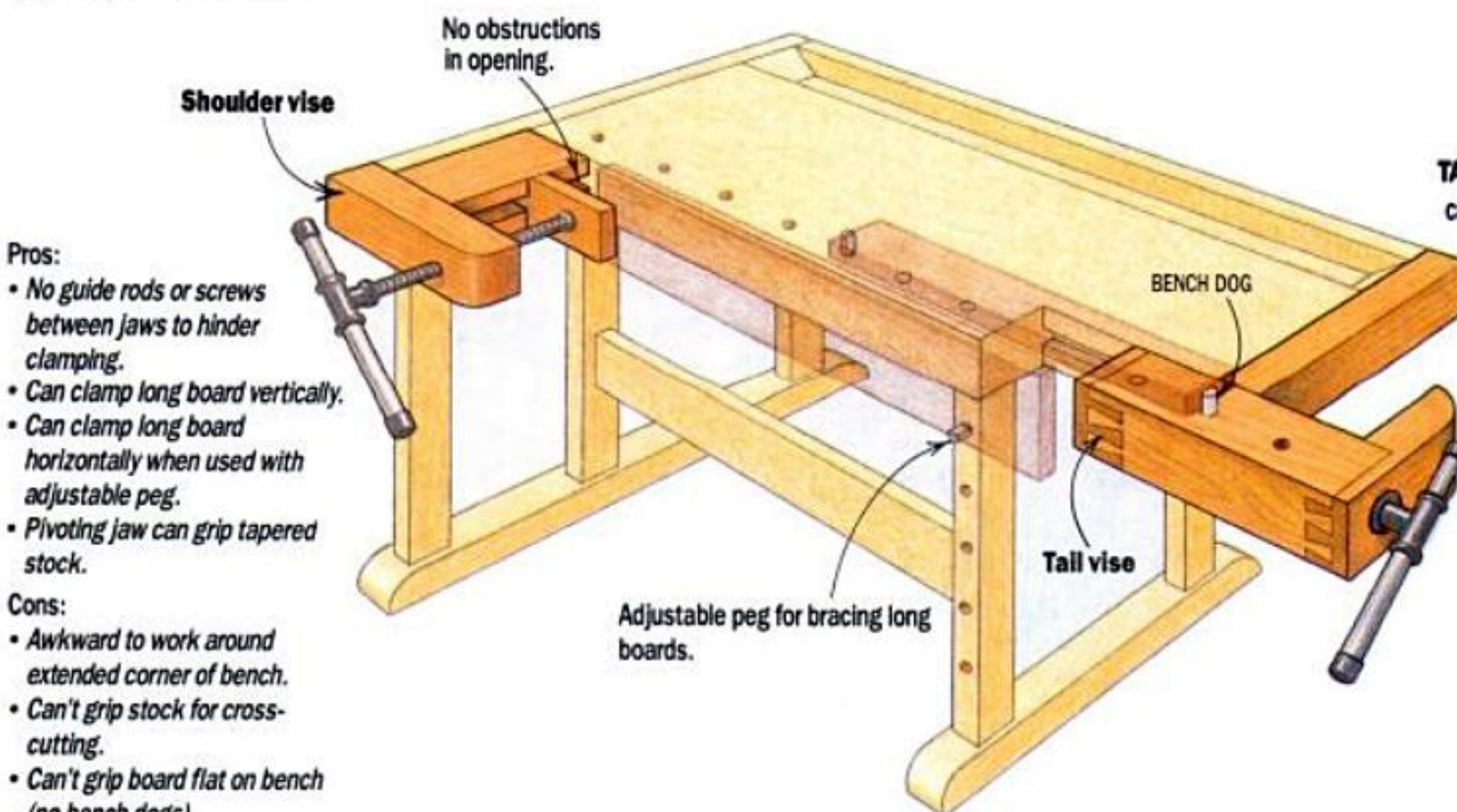
**Pros:**

- Easy to construct since bench forms rear jaw.
- Wide jaws can hold large stock easily.
- Can combine with bench dogs to grip wide panel, carcass, or frame.
- Can combine with bench dogs to pull apart assemblies by turning screw backward.

**Cons:**

- Guide rods limit depth of jaws.
- Slow to adjust.
- Wide jaws rack severely if stock is gripped off-center.

**SHOULDER VISES** are common on European workbenches. Built on right-angle extension of bench.



**Pros:**

- No guide rods or screws between jaws to hinder clamping.
- Can clamp long board vertically.
- Can clamp long board horizontally when used with adjustable peg.
- Pivoting jaw can grip tapered stock.

**Cons:**

- Awkward to work around extended corner of bench.
- Can't grip stock for cross-cutting.
- Can't grip board flat on bench (no bench dogs).
- Slow to adjust.

DRAWINGS BY FRANK ROHRBACH

**TAIL VISES** are common on old cabinetmaker's benches.

**Pros:**

- Can clamp long board vertically.
- With bench dogs, can clamp stock flat for planing and scraping.
- Can grip odd-shaped stock or assemblies.

**Cons:**

- Complicated to build.
- Can't grip stock for cross-cutting.
- Slow to adjust.



## LEG VISES

**LEG VISES** have outer jaws that pivot at the bottom.

Bench leg serves as inner vise jaw.

Place screw higher for more clamping force, lower to handle wider stock.

Leg vise

Movable jaw pivots on end of beam.

Horizontal beam adjusts to compensate for stock thickness.

## Pros:

- Simple, strong, and easy to construct.
- Good when working the edges of long planks.

## Cons:

- Jaws don't move parallel. Must adjust beam.
- Narrow jaws provide only small clamping surface.
- Can't clamp boards flat on bench (no bench dogs).
- Slow to adjust.



A legend in its time, the Emmert patternmaker's vise is famous for its rotating, tilting, pivoting jaws. Out of production for many years, it's being manufactured again.

and are ready to mount to most any workbench. To protect stock from the vise's steel jaw faces, you can install hardwood jaw liners.

vise is the Emmert Vise (patented in the 1870s), which became legendary for its versatility. (See photo.) Its jaws rotate 360° and tilt 90° from its normal vertical position to a horizontal plane. The front jaw pivots to hold tapered work and has four integral bench dogs to hold irregularly shaped work.

As the metal-casting industry switched to die casting, patternmaking declined as a profession. Emmert sales

vises and with a partial counterclockwise turn of the handle on others.

A pop-up bench dog in the front vise jaw combines with a bench dog in the top of the workbench to hold boards flat on the benchtop.

The term sprung jaws simply means that the jaws are toed-in a tiny amount, causing the top edges to meet slightly before the bottom edges do. This way, the jaws distribute even pressure over the stock when they're drawn up tight. Vises without sprung jaws tend to clamp unevenly, exerting greater pressure near the screw at the bottom.

Metal-jaw bench vises come in three standard jaw widths: 7 in., 9 in., and 10 in. or 10½ in. As the jaws get wider, the jaw depth and maximum jaw opening get larger. The

The Tucker Vise is a modern-day version of the original Emmert with several technical improvements. (See AW, #22, "Toolbox.") Introduced by Veritas Tools in 1991, the Tucker Vise has the rotation, tilt, pivot, and bench-dog features of the Emmert, enabling you to position a piece of stock at any angle you want. (See photos.) Its three sets of different-sized jaws (the largest is 13 in. wide) are faced with non-mar-

## SOURCES

Metal-jaw vises, hardware for making wooden vises, and workbench kits are available from the following mail-order companies:

## ▶ GARRETT WADE

161 Ave. of the Americas  
New York, NY 10013  
(800) 221-2942

## ▶ VERITAS TOOLS

12 E. River St.  
Ogdensburg, NY 13669  
(315) 393-1967

## ▶ WOODCRAFT SUPPLY CORP.

210 Wood County Industrial Park  
Box 1686  
Parkersburg, WV 26102  
(800) 225-1153

Metal-jaw woodworking vises are available from the following companies:

## ▶ ADJUSTABLE CLAMP CO.

417 N. Ashland Ave.  
Chicago, IL 60622  
(312) 666-0640

## ▶ WILLIAMS &amp; HUSSEY

Riverview Mill  
Box 1149  
Wilton, NH 03086  
(800) 258-1380

## ▶ GRIZZLY IMPORTS INC.

Box 2069  
Bellingham, WA 98227  
(800) 541-5537

Patternmaker's vises are available from the following companies:

▶ Emmert Vise: The Emmert Vise Co., Box 3553, Hagerstown, MD 21742, (301) 733-0730

▶ Tucker Vise: Veritas Tools  
(315) 393-1967 (address above.)

logs. The Asian imports are a bit rougher than their American and British counterparts, and some may lack sprung jaws or quick-release fea-

than cast from 'veritas' backs up claim with a lifetime guarantee against casting breakage.



JIM BARRETT



# JUST FINISHING



BY MICHAEL DRESDNER

How many camels does it take to make a camel-hair brush? None. Despite its name, this kind of brush contains no camel hair. History reports that camel is a corruption of the name of a popular brush maker, Camle, who originally used squirrel hair to produce an exceptionally soft, pliable bristle. What with the squirrel-hair market being what it is, most camel brushes are now made with pony hair.

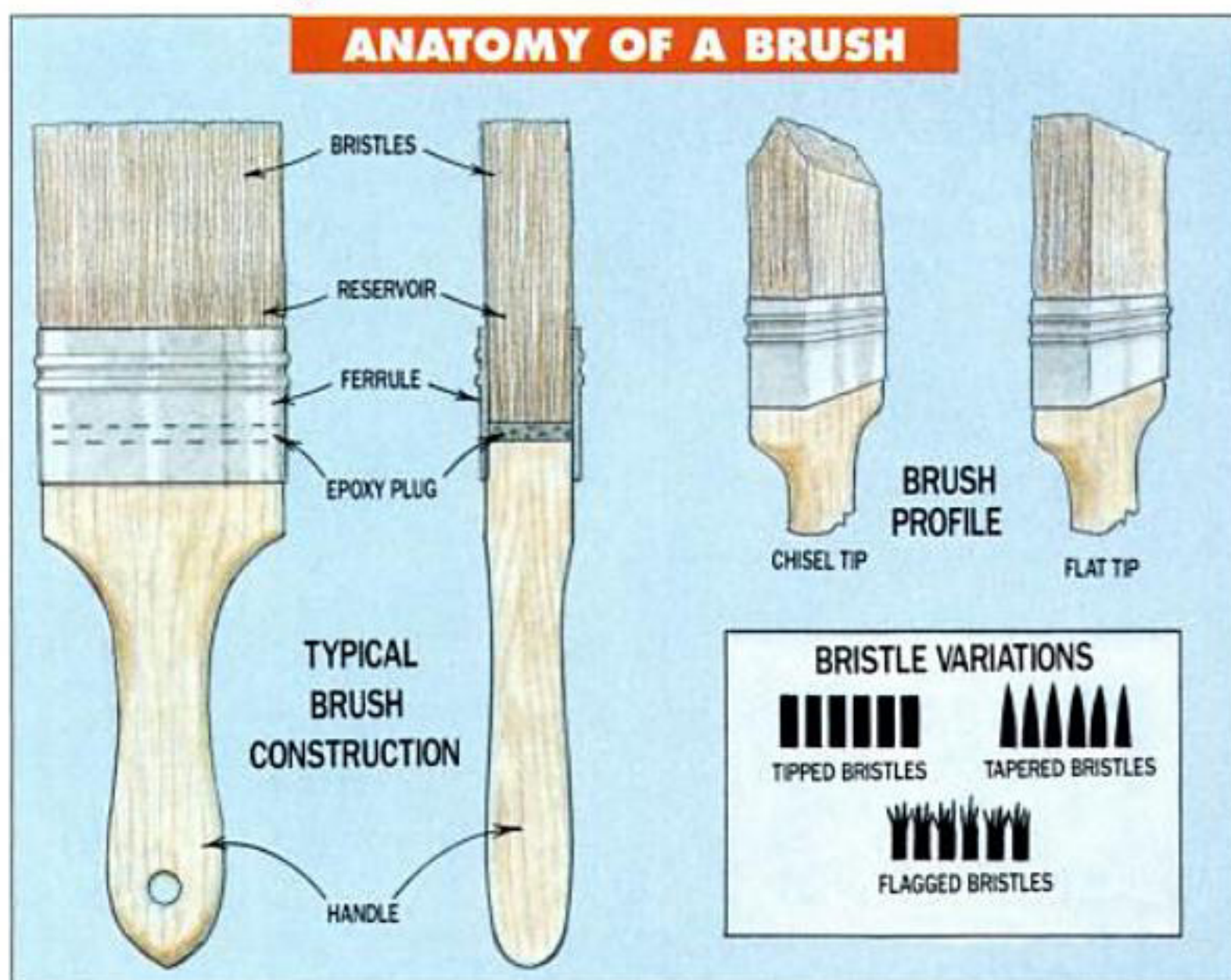
Which of the following animals do *not* donate hair to the brush-making trade: Hogs, squirrels, skunks, horses, badgers, sables, oxen, humans? They all do. While humans are probably the only ones who give up their hair willingly (and are paid for it), the hair of every animal listed above is used to make brushes.

Brushes are one of the oldest and finest finish applicators ever invented. They are inexpensive, lightweight, portable, versatile, and efficient. And while few woodworkers can afford a different spray gun for each class of finish, brushes offer that luxury to all. Almost every type of common finish is available in a brushable formula, so choosing a brush as an applicator will not cramp your style.

At the business end of a brush is the hair or bristle, which defines the brush and its use. (See checklist, next page.) This bundle of fibers can be all the same length (*flat tip*), or can taper on both sides to a more pliable *chisel tip*. The hair ends themselves can be *tipped*—cut off like the end of a toothbrush bristle, *tapered* to a point that is finer than the rest of the shaft, or *flagged* into a spray of split ends. (See drawing.) The bristles are set into an epoxy plug and attached to the handle by a metal ferrule. The center of the bristle cluster just above the ferrule is the reservoir. (See drawing.)

## Preparing a Brush

Before even opening a can of finish, prepare the brush by soaking it in an appropriate solvent all the way up to the ferrule, then squeeze out most of the excess. Select the



## CHOOSING AND USING A BRUSH

solvent needed to clean up your finish. (Water for water-based coatings; mineral spirits or naphtha for oil varnishes; denatured alcohol for shellac; lacquer thinner for lacquer.) This will fill the reservoir with just enough solvent to help the finish flow better. It also helps prevent the finish from forming a hard-to-clean crust at the upper edge of the line of finish on the bristles.

Before you dip your brush, stir the finish thoroughly to mix all the components evenly and completely. Dip only one third to one half the length of the bristles into the finish. Rather than scrape off the excess on the rim of the can, remove it by simply touching the end of the brush to the rim or inside wall of the can. After all, the idea is to prevent drips, not to unload the brush. Hold the brush at a comfortable angle to the wood (anywhere from 30° to 80°), and let the coating flow.

## Cleaning Up

As soon as you finish with the brush, clean it thoroughly in the correct solvent for the finish. When it appears perfectly clean, spin-dry the brush by rolling the handle briskly between your hands. Now go to the sink and wash the bristles with lots of warm water and plenty of foamy soap (I prefer shaving soap). Rinse out the soap.

To reshape the bristles, take a piece of stiff, absorbent



# JUST FINISHING



PHOTOS BY ELLIS VALENTINE

Hold the brush at the ferrule with your thumb on one side and your fingers extended on the other. The handle rests in the web of the thumb.

paper, such as a brown paper bag, about twice the length and four times the width of the bristles, and roll the ferrule and bristles in the paper. Fold the paper about an inch past the end of the bristles, and set the wrapped brush aside to dry. It should come out supple and reshaped—like a new brush.

## A BRUSH USER'S CHECKLIST

Brushes are defined by the type of hair or bristle used in them. Here are some guidelines for choosing the correct brush. This checklist will help you match the finish with the most appropriate brush. It is a wise idea to pay a bit more and buy quality.

**Touch up:** Camel works well for smooth, uniform coverage, but it is hard to beat the springy, sharp point of good red sable for adding fine grain lines and delicate touches.

**Oil varnish and polyurethane:** The old standby is still China bristle, which is actually white or black hog hair. The color makes no difference, but look for long, supple hair, a chisel end, and either tapered or flagged bristles.

**Water-based finishes:** Natural hair tends to splay and become unmanageable in water, so here, the best choice is synthetic bristles. Nylon is the softest and my favorite, but polyester or nylon/polyester blends also work well. Avoid flagged tips with water-based materials, as they can cause excessive foaming.

**Shellac and lacquer:** They are not as common as they once were, but if you can find one, try using a fitch brush. The hair comes from our smelly friend the skunk. The bristles themselves are short but very soft, and are often set into an oversized ferrule that rises partway up the handle. Badger brushes also work extremely well for these thin finishes. In a pinch, a good grade of China bristle brush will do.



## Corrosion Resistance Priced Less than Stainless

- 10 Times the Corrosion Resistance of Ordinary Yellow Zinc Plating
- Square Drive for Installation Ease
- Priced up to 50% Less than Stainless

Call 1-800-443-7937 or FAX (804) 847-7136

| No-Co-Ro-De Part # | Qty           | Ch \$ /Qty | \$/1000 | \$/100 |
|--------------------|---------------|------------|---------|--------|
| #Bx1-1/2 0814-FNC  | 122.94 / 5000 | 30.99      | 5.17    |        |
| #Bx2 0820-FNC      | 102.12 / 3500 | 36.80      | 6.10    |        |
| #Bx2-1/2 0824-FNC  | 96.84 / 2500  | 48.90      | 8.02    |        |
| #Bx3 0830-FNC      | 97.63 / 2000  | 61.66      | 10.05   |        |
| #10x2 1020-FNC     | 78.37 / 2500  | 39.55      | 6.53    |        |
| #10x2-1/2 1024-FNC | 97.56 / 2000  | 61.62      | 10.04   |        |
| #10x3 1030-FNC     | 85.06 / 1500  | 71.65      | 11.64   |        |
| #10x4 1040-FNC     | 68.20 / 800   | NA         | 17.39   |        |

### Delivery Charges

| Order Total        | \$&H   |
|--------------------|--------|
| \$0.01 to \$20.00  | \$3.50 |
| \$20.01 to \$50.00 | \$5.00 |
| \$50.01 to \$80.00 | \$6.50 |
| Over \$80.00       | \$8.00 |

### UPS Ground Service Only

Alaska, Hawaii, US Territories and Foreign countries extra

## McFEELY'S SQUARE DRIVE SCREWS

PO Box 3 • 712 12th st  
Lynchburg • VA 24505-0003

CIRCLE NO. 45 ON PRODUCT INFORMATION FORM

## WOODPECKERS 1-800-752-0725

Call about...FREE SHIPPING and the best selection of quality Router Bits, Saw Blades, and much more!



**18" INCRA FENCE SYSTEM**  
\$44.95 (LIST \$54.95)  
Includes: Incra Fence, Incra Stop & Stop Extender Bar  
**INCRA JIG**  
\$29.95 (LIST \$39.95)  
**RIGHT ANGLE FIXTURE**  
\$24.95 (LIST \$29.95)

**PRO PACKAGE —**  
\$169.00

16" Incra Pro, 28" Pro Fence System, Right Angle Fixture, Incra Gauge, Handbook & Templates  
\$225.00 Value

|                     |         |                        |           |           |         |
|---------------------|---------|------------------------|-----------|-----------|---------|
| INCRA JIG PRO 12    | \$59.95 | INCRA VIDEO            | \$16.95   | BOOK/TEMP | \$16.95 |
| INCRA JIG PRO 16    | \$69.95 | INCRA GAUGE            |           |           | \$12.95 |
| 28" INCRA PRO FENCE | \$54.95 | INCRA MITER SLIDER     | \$10.95ea | 2/\$19.50 |         |
| INCRA HINGE PLANS   | \$11.95 | 8 Piece Router Bit Set |           |           | \$59.95 |

MASTERCARD • VISA • DISCOVER  
WOODPECKERS  
8318 Manorford Drive • Parma, Ohio 44129

1-800-752-0725  
216-888-6332/FAX 216-888-9463

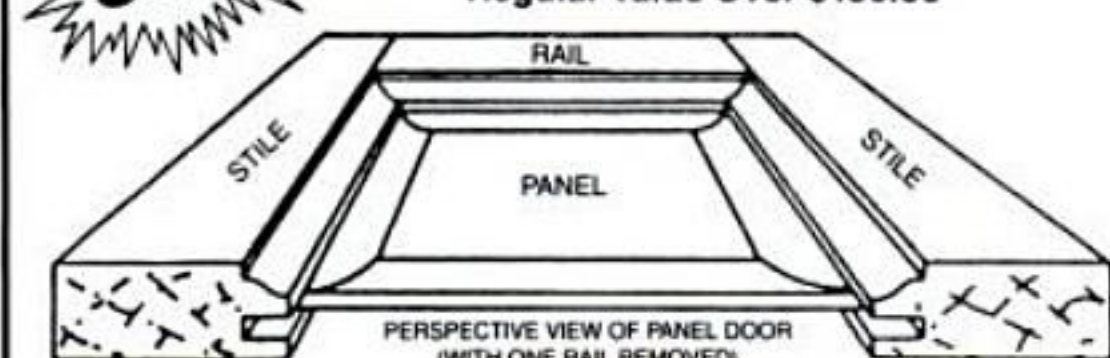
CIRCLE NO. 41 ON PRODUCT INFORMATION FORM

## MLCS, Ltd.

### MAKE BEAUTIFUL RAISED PANEL DOORS WITH YOUR 1/4" or 1/2" ROUTER or WITH YOUR 1/2" or 3/4" SHAPER.

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.

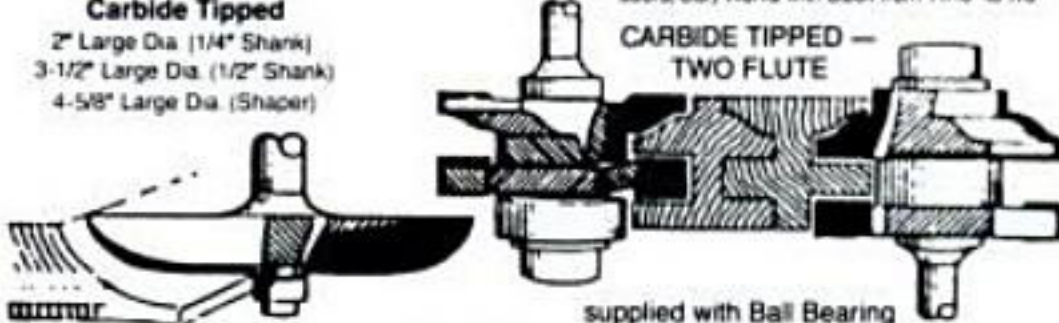
| Size & Form                 | Item # | Price per Set |
|-----------------------------|--------|---------------|
| 1/4" Shank Router           | #554   | \$69.95       |
| 1/2" Shank Router           | #882   | \$79.95       |
| 1/2" & 3/4" Shaper          | #1059  | \$99.95       |
| Regular value Over \$150.00 |        |               |



**RAISED PANEL BIT**  
SUPPLIED WITH BALL BEARING  
Carbide Tipped  
2" Large Dia. (1/4" Shank)  
3-1/2" Large Dia. (1/2" Shank)  
4-5/8" Large Dia. (Shaper)

### REVERSIBLE COMBINATION RAIL and STILE BIT

(For making matching rails and stiles in raised panel doors, etc.) Works with stock from 1 1/16" to 7/8"



supplied with Ball Bearing  
**NEW 32 page CATALOG** Featuring 100's of Bits & Shaper-Cutters

To order by MasterCard or Visa Toll Free  
7 Day - 24 Hour Order Service, Call 1-800-533-9298 or  
send check to: MLCS, Ltd., P.O. Box 4053AL, Rydal, PA 19046

CIRCLE NO. 18 ON PRODUCT INFORMATION FORM



# TOOLBOX



## Super-Fine Abrasive Sheets

For polishing a finish to a super-smooth, deep shine, the Micro-Mesh Woodworker's Kit provides a cost-effective alternative to conventional abrasives. The kit contains a series of 3-in. by 6-in. cloth-backed abrasive sheets with a cushioned layer for a uniform scratch pattern. The sheets come in nine different numbered and color-coded grits, from 1,500-grit (similar to conventional 600-grit paper), up to 12,000-grit sheets. The sheets' silicon-

carbide abrasive crystals are harder, more aggressive, and more durable than aluminum-oxide abrasives. You can use Micro-Mesh sheets wet or dry with a rubber sanding block (included), and you can wash the sheets to reuse them. (Price: \$33.50, 18 sheets)

*Micro Surface Finishing Products Inc., Dept. AWT, Box 818, Wilton, IA 52778, (800) 225-3006*

CIRCLE NO. 601 ON PRODUCT LITERATURE CARD

## Big-Capacity Scroll Saw

The new #23640 Contractor Series scroll saw from Sears offers big 20-in. throat capacity for a moderate price. It can cut stock up to 2 in. thick with plain or pin-type scroll-saw blades. A direct drive, variable-speed motor powers the saw from 300 to 2,000 strokes



per minute. The saw has a cast-iron base and table, and sturdy leg stand. The table tilts up to 45° for bevel cuts. A hold-down foot, sawdust blower, and removable locking key for the on/off switch are standard. (Price: \$399)

*For information, visit your nearest Sears store or call (800) 366-3000 to place a catalog order.*

CIRCLE NO. 602 ON PRODUCT LITERATURE CARD



For years, the Leigh Dovetail Jig has set a standard as the most versatile jig for making router cut dovetail joints. Now Leigh has

added an attachment that allows you to cut multiple mortise-and-tenon joints with the same jig.

A multiple mortise-and-tenon joint is a series of mortises and matching tenons all in a row. A typical application is for joining shelves or partitions to the sides of a cabinet. The tenons can be through tenons or blind tenons. Though a multiple mortise-and-tenon joint isn't a feature of traditional furniture, it's very strong and attractive.

The Leigh Multiple Mortise-and-Tenon Attachment (Leigh calls it the MMT) is a template that consists of a series of adjustable fingers on a rail. The fingers guide a plunge router to make the cuts. The template is available in 12-in. or 24-in. lengths and mounts to the same jig body as the Leigh Dovetail Jig (you'll have to buy the dovetail jig if you don't own one.)

## LEIGH MULTIPLE MORTISE-AND-TENON ATTACHMENT



### TESTED BY BOB MORAN

You'll need a plunge router of at least 1 HP and a spiral upcut router bit of either 5/16-in. dia. or 1/2-in. dia., depending on the size of the mortises and tenons you wish to make. A 1/2-in. bit comes with the jigs.

To use the MMT, you set up the finger assembly to the desired size and spacing of the joint, either by careful

measurement or by eyeballing. You can be creative because you're not limited by any preset spacing.

Cutting the mortises and tenons is a multistep procedure, which involves clamping the pieces of stock in place (one at a time), making a series of router cuts, and rearranging the finger assembly between cuts.

I spent a few hours getting familiar with the MMT jig, fine-tuning its adjustments, and trying different sizes and spacing for some trial joints. Once I was familiar with the jig's operation, cutting a multiple mortise-and-tenon joint was straightforward.

You can probably make one mortise-and-tenon joint faster with hand tools than you can with the jig the first time you use it. But in most cases, you'll need four, eight, or more joints, and then there's no contest—the jig will give faster and more uniform results. If you want to feature multiple mortise-and-tenon joints in your furniture, I recommend you try the Leigh MMT jig. (Price: \$199, 24-in. attachment; \$179, 12-in. attachment)

*Leigh Industries Ltd., Dept. AWT, Box 357, Port Coquitlam, B.C., Canada, V3C 4K6, (800) 663-8932.*

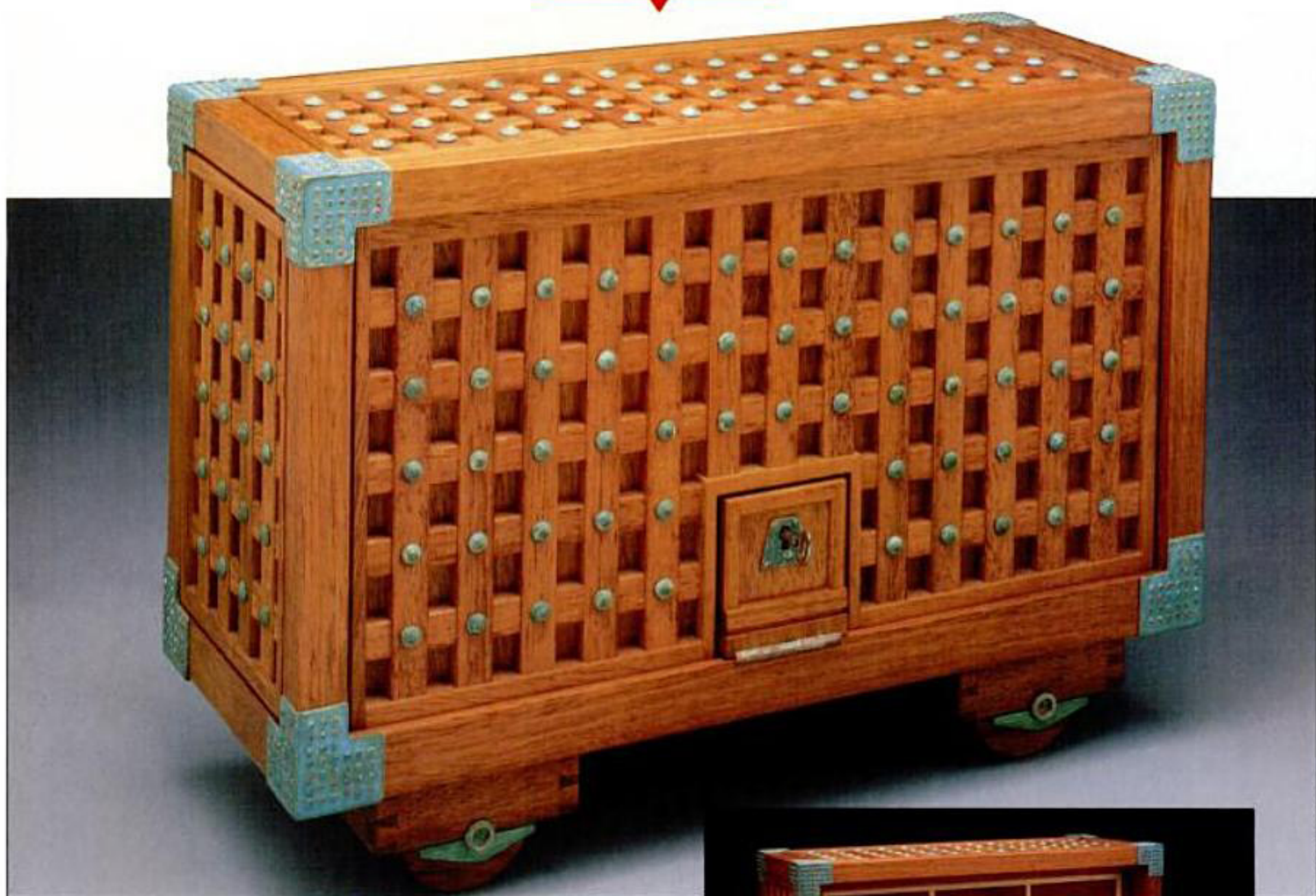
CIRCLE NO. 603 ON PRODUCT LITERATURE CARD







# GALLERY



Strongbox by Reginald Herndon, Fort Bragg, California. Kwilla, Lebanon cedar, ebony, brass. Dimensions: H: 12½ in., W: 17½ in., D: 7¼ in.



PHOTOS BY GEORGE POST

End chair by Paul Arnold, Asheville, North Carolina. Red oak. Dimensions: H: 48 in., W: 20 in., D: 20 in.



PAUL ARNOLD

Want to see your work in "Gallery?" Send color slides or color transparencies to "Gallery," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. Please include: materials, dimensions, name of photographer, and your name, address, and phone number. Enclose a self-addressed envelope for return of photos.



# GALLERY



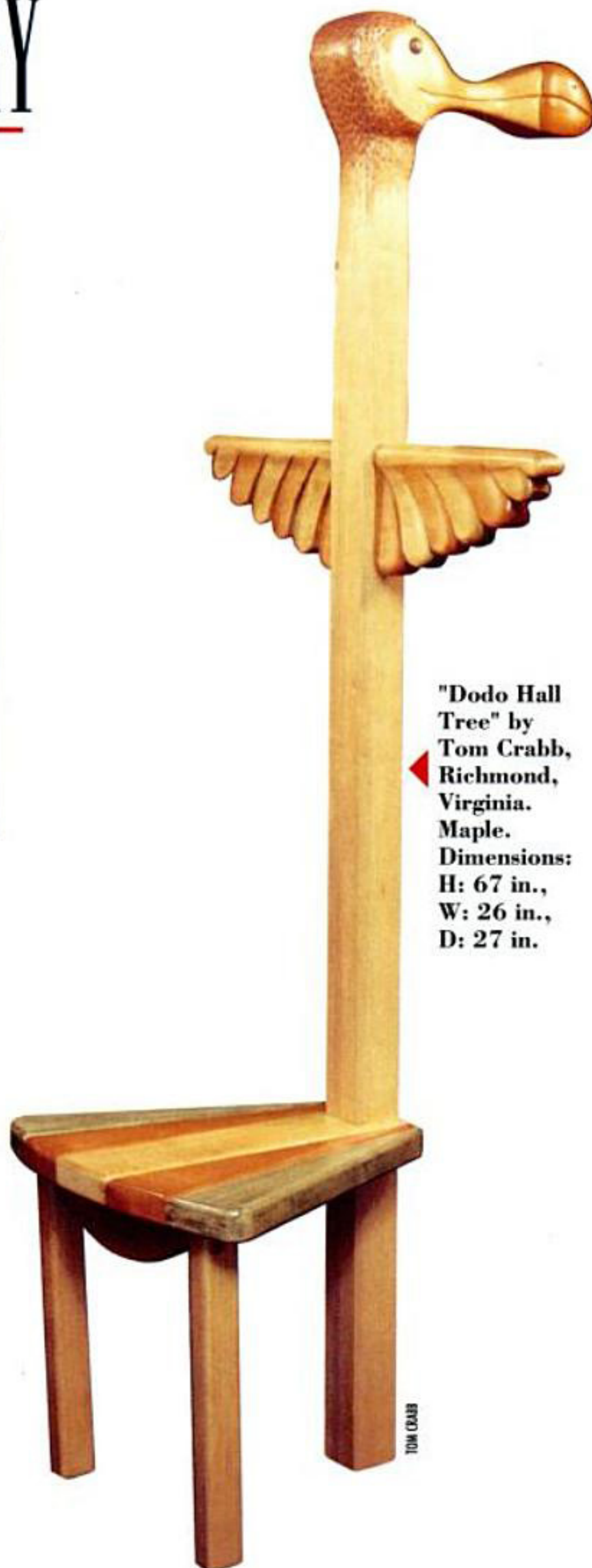
JOHN SHIPSTAD

Art Deco dressing table by John Shipstad, Coos Bay, Oregon. Tiger maple. Dimensions: H: 49 in., W: 48 in., D: 21 in.



JAN A. SOMERWIL

Chair by Jan A. Somerwil, Niagara on the Lake, Ontario. Ash, teak. Dimensions: H: 40 in., W: 20 in., D: 18 in.



TOM CRABB

"Dodo Hall Tree" by Tom Crabb, Richmond, Virginia. Maple. Dimensions: H: 67 in., W: 26 in., D: 27 in.



# FINAL PASS



Last-chance school wins an award for a woodworking program that builds self-esteem.

## Community Award

A high school that uses woodworking to build troubled teens' self-esteem has earned the first Minwax Community Craftsman Award. Minwax Co. is a maker of wood finishing materials.

DeLaSalle Education Center of Kansas City won the \$10,000 prize for its WoodWorks program, which helps students who have failed in other educational situations learn to build furniture and refinish antiques. The training program instills students with a sense of pride and worth that, in most cases, has

helped them improve their grades. The students' work in the woodshop has proved valuable, too. Some of their pieces have commanded prices as high as \$1,800.

Minwax plans to annually honor a person, group, or company that improves the community through woodworking.

To make a nomination for the 1993 Minwax Community Craftsman Award, send your suggestion to Minwax PR, c/o Gilbert, Whitney & Johns, 110 S. Jefferson Rd., Whippany, NJ 07981. The deadline is August 7.

## Tune Up Your Woodworking

If you like to make your woodworking sing—that is, in the form of handcrafted musical instruments—check out a copy of *Guitarmaker*, a magazine for luthiers produced by The Association of Stringed Instrument Artisans.

The quarterly offers construction tips, hardware sources, interviews with craftsmen, book reviews, and more.

For a sample copy of *Guitarmaker*, send \$5 to the association at 14 S. Broad St., Nazareth, PA 18064. Or you can receive a free year's subscription by joining the association. A first year

membership is normally \$50, but *AW* readers may join for the renewal price of \$35.

## Back to Basics

If you're concerned about the health hazards of wood dust, *Dust Collection Basics* may hold some answers. This 40-page handbook hits a number of topics, including system design, duct material, fittings, and system grounding.

A copy costs \$5.95 and is available from Woodstock International, Box 2027, Bellingham, WA 98227, (206) 734-3482.

## Riding for a Good Cause

Roger Thompson and Doug Aspinwall are two people who believe in putting the pedal to the metal for good causes. That's just what they'll do starting May 9, with the sponsorship of *AW*.

Thompson, the vice president of Biesemeyer Manufacturing, and Aspinwall, a woodworker at Gatehouse Furniture Studios in Holyoke, Massachusetts, are taking time off from their jobs to participate in a cross-country bicycle ride for charity.

The 3,430-mile, 48-day event has been organized by Pedal for Power, which will use a portion of the funds raised to support its Bicyclists Educational and Legal Foundation.

Riders also may designate some of the donations they receive for pet charities. Aspinwall's donations will go to the Woodworker's Alliance for Rainforest Protection (WARP). Thompson has chosen the National Cancer Society, the American Heart Association, the American Lung Association and the National Multiple Sclerosis Society.

Aspinwall said he was motivated to take the trip because, "Protecting the rain forests is something that means a lot to me and this seemed like a good way to help." Thompson, whose company is well-known for its tablesaw fences and accessories, said his month and a half in the saddle will not only raise money for causes that are desperately in need of the public's generosity, but will prove that "my Uncle Herman isn't the only nut in the family."

More than 70 riders are expected to make the ride. The bicyclists will start in Los Angeles, head west to Texas, then slant north, reaching Boston on June 28. Keep your eyes peeled.

Kevin Ireland

## COMING NEXT ISSUE

Small-Diameter Turning  
Shaker Sewing Stand  
Sawing Stock Safely