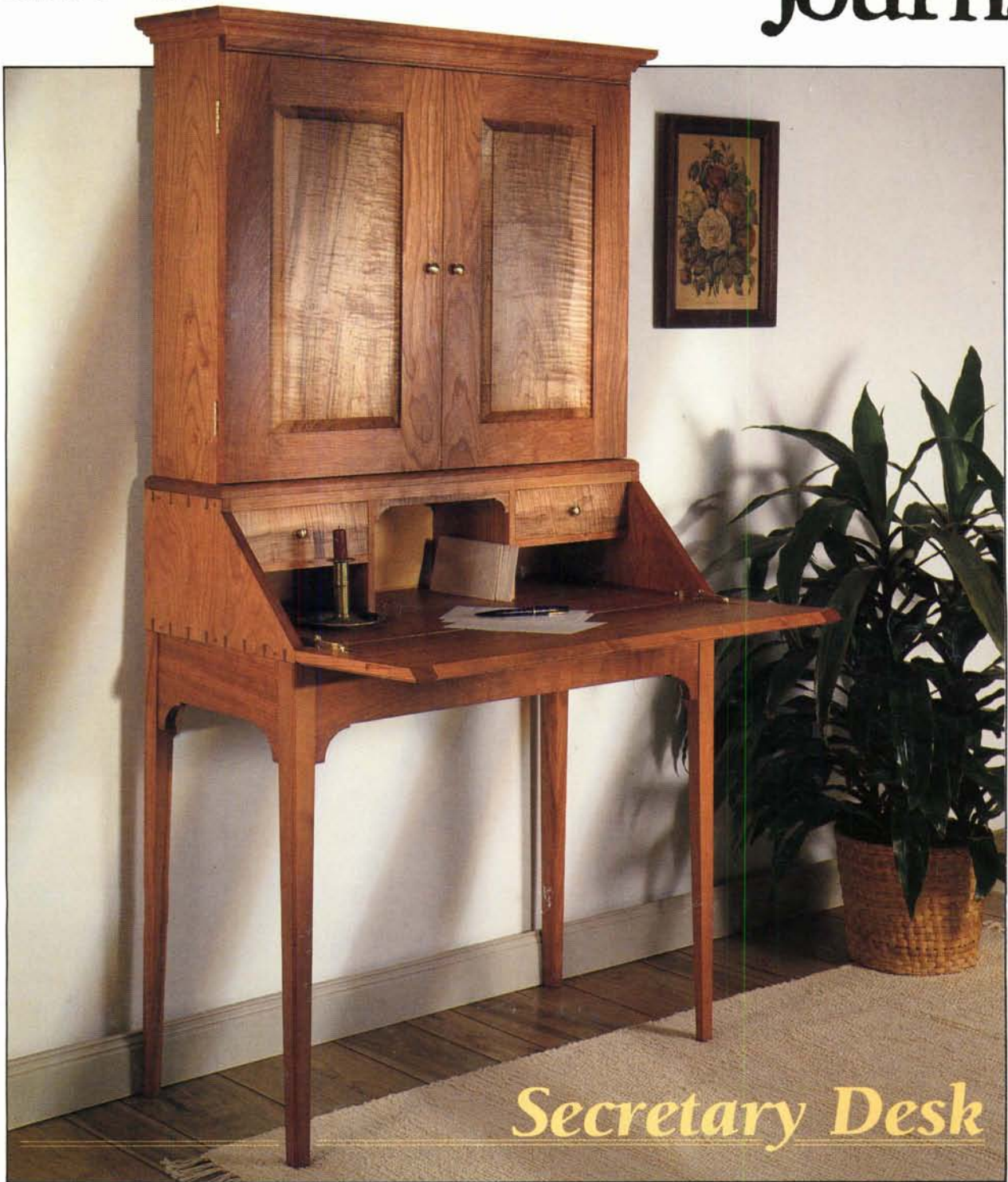


The Woodworker's Journal

Vol. 13, No. 6 \$3.50



Secretary Desk

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November/December 1989



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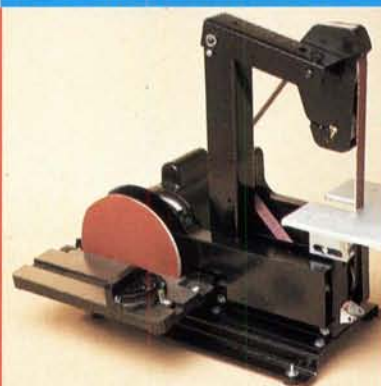
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NOVEMBER/DECEMBER 1989 VOLUME 13, NUMBER 6

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DEPARTMENTS

- 4 Shoptalk
- 6 Letters
- 9 Readers' Information Exchange
- 10 Cabinetmakers' Supplies
Hardwood Suppliers
- 11 Events
- 21 Woodworking Basics
Mortising Butt Hinges
- 24 In The Shop
Dado Heads
- 29 Special Techniques
Marquetry: The Empty Window Method
- 34 Finishing
Aniline Dyes
- 46 Gift Shop
- 74 Shop Tips

FEATURE

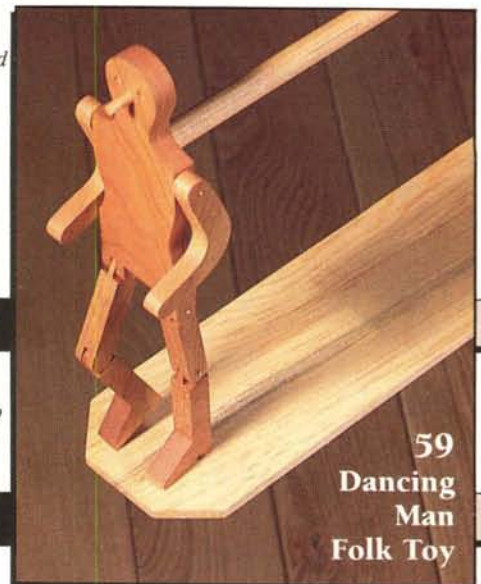
- 16 Lynes Unlimited
Making Toys in a Kansas Chicken Coop

PROJECTS

- 37 Bed-and-Breakfast Tray
- 40 Mission Style Trestle Table
- 42 Jewelry Box
- 46 Kids' Bobsled
- 48 St. Nicklaus Carving
- 54 Carousel Toy
- 56 Box Drum
- 59 Dancing Man Folk Toy
- 62 One-Board Towel Rack
- 64 Secretary Desk



46
Kids' Bobsled



59
Dancing Man Folk Toy



Mission Style Trestle Table
40



Shoptalk

Mark's Desk

Early this year we had an editorial staff meeting to decide what projects should be included in these upcoming winter issues. Going into the meeting, I wanted to push for a small secretary writing desk that I felt would have a lot of appeal. I thought it could be built of pine and given an antique painted finish.

Mark Ziobro, our staff cabinetmaker, took issue with me, saying that such a fine desk deserved to be built more as an heirloom rather than a decorator piece. He proposed that fine cabinet woods be used with a natural finish to emphasize the beauty of the wood. At the time, Mark was a new member of our staff and I suspect that he wanted to show us the high level of work he was capable of doing.

After thinking it over, I asked for the opinions of the rest of the gang. The vote was for the heirloom treatment and now, after seeing the finished desk, I'm glad I went along with Mark's suggestion.

It's a beautiful piece and certainly reflects Mark's skills in joinery and finishing. All of us look forward to the letters and photographs which we hope will soon be coming in from proud readers who have completed this project.

No One-Trick Pony

The desk is something special for the winter season but as regular subscribers know, *The Woodworker's Journal* is not

just a "one-trick pony." This issue has about as rich a collection of project plans and informative articles as any we've ever done.

The oak trestle table is in response to the growing popularity of the Mission style. With its beautiful dark finish, it can certainly be considered an heirloom piece, so don't forget to date and sign it somewhere under the top. Who knows, it may be up for auction at Christie's someday?

Our marquetry coverage continues with the Bed-and-Breakfast Tray. Perhaps you'll be inspired enough to make the transition from the craft of duplicating our designs to the art of creating your own compositions in wood.

Appropriate to the holiday season, there are plenty of projects that will make fine gifts for your family and friends. For the kids there's an up-dated version of our old friend the Dancing Man (I defy adults to keep their hands off him), a nifty old-time Sled, and for the toddlers, the Duck Carousel.

The Box Drum is as much a serious percussion instrument as a toy and may well find its way into some reggae and rock bands. And we've wrapped it up with Tony Lydgate's lovely Jewelry Box and the Shaker-inspired One-Board Towel Rack. Got enough to keep you busy for awhile?

The staff and I wish you and yours a fine holiday season, a healthy and productive new year . . . and perfect miters.

Jim McQuillan



Lights not included. Tree and figures shown for scale

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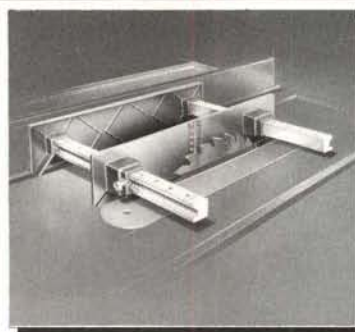
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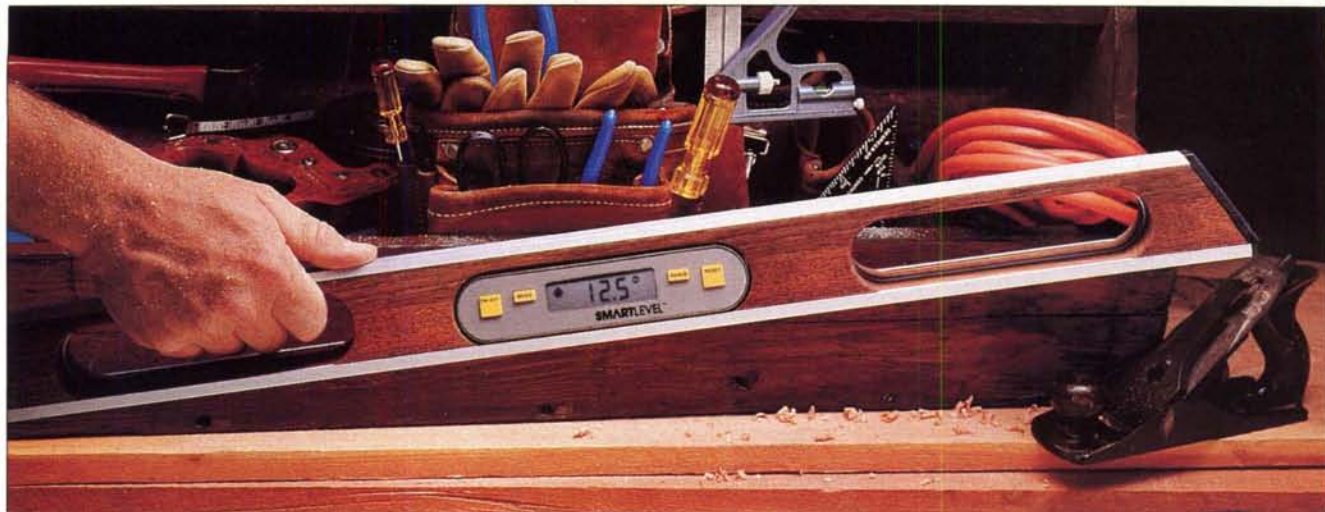
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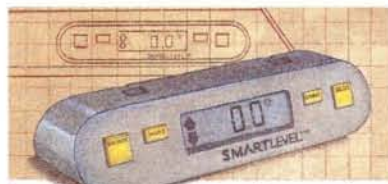
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One sensor module will fit interchangeably into any of the 2-, 4-, & 6-ft. rails. The sensor module can also be used alone as a torpedo level.

Letters

The Events column in your September/October 1989 issue listed a toll-free number to call for information on the Woodworking Across America show in Ventura, California. However, when I call the number, I can't get through.

Charles White, Oxnard, Calif.

We listed four Woodworking Across America shows in our September/October 1989 issue: Ventura, California; Indianapolis, Indiana; Columbus, Ohio and Milwaukee, Wisconsin. All four had the same toll-free number. After receiving your letter, we called the number and learned (from a recording) that it has been disconnected and no further information is available. We then tried the regular phone number that came with the original correspondence to us. That number is also no longer in service. Finally we tried writing, but our letter came back stamped "moved — left no forwarding address." Apparently then, all the shows have been

canceled.

Readers should keep in mind that sometimes the dates and times for an event can change after we go to press. On occasion, it can be canceled altogether. Before making plans, it's a good idea to check and make sure the event is still on as scheduled.

I have a circular saw in need of parts. It was manufactured by the Millers Falls Company of Greenfield, Massachusetts. When I wrote to them for information, I was informed by the Post Office that Millers Falls is no longer at that address and that the forwarding address has expired. Can you help?

Ed Ryan, Hudson, Ill.

The Millers Falls Company has been out of business for several years. However, their inventory of spare parts for the electric tools was recently purchased by Ohio Tool Systems, 3863 Congress Parkway, Ridgefield, OH 44286; telephone (216) 659-4181. They

don't have every part available, but the company reports that the inventory is large, so there is a good chance of finding what you need. Direct your call or letter to the attention of Brad Morckel.

It's a tedious job to punch all those holes in the eight tin panels of the Country Pie Safe project featured in your July/August 1989 issue. To make the job easier and faster, stack and secure the four door panels on a scrap pine board, then drill through all four at one time. Use a $\frac{1}{32}$ in. diameter bit for the tulips, a $\frac{1}{16}$ in. diameter bit for the stems, leaves and stamens, and a $\frac{1}{8}$ in. diameter bit for the border and remaining large holes. Once the door panels are completed, do the same for the four side panels. Be sure to use safety glasses as the $\frac{1}{32}$ in. and $\frac{1}{16}$ in. bits may break under heavy use.

When finished, turn each panel over and use a belt sander to lightly sand down the sharp edges of the holes. I know this is not the authentic way to

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pierce tin, but for this project, it certainly is the quickest.

Tom Russell, Suffern, N.Y.

I would like to know if the projects in *The Woodworker's Journal* can be made for sale and profit. Or is there a restriction?

Eric Belke, Stevens Point, Wis.

This is a question often asked by our readers and the confusion is probably related to the copyright statement that is found on page 3 of each issue.

Our copyright applies to the project photos, illustrations, and written copy. It serves to protect them from being reproduced by others and sold as plans. However, from our plans, you can make and sell as many of the projects as you like, and our permission is not needed. In fact, one of the main reasons we feature the Gift Shop section in each issue is to provide projects for those readers who would like to make a little extra money from their woodworking hobby.

You specified the wrong molding-head cutter for the Chippendale Small Chest project in your September/October 1989 issue. To cut the molded edge on the base front and sides (parts E and F), you said to use Sears part number 9BT2352. The part should be 9BT3212.

Ed Gibson, Cleveland, Ohio

Woodworking Clubs

The Kansas City Woodworker's Guild is a non-profit organization for woodworkers of all skill levels — from beginners and hobbyists to serious amateurs and professionals. The Guild has been operating for four years and currently has 147 members. Meetings are held the second Wednesday of every month from 7:00 p.m. to about 9:00 p.m. at the Moose Lodge, 510 North Sterling, Sugar Creek, Missouri. Prospective members and visitors are welcome. For more information write to Gary E. Derzinski, President, Kan-

sas City Woodworker's Guild, P.O. Box 413922, Kansas City, MO 64141.

The Woodworker's Club of Houston has 193 members. In the last four years the club has donated more than \$12,000 to the Make-A-Wish Foundation. The money was raised by selling items crafted by the members. For more information on the club, write to W.R. Hochmuth, President, Woodworker's Club of Houston, P.O. Box 34481, Houston, TX 77234.

Denis LaLonde writes to tell us that the 55 members of the Durham Woodworking Club meet every second Monday of the month from September to June. Meetings are held in the woodshop of the Eastview Boys and Girls Club, Eulalie Avenue, Oshawa, Ontario. New members are welcomed. Write to Denis LaLonde, President, Durham Woodworking Club, 221 Mitchell Avenue, Oshawa, Ontario L1H 2V7.

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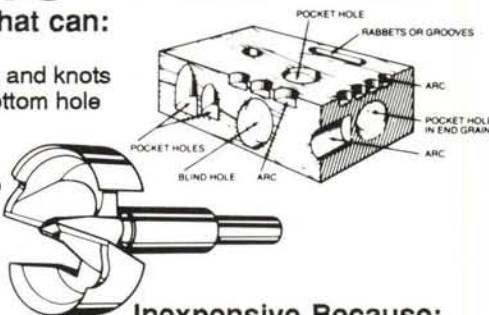
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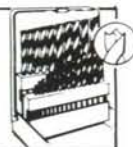
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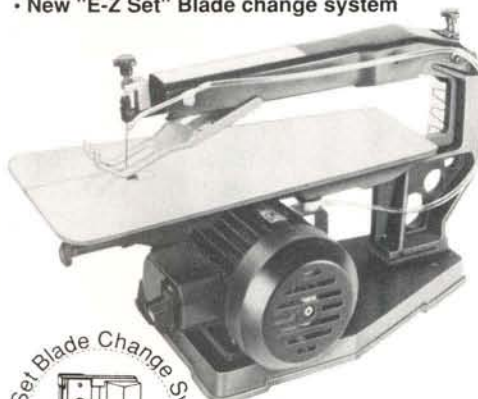
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"E-Z Set" Blade Change System
(Free with purchase of saw). Includes top & bottom holders, all hardware and instructions.
#RET **\$15.00/set** (*)

Neptune 1-1/2" plastic Lettering Guide Set
(Free with purchase of saw). Includes upper & lower case alphabet + numbers + FREE patterns.
#LN1... reg \$25.00, **On Sale... \$12.00/set** (*)

Foot Switch
7 amp, 6 ft cord. For hands free operation.
#FSW..... **\$20.00/ea.** (*)

(*) No freight chg if ordered with Saw, \$3.00 for any combination of these accessories ordered separately

Don't settle for less from importers selling stripped down versions of our Saw

Super 125 Planer

Portable with "Power Feed" • Shipped assembled • Retail value over \$600.00

On Sale ... \$349.95



Add \$15
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This machine will pay for itself time and again by planing your own lumber. At 65 lbs, you can carry this Planer to a job site or mount it permanently in your workshop like any stationary machine. **You'll spend hundreds of dollars less for this 12-1/2" power feed Planer than for a traditional stationary model of a similar capacity - with comparable results.**

SPECIFICATIONS:

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



Free
plans for
roller stand
with
purchase
of rollers

Planer & Accessories Price List

Super 125 Planer - complete and assembled
#PLA **\$349.95** (\$15 UPS)

Extra Set of 2 Knives - High speed steel, 12-12"
#PKN **\$25.00/set** (*)

Dust chute - for vacuum takeoff of wood chips
#PDS **\$24.00** (\$3 UPS)

Planer stand - Heavy duty, 27-1/2" high
#PST ..reg. \$44.00, **On Sale..... \$39.00** (\$6 UPS)

Ball Bearing Rollers - (Minimum purchase 2 rollers)
Build a roller stand, infeed/outfeed table etc. with these 13" X 2" Heavy Duty rollers. Purchase includes FREE plans for building the roller stand shown above.
#BBR **\$6.50/ea** (\$3 UPS/per order)

(*) No frt chg if ordered w/Planer, otherwise add \$3 UPS

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Readers' Information Exchange

Looking for an owner's manual for an old band saw? Need a bearing for a hand-me-down table saw? Can't find a source of supply for an odd piece of hardware? Maybe our readers can help. Send along your request and we'll try to list it here — and perhaps one of our readers will have an answer for you. Due to space limitations, we'll be unable to list all requests, but we'll include as many as we can.

I have an 8 in. Atlas tilting-arbor table saw, model no. 3021. It was manufactured by the Atlas Press Co., Kalamazoo, Mich. I need the pinion gear that makes the arbor tilt. I have the parts list, but I need a source for the parts. Can anybody help? If any reader needs a copy of the parts list, write to me and include a stamped self-addressed envelope.

W. James Otto
515 Heather Lane
Easton, PA 18042

Can someone tell me how to use spiral blades in my Craftsman 16 in. scroll saw, model no. 113.236110? It now handles only 5 in. pin-type blades.

Harold L. Behen
100 Rob Huffman Drive
Covington, TN 38019

I have a Craftsman/Dunlap bench drill press, model no. 101.03541. I need an owner's manual and parts list.

Tom Clark
123 Culvert St.
Torrington, CT 06790

I have a ShopCraft 10 in. table saw, model no. T6700. The motor stopped. I wrote to them and the post office returned my letter and said that they'd moved and left no address. Does anybody know who made the motor?

William M. Volonino
Curry Road, RD 3
Mahopac, NY 10541

I'm looking for a plane iron, cap and lever cap for a Bailey no. 4 plane.

E.D. Kadera
3041 Circle Hill Ct. N.E.
Cedar Rapids, IA 52402

I have a Montgomery Ward 10 in. table saw, model no. THS-2715, that I need a drive belt for, no. XM-1116. This belt is a flat cogged belt. Can you please tell me where I might be able to get one?

Eugene Nybbler
RR 1, Box 27
Rushville, NE 69360

I am looking for an instruction book for a Shopsmith Magna Engineering, model no. ER.

Alfred R. Steuart
174 Middle Island Rd.
Medford, NY 11763

I have been given a Craftsman benchtop lathe, model no. 103.23870, and am in need of an owner's manual and parts list for the same.

Dick Heiligenstadt
438 Second Ave.
East Northport, NY 11731

I'm looking for the owner's manual for a Craftsman jigsaw, model no. 103.0404.

H.L. Goodwin
134 Tracy Lane, Box 242
Shelburne, VT 05482

I am trying to locate a blade guard, owner's manual and parts list for a Homcraft 4 in. jointer, model no. J-1367.

William Pike
641 Grove N.E.
Albuquerque, NM 87108

I need an owner's manual and parts list for an old Sears Roebuck table saw, model no. 113.22411.

M. Christine MacTaggart
P.O. Box 187
Lakeside, CT 06758



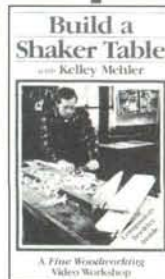
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Hardwood Suppliers

As a service to our readers, *The Woodworker's Journal* periodically lists sources for various woodworking products. In this issue, we are listing companies that specialize in mail-order sales of domestic and imported hardwoods. This is by no means a complete listing and we hope to include additional companies in future issues.

Acacia Hardwoods
Route 4, Box 130
Lubbock, TX 79424
Domestic, imported

American Woodcrafters
905 S. Roosevelt Ave. WJ
Piqua, OH 45356
Domestic, imported

Arroyo Hardwoods
2585 Nina St.
Pasadena, CA 91107
Domestic, imported

Austin Hardwoods
Dept. WJ
2119 Goodrich
Austin, TX 78704
Domestic, imported

Badger Hardwoods
Route 1, Box 262
Walworth, WI 53184
Domestic

Catskill Mountain Lumber Co.
P.O. Box 450-WJ
Swan Lake, NY 12783
Domestic

Colco Fine Woods & Tools
Dept. WJ
2631 Jackson Ave.
Memphis, TN 38182-0449
Domestic, imported

Maurice L. Condon Co., Inc.
Dept. WJ
250 Ferris Ave.
White Plains, NY 10603
Domestic, imported

Craftwoods
10921-L York Road
Hunt Valley, MD 21030
Domestic, imported

Croffwood Mills
Rt. 1, Box 14-J
Driftwood, PA 15832
Domestic

Croy-Marietta Hardwoods, Inc.
121 Pike St., Box 643
Marietta, OH 45750
Domestic

Dimension Hardwoods, Inc.
113 Canal St., P.O. Box 825-WJ
Shelton, CT 06484
Domestic

East Mountain Hardwoods
Route 7
Sheffield, MA 01257
Domestic

Educational Lumber Co., Inc.
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Asheville, NC 28813
Domestic, imported

Eisenbrand Inc. Exotic Hardwoods
4100 Spencer St., Suite J
Torrance, CA 90503
Domestic, imported

Garreson Lumber
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Bath, NY 14810
Domestic

General Woodcraft
531 Broad St. WJ
New London, CT 06320
Domestic, imported

Henegan's Wood Shed
7760 Southern Blvd. WJ
West Palm Beach, FL 33411
Domestic, imported

K & S Specialty Lumber
P.O. Box 125
Hill's Lake Road
Carthage, TX 75633
Domestic

Kountry Kraft Hardwoods
Rt. 1
Lake City, IA 51449
Domestic

McFeely Hardwoods
712 12th St., P.O. Box 3
Lynchburg, VA 24505
Domestic, imported

The Sawmill/Woodworker's Dream
510 Sycamore St.
P.O. Box 329
Nazareth, PA 18064
Domestic, imported

Talarico Hardwoods
RD 3, Box 3268WJ
Mohnton, PA 19540-9339
Domestic, imported

Wood World
1719 Chestnut Ave.
Glenview, IL 60025
Domestic, imported



Events

We will gladly list as many events of interest to woodworkers as space permits. Listings are free and may include shows, fairs, competitions, workshops and demonstrations. The deadline is six weeks before publication, Nov. 15 for the January/February issue. Please address announcements to the Events Department. Readers planning on attending events should call ahead if possible. Scheduled dates, times, and locations sometimes change between publication and the date of the event.

Arizona:

Arizona Association of Fine Woodworkers, 7th Annual Show, Nov. 5, noon to 4 p.m. Los Olivos Adult Center, Phoenix. For more information call (602) 246-8245.

California:

California Woodworking 1990, Juried Exhibition, Jan. 11 - Feb. 16, Brea Civic Center Gallery, Brea. For more information call (714) 526-7100.

The Woodworking Shows, So. California, Nov. 10-12, L.A. County Fairgrounds, Pomona. For more information call 1-800-826-8257.

The Woodworking Shows, San Diego, Nov. 17-19, Del Mar Fairgrounds, Del Mar. For more information call 1-800-826-8257.

Connecticut:

Brookfield Craft Center 11th Annual Holiday Sale, Nov. 24 - Dec. 24. Post Modern Architectural Furniture Exhibition — David Barth, Nov. 11 - Jan. 7. For more information contact the center at P.O. Box 122, 286 Whisconier Road, Brookfield, CT 06804; (203) 775-4526.

Brookfield Craft Center, Weekend Workshops: Table Saw Techniques I, Nov. 11; Table Saw Techniques II, Nov. 12; 18th Century Carving Techniques with Eugene Landon, Nov. 18-19. For more information contact the center at P.O. Box 122, 286 Whisconier Road, Brookfield, CT 06804; (203) 775-4526.

Nutmeg Woodturners League meeting, Nov. 20, 7:15 p.m. at the Brookfield Craft Center, 286 Whisconier Road, Brookfield. For more information call Andy Barnum at (914) 225-2798.

Guilford Handcrafts Center 11th Annual Holiday Exposition, Nov. 4 - Dec. 23, Mill Gallery and The Shop, 411 Church St., Guilford. For more information call (203) 453-5947.

Florida:

Woodworking World, The Jacksonville Show, Feb. 23-25, Jacksonville Memorial Hall. For more information call 1-800-521-7623.

Maryland:

ACC Craft Fair Baltimore, Feb. 27 - March 4, Baltimore Convention Center. For more information call (914) 255-0039.

Massachusetts:

North Bennet Street School: An Exhibition in Craftsmanship, Sept. 28 - Jan. 4, 39 North Bennet St., Boston. For more information call (617) 227-0155.

Michigan:

Woodworking World, The Grand Rapids Show, Feb. 2-4, Stadium Arena, Grand Rapids. For more information call 1-800-521-7623.

Missouri:

Midwest Woodworkers' Association Show, Nov. 25-26, Columbia Mall Community Room, 2300 Bernadette Drive, Columbia. For more information contact Karl Haak, P.O. Box 7093, Columbia, MO 65205.

New Jersey:

The Woodworking Shows, Delaware Valley, Dec. 1-3, Garden State Park, Cherry Hill. For more information call 1-800-826-8257.

(continued on page 13)

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BOOKS&VIDEOS

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Scott Landis



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Events Continued

South Jersey Wood Carvers, 4th Annual Fall Woodcarving Show, Nov. 18-19, N.J. National Guard Armory, Route 38, Mt. Holly. For more information call Jack or Connie Raleigh at (609) 829-8731.

New York:

Woodworking World, The Central New York State Show, Nov. 3-5, The N.Y. State Fairgrounds, Syracuse. For more information call 1-800-521-7623.

Woodworking World, The Long Island Show, Jan. 19-21, Hofstra University, Hempstead. For more information call 1-800-521-7623.

Constantine Woodworking Courses: Wednesday schedule: Marquetry, Nov. 1, 8; Picture Framing, Nov. 15, 29; Wood Finishing, Dec. 6, 13. Saturday schedule: Marquetry, Nov. 4, 11; Using Your Router, Nov. 18, 25; Chair Caning, Nov. 11, 18; Furniture Restoration, Dec. 2; Wood Finishing, Dec. 9; Picture Framing, Dec. 16. For more information contact Constantine's, 2050 Eastchester Rd., Bronx, NY 10461; (212) 792-1600.

Oregon:

The Woodworking Shows, Oregon, Nov. 3-5, Memorial Coliseum, Portland. For more information call 1-800-826-8257.

Oregon School of Arts and Crafts: Holiday Show, Nov. 9 - Dec. 31, Hoffman Gallery, 9245 SW Barnes Road, Portland. For more information call (503) 297-5544.

Pennsylvania:

Olde Mill Cabinet Shoppe: Wayne Barton on Chip Carving, Nov. 11-12. For more information contact the shop at 1660 Camp Betty Washington Road, York 17402; (717) 755-8884.

Woodworking World, The Central Pennsylvania Show, Nov. 17-19, State Farm Complex, Harrisburg. For more information call 1-800-521-7623.

Texas:

Paxton Beautiful Woods, 2nd Annual Woodworking Art Fair, Nov. 18-19, 1105 6th Ave., Carrollton. For more information call Wes Guyer at (214) 245-1192.

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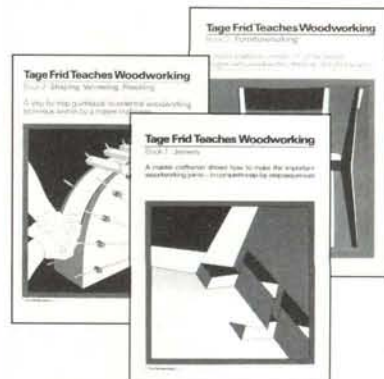
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Product News

To keep our readers up-to-date, we use this column to feature brief descriptions of tools and supplies that may be of interest to woodworkers. The product descriptions are provided by the manufacturer and are not a result of tests or reviews by the editors of *The Woodworker's Journal*.



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The Savogran Company's new Acrylic Enamel is a non-toxic, non-flammable and odor-free spray finish which adheres to virtually any surface. Acrylic Enamel is safe to use indoors for interior decorating and craft projects, and yet is strong enough for industrial purposes. And because it is also salt and weather resistant, it can be used outdoors. The water base prevents it from running and sagging, and it can be removed with soap and water. For more information, contact the Savogran Company at 1-800-225-9872.

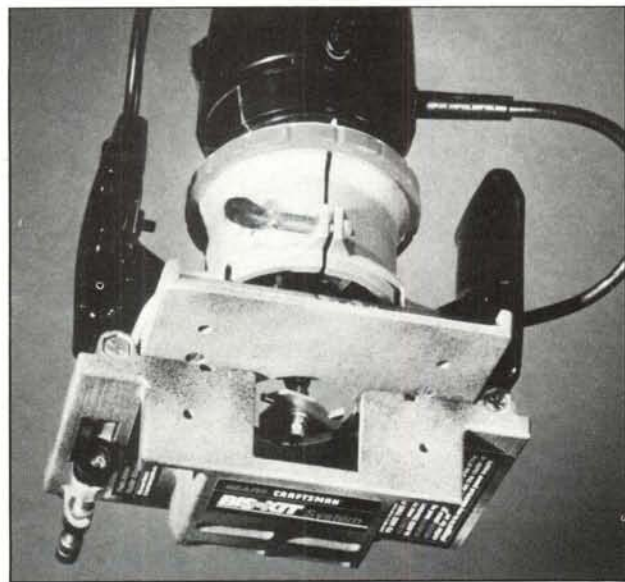
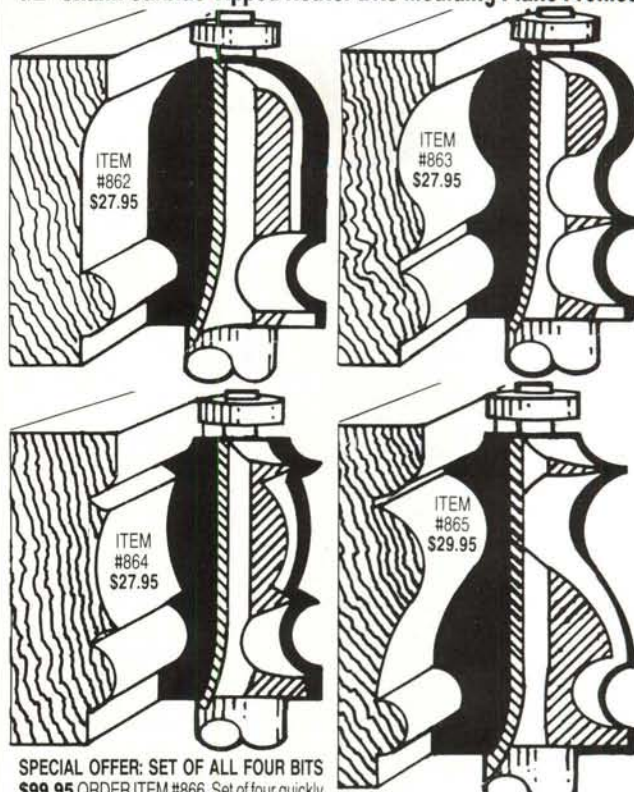


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Fred Cairns and Kathy Dawson at work in their tiny shop in rural Kansas.

LYNES UNLIMITED

Making Toys in a Kansas Chicken Coop

Two dozen small tractors fill a bench, each getting its own set of oak fenders. Two fully assembled intricately detailed locomotives rest on a shelf, looking like works of art. About 20 toy pickup trucks hang in a rack along one wall, their noses pointed skyward waiting for finishing touches — two dabs of glue and a pair of headlights. Rows of tractor wheels line a shelf near the workbench. Stacks of truck chassis, trailer hitches, train grills and axle yokes fill cubbyholes set into a wall.

The owners of Lynes Unlimited, husband-and-wife team Fred Cairns and Kathy Dawson, were busy trying to make more of their classic wooden toys, prepare samples for an upcoming craft show, supervise the excavation for a new shop building, and entertain a visitor. Fred drilled holes for mounting bumpers, Kathy glued parts onto a chassis, quickly working her way to the bottom of the stack of partly assembled tractors. They tried to stay out of the way of their two employees. Fred and Kathy talked about how they started in the toy business and what it's like now that they have become successful at it. And about what it's like to live in rural Kansas, yet travel all over the country selling their toys at craft shows, about 20 a year.



This large train set made by Lynes Unlimited takes up nearly six feet of track.

Fred said that after more than 10 years in the business he's finally starting to feel comfortable with all the ins and outs. The toy line is selling well; Fred and Kathy are recognized as established artists. The hours are as long as ever. The two find the shows themselves to be a friendly environment.

"Most of the people who do shows are our age, in their late 30's, early 40's. We know lawyers, teachers, professors who gave up their professions to do crafts," Fred said. Many, if not most, of the couple's friends were made on the craft circuit, so each show is a renewal of old friendships.

Fred and Kathy both had careers in social services, doing rehabilitation work with the handicapped, before they started Lynes. In fact, Fred and Kathy met while involved in rehabilitation work, which used woodworking to help develop the motivation and manual skills of the handicapped. Neither Fred nor Kathy have formal woodworking training.

Lynes has turned out to be successful, but the nature of the craft business is that it's hard to get too comfortable. There are times when the cash flow just barely keeps up with expenses.

"At a lot of woodworking shows, like Springfield (Massachusetts), I may only have \$30 in my pocket when I get there. If I don't make a sale, I just moved to that town," Fred said.

"Why, oh why, do we do what we do?" Kathy asked rhetorically.

But despite the uncertainties, Fred and Kathy say they are committed to making a living from woodworking. And the craft business is, after all, what allows them to live in the beautiful Kansas countryside, which is central to the lives of Fred, Kathy and their two children, Jordan, 6, and Caitlynn, 3½.

The fields outside the toy shop window extend into a far horizon in every direction. The shop is in a small chicken coop on Fred's parents' farm. It's one of a collection of out-buildings surrounded by the rolling northern Kansas farmland. The town, Kimeo, with about 20 people, is too small to have its own post office. The mail goes to Greenleaf, just north of Kimeo.

Fred and Kathy live in a house on a 20-acre "plot" one mile away from the shop. The land in rural Kansas is so vast that 20 acres does seem like a plot. A mile seems a considerable distance in more populated areas. Here, Fred and Kathy's house is the first one you come to after Fred's folks', who are semi-retired after a life of farming. The house rests on a high spot in the Kansas prairie, with a view of cows grazing in a far pasture, a clump of trees shading a nearby glen, fluffy clouds marching off into the distance, and a large mission church serenely occupying an open field. The stone church and steeple tower over the nearby empty countryside. (The mission was built in 1904 by the Catholic Church, optimistic about the area's potential for settlement. Recently the church suspended regular services.)

The beauty of the area is jarred by the proliferation of abandoned farms. The boarded-up buildings, rusting metal roofs and falling-down barns are testimony to a region beset by chronic economic ills. There are small towns with plenty of houses, but virtually no business. A visitor to the area is liable to see a foreclosure notice or two tacked to a locked door. The economic reality makes it imperative that Fred and Kathy continue in their present work if they want to stay there.

The new shop building is going in next to Fred and Kathy's house. It actually will be on the site of their former home, which was destroyed by a tornado two years ago. Luckily, there were no injuries because the family was out of town at a show. Their old place was a total loss. The experience, however, reminded them of the strong bond rural people share. When they returned, unaware of the destruction, Fred and Kathy found the site already cleaned up and their salvageable possessions boxed up and stored. All the neighbors had pitched in to help out, even though nobody could reach Fred and Kathy.

The legacy of the tornado reinforced the family ties to the area, and even contributed to the decision to finally move out of the tiny shop, which was getting too small to handle the increasing workload.

Inside the present shop is a collection of hand tools and stationary equipment that includes a drill press, table saw, radial-arm saw, lathe, jointer, thickness planer, disk sander, band saw, portable electric drill, several glue bottles and tape measures. The tools are nothing fancy or expensive, mostly inexpensive machines made for hobbyists and homeowners. Except for the abundant supply of toys and toy parts, the shop could belong to a well equipped woodworking hobbyist.

The new shop will double their available work area, from a tiny 700 square feet to an acceptable 1,500. And Fred wants to buy some industrial-quality equipment. Although the work has begun, Fred and Kathy aren't sure when they'll actually be in the new shop. They still have to work out some details, such as going to the bank to ask for money.

"We've needed to move for a long time and finally we're getting around to it," Kathy said.

Starting a project before getting the loan or lining up the money may seem strange to city folk, but it's apparently a way of life in Kansas, where much of the work is done for barter. The contractor, for example, may take some of Fred and Kathy's toys as part payment for the work.

In fact, it's the barter system and the extended family that helped start Lynes and that still helps to keep it going. Fred and Kathy's tiny shop is rent-free and utility-free. In exchange for the electricity, Fred supplies water for part of his father's land near Fred's house. Water can be expensive in Kansas, where electric or wind-powered pumps are used to extract the water from the huge underground aquifer.

(continued on next page)

One difficulty of the rural location is getting and maintaining tools. There aren't any distributors for woodworking machinery nearby, so Fred and Kathy have been buying tools from a major national mail-order company, which they asked not to be named because they are not happy with the service of the tools.

"We don't want to give (them) any publicity if we can help it," Fred said.

Dealing with a company that sells mainly to homeowners presents problems to professionals. When tools break down or need servicing, the repairmen that come aren't always well trained. One repairman who serviced the thickness planer recently gave it a new and disturbing noise, Kathy said. When they called to complain about the noise, the company gave them the runaround.

"Their response was, 'Well, I guess that's what a two-year old planer is supposed to sound like,'" Kathy said.

But despite the drawbacks of the remote spot, the two have no plans to change their lifestyle or locale.

"We're very committed to rural living and it's worked out for us. We like Kansas," Kathy said. "But there aren't a lot of advantages here as far as cultural things."

Lynes' rural location does give the company a certain local notoriety. Fred jokingly boasted that Lynes is one of the top four manufacturing concerns in the county. He can be sure of that fact even without any revenue statistics. There are exactly four businesses. When the local television station wants a business story, Lynes is one of the obvious choices.

"We were on the Christmas show, as one of the four businesses in the county," Fred said.

Being out in the country may help Lynes get governmental assistance. Fred said that their property had recently been named an enterprise zone, making them eligible for special tax treatment. The state is also helping to promote Lynes and will include the firm in a special exhibition of Kansas crafts to be held at one of the country's premiere shows, The New York International Gift Show.

The road to New York from the first toy has been a long one. In fact, when Fred decided to leave his rehabilitation job in 1978, he opened up a shop doing general custom woodworking. He started making a few toys, and that part of the business seemed to take over.

"It just evolved to the point where everything else just sort of took the back burner," Fred said.

By the time Fred and Kathy married, in 1982, the direction was established: from making and selling toys locally, to selling wholesale, to doing small craft shows, to finally winning entrance to the national juried craft exhibitions. At the major shows, Fred and Kathy generally sell directly to retail buyers, as well as taking orders for wholesale accounts.

Along the way, Fred has developed unique designs.

"In order to survive in this business you've got to be unique," Kathy said.

Kathy keeps the books, arranges the show dates, makes toys, keeps house, and helps organize production. The grandparents often watch the children. Life and work within the tiny shop is now a routine. Fred and Kathy seem to step in and out of the production line, hardly missing a beat as they instinctively know what remains to be done to finish a run of toys.

"It's been an evolving process, and a process that's still going on," Kathy said. "We'll make something for a long time, and then it'll sort of dawn on you: why don't I use a smaller piece there and save some money," Kathy said.

But Fred and Kathy also spend a lot of time making sure that they market a quality toy. If it isn't perfect, it's not a Lynes toy. As Kathy said: "It's just got to be right. When you roll it and you see only three wheels moving . . . that's yeck."

Because they make hundreds of toys a year, with a minimum of help, they do everything they can to streamline production. For example, many of the toys share a common chassis. Their shelves are filled with sub-assemblies that can be used for a lot of the toys, depending on what orders they receive. There are stacks of chassis assemblies, tractor wheels, hoods, engine assemblies and other miscellaneous parts. There are bins of axles, wheels and pins.

If the list of toy parts sounds something like a machinery catalog, it's by design. Lynes specializes in farm equipment, trucks, and construction machinery. Fred seems to have tapped into a yearning for a type of toy that appeals to adults and children alike. One new design is a cement mixer, with a barrel turned from laminated oak and padauk. Another popular design is a steam shovel, with pistons that work. And there's the popular bulldozer with a track system that Fred designed. Fred is especially proud of the fully functional track for the bulldozer and steam shovel. A lot of toys have track systems that are fixed, but Fred uses a clever system of wood slats and leather strips to make a movable track.

Fred and Kathy would also like to concentrate more on toys as an art form, which they believe makes their toys so successful. Their toys are now being sold in galleries, and on special commission, and they'd like to increase that part of the business.

Getting people to see toys as works of art, however, is sometimes a struggle. Kathy said people seem to resist the idea that something designed for play can also be art. And if people do agree the toys are art, they often say the toys are too nice to give to children. Fred and Kathy say that it's parental expectation as much as anything else that leads children to destroy toys. It may be hard for some people to believe, Kathy said, but children can readily be taught to respect fine toys. And, after all, the alternative to giving children fine toys is giving them junk.

"You teach your kids taste when they grow up. It might as well be good taste," Kathy said.

Fred is also working on designs to move in other directions than toys. He and one of his employees, Don Bruna, are working on a traveling case for gun collectors. But design time is hard to find in the crush of day-to-day orders. It always seems like the time will be available next week or the week after.

"Let's get this run over and then we'll have the time. Then another run comes along. We never get the quality time," Fred said.

Editor's Note: The Woodworker's Journal has published plans for two of Lynes' toys. The Farm Tractor and Wagon was featured in July/August 1989, and the Classic Pickup Truck in November/December 1988.



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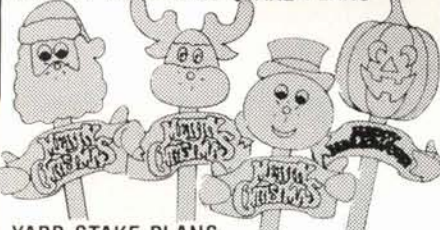


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Woodworking Basics

Even though it's a fairly simple operation, mortising for hinges often tests the patience of experienced woodworkers. It just doesn't seem fair that a slip of the hand here can ruin hours and hours of meticulous work. But slips often do occur, sometimes because of a rush at the end of a project — hoping to get those doors on before calling it a night — and sometimes because of fatigue.

Another reason woodworkers may foul up the operation is that they just plow into it without having anyone show them the essential tricks of the trade. We can't help you with the

fatigue or the overeagerness, but we can help with sound technique. First, though, a word about hinge types.

There are an extraordinary number of hinge types on the market today. There are wrought iron hinges for an Early American look, there are rule joint hinges for table leaves, there are offset hinges for face-frame kitchen cabinets, there are concealed hinges for Euro-style cabinets and there are pivot hinges for mounting on the tops and bottoms of cabinet doors. There are variations of all the common hinge types and there are hinges for every conceivable purpose.

But hinges fall into several broad categories: hinges that are applied to the surface, hinges that mount into pre-drilled holes and hinges that need to be recessed or mortised in place. The mortised butt hinge shown here is still the most common type of hinge for traditional cabinetry, although concealed pre-drilled hinges are supplanting it in contemporary styles. Note that hinge dimensions are commonly given as length by width — where length is the measure along the joint or barrel, and width is the measure of the open hinge. So the width includes both leaves and the space that the joint takes up between them.

In this article we're talking about only the butt hinge. First we'll go through the basic hand-tool procedure, then we'll discuss a variation using an electric router. If you master the technique of applying this basic hinge, you'll manage the other styles more easily.

Mortising Butt Hinges



Photo 1: The tools fall into three basic categories: layout, cutting and mounting. The layout tools needed are a combination square, a pencil, a razor knife and a marking gauge. The cutting tools required are chisels and a dovetail saw. The mounting tools are a screwdriver, an electric drill and a self-centering drill bit called a Vix bit.

The tools here are representative in the sense that you don't necessarily need an identical set to mortise a hinge. One ½ in. or ¾ in. wide chisel will get the job done as well as the two we usually use in our shop. You can get away without the Vix bit. A small brad-point or twist drill will do the trick. The Vix bit makes mounting easier by centering the pilot holes for the screws.

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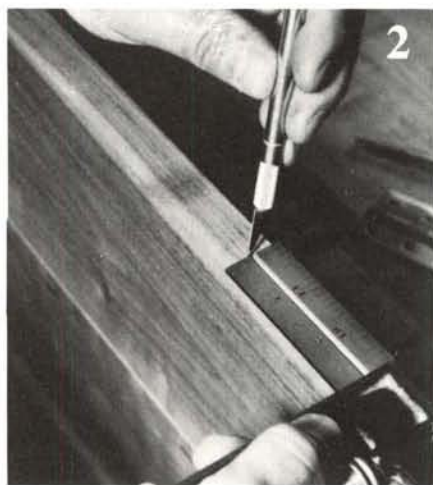


Photo 2: Locate the hinges on the door. The precise location doesn't matter as long as the pair of hinges supports the door properly. Whatever looks good is usually fine. Measure from top and bottom and lightly mark the location of both hinges with a pencil or razor knife. Just mark one end of each hinge; a light nick will do. You'll establish the other end from the actual hinge.

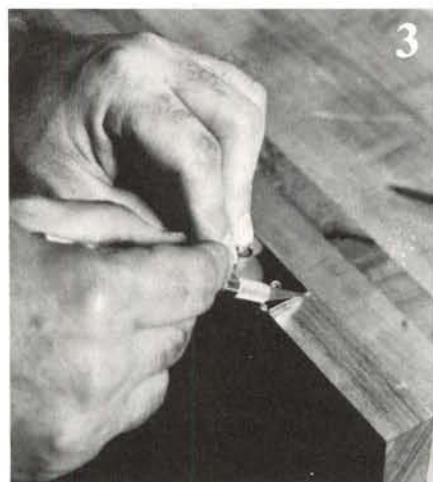


Photo 3: Start scribing the hinge profile into the door, setting the actual hinge in position, and establish the top and bottom mortise perimeter. Use the razor knife to lightly sever the wood fibers as shown. Don't set the width, or *back line*, yet. (Note that the joint or barrel overhangs the edge of the door. Some craftsmen let it overhang fully, others set it halfway in, deepening the mortise a bit along the edge.)

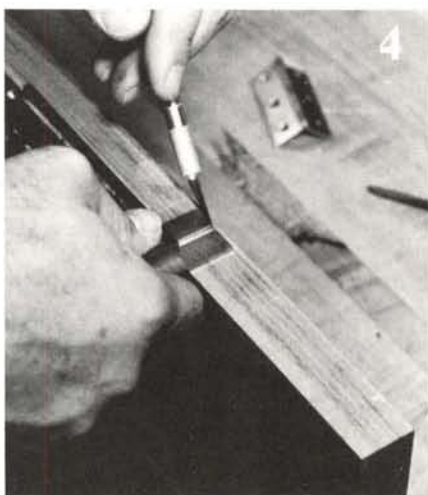


Photo 4: Establish the mortise width and deepen the cuts. Use the combination square and the razor knife to establish the width of the mortise. Set the square from the actual hinge. With the hinge in one hand and the square in the other hand, slide the rule until the end rests against the joint. Slide the combination square along the edge as shown, using it to guide the knife. First make a light cut and then bear down and deepen the score line. Also use the combination square as a guide to deepen the side cuts.

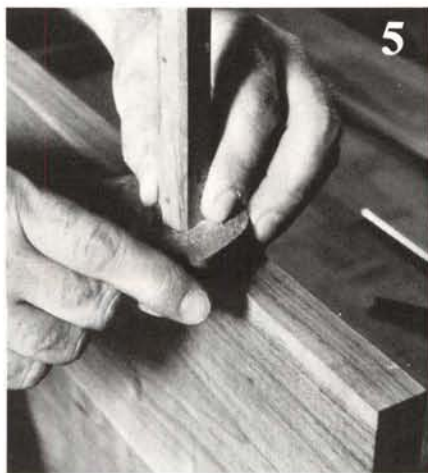


Photo 5: Use a marking gauge to set the depth. The depth is taken from the hinge thickness. You can either recess both leaves of the hinge into the door (or case) and mount the other leaf flush, or use the more common

method of mortising for each leaf separately. With either method it's best to set the depth a little under the actual thickness.



Photo 6: Use the dovetail saw to make a series of kerfs almost, but not quite, to your marked depth. First hold the handle of the saw down and make an angled cut from the depth line to the width line. Then slowly raise the handle as you work the saw, deepening the rear of the cut but staying within the mortise. Make the kerfs $\frac{1}{4}$ in. to $\frac{3}{8}$ in. apart.



Photo 7: Use the corner of a small chisel to widen the kerfs as shown, cutting one side of the kerf and then the other. The chisel should be very sharp so you can pare away the waste without having to use excessive force. If you have to push too hard, you're likely to slip.

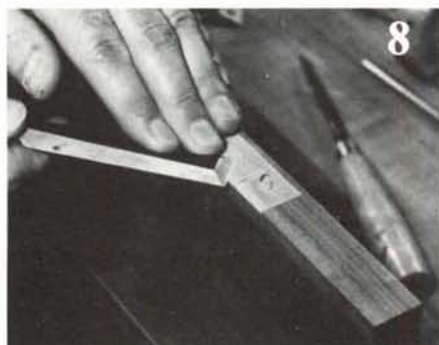


Photo 8: Pare to final depth. With most of the waste removed, use the flat of the chisel to slowly pare the mortise to final depth. Work deliberately. If the chisel starts to cut into and lift the grain, come in from the other direction. As you get close to the depth, try the hinge in the mortise. Run your fingers across the top of the hinge and door to judge whether the two surfaces are flush. Your fingers are a better judge than your eyes.

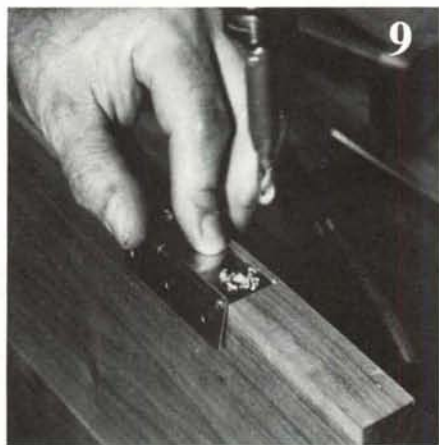


Photo 9: Setting the hinge. Use the Vix bit, if you have one, to drill pilot holes for the screws, using the actual hinge as the guide. Make sure you mark which side of the hinge goes on the door and which goes on the cabinet. The holes are sometimes different enough to throw off the fit of a door.

Router Method

You can use the router to cut the mortise without a lot of elaborate jigs. The trick is to establish the outlines of the mortise as you do with the hand-tool method, and use the router for removing the waste only. Even with the

best coordination, it's difficult to cut a perfectly straight line with the router. Follow the steps detailed in Photos 2 - 4 above, using the knife to establish the outlines of the mortise. Try to cut as deeply as possible with the razor knife. Then proceed with the following steps. The mounting is also the same as with the hand procedure. Note that we use a laminate trimmer for the routing. It's lighter and easier to control than a full-size router.

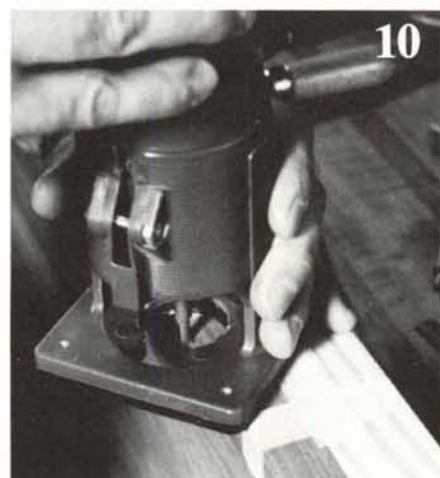


Photo 10: Clamp a support block along the workpiece edge so that you have a wide enough surface to keep the router from tipping. Mask off the edges of the mortise to make it easier to see the line. Use a $\frac{1}{4}$ in. radius straight bit and set it to the depth of the hinge leaf. Start a little off the line, and move toward the line as you proceed. Stay just a hair inside.



Photo 11: Clean up the mortise with a chisel. First pare to the lines, and then use the shoulders to guide the chisel as you square the corners.

More Mortises

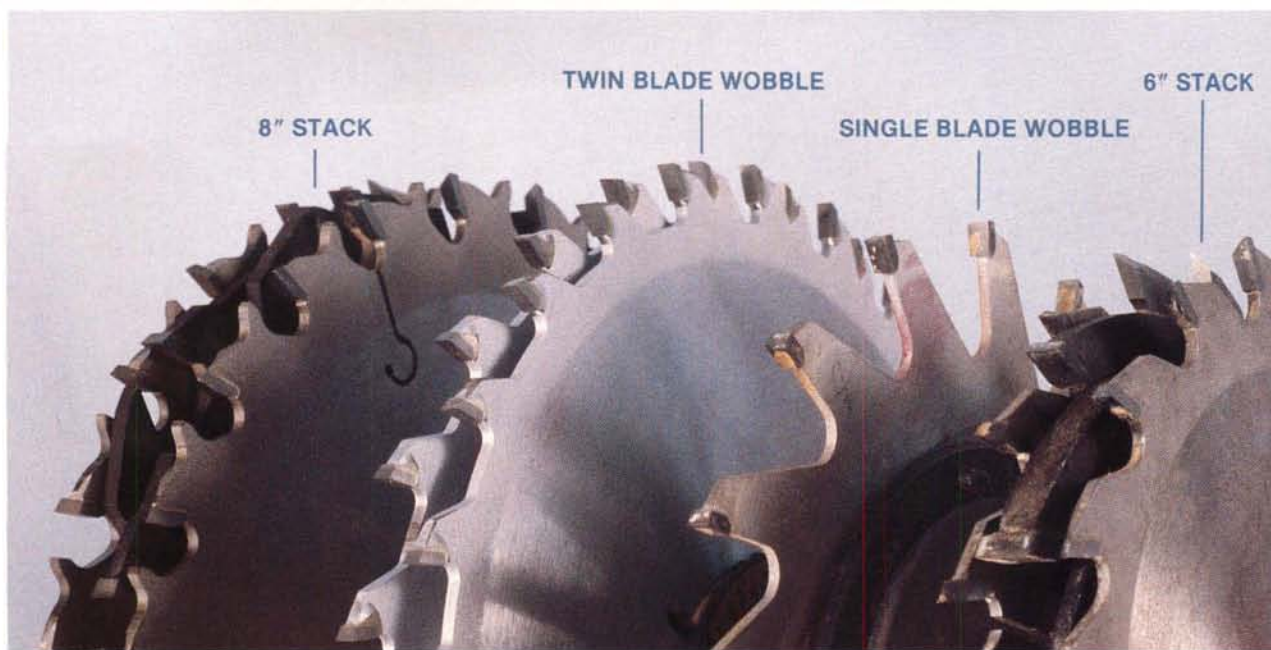
Once you've cut your first mortise successfully, you've gone most of the way toward mastering the process of mounting butt hinges. All that remains is to cut the second mortise on the door, and the matching case mortises.

To line up the case mortise with the door mortise it's best to use the already-cut mortises as a guide. If you rely on measurement alone, small errors can mount up and create an ill-fitting door. First, mount both hinges on the door and set it into the opening exactly as you want it to hang. You'll probably need to use thin cardboard as a shim. Then mark the location of the hinges onto the front or sides of the case. Scribe the sides and width with a combination square and the depth with the marking gauge.

Often it's not easy to mark the hinge location on the case because the pin obscures the top and bottom edges of the hinge leaf. And opening the door disturbs the position you're trying to achieve. To resolve the problem, it's best to make a simple positioning aid. From scrap stock ($\frac{1}{4}$ in. plywood works well) cut a template that's the same thickness and height as the door. With the hinges mounted to the actual door, transfer the locations of the free hinge halves to the template, and drill through the open hinge holes into the template. Now you can position your template, called a story pole, on the case and lift off the hinge locations. You also use it to locate and drill the holes.

This method is especially handy if you have a lot of doors to hang. You can set a pair of hinges in the first door and then use the template to lay out the mortises on the remaining doors and case sides. If you use the story pole to transfer the mounting holes, you should make sure the hinge leaves have uniform holes from side to side. If not, use the story pole for laying out the mortise, but use the actual hinges for marking and drilling the holes. 

In The Shop



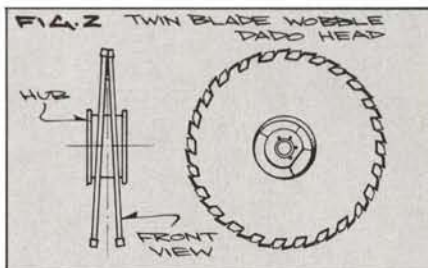
D A D O H E A D S

A dado head is a cutter that's used on the table saw or radial-arm saw to make cuts wider than the kerf a single saw blade can make. Although it's possible to get by without a dado head and make wide cuts by repeatedly readjusting the rip fence or workpiece, this is not a very practical alternative.

Types of Dado Heads

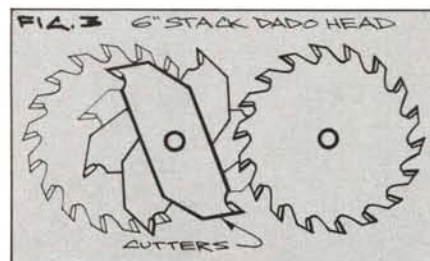
There are two types of dado heads, wobble dado heads and stack dado heads. With most wobble dado heads, a single blade is mounted on a cam-like hub (Fig. 1). By rotating the blade on

based on their rotation around the central hub cam (Fig. 2). Most single blade

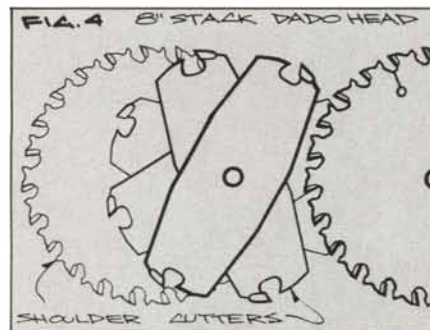


models adjust to any dimension from $\frac{1}{8}$ in. to $\frac{13}{16}$ in., while the twin-blade variety adjusts to any dimension from $\frac{1}{4}$ in. to $\frac{13}{16}$ in. All wobble dado heads have a scale on them that indicates the width of cut, but a practice cut should be made first to check accuracy.

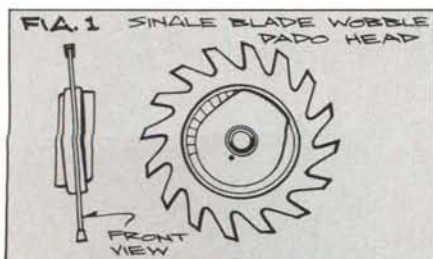
Stack dado heads are essentially two saw blades with chipper blades sandwiched in between. The standard stack dado head includes four $\frac{1}{8}$ in. chippers and one $\frac{1}{16}$ in. chipper, or one $\frac{1}{4}$ in. chipper, two $\frac{1}{8}$ in. chippers and one $\frac{1}{16}$ in. chipper (Fig. 3). By combining chippers, any width in $\frac{1}{16}$ in. increments from $\frac{1}{8}$ in. to $\frac{13}{16}$ in. can be achieved. For finer adjustments a shim set is required, or spacers can be made of cardboard, paper or sheet metal. A



variation of the stack dado head is Freud's new safety dado head, which features a high shoulder in front of each tooth (Fig. 4).



Some non-carbide dado heads are still available, but we don't recommend them. Carbide outlasts steel by at least 10 to 1, and with steel only marginally less expensive than carbide, the money saved doesn't justify the



the hub, the width of the dado cut is adjusted. More wobble produces a wider cut. A variation of the standard wobble dado head is the Sears twin-blade version, which features opposed blades each tilting an equal amount

shorter life. Whatever type of dado head you use, keep in mind that, after sharpening, the width of your dado cut will probably be a little less than the width the same blade produced at the same setting before sharpening.

Primary Function

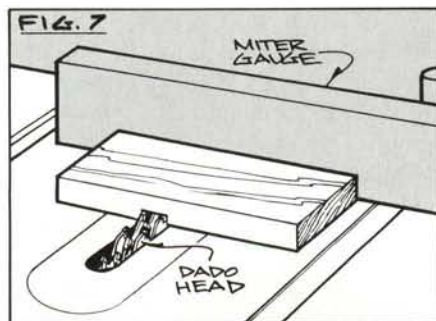
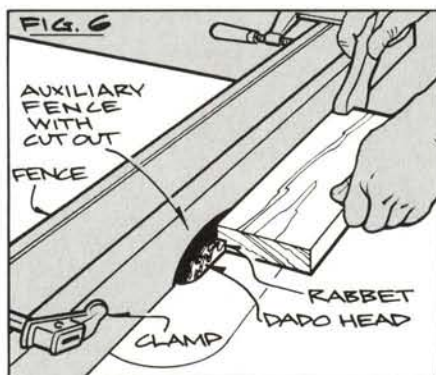
Although a dado is specifically a groove that's cut across the grain of a board, the dado head can also be used to cut rabbets, make tongue-and-groove joints, and cut tenons, grooves and lap joints. As is the case with regular saw blades, if you work mostly in plywood, it's a good idea to purchase a stack dado head that's designed for use in plywood. General-purpose dado heads are designed for both ripping and crosscutting. Dado heads for laminates and composition board have more teeth and produce a smoother cut.

The size (diameter) of the dado head you buy will depend on the power of your saw. Many light-duty 10 in. table saws are not capable of powering an 8 in. dado head. To make a simple comparison, powering a dado head that's been set for a $\frac{3}{4}$ in. wide cut is like ganging six $\frac{1}{8}$ in. thick saw blades side-by-side. The amount of wood that's being removed in a single pass is six times the amount that a single blade removes in a single pass when set at an equivalent height. A 6 in. diameter dado head requires less power than a larger diameter dado head set for the same width, mainly because the smaller arc the blade transcribes means there's less surface area in direct contact with the board (Fig. 5).

Smaller diameter dado heads will also usually be capable of less depth-

of-cut than larger heads. However, this isn't a problem unless you work in very thick stock. Most cuts with the dado head will be at a depth of less than 1 in. Where a greater depth of cut is required you'll probably need several passes to achieve the full depth, especially if the cut is wide. Your ear is the best judge of your saw's power limitations. If the saw is laboring, you'll not only shorten the motor's life but chances are the cut will be rough.

There are a number of ways to use the dado head. The two most common uses are in conjunction with either the rip fence for making grooves and rabbets (Fig. 6), or with the miter gauge for cutting dados (Fig. 7). As the rabbeting illustration shows, you'll need to mount an auxiliary fence with a cutout for the dado head for this operation. Always use a pushstick for ripping cuts.

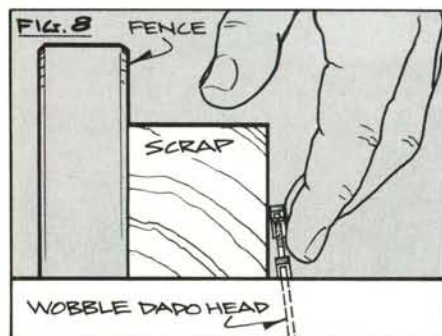


You'll also need a special table saw insert to use with your dado head, since the slot in the regular insert isn't wide enough to accommodate the dado head. You can make your own insert from scrap plywood if a commercial dado head insert for your saw isn't available. Just be sure the insert is flush with the saw table surface and does not protrude above it.

The tricky part of using the wobble

dado head is figuring out just where the sides of the cut will fall. There's really only one way to do this. With the saw turned off and unplugged, rotate the blade by hand until you locate the farthest tooth. Measure over from that tooth to the rip fence. Don't assume that the farthest tooth at one setting will be the same tooth for all settings. Mark the teeth with colored felt-tip pens to identify which is the farthest tooth for settings you use frequently.

For the distances that you use frequently, cut spacer blocks to fit between the fence and the dado head, then adjust the fence until the farthest tooth for that setting just touches the spacer (Fig. 8). Be sure to unplug the saw before making this adjustment. Always make a test cut in scrap before using your project stock. It's difficult to set the width exactly using the dials on wobble dado heads. The dials are there mainly as an indicator, and the

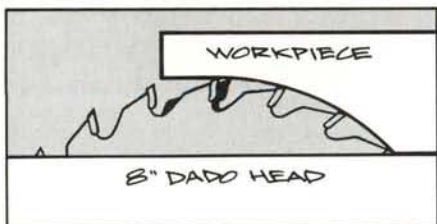


test cuts are needed to check and fine-tune the setting.

If you've opted for a stack dado head, you'll not have any trouble locating the dado. Just measure from the outside face of a tooth. As with wobble dado heads, spacer blocks come in handy for setting the rip fence with distances you use frequently. However, because the chippers that come with the cutter usually don't allow fine-tuning the dado head width, you'll be left with two options for widths that can't be measured in $\frac{1}{16}$ in. increments. First, you can use shims or spacers to fine-tune the width, or second, you can dimension the board so that it will fit into the dado you cut.

Thickening the board is easy if you own a planer or thickness sander, but even if you don't own one of these tools there are a few simple tricks to get

(continued on next page)





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In The Shop Continued

a good fit. Planing or sanding just the end of the board to reduce the thickness a little is the easiest way. Or you can readjust the fence or workpiece and make a second cut to widen the dado a little. When you are making cuts wider than $\frac{1}{16}$ in., or cutting lap joints or tenons, you'll usually need several passes to complete the operation. Overlap the cuts at least $\frac{1}{16}$ in. to get a smooth bottom.

Shop-Test

We tested four different dado heads. Two were wobble dado heads, the Sears 7 in. single blade model with 16 teeth, and the Sears 8 in. twin-blade Excalibur, with a total of 48 teeth (24 teeth on each blade). The other two were stack dado heads: Freud's 6 in. stack dado head that we've used in our shop for years, and Freud's new 8 in. safety stack dado head, which has replaced the older stack dado head in the Freud line. The 6 in. Freud stack dado head has 18 teeth per blade for a total of 36, while their 8 in. safety dado head has 48 teeth total (24 per blade). The chippers on stack dado heads each have two teeth.

Freud says that the new safety dado head eliminates the kickback and reduces the tendency to climb that traditional dado heads have. This is made possible by the addition of a special high shoulder in front of each tooth. The shoulder limits to .2 mm the cut each tooth can take with each revolution of the blade. It does not limit the depth of cut.

The Sears and Freud dado heads are fairly representative of what you might expect with wobble and stack dado heads when it comes to both cut characteristics and ease of setup. We'll let you come to your own conclusions as to what's best for you.

The current prices of the models tested cover a wide range. On the low end is the Sears 7 in. wobble dado head, with a catalog price of \$39.99. Next up the line is the Sears twin-blade wobble design, with a catalog price of \$76.47. Freud's old 6 in. stack dado head is being discounted for about \$95, and their new 8 in. safety dado head is \$119, with the 6 in. version a little less, \$109 in a current catalog.

Our test consisted of crosscutting a $\frac{3}{8}$ in. deep by $\frac{3}{4}$ in. wide dado in cherry. This is a common size dado

cut, such as would be made in the side of a bookcase to accept a $\frac{3}{4}$ in. thick shelf. We looked at the accuracy of the dado groove width, the smoothness of the sides and bottom, the profile of the bottom, and the tendency to chip-out as the cutter exited the board. In order to be able to evaluate the cutting quality of the dado heads, we did not back up our test cuts, although in practice crosscuts should always be backed up with scrap to prevent chip-out.

Sears 7 in. Wobble Dado Head: This model plowed a reasonably smooth dado in our cherry board. The sides of the cut, although a bit rougher than the cuts produced by the stack dado heads, were very acceptable. The vibration to our Rockwell Unisaw was minimal. The width measured exactly $\frac{3}{4}$ in. on our first try. The bottom of the cut was flat (Fig. 9) and did not exhibit the concave profile that we often see from wobble dado heads (Fig. 10). Finding and identifying the farthest tooth was no problem with this 16-tooth blade, which in turn made it easy to locate the fence. The corners of the cut produced by this wobble dado head were square.

Sears 8 in. Twin-Blade Wobble Dado Head: Although it costs twice as much as the single blade Sears model we tested, this dado head wasn't measurably superior to the less expensive blade.

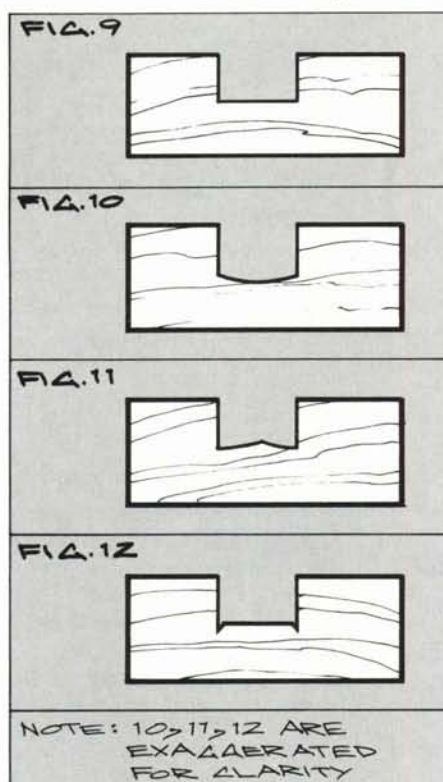
Although the instructions clearly state that the bottom profile of the dado can be controlled by the dado head's positioning on the saw arbor, we did not find this to be the case. We tried several positions, but all produced the same twin scoops at the bottom of the dado (Fig. 11). To its credit, the dado head produced smooth sides and no chip-out. Our initial setting at $\frac{3}{4}$ in. on the dial produced a cut a little wider than the desired $\frac{3}{4}$ in.

Freud 6 in. Stack Dado Head: Our old stack dado is still the favorite, even though some of its teeth are chipped and it's due for a cleaning and sharpening. There's no fussing with locating the farthest tooth, the sides and bottom of the cuts are smooth, and there's no chip-out problem. The combination of chippers produced a cut just a little under $\frac{3}{4}$ in. wide. Our only complaint is the small V-cuts that the two outside blades leave in the corners (Fig. 12). We'd prefer a blade that leaves the corners square. Freud says the V-cut ac-

The Woodworker's Journal

commodates some of the excess glue when you assemble a joint.

Freud 8 in. Safety Stack Dado Head: This newest offering from Freud was not heads-and-tails above the other models as we had expected. The sides and bottom of the cuts were smooth enough, but no matter how many times we remounted this dado head it still produced tear-out on one side as it exited the board. It's possible that we had a defective blade, or that one tooth was not machined properly, but the tear-out was annoying. Another annoyance was the fact that the blade plowed a



path $\frac{1}{2}$ in. greater than the desired $\frac{3}{4}$ in. width. We'd prefer that the cut was a little under $\frac{3}{4}$ in. rather than over, since it's easy to sand stock down, but very hard to grow boards thicker. A wider cut is an even greater problem if factory-milled $\frac{3}{4}$ in. stock must fit into the dado, since this stock usually measures a little under $\frac{3}{4}$ in. by the time you've finished sanding.

To their credit, when Freud designed this new blade they placed safety high on the list of priorities. There's no questioning the fact that the shouldered design of this blade cuts down on kickback and climb, especially if you work on a radial-arm saw. Also to their credit, Freud reduced the

size of the V-cuts that this dado head leaves in the corners.

Safety Reminders

Although a dado head does not usually protrude very far out of the saw table throat, it is an accessory that requires great care in use. Don't feed stock too quickly or take too deep a bite. If your saw is not capable of powering the dado head through a $\frac{3}{4}$ in. wide by 1 in. deep cut in a single pass, then make the cut in two passes, taking a $\frac{1}{2}$ in. deep cut each time.

When using a stack dado head, make certain that chippers and blades are all facing in the right direction, and that the teeth of the chippers fit in the spaces created by the gullets of the outside blades. Stagger the chippers so they are evenly spaced.

With wobble dado heads, check that the center hub is not cracked or broken before mounting the dado head.

With all dado heads, make certain that the blades clear the sides of the slot in the table saw insert before turning the saw on. Also make sure that the nut holding the dado head has been fastened tight. Remember, the saw should be unplugged for any and all adjustments.

Never attempt to use the dado head or any other saw blade without the throat insert. When using the dado head in conjunction with the rip fence, always use a pushstick and keep your hands well away from the blade.

Wear a dust mask, eye protection and a short-sleeved shirt. These three items should be routine whenever you use the table saw, not just when using the dado head.

Sharpening

We don't advocate the do-it-yourself approach to sharpening. If blades are sharpened incorrectly, they can grab and tear stock right out of your grasp. If you crack the carbide and a piece of tooth breaks off during use, it becomes a dangerous projectile. We'd rather send our blades to someone who sharpens them for a living and is set up with the right machinery for the job.

All sharpening services are not equal, and it may take several tries before you find a service whose standards satisfy yours. Check the Yellow Pages or ask local millwork shops or other woodworkers for sharpening services in your area.

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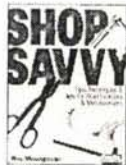
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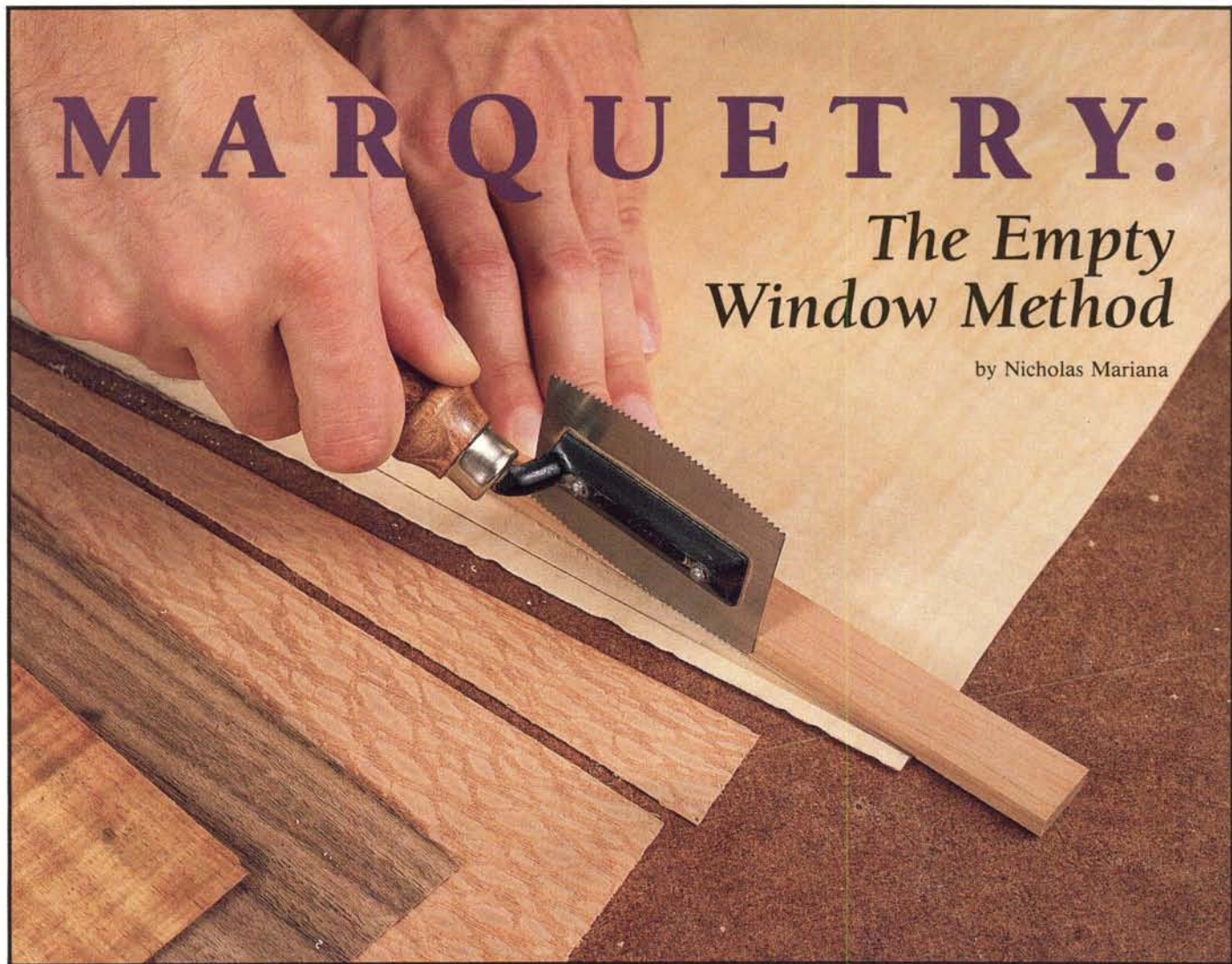
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MARQUETRY:

The Empty Window Method

by Nicholas Mariana



The window method of marquetry is a technique where a sturdy scrap piece of veneer, called the waster, is used as a template for cutting out the various shapes in a picture that's made up of many different pieces of veneer. By cutting away a portion of the waster a window is created, which is used as the template for cutting the individual pieces of veneer that build the picture. With complex shapes and curved or free-form patterns, the window enables the marquetarian to try any number of veneers and adjust them for grain or color before the right piece is found. The marquetarian just slides various veneers under the waster to judge their effect in the window. A new window is cut out for each shape in the picture.

It's possible to use the window

method for almost any marquetry pattern, but when the pattern involves mainly geometric shapes and straight lines, I prefer to use a variation of the window method that I call the empty window. With this method no waster is used. Instead, the entire pattern is the window — hence the term empty window. The marquetry picture is constructed much like the pieces of a puzzle are put together, but you work directly over the pattern.

The empty window technique is perfect for making the marquetry sunburst that decorates the Bed-and-Breakfast Tray on page 37. This design is basically an exercise in cutting straight lines and corner miters. The edges of already fitted pieces of the work-in-progress also provide a window for tracing common seams. You

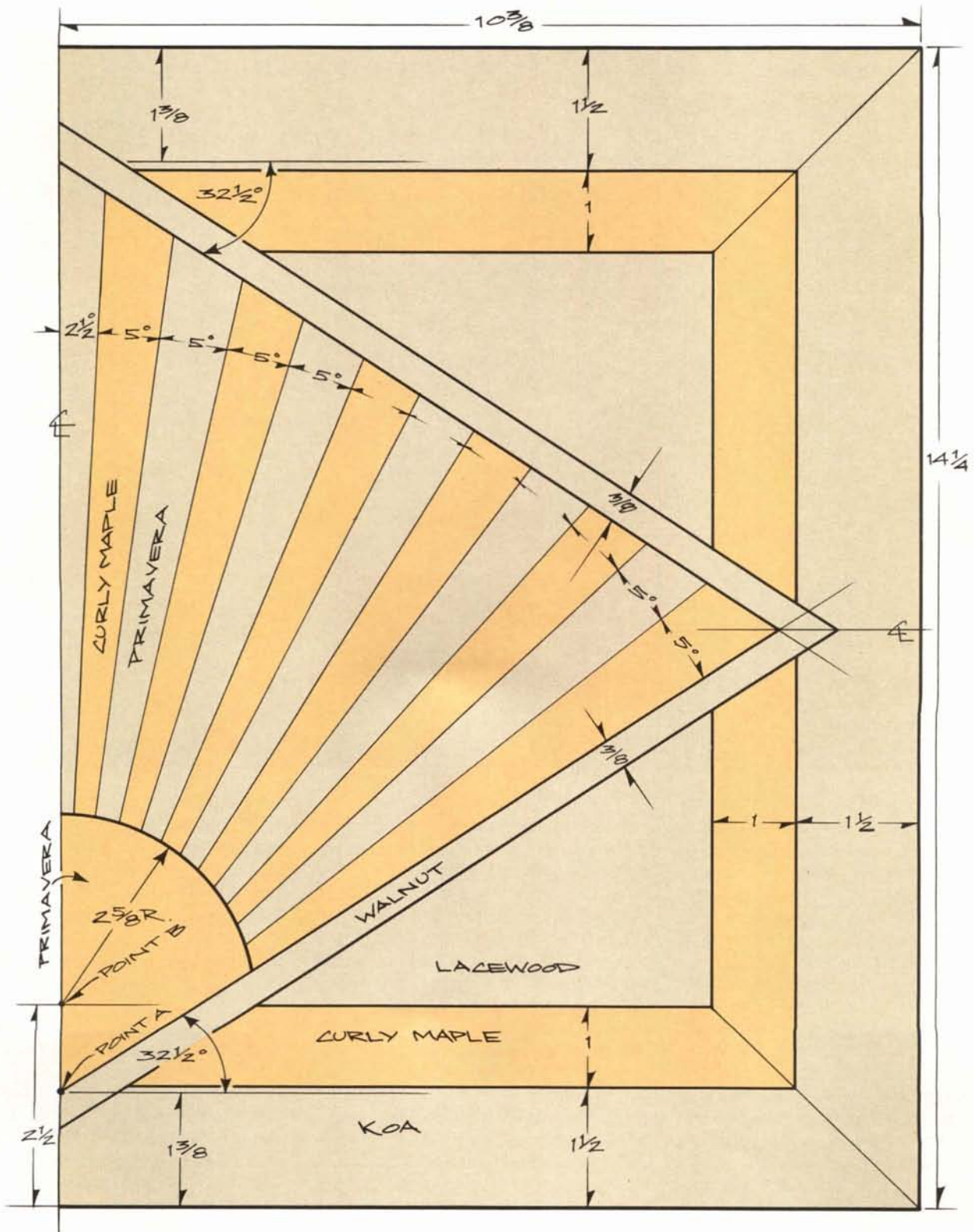
don't need experience working with marquetry or veneer in order to make this sunburst. Most of the cuts are made with either the veneer saw or knife, using the straightedge as a guide.

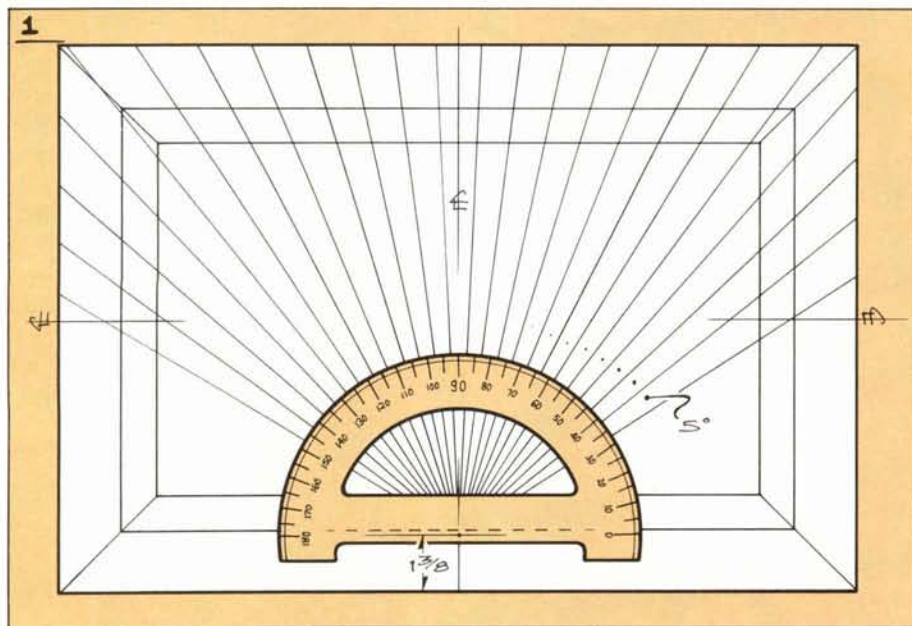
The Empty Window Method Step-by-Step

Organize your materials before you start. Most important are the veneers. For the sunburst, I used koa for the outside border, curly maple for the inner border, walnut for the diamond border, lacewood at the four corners surrounding the diamond, primavera for the sun and primavera and curly maple for the rays. Each of these veneers contrasted nicely with the others and complemented the ash stock

(continued on next page)

HALF PATTERN





used for the tray. Many other combinations of veneers will work as well. Just be careful when selecting your veneers to not choose something that's too brittle. With long pieces like the border strips and rays, brittle veneers tend to break apart or crumble.

In addition to the face veneers, you'll need a sheet of veneer to apply to the reverse side of the panel. When veneering large surfaces, it's essential to veneer both sides and not just the face. Without the reverse side veneer to equalize stresses, the panel would warp or cup. Select an inexpensive hardwood veneer, such as birch, for the reverse side. For the panel substrate, I used birch plywood.

The tools you'll need are a veneer saw, a sharp knife, a straightedge, a framing square, and either a fret saw or a scroll saw. You also need clear or frosted contact paper (I use the frosted plastic sheet that's sold in hardware stores as a stick-on window privacy panel), yellow glue, masking tape and a large sheet of paper for your pattern.

Step 1: Lay out the full-size pattern on a sheet of heavy paper. Draw two perpendicular lines that intersect at the center. These lines will center the pattern. Next, measure out from these center lines and mark the perimeter. As shown, the outside dimensions of the pattern are $14\frac{1}{4}$ in. by $20\frac{1}{4}$ in. Now

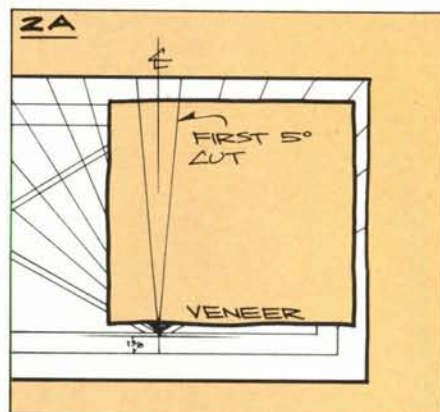
measure up $1\frac{1}{8}$ in. along the perpendicular center line from the bottom, and mark point A. Draw a horizontal line through point A.

Then using a protractor, locate the center ray by marking points $2\frac{1}{2}$ degrees on either side of the perpendicular center line (Fig. 1). This center line is the 90-degree point on the protractor. From there mark out the 5-degree steps that establish the remaining rays until all the rays are marked. When scribing the actual ray lines, use a sharp pencil and continue the ray lines out to the border.

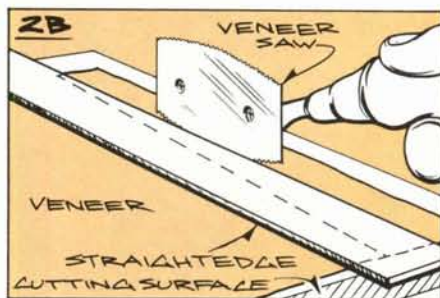
Next, from point B, $2\frac{1}{2}$ in. up from the bottom, scribe a $2\frac{1}{8}$ in. radius for the sun. Also locate the points of the diamond and mark out the various borders, as shown. The diamond border is $\frac{3}{8}$ in. wide, the outer border is $1\frac{1}{2}$ in. wide and the inner border is 1 in. wide.

Step 2: Lay out and cut the ray pieces. The rays are alternating strips of primavera and curly maple. It's best to start building this pattern out from the center, so start with the center ray.

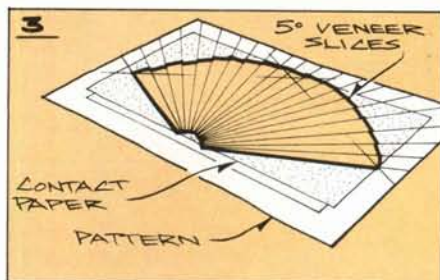
Making the first ray is a two-step process. First position your veneer over the pattern and mark out the ray lines (Fig. 2A). Then move the veneer to a cutting surface ($\frac{3}{4}$ in. thick particleboard is a good cutting surface) and use a straightedge and veneer saw



to cut the first ray (Fig. 2B). Use the first ray as a pattern for tracing the remaining rays, and cut them with the straightedge and veneer saw.



Step 3: Now assemble the rays on a sheet of contact paper (Fig. 3). Lay the contact paper sticky side up over the pattern. Position the rays facedown on the contact paper using the pattern as a guide. By sliding the rays up or down a little you'll get them to fit just right. Don't press each ray onto the contact paper until it's properly positioned.

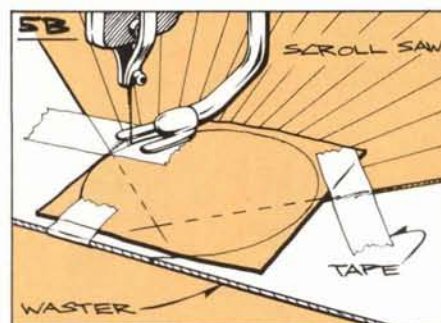


Step 4: Transfer the top lines of the diamond and use the straightedge and veneer saw to cut them (Fig. 4). Note that you'll be cutting through both the veneer and the contact paper under it.

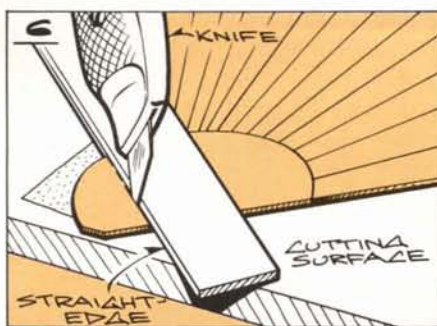
Step 5: Using a compass, scribe a $2\frac{1}{8}$ in. radius half-circle on a piece of
(continued on next page)



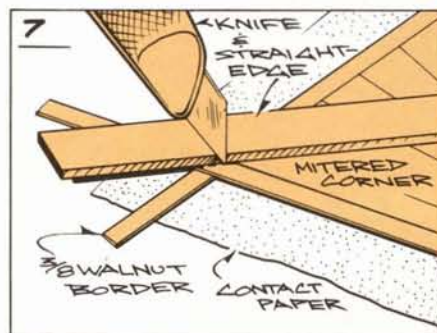
primavera veneer for the sun. (Fig. 5A). Then tape the primavera in place over the rays, with a waster sheet of veneer beneath. The waster is just a scrap of sturdy veneer that backs up the cut. Use masking tape to anchor the primavera securely, and locate the radius by positioning the sun with respect to the sun on the full-size pattern. Then use the scroll saw to cut the sun radius (Fig. 5B). Since you are cutting through both the rays and sun at the same time, you'll get a perfect match where they meet.



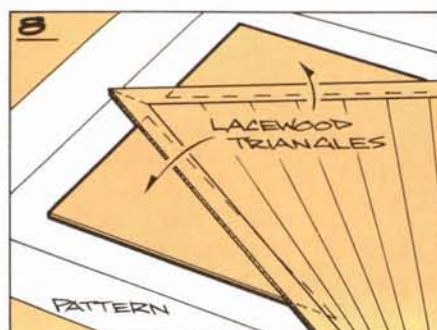
Step 6: After removing the scrap from the rays and sun, use a piece of contact paper to add the sun to the ray assembly (Fig. 6). Then move the assembly to your cutting surface, and using a straightedge and either the knife or veneer saw, trim the sun flush with the outside rays. Note how the straightedge is positioned over the part you keep, so any slips with the knife or saw will not ruin the marquetry picture.



Step 7: Cut $\frac{3}{8}$ in. wide strips of walnut to use as your diamond border around the rays (Fig. 7). As shown, the strips are cut long and overlapped at the corners. Join the border strips to the sunburst with contact paper, being careful to get a tight butt all around. Lay the straightedge across the strips at the corner and cut the miter with the knife. Note that the knife is drawn from the inside of the corner to the outside. This way there's no chance of a knife slip damaging the rays. Repeat this procedure at the remaining three points of the diamond.

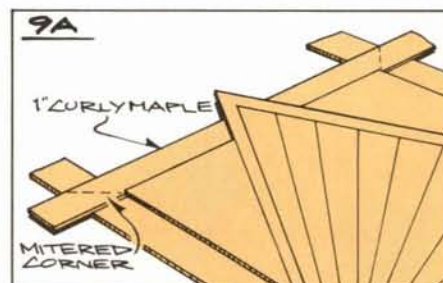


Step 8: Cut four right-angle pieces of lacewood (Fig. 8). As shown, the lacewood triangles are slightly larger than final size. Position the lacewood triangles by sliding them under the sunburst, using the full-size pattern as your guide. Mark the cut line with a

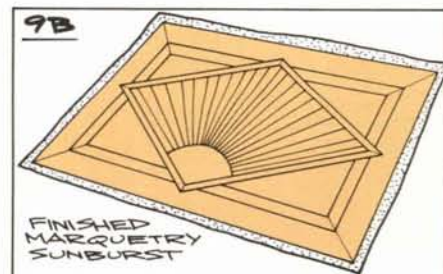


sharp pencil. Then move the triangles to your cutting surface and trim along the pencil line with the straightedge and veneer saw. Join the triangles to the sunburst with contact paper, butting the joints as tight as possible.

Step 9: The two borders are added last. Cut the 1 in. wide curly maple border and slide it under the sunburst (Fig. 9A). Then use a sharp pencil to mark where the points of the diamond overlap it. After cutting the waste on this overlap with the straightedge and knife, assemble the maple border strips to the sunburst with contact paper. Overlap the ends and cut the corner miters as before with the straightedge and knife.



The $1\frac{1}{2}$ in. wide koa border is cut and fitted much like the curly maple border. Position the border and use a sharp pencil to mark the V where the points of the diamond overlap it. Move the border strip to the cutting surface and cut these relief points with the straightedge and knife. Be sure to cut out from the points of the V so if you slip you won't ruin the border. Mount the koa border to the sunburst with contact paper, and cut the corner miters as before. You should now have the completed marquetry sunburst mounted on contact paper (Fig. 9B).



Editor's Note: Gluing the veneer to the plywood substrate is covered in the Bed-and-Breakfast Tray instructions.





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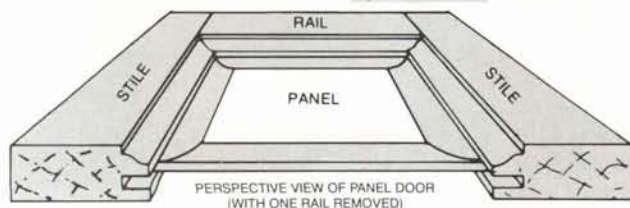
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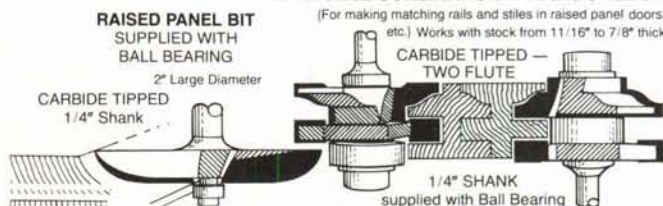
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Finishing

One problem with most wood stains is that they partially obscure the wood grain, which often results in a muddled look. If that is the effect you're after, fine. But if you want to color wood, yet retain as much grain detail as possible, try an aniline dye stain.

What's the difference between aniline dyes and other stains? First, most stains rely on pigments to color the wood. Pigments are fine, solid particles of color, suspended in a solvent such as water, mineral spirits or some other petroleum distillate solvent. A binding material (usually linseed oil) is added to make the particles adhere to the wood surface. As the stain dries on the wood, the solvents evaporate, leaving a thin film of the pigment on the wood surface. Aniline dyes, on the other hand, completely dissolve in the solvent, enabling them to saturate the wood fibers with color — without hiding the grain pattern. This same penetrating ability makes dye stains preferable to pigment stains for use on dense, non-

water-soluble dyes will. Because of their ability to penetrate varnish and shellac finishes, alcohol dyes are often used for minor touch-up and repair work.

Oil-soluble dyes are non-grain-raising dyes used primarily to tint oil-based varnishes and lacquers. But they can also be applied directly to the wood as a stain when mixed with the appropriate solvent (turpentine, naphtha, lacquer thinner). Use the solvent recommended by the dye manufacturer. Oil-soluble stains aren't as lightfast as water-soluble dyes, but

ANILINE DYES

by Jim Barrett

porous woods, such as birch or the maple blocks shown in the photo. (The pigments in stains often don't adhere very well to these woods).

Choices in Aniline Dyes

Aniline dyes are available in a wide variety of wood tones, as well as pure colors such as red, black, yellow, blue, green, orange, and many accent colors. (One manufacturer makes over 75 colors and wood tones in water-soluble dyes alone). And, if you're into experimenting, you can mix the dye solutions to produce virtually any custom color that you want.

Most aniline dyes come in powder form that you mix with the appropriate solvent: water, alcohol (methanol), or a hydrocarbon-based (oil) solvent such as turpentine, naphtha, or lacquer thinner. The dye powders are economical to use. Depending on the color and manufacturer, one or two ounces of powder costs between \$2.50 and \$5.00, and will make about one quart of dye. Stored in tightly sealed glass or plastic containers, the mixed dye has a nearly infinite shelf life.

Alcohol-soluble dyes are the least desirable for use by the home woodworker for several reasons. They don't penetrate as deeply as water- or oil-based dyes, so the colors aren't as brilliant. Many of the colors aren't as lightfast (resistant to fading) as those of the water and oil soluble types. Their fast dry time makes alcohol-soluble dyes tricky to apply with a brush or cloth, so they usually must be applied with a spray gun to insure even coverage, especially on large pieces of furniture. On the plus side, they won't raise the wood grain like

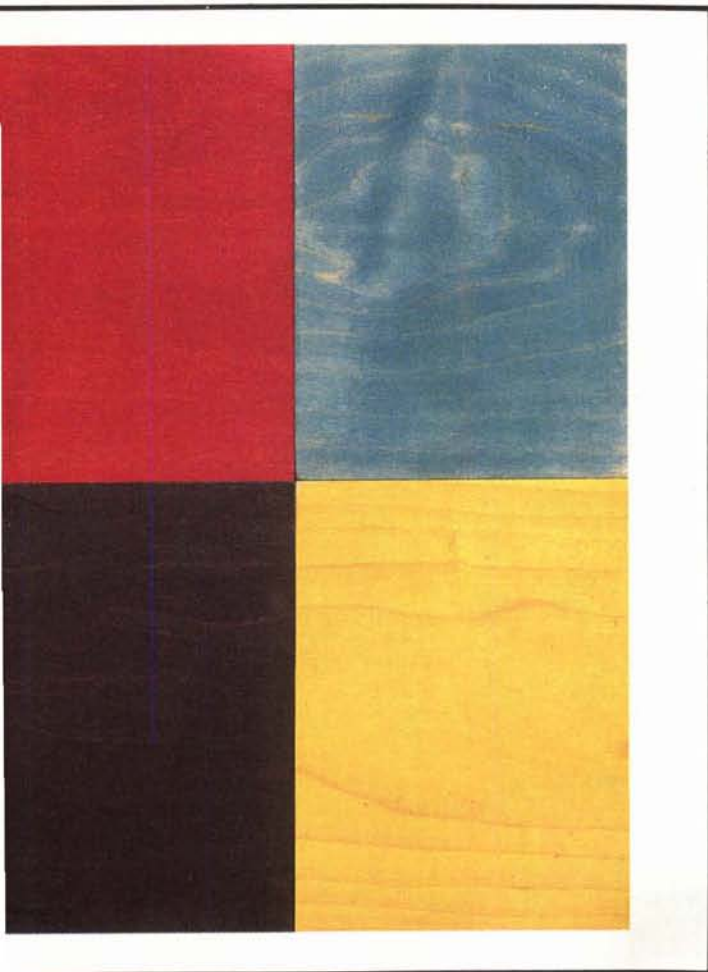
they're more lightfast than the alcohol-soluble type. The one major drawback to oil-soluble dyes is that they will bleed through lacquer and some oil-based topcoats. They generally need to be sealed with a 1-pound cut shellac sealer before you apply the final finish.

Water-soluble dyes are, in our opinion, the best all-around choice for most projects. Not only are they more lightfast than the other types, but the colors tend to be richer and come in a wider variety. Overall, they're less expensive than alcohol- or oil-based dyes. This is because, although the powders cost about the same, the solvent you use to mix them comes from your faucet. In addition, they're easy to mix and apply, non-toxic when dry, and won't bleed through oil or lacquer finishes. The only drawback is that, because they're water-based, these dyes tend to raise the wood grain,



giving it a fuzzy feel and appearance. To counteract this problem, you'll need to take the additional step of raising the grain with water, then sanding it off *before* applying the dye (see Applying the Dyes).

A variation of water-soluble dyes, called NGR (non-grain-raising) dyes or stains, consist of a water-soluble dye premixed in water-free solvents. One such dye is sold by Behlen's under the brand name Solar-Lux Stain. These dyes share all of the characteristics of water-soluble dyes above,



but won't raise the wood grain. They can also be used as tints for lacquer finishes. However, NGR dyes don't come in as many colors as water-soluble dyes, and ounce-for-ounce, they're about twice as expensive (\$5.00 to \$6.00 per pint). Also, because they're premixed, you can't darken the color indicated on the label. If you want to lighten the color, you must add a special reducer recommended by the manufacturer. Otherwise, we found them every bit as effective as water-soluble dyes, without the hassle of mixing.

All things considered, we recommend that you stick with the water-soluble dyes — at least for starters. Following are specific instructions for mixing and applying them.

Mixing the Dyes

Mixing water-soluble dyes is not much harder than making

Jell-O. Following the powder/solvent proportions recommended by the manufacturer will produce the color indicated on the container. Adding less powder to the solvent will produce a lighter shade of the color; more powder, a darker shade. As mentioned earlier, you can mix various colors to achieve custom colors, provided the dyes you're using are all water-soluble (you can't mix a water-soluble dye with an oil- or alcohol-soluble dye). Although you can mix the various water-soluble powders when these are dry, it's much easier to mix already-prepared solutions.

One quart of dye should be more than enough for all but the largest projects. Items needed for mixing include a 1-ounce plastic measuring spoon, a 1-quart glass or plastic measuring cup or mixing bowl, a stirring stick, and a 1-quart glass or plastic storage container (plastic lids are preferable to metal ones). Avoid metal containers and utensils, because the metal may affect the dye color.

Follow the general mixing instructions on the container label. To make a quart of dye, measure 1 quart of hot (not boiling) water into the mixing bowl. Hot tap water is fine, unless the water in your area has a high mineral content. (Minerals in the water may affect the dye color, in which case it would be safer to use distilled water.) Next, gradually stir in the amount of powder recommended by the dye manufacturer (either 1 or 2 ounces). Several of the Behlen's dyes we used required the powder to be premixed with 8 ounces of methanol (wood alcohol) before adding them to the water.

Once the powder has dissolved, strain the solution through a cloth filter (such as several layers of cheesecloth) into the storage container, and seal tightly. Allow the mixture to stand 1 hour before using.

As mentioned earlier, you can vary the intensity of the color indicated on the label by adding more or less powder to the water. Before staining the actual project, test the dye solution on a scrap of wood of the same species. If the color is too strong, add more hot water; if it's too weak, reheat the solution and add more powder. Judge the color when wet. It will be somewhat lighter when the dye dries, but will darken again when you apply your final clear finish.

Applying the Dyes

Water-soluble dyes don't emit toxic fumes, so you don't need a mask or respirator when mixing or using them (just avoid inhaling the powder). It's a good idea, though, to wear plastic gloves, unless you want to dye your hands the same color as the wood. In general, follow the same common-sense procedures that you would with any paint or stain.

Before staining the wood, you'll need to raise the grain and sand it off. Wipe the project with a wet cloth, let dry, and sand lightly with 220-grit sandpaper to remove the "fuzz." If you notice any additional raised grain after staining, lightly hand-sand with 320-grit paper, being careful not to remove the stain. An alternative to this process is to go ahead and apply the dye, letting the grain raise as it will. Then apply a wash coat of shellac to stiffen the fuzz, and sand it off with 320- or 400-grit silicon carbide paper. In either case, blow or vacuum the dust off the piece before applying the final finish.

(continued on next page)

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But Don't Suffer in Silence!

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Finishing Continued

Although you can apply the stain with a brush, we find it easier to use a sponge or soft cloth for application. To avoid streaks and lap marks, make sure you apply enough dye to keep the surface wet until the entire area is covered. You don't have to worry about applying too much, as the wood will only accept a certain amount before it becomes fully saturated. If you do notice any streaking or spotting, simply wipe over the entire surface with more dye, which will put the dried dye back into the solution.

With most woods, the end grain will absorb more dye than the face or edge grain, and will be darker. Also, some softwoods and highly figured woods will absorb the dye unevenly. Unless you like this effect, you can insure more even absorption by first sizing the entire wood surface (or just the end grain) with a mixture of 1 part yellow woodworker's glue to 5 parts water. After the glue dries, lightly sand the surface with 220-grit paper.

When working on a large project, such as a table, start at the bottom, and complete one entire section or part (such as the legs) before moving on to the next. After you've dyed each part, wipe it with a dry rag to remove excess dye.

If you decide that the piece is too dark after you've applied the dye, you can lighten the color by wiping over the entire surface with a rag dampened in clear water. This puts the dye back into the solution and removes some of it. Conversely, if the piece is too light, simply mix a more concentrated solution of the same color and apply a second coat after the first has dried completely (12 to 24 hours). Unlike pigment stains, a second coat of the same solution usually won't intensify the color if the wood surface is already fully saturated with dye.

Also, once you've dyed the piece, you can alter the color by wiping a second color or several colors over the first. If you want to remove the color altogether and start from scratch, use a commercial wood bleach (available through most woodworking catalogs or from a local lumberyard or home center).

After the piece is dyed to your satisfaction, let it dry overnight before applying the final finish. Because water-soluble dyes are insoluble in both oil and lacquer, they shouldn't bleed through finishes based on these solvents. Some alcohol- or water-based finishes may reflow the dye, however. You can prevent such problems by sealing the dyed piece with a light coat of shellac before applying these finishes.



Suppliers

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(Behlen's products)
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Bed-and-Breakfast Tray

If you've never had the pleasure of serving or being served breakfast in bed, then build this tray and the experience is sure to follow. The adjustable tray also tilts up for a writing, reading or drawing surface.

Marquetarian Nicholas Mariana explains how to make the sunburst design in our Special Techniques article beginning on page 29.

We used ash, but other woods such as oak or cherry will also look fine with the marquetry sunburst veneers. The base and tray are constructed of $\frac{3}{8}$ in. thick stock, except for the $\frac{1}{2}$ in. thick supports (C), the 1 in. diameter handles (D), and the tray bottom (G), which is $\frac{1}{4}$ in. thick plywood. We resawed all the solid stock from a 2 in. thick by 6 in. wide by 8 ft. long board.

Use about 6 ft. of your 8 ft. board for resawing to provide the $\frac{3}{8}$ in. thick parts. Resawing 8/4 in. thick stock will yield three individual $\frac{3}{8}$ in. thick pieces, after allowing for the resaw kerfs and planing. The remaining 2 ft. of your board will yield the supports and handles.

Before cutting the stepped profile in the sides (A), establish the notches into which the supports will fit. We used the router table for all the notches, rabbets, grooves and dadoes in this piece. The bit height for these notches must be $\frac{3}{8}$ in. Later, when you shape the sides, the $\frac{3}{8}$ in. deep cutaway that's made at the bottom edge will produce the final $\frac{1}{4}$ in. notch depth that's illustrated in the Side Elevation. The 1 in. diameter holes for the handles and the $\frac{1}{8}$ in. deep by $\frac{3}{8}$ in. wide dadoes for the ends (B) are also cut before the sides are shaped.

The notches in the legs (E) for the stretchers (F) are cut before the ends of the legs are rounded. Tape all four legs together and establish the notches in them at the same time. If you are using a $\frac{1}{4}$ in. diameter bit in the router table, each notch will require four passes. Use the band saw to profile the sides and to cut the radius on the ends of the legs. Stay outside the radius line on the legs with the band saw, then final sand to the line. The four legs should still be taped together for the band saw and

sanding operations.

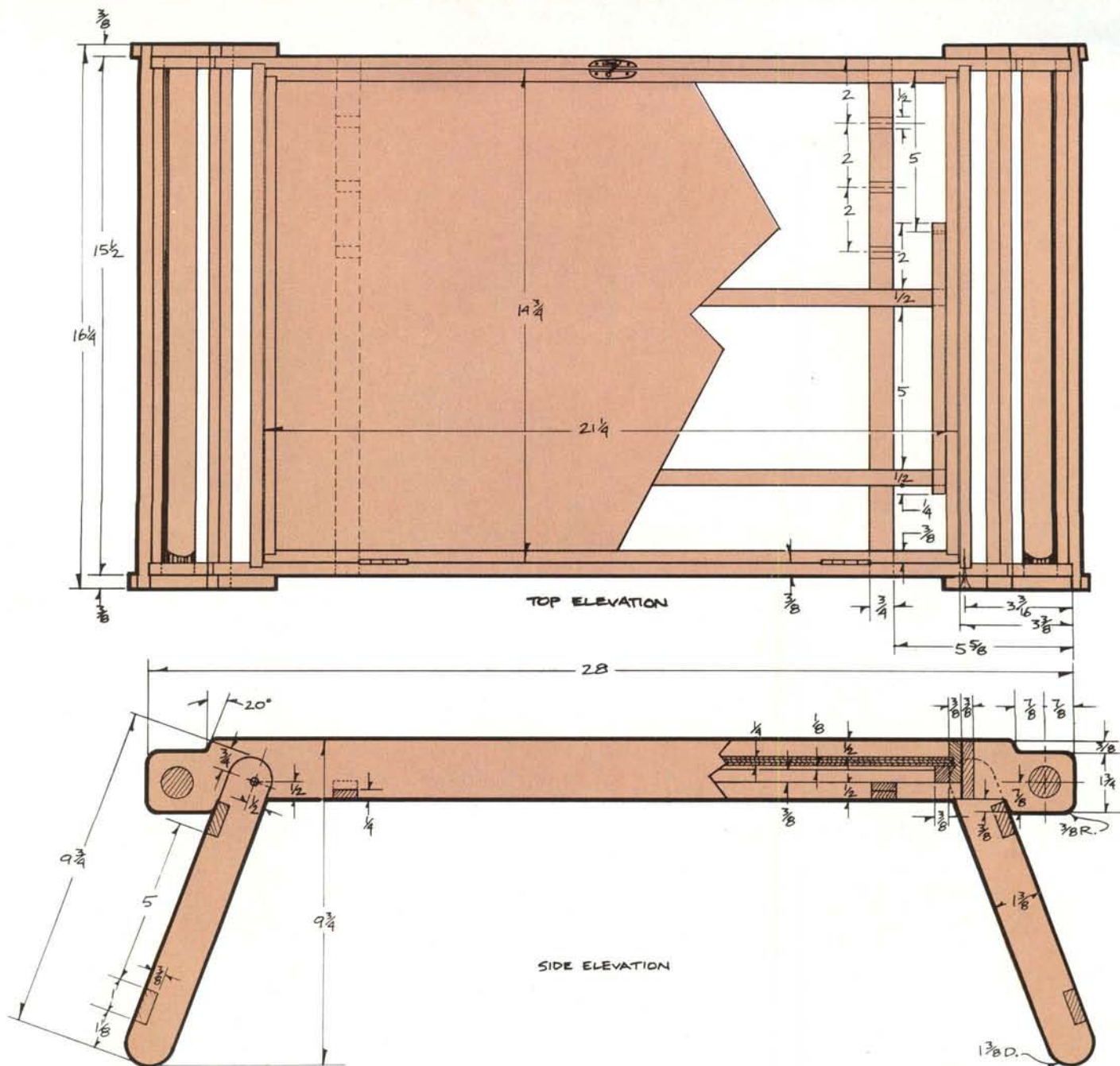
The $\frac{1}{2}$ in. diameter half-round notches in the supports are made by clamping the two supports face-to-face, and then drilling through on-center at each location with a $\frac{1}{2}$ in. diameter bit. The hole positions are shown in the Top Elevation.

We lathe-turned the handles, but if you don't have a lathe they can also be made on the table saw using the $\frac{1}{2}$ in. radius rounding-over cutter in the molding head. A $\frac{1}{2}$ in. radius rounding-over bit in the router table is still another option.

Assemble the base section before going on to the tray section. Use screws and brads to reinforce the joints.

The tray section is made to fit the base. First, you'll have to laminate the marquetry sunburst to the plywood tray bottom (G). Start with a piece of plywood that's a little larger all around than the marquetry picture. Then, using yellow glue, sandwich the marquetry sunburst and a backing veneer around the bottom. Use $\frac{3}{4}$ in. thick sec-

(continued on next page)



perimeter on the face of the marquetry. The tape keeps the delicate veneer from splintering. Then lay a straightedge horizontally across the panel, in line with the points of the diamond, and mark these center points at the edges. Repeat for the vertical points of the diamond. Measure out from these center lines when marking the final size of the panel. This will insure that it's centered.

The final trimming of the panel is best done with a cutoff box on the table saw, using a 60-tooth carbide blade. Remember, there's no chance for a graceful recovery if you make a mistake here. Finish both sides of the marquetry-decorated bottom with a good-quality polyurethane to protect it from spills and moisture.

When dry, assemble the sides (H) and ends (I) around the bottom. Note that a thumb slot is cut into the inside face of the tray side before the tray is assembled. Bore a series of side-by-side holes, then clean up the slot sides by sliding the piece along the fence that you clamped to the drill press table. Cut the groove for the bottom after you've laminated the marquetry and backing veneers, so it will be the correct width.

Add the leg/stretcher assembly (J and K), which is pinned in place with clipped fourpenny finish nails. Round the bottom edge of the lower stretcher so that it will fit neatly into the half-round notches in the supports. Reinforce the lap and rabbet joints with brads or screws.

If you made your tray for an exact fit into the base frame, then you'll find that a gentle bevel on the outside edge of the tray will be needed so that it will clear the base side after the hinges are mounted. This bevel can be hand-planed (be sure to set the brads first), or it can be made by sanding on the belt or disk sander.

Finish with two coats of Deft semi-gloss aerosol-spray wood finish. Mask off the marquetry panel to avoid overspray. Sand lightly between coats, then rub the final coat with steel wool before waxing. Finally, mortise for the hinges (L) that mount the tray to the base, and add the catch (M), which prevents the tray from opening unexpectedly. We used 1/2 in. long brads to fasten the catch.



Mission Style

TRESTLE TABLE

Here's a substantial table you'll be proud to serve a turkey on. The dark oak and simple, sturdy construction are characteristic of the American Mission style popular in the late 19th and early 20th century.

We made the table from 5/4 and 6/4 stock so we could achieve a 1 in. thickness for the top (A), cleats (B) and legs (E), and the 1 1/4 in. thickness for the shelf (C), spreaders (D) and feet (F).

Start by edge-joining boards for the wider parts of the table (the top and the shelf). After they are joined, plane or sand them to the final thickness.

Next, make the feet and spreaders, which are the same except for the cutout on the bottom of the feet. After making the parts to the size given in the Bill of Materials, cut the mortises. Lay them out carefully, using a marking gauge to insure they're all the same. Then drill a series of holes to establish the mortises, and clean them up with a chisel. Use a band saw to form the profiles.

Now cut the four legs to size, and form the 1 1/4 in. long tenons. First establish the shoulders of the tenons by cross-cutting to the 1/4 in. depth all around the workpieces. Then use a tenon jig — or clamp the workpiece to a supporting piece of plywood — to remove the waste pieces. Don't try to run the workpiece through the saw on end without a support, because the workpiece can twist and pull your hand into the

saw blade. When making these cuts, it's best to try your setup with some scrap to insure the tenons fit tightly in the mortises.

Next, form the through-mortises in the legs, the matching tenons in the shelf, and the mortises in the shelf for the keys (G). Use a band saw to cut the profile and tenons on the ends of the shelf. Again, lay them out carefully with a marking gauge so that all the tenons are the same and they fit in the mortises.

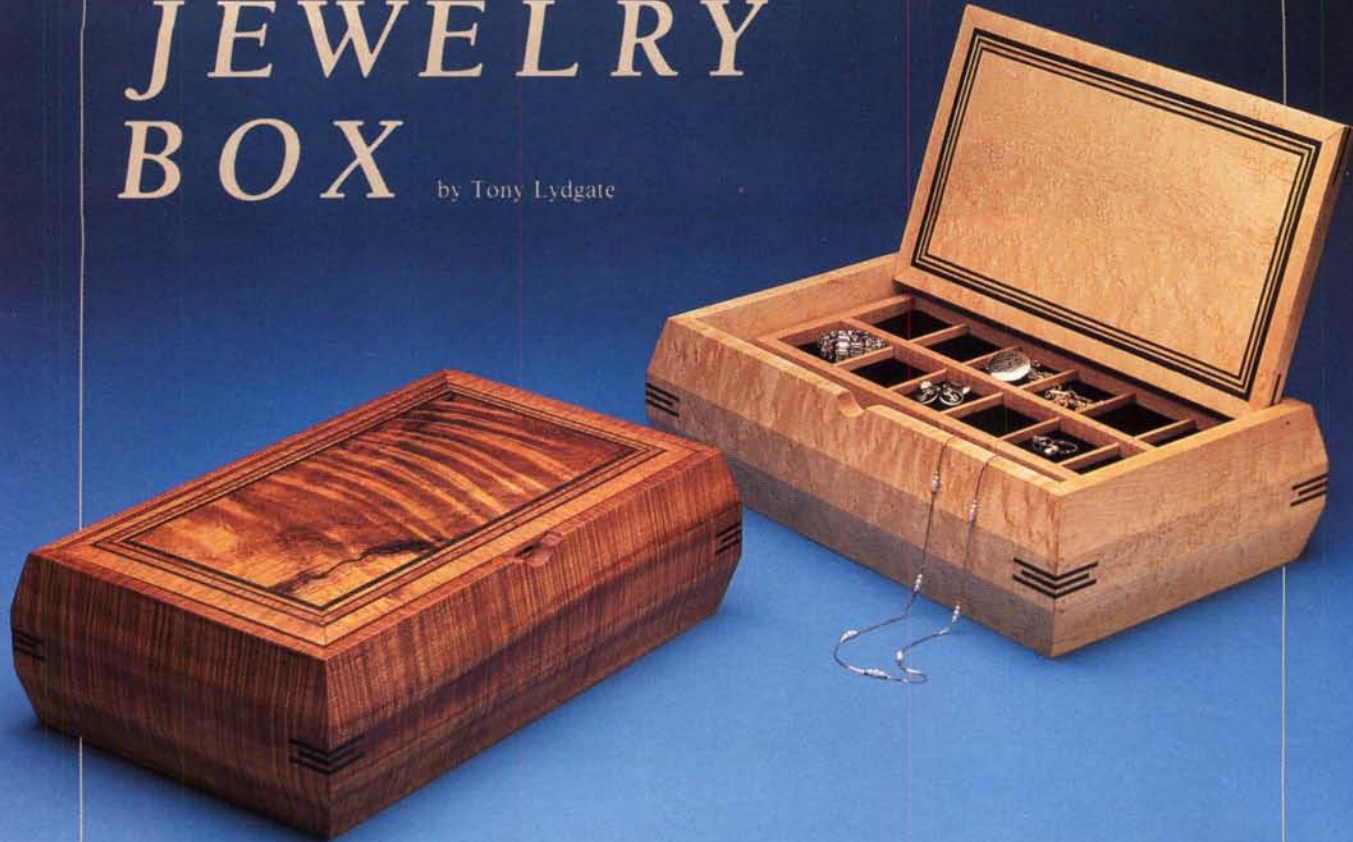
Make the cleats from the 5/4 stock and bevel the corners and drill the holes as shown. Note that one of the holes on each cleat is elongated to allow the screw to move slightly as the top adjusts to seasonal moisture changes. Also drill the holes for the 2 1/2 in. by no. 10 machine screws that hold the spreaders onto the cleats.

The keys are cut on the band saw and filed and sanded to final shape. The chamfer on the ends of the shelf tenons is also established with wood files. Use a 3/16 in. radius round-over bit in the router to soften the edges of the top.

Give all the parts a good sanding. Start with 120-grit paper and then use 150-, 180-, and 220-grit paper. Stain all the parts with a dark stain such as Minwax Jacobean. Then glue the legs into the feet and spreaders. Finish the piece with several coats of polyurethane varnish or lacquer. 

JEWELRY BOX

by Tony Lydgate



The most important thing about making this box is the choice of lumber. The finished piece should have a truly gemlike appearance, so select stock that is highly figured. I use curly, tigertail/fiddleback, bird's-eye or anything else that's especially beautiful. It's worth spending money on the materials; you only need about three board feet.

Select material that when ripped in half will yield two pieces, $\frac{7}{8}$ in. thick by 4 in. wide by 24 in. long. The ideal stock is about 9 in. wide by 2 ft. long.

Crosscut to yield the two sides (A) and the two ends (B). These parts should be a little oversize in thickness, length and width. Then joint one face of each piece to get it perfectly flat. If you're using highly figured stock, however, watch out — even a sharp jointer can tear the grain. If a piece is too figured to joint, I use a 6 in. by 48 in. belt sander with a 60-grit belt to sand the face smooth. Once you have established the flat face, rip the sides and ends to exactly 4 in. wide.

Mill the grooves for the bottom (C). Also, cut the groove in the end pieces to accept the rails (D) that support the tray. The location of the groove is $1\frac{3}{4}$ in. down from the top edge.

Crank your table saw blade over to

45 degrees, and check the setting by carefully milling several test pieces. Make sure you get a true 90-degree angle when you butt the mitered test pieces together. Mill a 45-degree miter on one end of each of the sides and ends. Then set up a stopblock on your auxiliary miter fence, and cut the other ends to establish the 14 in. and 9 in. lengths respectively. Make the bottom a perfect rectangle, about $\frac{1}{16}$ in.

smaller than the space it fits into.

You are now about ready to glue up the box. First polish the inside faces of the sides and ends. I use the 6 in. by 48 in. belt sander, with a well-worn 120-grit belt. A pad sander will also get the job done. Vibrate the veneer side of the plywood bottom with 220-grit paper, if it needs it. Don't sand too long, though, as many veneer plywoods have a flitch that is paper-thin.

I use duct tape or masking tape for many glue-up operations. It's often awkward to use clamps for smaller projects such as boxes. Put a piece of 2 in. wide tape that's about 4 in. long over the miters of the two long sides. The point of the miter should be positioned right at the center of the tape.

Run a bead of glue into the bottom groove of all four pieces, and spread an even layer of glue over the miters on the ends only. Don't let the glue get all the way to the inner edge of the miter. With the box right-side-up, put the bottom in one side (be sure the veneer side of the bottom is down), and add one end. Butt the miters together, make sure they're true, and wrap the other half of the tape around the end. Add the second side, wrap its tape, and finally the other end, wrapping again with tape. Check your box with a try

Bill of Materials (all dimensions actual)

Part	Description	Size	No. Req'd.
Box			
A	Side	$\frac{7}{8} \times 4 \times 14$	2
B	End	$\frac{7}{8} \times 4 \times 9$	2
C	Bottom	$\frac{1}{4} \times 7\frac{1}{16} \times 12\frac{1}{16}$	1
D	Rail	$\frac{1}{8} \times \frac{3}{4} \times 7\frac{1}{4}$	2
E	Post	$\frac{5}{16} \times \frac{5}{16} \times 1\frac{1}{4}$	2
F	Border	$\frac{3}{16} \times \frac{1}{16} \times 20^*$	2
G	Panel	$\frac{3}{4} \times 5\frac{3}{8} \times 10\frac{3}{8}$	1
Tray			
H	Side	$\frac{3}{8} \times \frac{3}{4} \times 12\frac{1}{16}$	2
I	End	$\frac{3}{8} \times \frac{3}{4} \times 5$	2
J	Bottom	$\frac{1}{8} \times 5\frac{1}{8} \times 11\frac{1}{16}$	1
K	Center Divider	$\frac{5}{16} \times \frac{1}{2} \times 11\frac{1}{16}$	1
L	Divider	$\frac{1}{16} \times \frac{1}{4} \times 4\frac{3}{4}$	5

* Border lamination dimensions are at rough lamination stage, before cutting and shaping.

square laid flat on the workbench.

Turn the box over to check that the joints are tight at the bottom. If there's glue squeeze-out, wait about an hour and then carefully chisel the half-dry beads off. If you use white glue, the beads should be the consistency of chewing gum and will scrape off easily.

After the box has dried, mill the kerfs for the exposed splines. These are both decorative and structural, since they reinforce the miter joint. Use the jig shown in Fig. 1. This jig holds the box at 45 degrees to the table, and is guided against a high auxiliary rip

fence. Practice a few cuts with the jig and some 4 in. wide scrap to be sure that the groove for the middle spline is in the precise center of the box side.

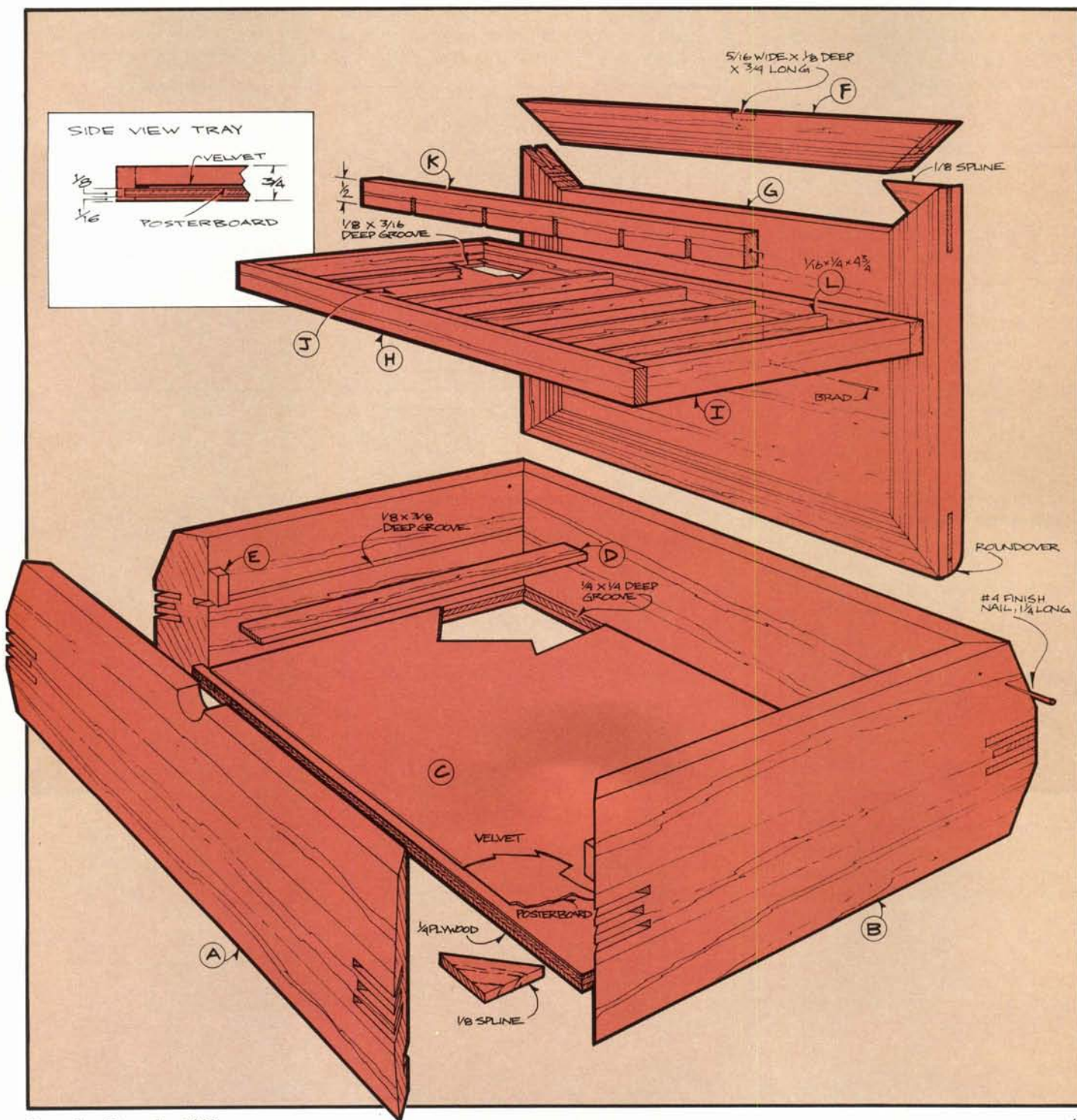
The blade height setting for the middle spline groove is $1\frac{1}{16}$ in., while the blade height for the two deeper grooves is $\frac{7}{8}$ in. If your setup for the middle groove is accurate and on-center, then you can mill both grooves for the outer splines using the same fence setting. Simply flip the box over so the opposite edge is against the jig.

Whether I make this box from curly Hawaiian koa or bird's-eye maple, I

use Indian rosewood for the black accent trim on the lid and for the splines. You can use other woods, but I'd hold to the theme of using the same species for the lid accents and the splines.

The thickness of the spline stock must be equal to the width of the groove that the saw blade created. Resaw stock to the required thickness on the table saw, but take care not to work with anything less than a 12 in. length. Use your pushstick for this and all other table saw ripping operations outlined in this article. I use a carbide

(continued on next page)



50-tooth alternate top-bevel blade. This blade should leave a smooth enough cut so no jointing is needed.

Use the band saw to cut the spline stock into triangular pieces, about $\frac{1}{8}$ in. larger all around than final size. Dip the splines in glue and insert them in the grooves. This is one time when you want to see glue slobbering out. Too little glue and there may be gaps around the splines that you'll need to fill later. Let the glue dry overnight. Then mill off the excess length of the splines on the band saw, and sand flush on the belt or disk sander. You should have a box that's a perfect rectangle, with three splines at each corner.

The lid is a series of strips (F) laminated together and then applied around a center panel (G). To make the lid, you'll need to first cut stock (use the same woods that you selected for the box) into a series of strips of varying thicknesses that are all $\frac{1}{16}$ in. wide. For the boxes shown I used an outer border about $\frac{1}{2}$ in. thick, followed by alternating strips of dark and then light wood that are $\frac{1}{8}$ in., $\frac{1}{16}$ in., $\frac{1}{16}$ in., $\frac{1}{8}$ in., and $\frac{1}{16}$ in. thick respectively.

I start with two pieces of koa or bird's-eye maple and two pieces of Indian rosewood. All four pieces should be $\frac{1}{16}$ in. thick by 4 in. wide by 20 in. long. Once I'm sure the pieces are the same size, I set the rip fence on the table saw so that I get, to the left of the saw blade, strips as thin or thick as I like. Don't try to get the strips to the right of the blade (between the blade and the fence) — this is difficult and dangerous. I now rip four strips (two koa or bird's-eye and two rosewood) at the same fence setting. Move the fence a little to the left and rip four more strips, and so on until the stock is too thin to rip anymore. I now have strips to laminate lids for a series of boxes.

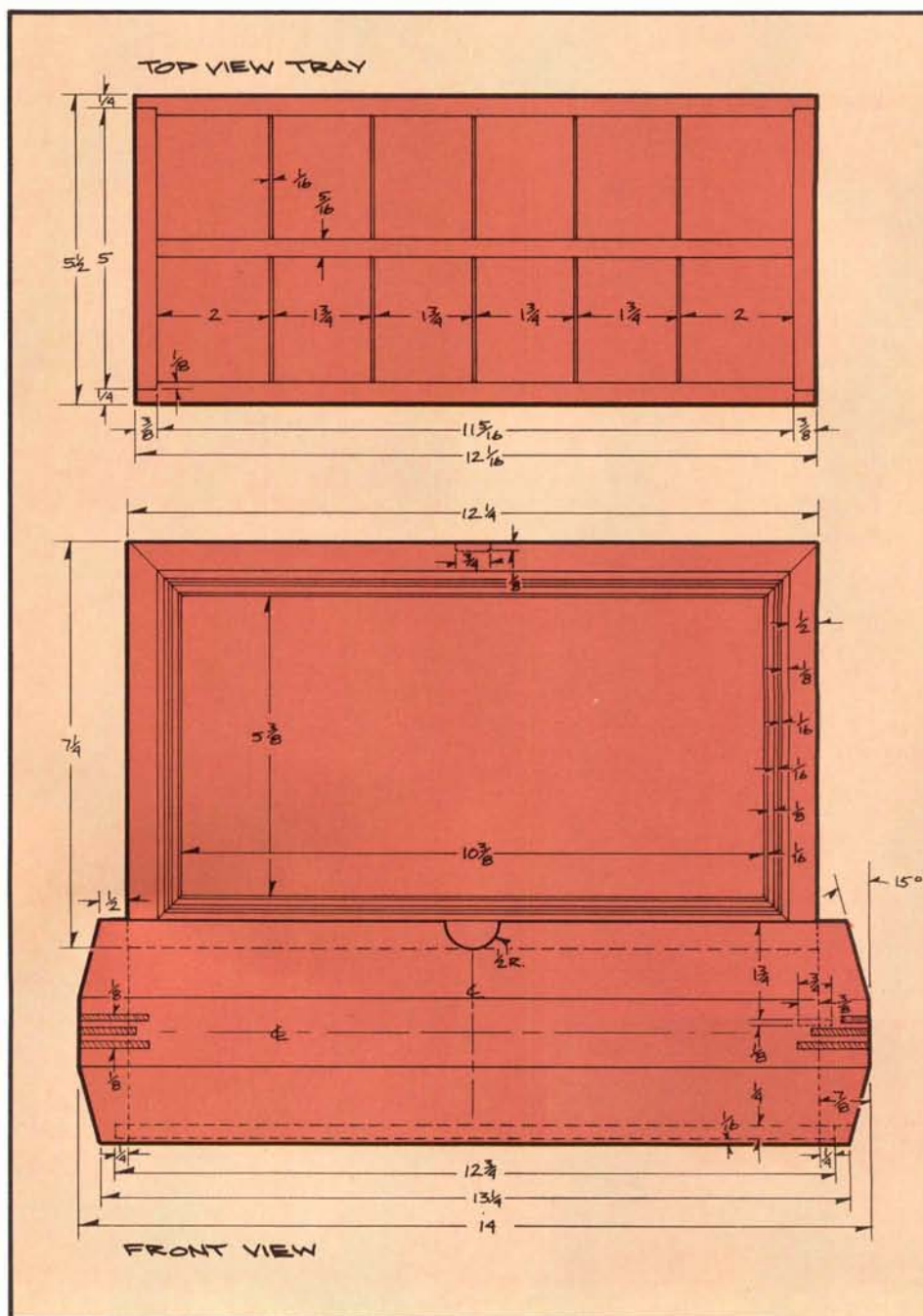
To glue up the strips, first make a gluing jig out of a piece of $\frac{3}{4}$ in. thick plywood about 7 in. wide and 22 in. long, and two strips of $\frac{3}{4}$ in. plywood about 2 in. wide by 22 in. long. Lay newspaper down on the 7 in. wide plywood, then one-by-one laminate the strips in the order you like, starting with the $\frac{1}{2}$ in. thick border strip. You should have six layers. Add the 2 in. wide plywood clamping strips on either side, and clamp crossways with three bar clamps. Place two short clamping blocks over the top of the laminations and clamp them to the plywood base with two 6 in. clamps to keep the laminations from buckling (Fig. 2). Allow to dry for at least 24 hours. Re-

peat the procedure for the second 20 in. long lamination, taking care to keep the individual strips in the same order.

When the lid border lamination has dried, crack it out of its cocoon of newspaper and glue. Crosscut it to yield a side lamination and an end lamination, about $12\frac{1}{2}$ in. and $7\frac{1}{2}$ in. long respectively, or just slightly longer than the final length and width of the lid. Set the rip fence to about $\frac{1}{16}$ in. and raise the blade to a 1 in. height. With the laminations on edge, rip one face to clean off the excess glue and produce a smooth surface. Move the fence in so that it's $\frac{3}{4}$ in. from the blade, turn the pieces, and rip again to clean up the opposite face. Repeat this

process for the second lamination.

Select the center panel from your finest figured stock. Make sure it is kiln dried and has been allowed to acclimate. A center piece of solid wood this size will expand and contract slightly with changes in climate. The lid will not come apart, however, because the center panel is edge-glued to the laminated border, which is splined together. Prepare the stock for the center panel as you prepared the sides and ends. Keep it as thick as possible, ideally about $\frac{7}{8}$ in. Make sure it is a true rectangle at least large enough so that its width plus the two laminations and its length plus the two laminations are slightly larger than the box open-



ing. Then rip the panel in a series of cuts, taking off only a small bit at a time, until it's just wide enough to fit in the box with the laminations all around.

Once the lid panel and the lid border are cleanly milled, miter the border and glue it on. Let the assembly dry.

After the bevels are cut on the lid, it will be only $\frac{1}{2}$ in. thick at the perimeter. Center the lid splines on that $\frac{1}{2}$ in. Using the table saw jig you made for the spline grooves in the box, cut the spline grooves in the lid. Glue the splines in place and let dry.

Trim the splines using the band saw, and sand them flush. Also sand the inside face of the lid flat. The top of the

lid is beveled on the table saw. Raise the blade as high as it will go and incline it 6 degrees off the vertical. Locate an auxiliary rip fence so that you'll have the $\frac{1}{2}$ in. thickness remaining at the edge. Cut the long bevels first, and then the short bevels. If your center panel is about $\frac{7}{8}$ in. thick, as mine is, then you'll end up with a small flat at the top.

Now use the belt sander to soften the sharp edges of the bevels and produce the domed shape. Don't reduce the thickness at the edge; concentrate your efforts toward the center. Also, round the rear edge of the lid as shown so it will not bind when opened.

Fit the lid by sanding the edges till it

just slips within the box. Then wedge the lid in place with a few slips of paper, and drill the $\frac{3}{2}$ in. diameter by $1\frac{1}{2}$ in. deep hinge pin holes. It's important that you select the proper hardware for this part — and spare no expense. I use four-penny finish nails, \$1.79 for a box of 1000. Locate the hinge pin hole about $1\frac{3}{8}$ in. from the back of the box (see Side View), centered squarely in the middle of the spline in the lid. The idea is to position the hole so the lid tilts back at a comfortable angle when open. That way it won't unexpectedly slam shut on its owner's fingers.

Once you are satisfied with the lid location, remove it and cut the bevels on the sides and ends of the box. These bevels are cut with the table saw blade angled to 15 degrees. Set up your fence so that the thickness of the sides at the top and bottom edges is $\frac{1}{2}$ in. Sand the bevels, but do not soften the crisp corners. Fill any gaps with a mixture of sawdust and glue before final sanding.

Next, cut the two rails that support the tray, and the two posts (E) that support the lid. Glue these parts in place, but test-fit the posts to make certain they stop the lid flush with the top.

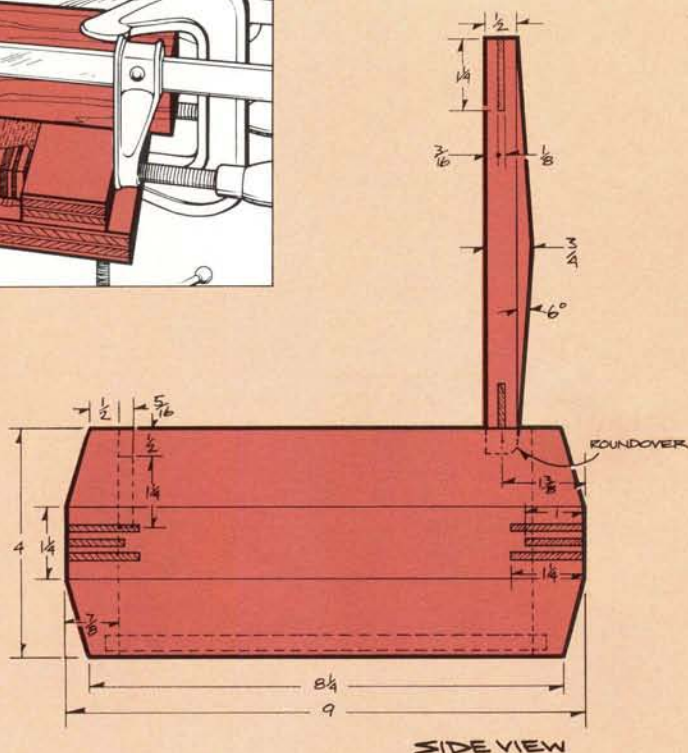
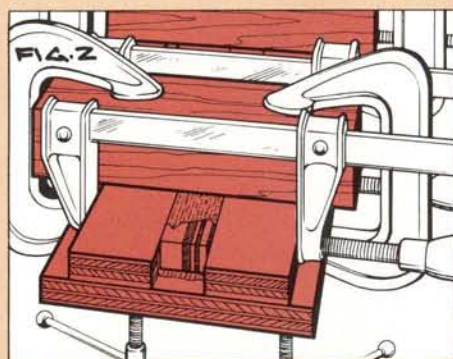
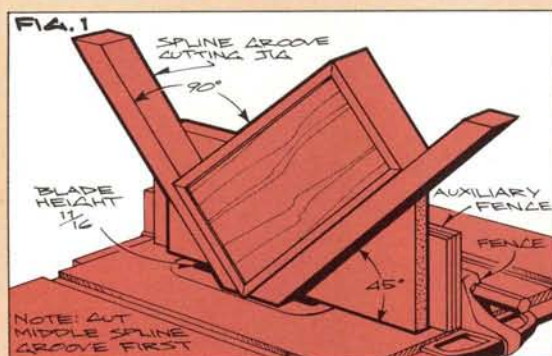
I cut the thumb radius in the box front by roughing it in with the chisel, and then wrapping some sandpaper around a 1 in. diameter dowel to final shape the radius. The thumb slot in the front edge of the lid can be cut on an overarm pin router, if you have one, or by drilling a series of side-by-side holes with a $\frac{5}{16}$ in. diameter drill bit. Clean out the waste with a sharp knife.

To final mount the lid, chop the heads off the finish nails, drive them halfway through the box side with a tiny punch or another nail, and plug the holes. I sand some stock to a $\frac{3}{32}$ in. diameter for the plugs.

Finish the box with Watco oil. Flood on a coat, rub with 00 steel wool, and wipe dry. Wait 36 hours, then steel wool to remove the Watco crust. Blow off the dust and apply paste wax.

The tray is a straightforward construction of ends (H) rabbeted into sides (I) assembled around a plywood bottom (J). A velvet-over-posterboard liner cushions items placed in the box. The divider assembly (K and L) is mounted over the liner and is cut for a press-fit into the tray. Brads through the tray ends anchor it.

Tony Lydgate is a professional woodworker who lives and works in Palo Alto, California.



We won't make any claims for downhill speed records with this sled. It's strictly for small fry and safe, gentle hills. We do promise that delight will register on those little faces when they spy it under the Christmas tree.

Our sled is made from $\frac{3}{4}$ in. thick oak, except for the $\frac{1}{2}$ in. thick plywood top (A). A $\frac{3}{4}$ in. thick by 8 in. wide by 7 ft. long board will yield all the oak parts.

The top is a good place to start. We used cabinet-grade birch plywood, which is fairly free of voids. If you use a construction-grade fir plywood, be sure to fill the edges and sand well to eliminate splinters. Lay out the top profile (the grid pattern will help with the front) and cut out with a band saw or jigsaw. Drill the carriage bolt hole,

fill any voids, sand the edges well and then paint. We applied two coats of Rust-oleum Regal Red aerosol.

Next, lay out the various oak parts. Contour the front and back cleats (B, C) to match the profile of the top. The 25-degree angles on the stop (D) are cut on the table saw. Cut the steering and back stretchers (E, F) to size, referring to the grid pattern for the profile on the ends of the steering stretcher. Drill the $\frac{5}{16}$ in. diameter pull-cord holes in the steering stretcher.

The four runners (G) are made by first laying out and cutting one runner, and then using it as a template for marking the other three. Again, refer to the grid pattern for the runner shape.

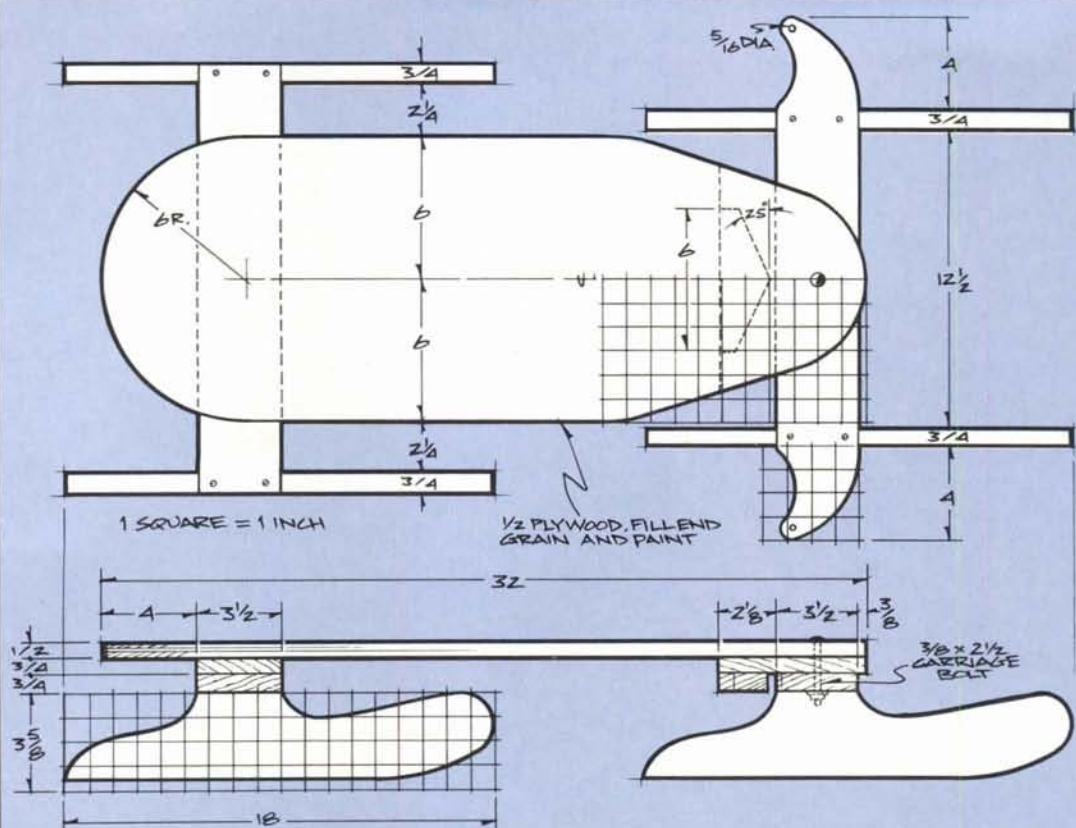
After cutting four triangular glueblocks (H), assemble the sled. The

front and back cleats are glued and screwed in place with 1 in. by no. 8 screws. We also glued and screwed the back stretcher, stop and runners. Use $1\frac{1}{4}$ in. by no. 8 screws to fasten the back stretcher and stop, and $1\frac{1}{4}$ in. by no. 10 screws to mount the runners. To avoid rust, use brass or galvanized screws. The glueblocks help provide rigidity.

Finish the oak parts with Deft spray polyurethane, then mount the front steering stretcher and runner assembly with a $\frac{3}{4}$ in. by $2\frac{1}{2}$ in. long carriage bolt. Use flat washers between the front cleat and steering assembly and under the locknut. The locknut insures that the sled won't come apart during use. Make sure the bolt, washers and locknut are galvanized. A clothesline pull completes the sled. 

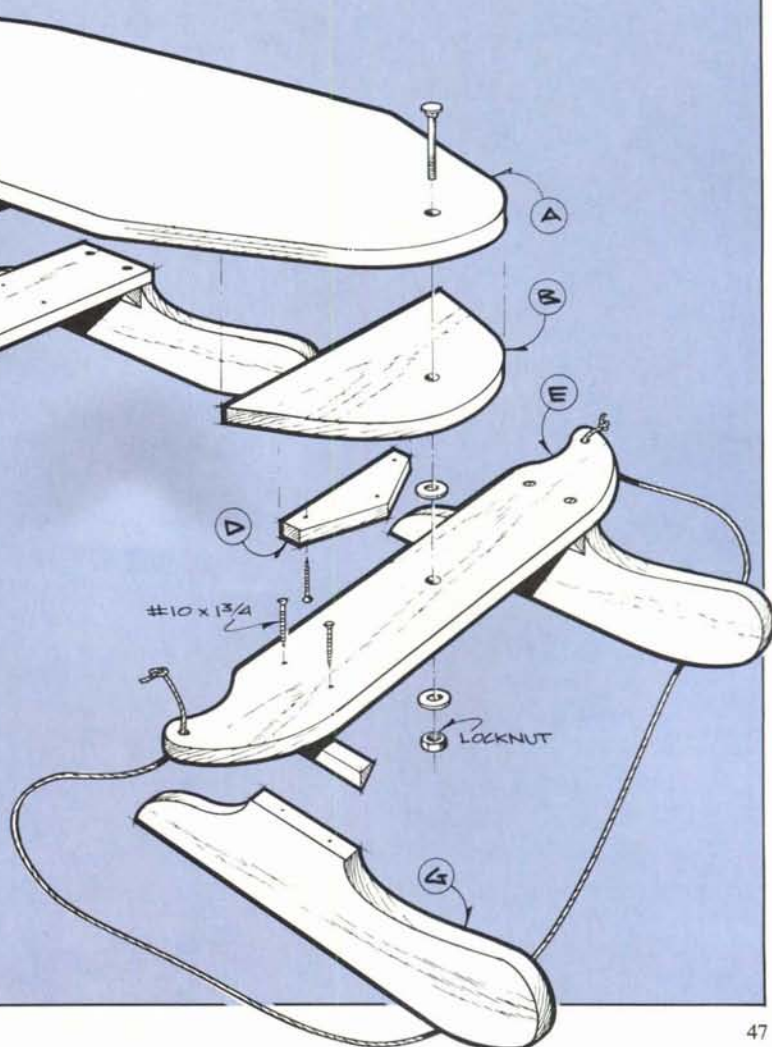


Kids' Bobsled



Bill of Materials
(all dimensions actual)

Part	Description	Size	No. Req'd.
A	Top	1/2" x 12" x 32"	1
B	Front Cleat	3/4" x 6" x 9 1/4"	1
C	Back Cleat	3/4" x 3 1/2" x 12"	1
D	Stop	3/4" x 2" x 6"	1
E	Steering Stretcher	3/4" x 3 1/2" x 22"	1
F	Back Stretcher	3/4" x 3 1/2" x 18"	1
G	Runner	3/4" x 3 5/8" x 18"	4
H	Glueblock	3/4" x 3/4" x 3 1/2"	4



St. Nicklaus

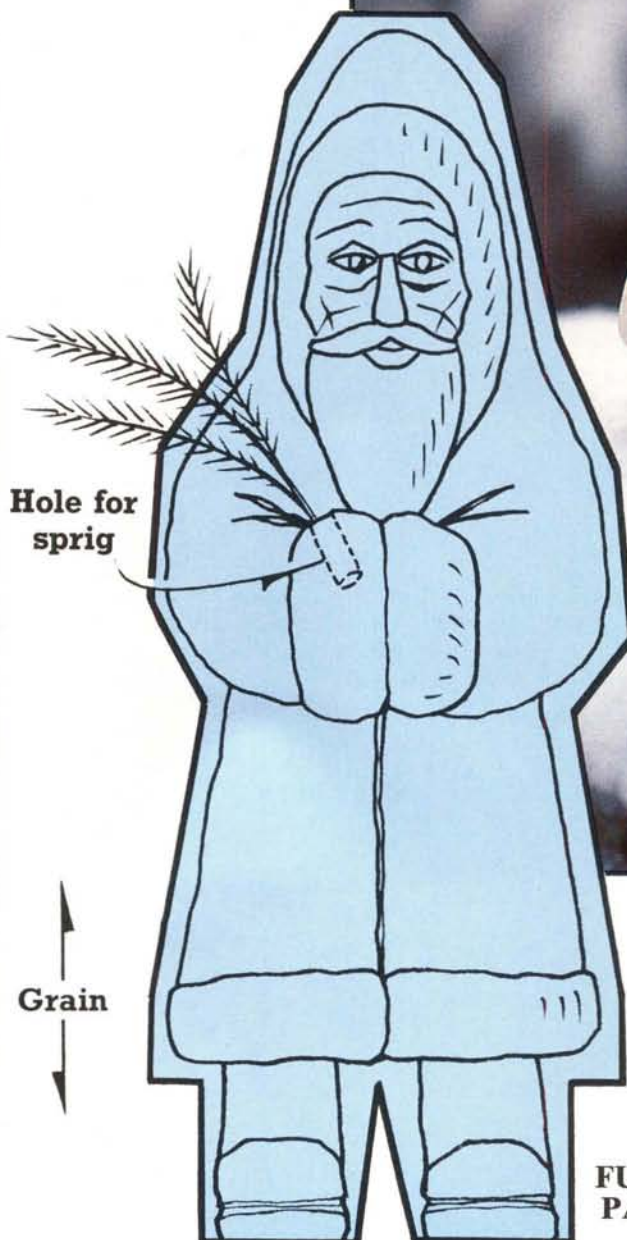
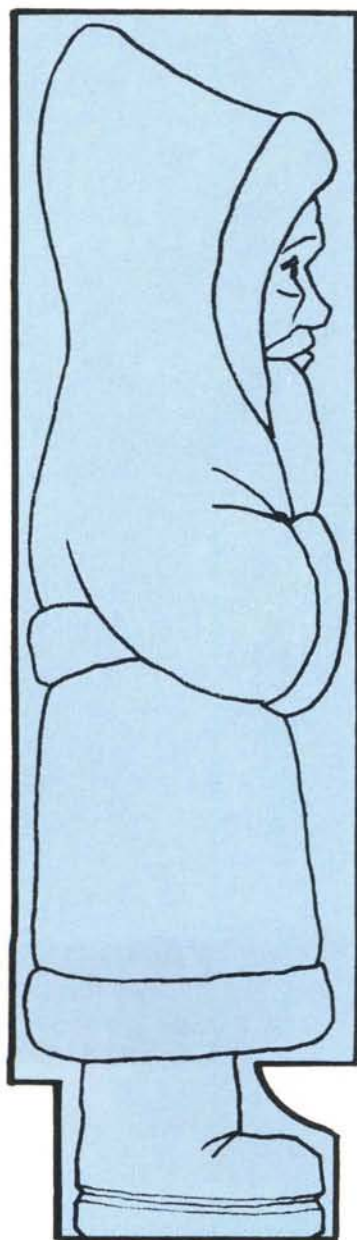
Carving

by Rick and Ellen Bütz

*This project is excerpted from the book, **Woodcarving With Rick Bütz**, by Rick and Ellen Bütz. Ordering information can be found on the insert bound in the center of this issue.*

Many of our Christmas customs come from Germany, among them the Christmas tree and several favorite carols. None, though, has found a warmer place in our hearts than St. Nicklaus.

The roots of the St. Nicklaus tradition go back several centuries to a certain early bishop who, because of his legendary acts of kindness, became the patron saint of students and children. In time, St. Nicklaus' feast day, December 6, was celebrated by the giving of gifts to small children in the saint's name.



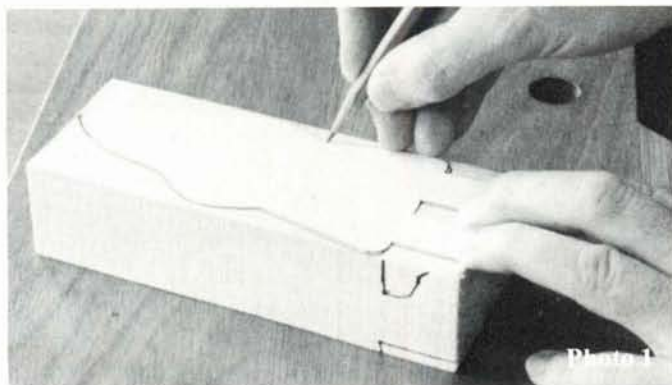
**FULL-SIZE
PATTERN**

As the tradition flourished in the remote Black Forest region of Germany, small figures of St. Nicklaus, like this one, were often whittled as gifts. These early carvings were usually blue or green or even brown, instead of the red we've come to associate with "Santa Claus."

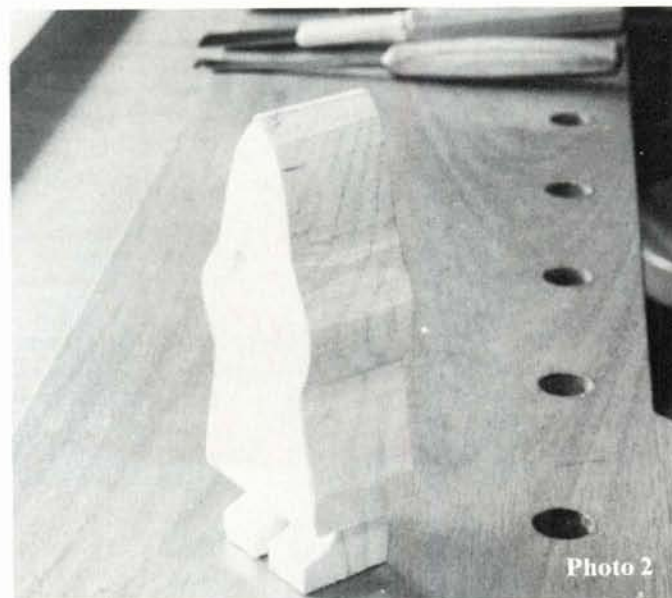
I love to make these little carvings in the fall when the chill in the air reminds me that winter isn't far away. It seems that some of the magic of Christmas is reflected in the feeling that I always get when suddenly, after hours of patient whittling on a block of wood, a little person appears to be looking back at me. The carving really seems to take on a life of its own.

Try carving St. Nicklaus and I think you'll feel the magic yourself.

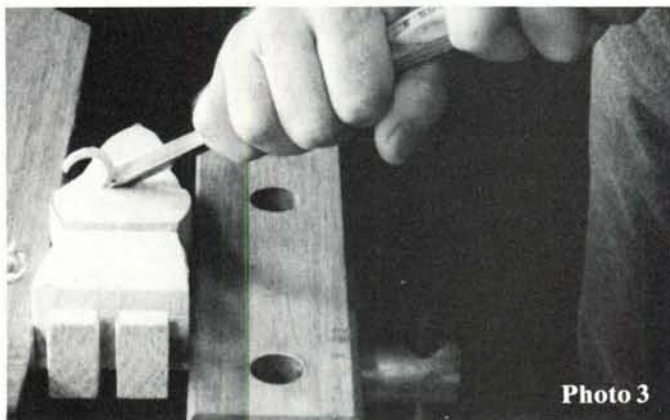
I used air-dried white pine for this St. Nicklaus. Pine is a traditional carving wood in the mountain regions where this type of figure was first carved. I love the fragrant scent of the pine shavings, reminding me of Christmas trees and pine bough decorations.



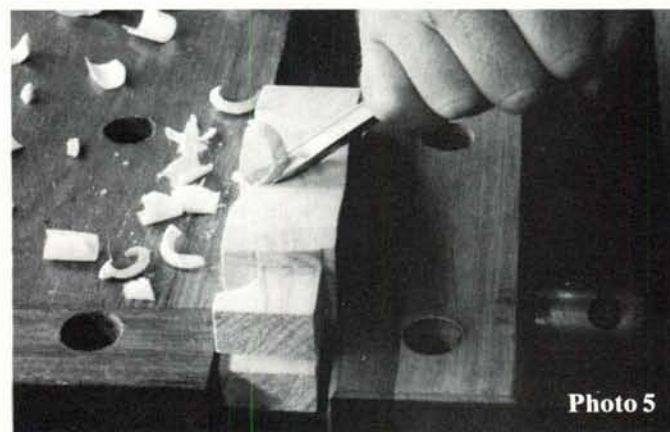
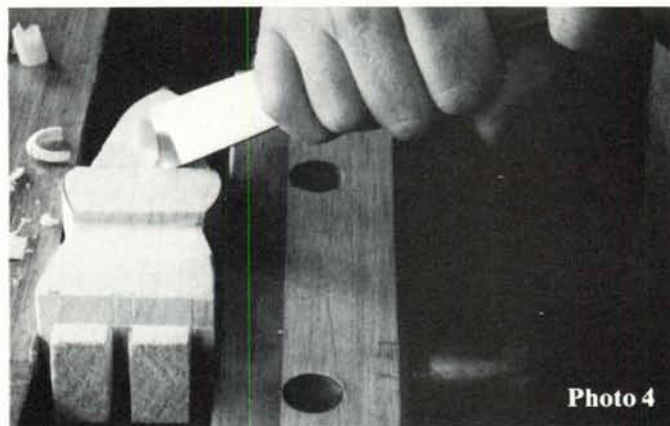
Begin by drawing the front and side views of St. Nicklaus on a block of wood $2\frac{1}{2}$ in. by $6\frac{1}{2}$ in. by $1\frac{1}{4}$ in. thick. You'll notice that I only drew in the feet on the side view; the rest will be shaped with carving tools (Photo 1). Cut out the blank on a band saw beginning with the side view. This will leave you with a flat surface to rest your blank on when cutting out the front view (Photo 2).



If you have a carving bench with a vise and some gouges, you can begin this carving in the same way a mountain wood-carver of a small Alpine village would. In roughing out, the gouges are more efficient than a knife, since they take off the waste wood more quickly. Otherwise, you can carve St. Nicklaus entirely with a knife, but it takes a little longer.

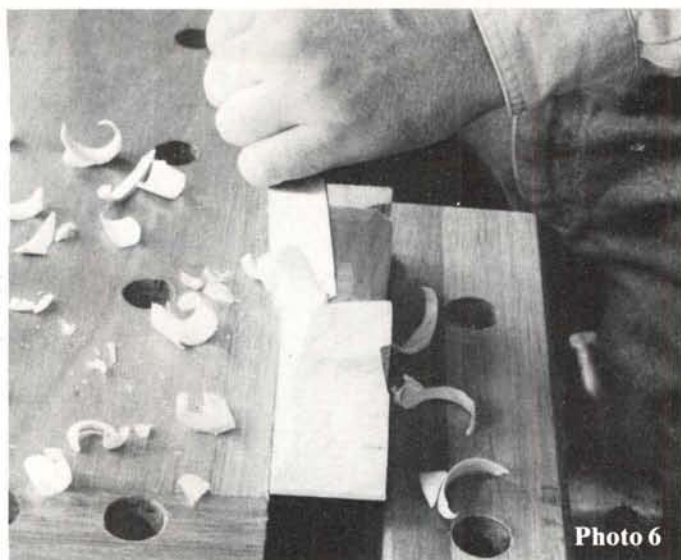


Fasten the carving in the vise and use a V-gouge, 6 mm to 10 mm wide, to mark the top and bottom of his sleeves (Photo 3). Then use a flat 30 mm no. 2 gouge and bevel the wood down to the level of the V-gouge cut on either side of the sleeves, leaving them raised (Photo 4).

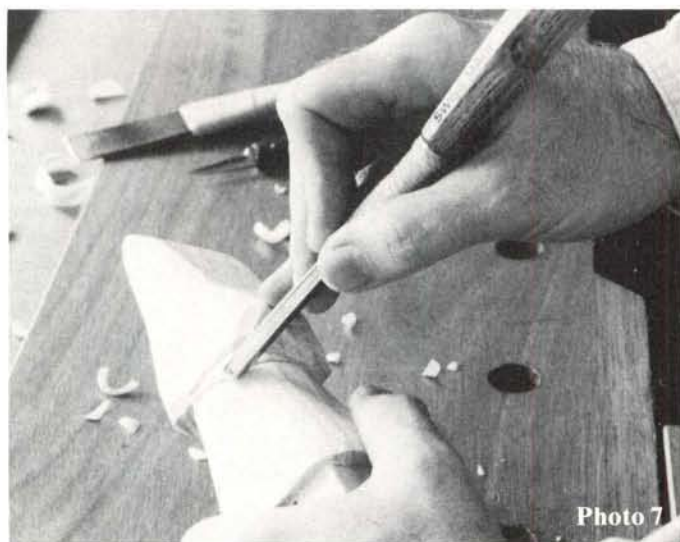


Turn the carving sideways and reclamp it in the vise. Then use the V-gouge to make a diagonal cut to outline the bottom of the arm (Photo 5).

(continued on next page)



Then round off the sharp corners of the block with the no. 2 gouge (Photo 6). Continue rounding over to the middle of the back. Do the same on the other side, using the V-gouge to outline the arm, and the flat gouge to round the corners. The back should be slightly rounded.



Now that most of the excess wood has been removed, take the carving out of the vise. The rest of the work on St. Nicklaus will be done while he's held in your hand.

Use the V-gouge again to outline the belt with a shallow cut. Hold the gouge the way you would hold a pencil and gently push it through the wood with your fingertips. Remember, don't let the fingers of your left hand get in front of the cutting edge of the gouge (Photo 7). Notice that I've wrapped heavy string around part of the shaft of the blade. The string makes the tool more comfortable to hold when you're making this type of cut. I learned this technique while visiting some woodcarvers in Switzerland. It really helps.

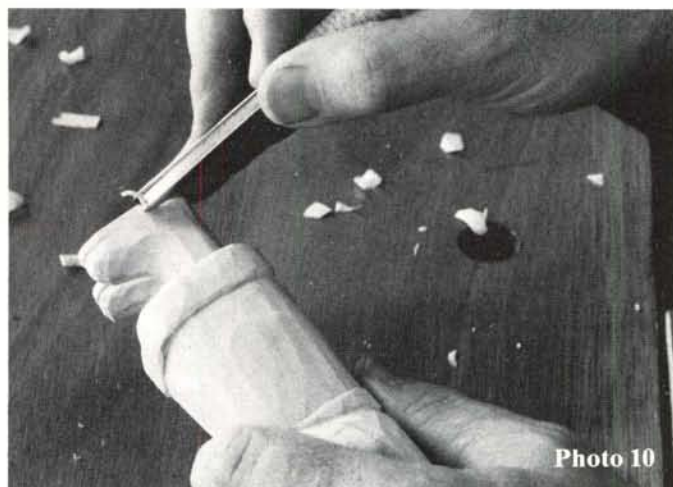
Now use your carving knife to pare the wood on either side of the belt down to the cut. This leaves the belt raised above the cloak (Photo 8).

Use the same techniques to make a 1/2 in. wide ruff around the hem of St. Nicklaus' cloak.



Next, shape the feet by rounding off the sharp angles (Photo 9). Be careful not to carve against the grain. You can tell when this is happening because your knife starts digging into the wood, making splinters. If that happens, reposition your hands and the wood so you're carving from the opposite direction.

Working with the grain is especially important around the feet because the toes are fragile. Carving against the grain can easily split them off. If a toe does break off, glue it back in place with some wood glue and continue carving when it has dried.



After shaping the boot, use the V-gouge to incise a very shallow line around the bottom to form the sole of the boot (Photo 10).

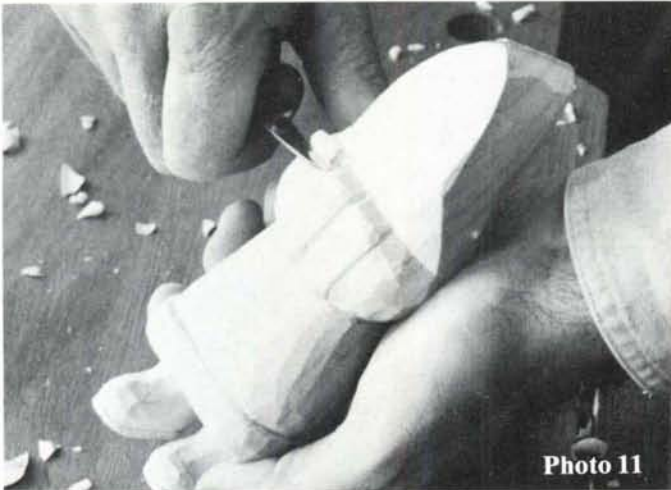


Photo 11

Mark out the cuffs on the sleeves by making a shallow cut down the center of the sleeve area, and a cut about $\frac{1}{2}$ in. on either side of it with the V-gouge. Then pare away the wood of the sleeves leaving the cuffs raised (Photo 11).

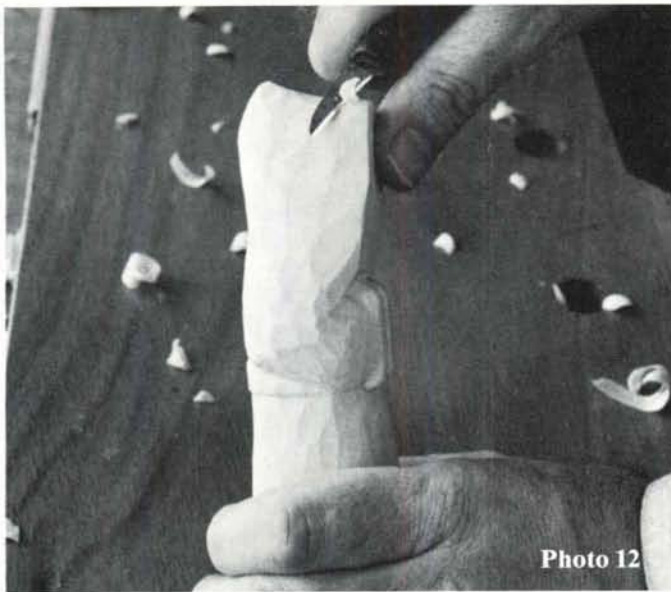


Photo 12

With your knife, round the back of the head to form St. Nicklaus' hood. Then carve the top of the hood down so it slopes toward the face (Photo 12).



Photo 13

Draw a line around the hood about $\frac{1}{4}$ in. back from the face. Then cut along it with your V-gouge (Photo 13). Next, use your knife to pare away the excess on the face side of your V-gouge cut (Photo 14). Repeat this procedure until the face is about $\frac{7}{8}$ in. wide with $\frac{1}{4}$ in. of hood standing proud around it.

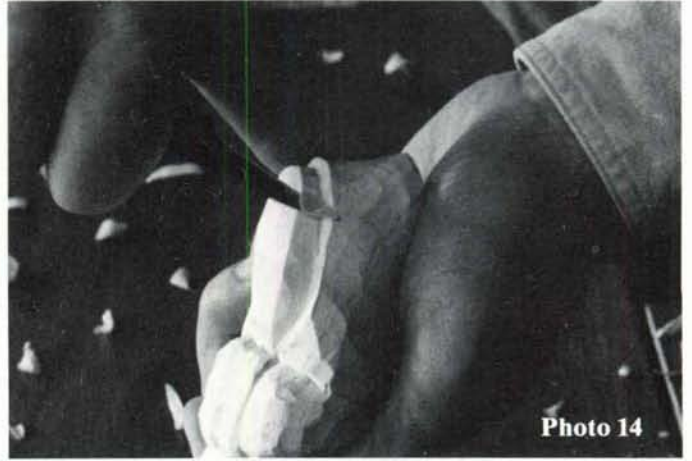


Photo 14

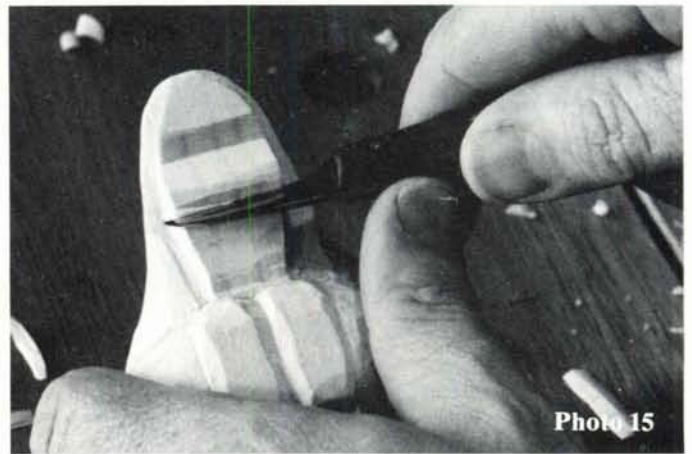


Photo 15

Draw a line for the eyes $\frac{1}{2}$ in. down from the top of the forehead, and draw another line $\frac{1}{2}$ in. below that for the bottom of the nose. Then make two notches about $\frac{1}{8}$ in. deep where you drew the lines (Photo 15).

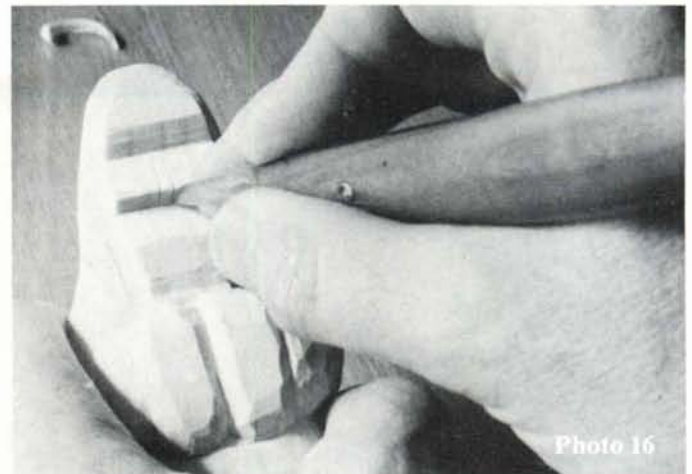


Photo 16

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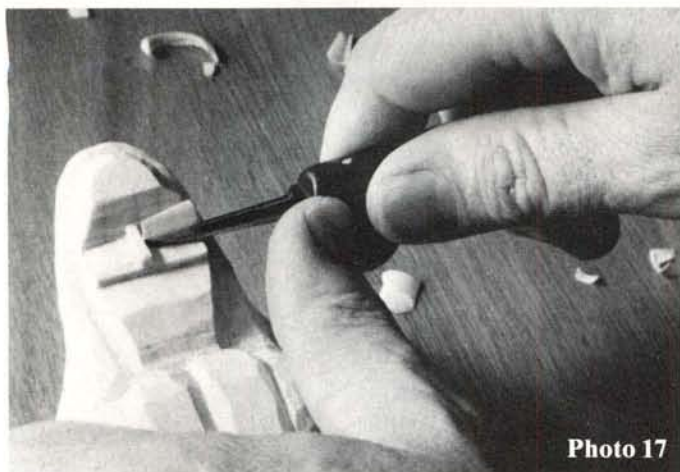


Photo 17

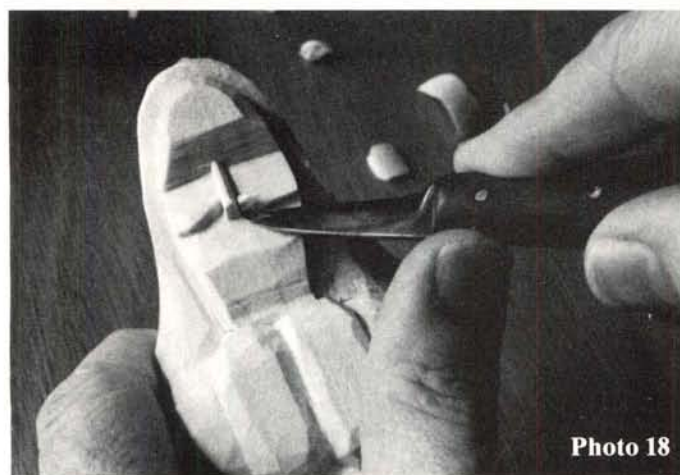


Photo 18

The next several steps of carving the face can be a bit tricky. You may want to practice on a scrap of wood to get a feeling for carving the details.

Holding the knife in the pencil grip, incise the two lines that will form the sides of the nose (Photo 16). Then pare away the excess wood over the cheeks (Photo 17). To shape the cheek, remove a small triangular chip by making a vertical cut between the cheek and the nose and then making a small horizontal cut to slice the chip free (Photo 18). Then round over the sharp angles on the cheek and forehead.

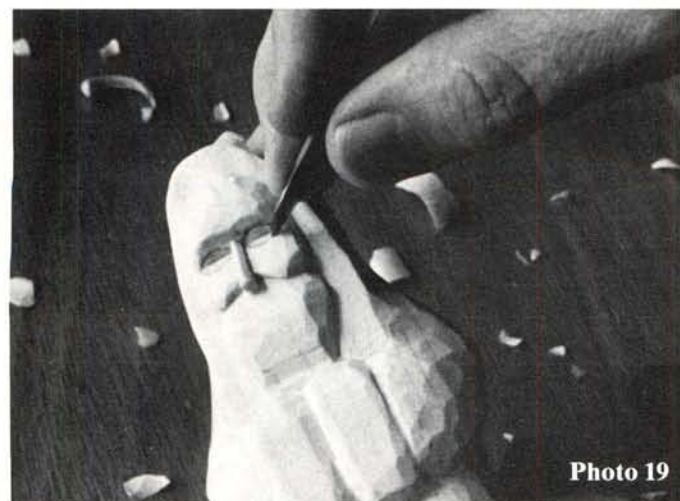


Photo 19



Photo 20

To shape the eyes, hold the knife in the pencil grip and incise a very shallow cut (about $\frac{1}{32}$ in. deep) around the outline of the eye (Photo 19). Then carefully slice away a very thin chip above and below the eye area (Photo 20). To make the pupil of the eye, remove a tiny triangular chip of wood from the bottom eyelid by taking the point of your knife and making three cuts angled so they meet at the bottom (Photo 21). At this point, you'll really start to see St. Nicklaus in the wood.

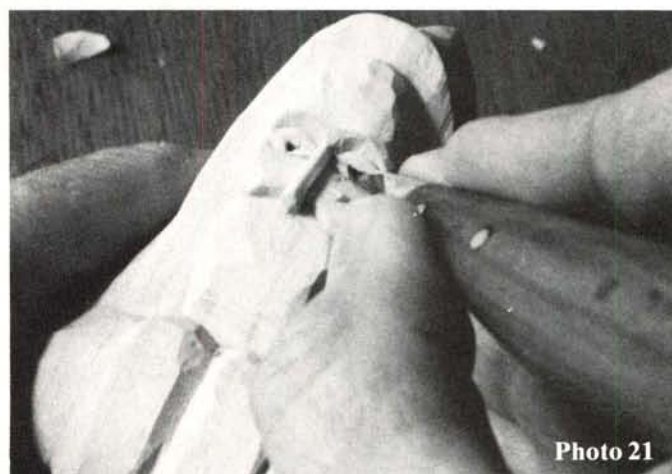


Photo 21



Photo 22

Next, holding the knife in the pencil grip, draw a line to establish the lower edge of the mustache and a second line for the lower edge of the mouth (Photo 22). Then use the point of the knife and pare away a thin chip below each of the cuts (Photo 23). This is similar to the technique used to shape the eye.



Photo 23



Photo 24



Photo 25

Now that the face is done, you're ready to start the finishing details. Use a V-gouge to texture the long hair of the beard and mustache. A little 3 mm V-gouge is perfect for this if you have one (Photo 24).

With the V-gouge, carve a line around the hood meeting at the beard to form the fur ruff on the hood. Round it slightly with a knife.

Then, using the V-gouge again, make a series of short cuts to create the fur texture on the cuffs, hem, and hood of St. Nicklaus' cloak (Photo 25).

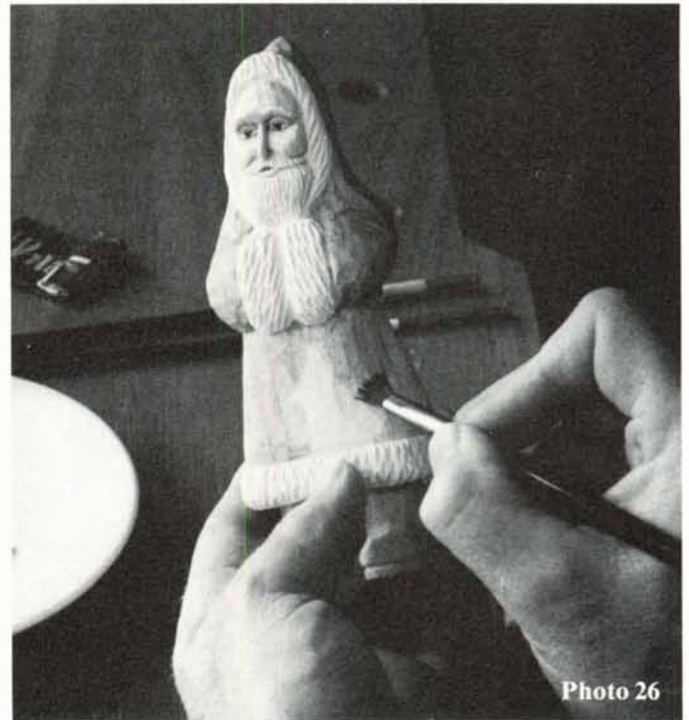


Photo 26

The carving is now done. But before you start painting, drill a small hole at a downward angle in the crook of his arm. This will hold the traditional good luck sprig from your Christmas tree.

The painting techniques used on this carving are very simple. For St. Nicklaus' white beard and eyebrows and the trim on his cloak, use white acrylic paint thinned with water to a good brushing consistency. For these areas, I find acrylic covers better than oil paint. But for the other colors, I use oils since they have a softer look.

After the white paint has dried, you may paint the cloak any color you choose. I like cerulean blue, because it is very close to the azure color traditionally used in some areas of Germany.

Squeeze a little oil paint into a saucer and thin it with turpentine until it becomes a transparent stain. This paint mixture will allow the wood grain to show through and add extra character to your carving. Paint it on the carving with a soft sable brush (Photo 26). Paint the boots and belt with black oil paint also thinned to a stain with turpentine. As a historical note, this style of painting is called tinting and is seen on many of the old European woodcarvings.

You may find yourself carving several of these for friends and family. Although some of the fine details may be challenging, this type of woodcarving gets easier to do with each new one you make.

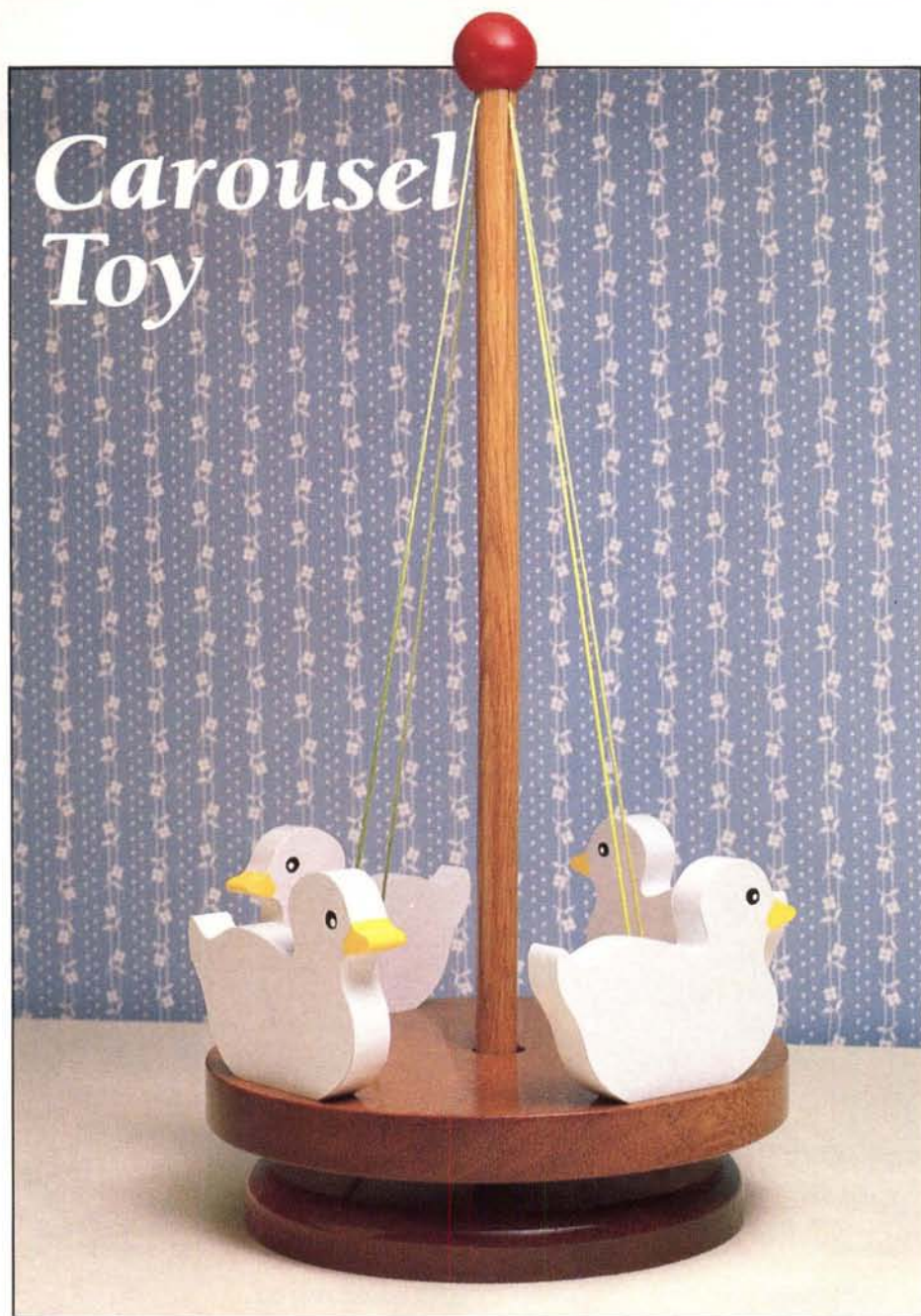


A version of a traditional toy, this small carousel seems especially enchanting to young children. The spinning disk rises and falls as the ducks go back and forth in their merry-go-round. The effect seems to cast a spell on the little ones.

We made our carousel from scrap we had around the shop: mahogany for the base (A) and spinning disk (B), and pine for the ducks (D). Start by laying out the two circles for the base and the disk. Then cut out the circles and drill the center holes in the base, disk and ball (E). Also drill for the screws that hold the ducks onto the disk, and the $\frac{1}{16}$ in. diameter holes for the string. Soften the edge of the base with a $\frac{3}{8}$ in. radius round-over bit in the router. Cut out the ducks using our full-size patterns as a guide.

Next, cut the pole (C) to length and establish the two $\frac{1}{4}$ in. deep kerfs that hold the strings in place. A dovetail saw works well for the thin kerfs. Sand all the parts thoroughly before finishing and assembling the toy. The base, disk and dowel are finished with three coats of Minwax Antique Oil Finish. The ducks and ball are first primed and then painted with enamels: red for the ball, white for the duck body, yellow for the beak, and black for the eyes.

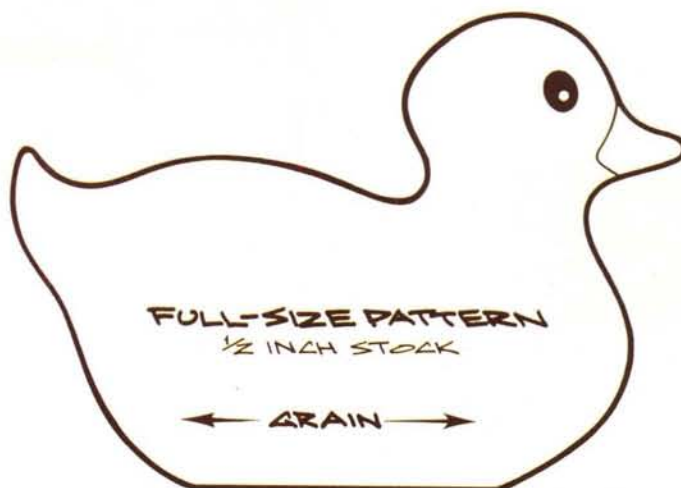
The ducks are screwed into the disk with $1\frac{1}{4}$ in. by no. 6 flathead screws. The pole is glued into the base. The string is inserted through the holes and looped over the top of the pole. We used one continuous length of string, rather than four separate pieces. Adjust the length so that the disk is suspended about $\frac{1}{2}$ in. above the base. Finally, secure the ball with a dab of glue. 

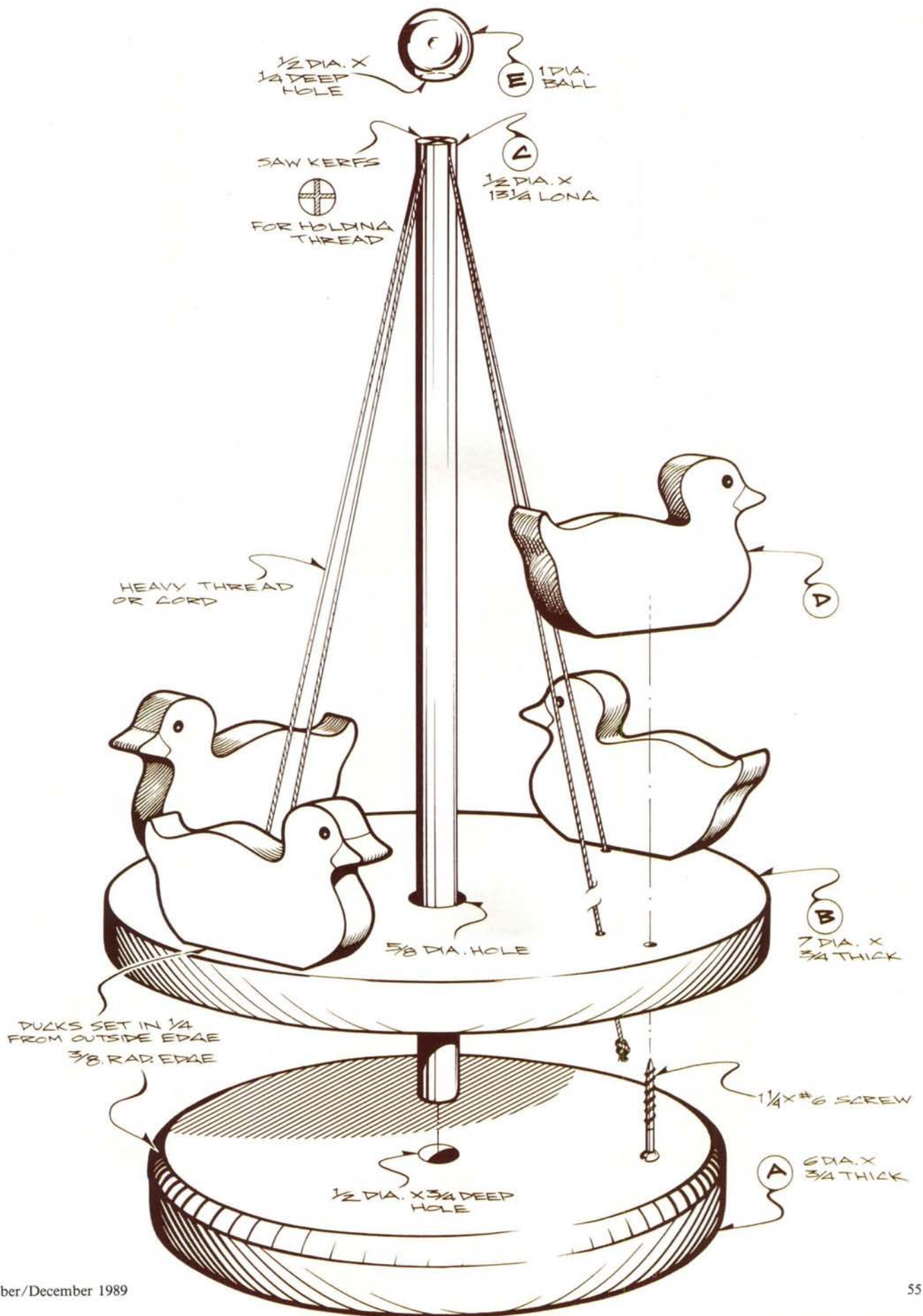


Bill of Materials (all dimensions actual)

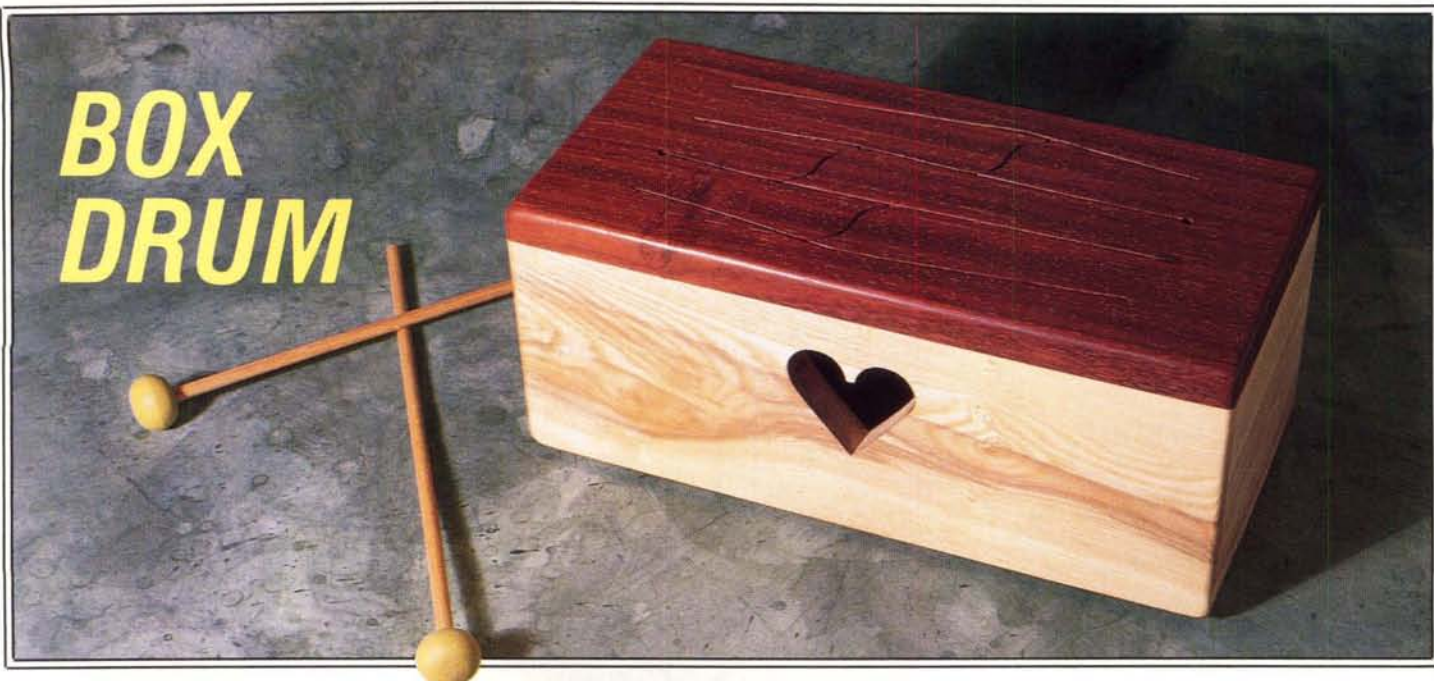
Part	Description	Size	No. Req'd.
A	Base	6 in. dia. $\times$ $\frac{3}{4}$ thick	1
B	Disk	7 in. dia. $\times$ $\frac{3}{4}$ thick	1
C	Pole	$\frac{1}{2}$ in. dia. $\times$ $13\frac{1}{4}$ long	1
D	Duck	see full-size pattern	4
E	Ball	1 in. dia.*	1

* Available from Constantine, 2050 Eastchester Road, Bronx, NY 10461; (212) 792-1600. The catalog number is WB100.





BOX DRUM



Oregon woodworker Gary Damaskos has built a business selling these wooden drums. His company, Nova Diversified, claims the drums are especially great for kids, providing an outlet for creative expression and spontaneity, while developing eye/ear/hand coordination. We can say with certainty that the drums are fun to play — whatever your age.

Damaskos tells us that the origin of the Box Drum is pre-Columbian, and that it was developed independently by Aztec, Mesoamerican and African cultures. Other names for it are tongue drum, slit drum or bongo box.

The first box drums were simply hollow tree trunks, with an H-shaped slit cut into the side. The H shape resulted in two pitches. Combinations of several size tree trunks were used to create melodies.

The drum shown is crafted in ash, with a padauk head and a plywood bottom. While other woods can be substituted, we recommend that you stay with hardwoods for the sides (A), ends (B) and head (C).

The Box

Start by getting out stock for the sides and ends. The sound hole isn't a must, but it does improve the tone a little. Refer to the grid pattern for the heart profile. It's easiest to cut the sound hole with a scroll saw before assembly. Next cut a $\frac{1}{2}$ in. wide by $\frac{3}{4}$ in. deep rabbet on the ends of the sides, and then assemble the sides and ends.

The Head

While you are waiting for the side/end assembly to dry, go to work on the head. It's important that you select a piece of hardwood that meets three criteria. It should be attractive, thoroughly seasoned, and reasonably straight-grained. Don't reach for that highly figured bird's-eye maple or walnut crotch. Chances are the wood will be under tension, which would be released when the tongues are cut, causing them to warp or bind.

The thickness of the head is $\frac{1}{16}$ in. Start with stock about $\frac{3}{4}$ in. thick, then joint flat the face that will be glued down to the box. The power jointer is the best tool to use, although the hand plane can also be used.

To transfer the tongue pattern, slip a sheet of carbon between the full-size pattern page and your stock, and trace the tongue outlines. Damaskos uses a jigsaw to cut the tongue pattern. Drill starter holes as shown to provide entrance points for the jigsaw blade. After cutting, use a belt sander with a 150-grit belt to sand off the chip-out. Don't get carried away with the belt sander, though. The head thickness needs to stay within $\frac{1}{32}$ in. of the $\frac{1}{16}$ in. dimension (not less than $\frac{2}{32}$ in.).

The next step is to rout a $\frac{1}{2}$ in. wide blind dado on the underside of the head, as shown in Fig. 1. It's important that the depth of the dado be figured to leave exactly $\frac{3}{8}$ in. of material. Any deviation (even as little as $\frac{1}{16}$ in.) will detract from the quality of the sound. If your head thickness is exactly $\frac{1}{16}$

in., then the dado depth must be $\frac{1}{16}$ in. to leave the required $\frac{3}{8}$ in. Note that the side of the dado starts at about the end of the jigsaw cuts and that the dado extends in $\frac{1}{2}$ in. toward the center. A plunge router is ideal for this type of cut, but you can also use a regular router. Set the desired depth, use a fence, and plunge the cutter in by tipping the router slightly. Stop the router at each end, so the dado is no more than $4\frac{3}{8}$ in. long. You'll probably need several passes to achieve the full depth.

Bill of Materials

(all dimensions actual)

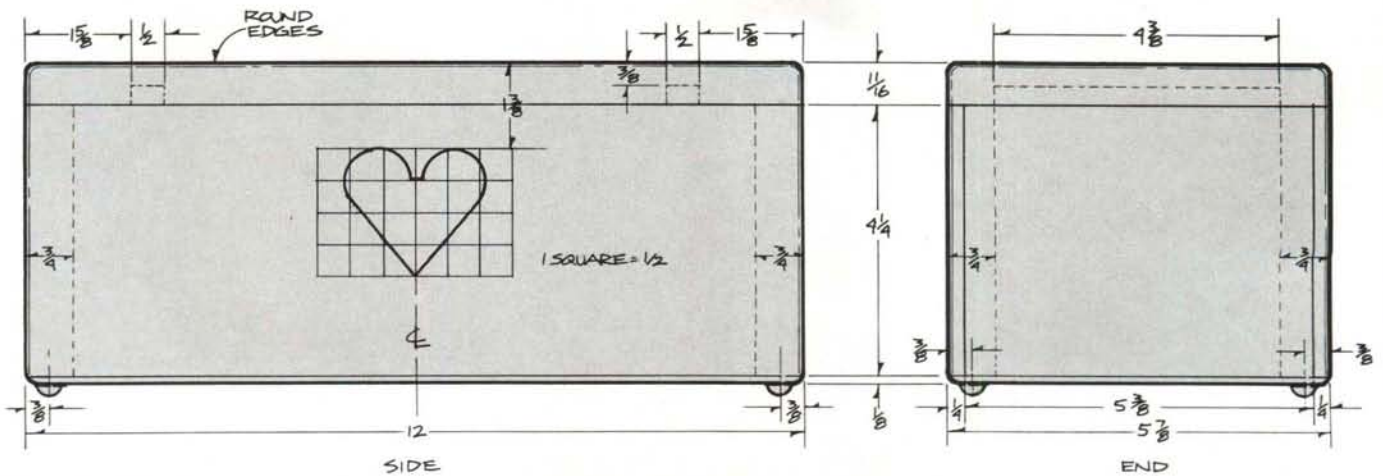
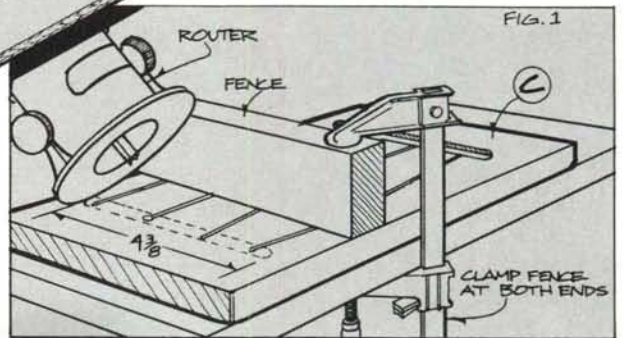
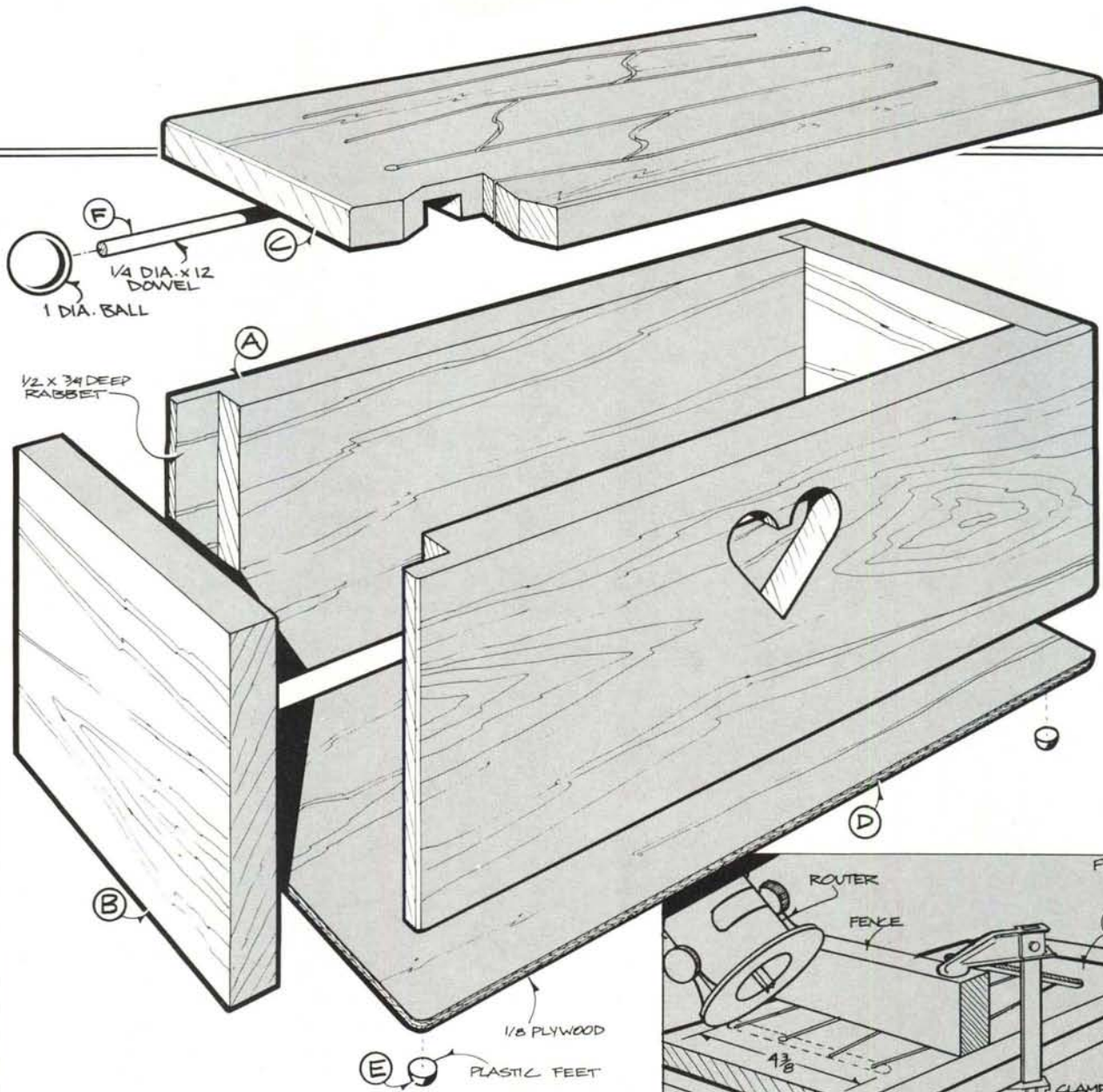
Part	Description	Size	No. Req'd.
A	Side	$\frac{3}{4} \times 4\frac{1}{4} \times 12$	2
B	End	$\frac{3}{4} \times 4\frac{1}{4} \times 5\frac{7}{8}$	2
C	Head	$1\frac{1}{16} \times 6 \times 12\frac{1}{8}$ *	1
D	Bottom	$\frac{1}{8} \times 6 \times 12\frac{1}{8}$ *	1
E	Foot	as shown	4
F	Mallet	as shown**	2

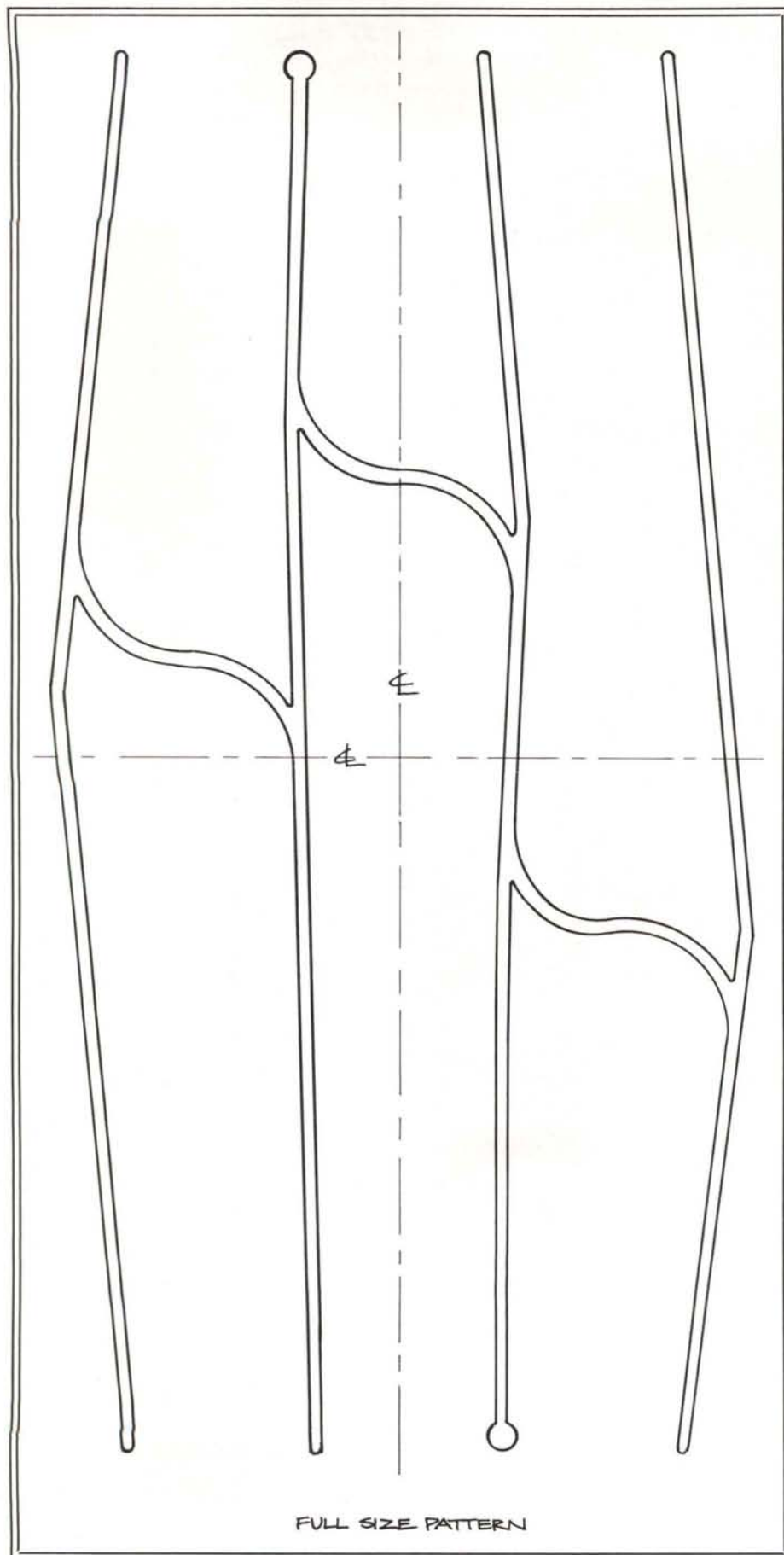
* Parts are slightly oversize before assembly and final sanding.

** Available from Nova Diversified, 1104 N.E. 28th Ave., Portland, OR 97232. Cost is \$7.50 postpaid for one pair.

Next, take sandpaper strips and sand between the tongues to remove any loose wood fibers. If any of the tongues are binding, try recutting with the jigsaw to widen the kerf. In some rare cases, if recutting does not correct the binding, you may need to discard the head and try a new piece of stock. If a tongue warps slightly so that the

The Woodworker's Journal





kerf is not consistent, then sand as needed to open up the kerf.

Assembly

Before you start gluing up, make certain that the top and bottom edges of the box are perfectly flat. Damaskos uses a very light cut on the jointer to true the edges. Another option is to set up 120-grit sandpaper on a section of Medium Density Fiberboard (MDF), and clamp it to the saw table or some other *flat* surface. Use this setup to sand the edges true.

Then apply the head and bottom, using yellow glue. Don't be too generous with the glue. A lot of glue beads running down the inside of the box will detract from the tonal quality. Line the head up carefully to make certain that the outside tongues, when depressed, don't come into contact with the sides. As you'll note from the Bill of Materials, both the head and bottom are slightly oversize. When dry, use a flush-trimming bit in the router to flush the edges with the box. Apply a $\frac{1}{8}$ in. radius roundover all around, and final sand the drum with 180-grit paper.

Finishing

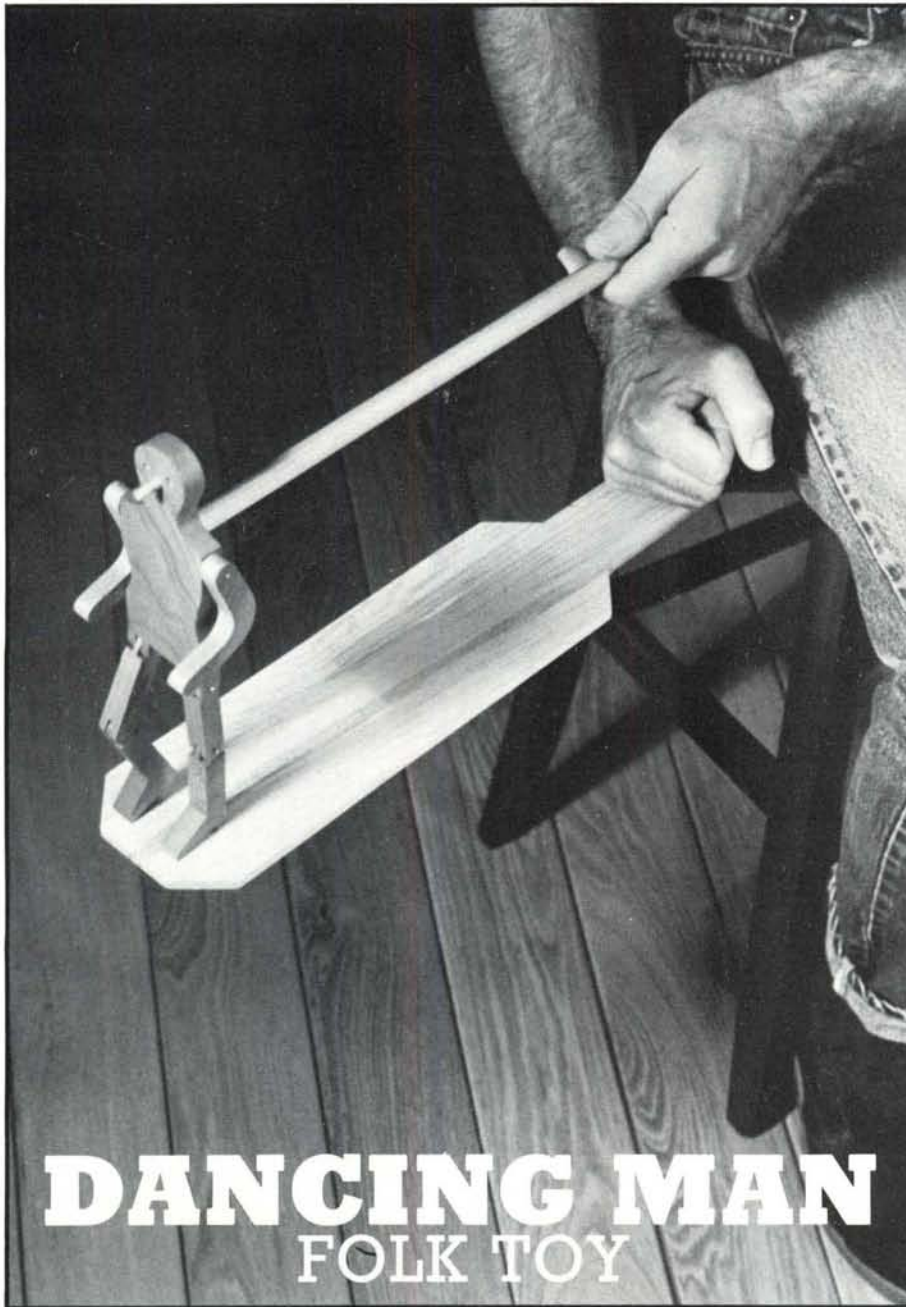
The type of finish you use is important. Lacquers, shellacs, polyurethanes and on-the-surface finishes are not recommended. Use only penetrating oils or oil-and-varnish mixtures that *penetrate* the wood, rather than creating a separate layer *over* the wood. It's important that the wood be free to resonate. Flood on enough oil to saturate the inside surface of the head. Both sides of the head must be treated equally. This is messy, but a rag will take care of cleaning up the excess.

After the finish is dry, apply the four plastic feet (E), which are available at most hardware stores. The feet keep the drum from rocking, and raise it slightly above the surface it's placed on. This improves the resonance.

Mallets

You can make mallets (F) using dowel stock and Superballs. Drill a $\frac{1}{4}$ in. diameter hole about two-thirds of the way through the Superball. Then cut a 12 in. length of $\frac{1}{4}$ in. diameter dowel, and use epoxy to glue the dowel into the Superball. As an option, professional-quality oak mallets with durable latex heads are available from Nova Diversified (see Bill of Materials).





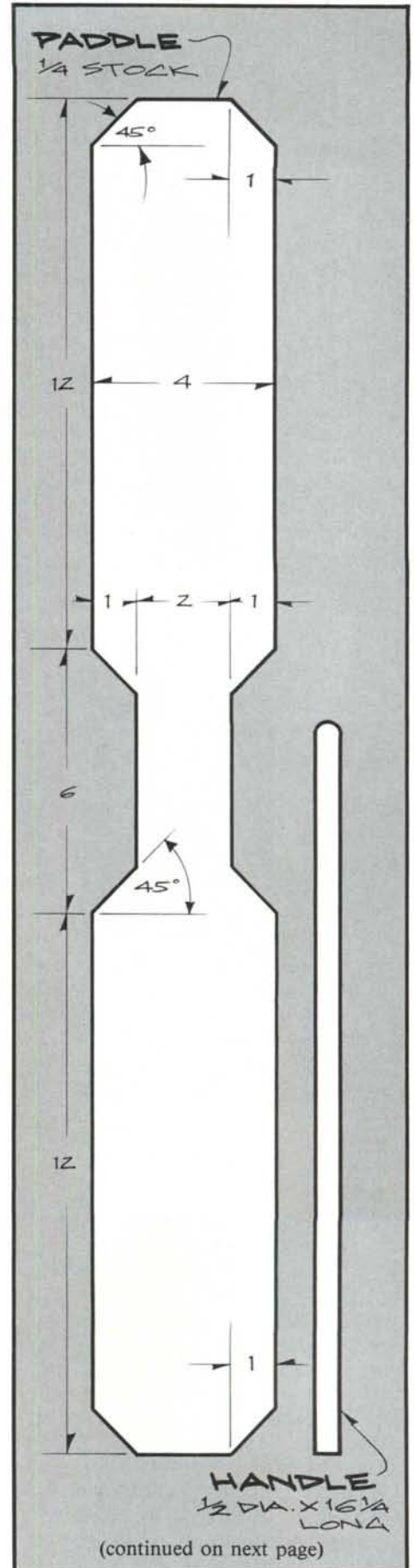
DANCING MAN FOLK TOY

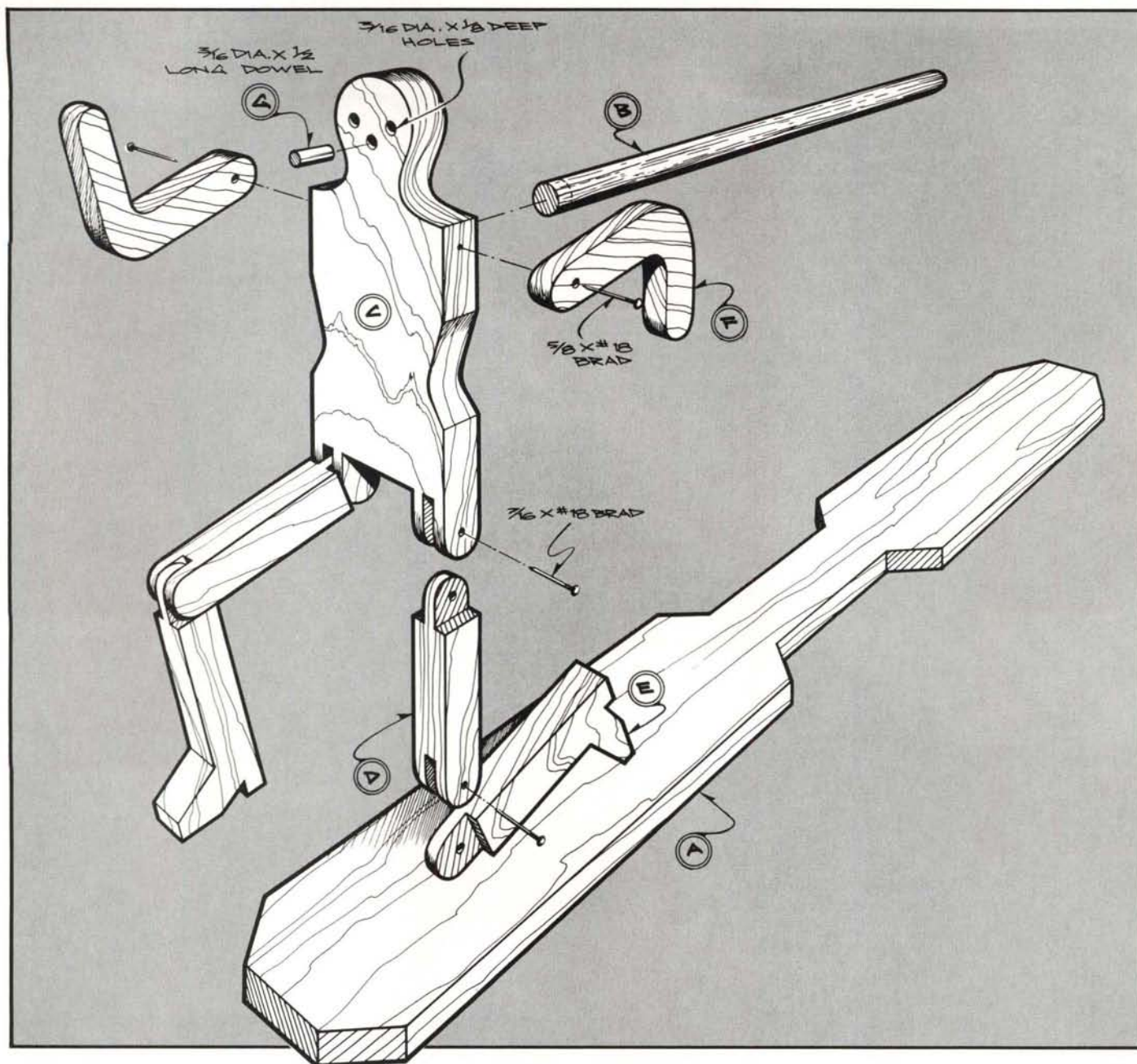
This Dancing Man is one of our all-time favorite folk toys. It's an ideal hand tool project. These toys were originally crafted by hand, and there's always a certain joy in making something without using power equipment.

He looks rather staid and stiff, but those wooden legs and arms are capable of moves that amaze. To set his limbs in motion, sit on one end of the paddle board (A) with the other end extending out over the edge of a table or chair, and vibrate the board with your fist. By controlling the dancing man with the dowel handle, you'll

soon have him tap-dancing at a frenzied pace. Rotate the dowel handle for flips, and move him to and fro on the paddle as he goes through his routine. With a little practice, you're sure to have your audience clapping along to the beat.

We've provided full-size patterns for all the parts except the paddle board and the dowel handle (B). Our man and the handle are cherry and the paddle board is pine. While various thicknesses are required, the pieces are small and can easily be planed by hand. The torso (C) and legs (D, E) are $\frac{1}{2}$ in. thick and the arms (F) are $\frac{3}{8}$ in. thick.





The handle is a length of $\frac{1}{2}$ in. diameter dowel, the nose (G) is a short piece of $\frac{3}{16}$ in. diameter dowel and the paddle board is $\frac{1}{4}$ in. thick.

First, thickness your stock, then lay out the various parts using the full-size patterns. You can slip a piece of carbon paper between the page and your stock and trace the profiles. Cut the pieces out with a coping saw.

Next, use a dovetail saw to cut the slip joints that form the knee and hip connections. A $\frac{1}{8}$ in. wide chisel will clean out the waste in the notched half of the slip joint. Sand to smooth out

any saw marks. Test-fit the slip joints to make sure there's plenty of slop. You want the joints to be loose.

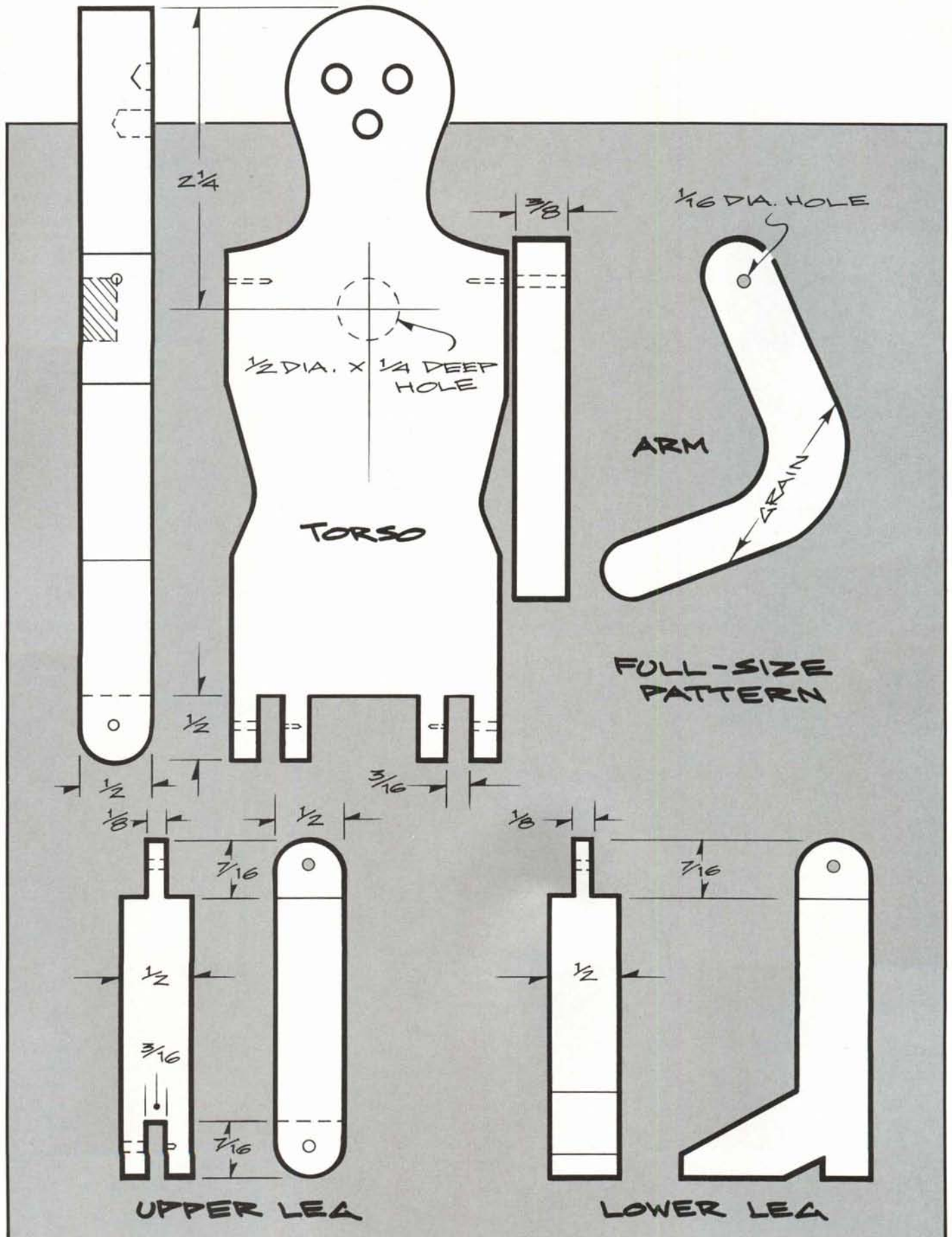
Before assembly, drill the $\frac{1}{2}$ in. diameter by $\frac{1}{4}$ in. deep hole in the dancing man's back for the handle, the $\frac{3}{16}$ in. diameter by $\frac{1}{4}$ in. deep hole for his dowel nose, and the two $\frac{3}{16}$ in. diameter by $\frac{1}{4}$ in. deep eyeholes. Also drill the $\frac{1}{16}$ in. diameter holes for the brass escutcheon pins, or brads, that join the legs and arms. We used $\frac{3}{8}$ in. long 18 gauge pins with the ends nipped off to get the right length (about $\frac{1}{16}$ in.) for the slip joints. These pins can be hard

to find locally, but you can order them from The Wise Company, 6503 St. Claude Ave., P.O. Box 118, Arabi, LA 70032.

For the legs, remember to drill only through the outside cheek and the tongue of the slip joint. Don't drill into the inside cheek. If you drill through the inside cheek, the pins won't grab.

Also on the leg joints, we set the escutcheon pins and used a dab of clear epoxy over the heads to hold them fast.

After gluing the dowel handle and nose in place, finish all parts with penetrating oil. 





ONE BOARD TOWEL RACK

Here's a towel rack that's perfect for a spot near the kitchen sink. It has enough arms to hold plenty of dish towels, yet it folds flat against the wall when not needed. We made our towel rack from bird's-eye maple. The light maple seems to go well in a kitchen setting, and the figured grain adds interest. The project is small enough so that the fancy wood won't set you back too much. For a mail-order source for the bird's-eye maple and other hardwoods, refer to the Cabinetmakers' Supply listing on page 10.

Start with $\frac{3}{4}$ in. thick stock for the arched top and bottom (A) and the six arms (B). A single piece of bird's-eye 10 in. wide and 20 in. long will yield all the parts except the hinge components: the spacers (C) are $\frac{5}{8}$ in. diameter dowel. The rod (D) is $\frac{1}{4}$ in. diameter brass rod. The washers (E) are common $\frac{3}{8}$ in. I.D. washers, the same washer that's sold to fit a $\frac{3}{8}$ in. diameter bolt or machine screw.

Prepare the bird's-eye board by thoroughly sanding both sides with

successive grits of paper up to about 150- or 180-grit. Next, lay out the cuts you'll make to establish the top, bottom and six arms. Remember that you'll need to leave $\frac{1}{8}$ in. between pieces to allow for the saw's kerf. You want to arrange the cuts so that the towel rack parts fit together the same way as the original board, so make sure that you letter or number the parts so they go back together the right way.

Next, cut the board into the eight pieces. First cut off the 2 in. wide top, then cut the six $\frac{3}{4}$ in. wide arms, then cut the 2 in. wide bottom. This cutting sequence is safer than cutting off both 2 in. wide strips and then ripping the $\frac{3}{4}$ in. arms. Then cut the $\frac{5}{8}$ in. diameter dowel into six $\frac{3}{4}$ in. long pieces to use as spacers.

With all the wood parts cut to size, start boring the holes to form the hinges. Set up a V-block on the drill press as shown in Fig. 1 to bore the $\frac{1}{4}$ in. diameter holes in the center of the dowel spacers. Also lay out and drill $\frac{1}{4}$ in. diameter holes in the top, bottom, and the six arms. Note that the holes in the top and bottom are $\frac{1}{4}$ in. deep. It's

a good idea to use a stop to make sure all the holes are the same depth.

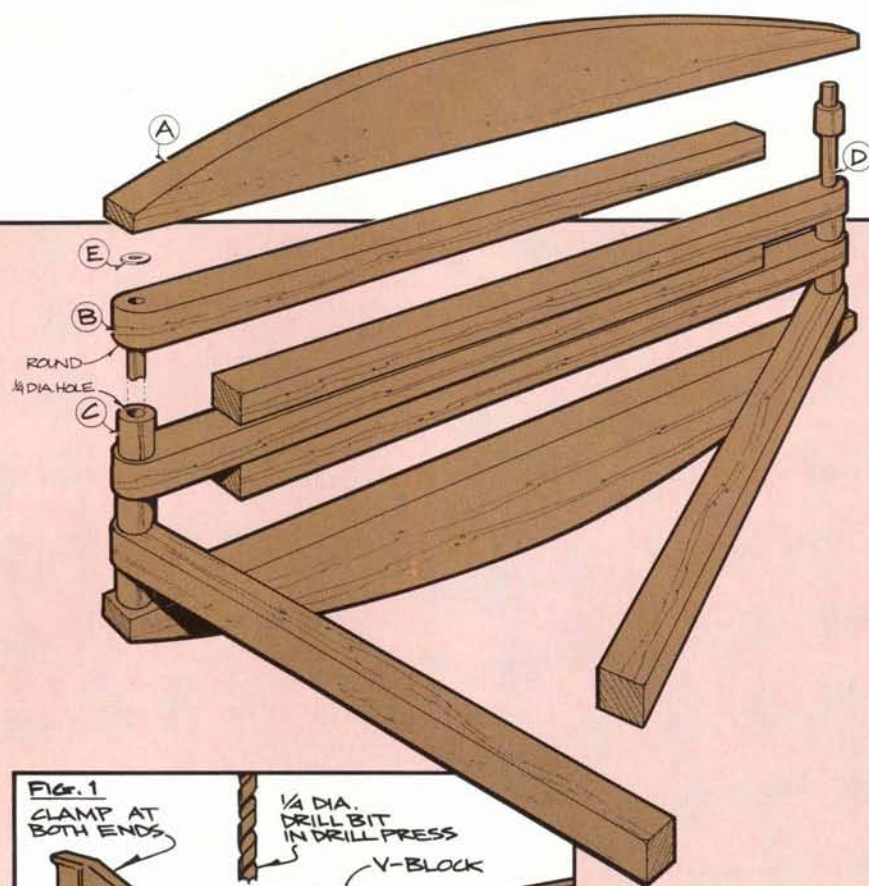
While you're working on the drill press, lay out and bore the keyhole cutouts in the back of the top. You'll need a keyhole bit for this operation.

With the holes cut, finish the shaping. Cut the radii on the top and bottom, and use a tapering jig (Fig. 2) to establish the slight tapers in the arms, which start $2\frac{1}{2}$ in. from the hinge ends. Form the $\frac{3}{8}$ in. radius roundovers on the arm ends with a wood file. When rounding the arms, work the file a little extra so that you reduce the total length by about $\frac{1}{32}$ in. That way the inside of the arms won't rub against the wall.

Next, sand all the wood parts to a high sheen. We used 120-, 180-, 220- and 320-grit papers. We finished the parts with three coats of spray lacquer.

Assemble the parts using a dab of epoxy glue to hold the brass pins in the holes in the top and bottom. Make sure that the parts aren't arranged too tightly on the pins or the arms won't swing out smoothly.



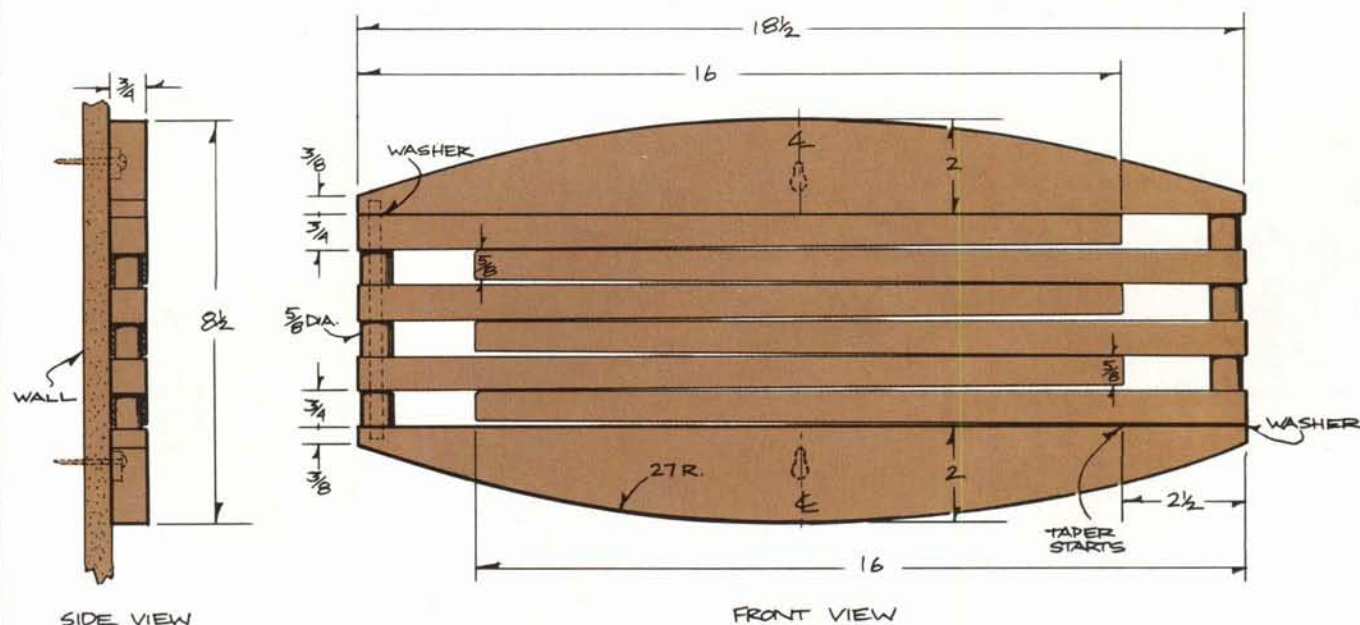
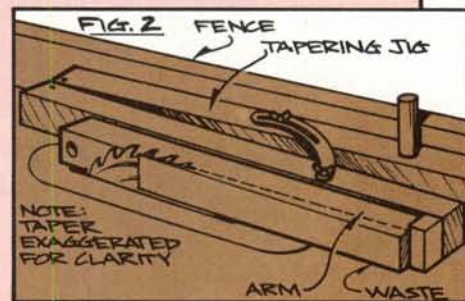


Bill of Materials

(all dimensions actual)

Part	Description	Size	No. Req'd.
A	Top/Bottom	$\frac{3}{4} \times 2 \times 18\frac{1}{2}$	2
B	Arm	$\frac{3}{4} \times \frac{3}{4} \times 16$	6
C	Spacer	$\frac{5}{8}$ dia. $\times \frac{3}{4}$ long	6
D	Rod	$\frac{1}{4}$ dia. $\times 5$ long*	2
E	Washer	$\frac{3}{8}$ I.D.	2

* Rod is brass (or steel) and available at many hardware stores. Steel rod is available mail-order from Meisel Hardware Specialties, P.O. Box 70, Mound, MN 55364-0070, catalog number 7403.



Secretary Desk



Stately yet delicate, this small secretary will lend an air of elegance to any room of your house. The curly maple details in a cherry case give this traditional design an appeal that's hard to resist.

The door panels, drawer fronts and valance are cut from curly maple. For some extra visual interest, we used

pieces with dark heartwood as well as the lighter sapwood. The panel we used is $\frac{3}{4}$ in. thick by $10\frac{5}{8}$ in. wide, so you'll need to hunt up some wide stock unless you decide to glue up the panels from smaller pieces. Since the visual appeal of the secretary depends so much on the panels, we think it's worthwhile to find some wide stock. If you don't

have a local source for hard-to-find woods, refer to the list of mail-order sources for hardwoods on page 10.

Most of the cherry case parts are cut from $\frac{3}{4}$ in. thick stock, but you'll need a few small pieces of $\frac{1}{2}$ in. thick stock for the cubbyhole parts. Because you only need a little, it's easiest to plane down some $\frac{3}{4}$ in. stock to get the required $\frac{1}{2}$ in. You'll also need $1\frac{1}{2}$ in. thick stock for the tapered legs. We used $\frac{8}{4}$ stock to achieve the full $1\frac{1}{2}$ in. width at the top of the legs, but you may be able to get away with $\frac{6}{4}$ stock if you don't mind making the legs a little undersized. If you buy the $\frac{6}{4}$ stock rough, you'll get usable stock between $1\frac{1}{8}$ in. and $1\frac{1}{16}$ in. thick.

You'll also want some poplar or pine for the $\frac{3}{8}$ in. thick inside drawer parts. We used pine because it was available. Of course, you can also use cherry if you happen to have plenty on hand. Finally, you'll need some $\frac{1}{4}$ in. thick plywood for the case and desk backs and drawer bottoms. A cherry veneer plywood is the best choice, but you can substitute pine or mahogany if you want.

Getting Started

The secretary is made in three separate pieces: the base, desk and bookcase. For purposes of discussion we'll treat them separately, but in practice you'll want to mill the stock for all the sections at the same time and also glue up stock for the wider sections at the same time. Make the panels carefully, being sure that all the stock is true and that the edges are jointed perfectly square before glue-up. Depending on the width of your lumber, you may need to glue up stock for the desk top and bottom (A and B), the desk side (C), the desk lid (E), the bookcase top and bottom (Q and S), and the door panels (Z). Since the desk section is the most involved, we started construction there. But it really doesn't matter, so begin with whatever section you're in the mood for.

Desk Section

Start by cutting the stock to the overall dimensions listed in the Bill of Materials and preparing the wider panels as needed. Make sure that the desk lid and the case parts are flat and true after glue-up. A little extra care now will save you a lot of grief trying to fit the lid to a crooked case. If you find that the parts are slightly out of true after they are glued up, use a hand plane to true them.

With the parts cut to size, start on

the details and joinery. First, cut the $\frac{3}{8}$ in. wide by $\frac{1}{4}$ in. deep rabbets in the case parts for the back. Then establish the sloping angle on the side sections using a band saw.

For the dovetails, first scribe the depth of cut (the thickness of the stock plus $\frac{1}{32}$ in.) onto the ends of the case top and bottom and onto the matching edges of the sides. Then lay out the tails on the sides using the dimensions shown in the side view. (It helps to use a sharp knife for the layout here.) Extend the layout lines across the end grain. Use a dovetail saw to cut out the

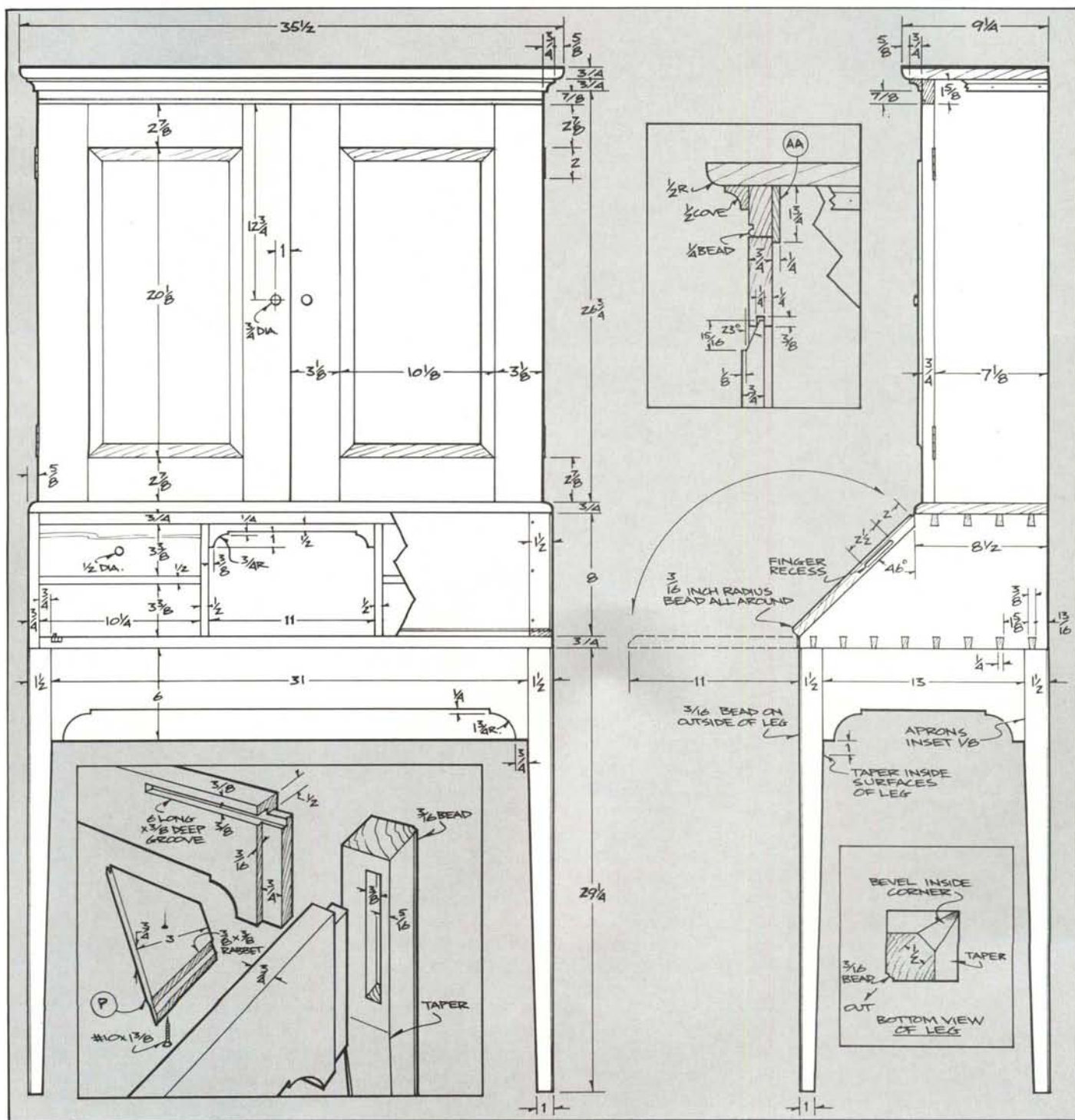
tail sides and then use a chisel to cut along the depth lines.

Note that before starting the chisel cuts, it's best to use a knife to create a small shoulder to rest the back of the chisel against. Cut down once lightly with the knife at the depth line for each pin, using a straightedge as a guide. Then cut down again with the knife angled toward the waste portion. The two cuts should form a thin cross-grain chip. When you remove the chip, you have a neat shoulder along the bottoms of the tails. If you don't create the shoulder to start with, the chisel tends

to creep off the line.

Holding the parts together with a clamp, mark the pins from the completed tails, and extend the lines down from the end grain to the depth lines you established before. Again use the dovetail saw and chisel in sequence to cut away the waste. Work carefully and slowly on the dovetails so they come out crisp.

After cutting the dovetails, dry-fit the case together and adjust the dovetails as needed to get a snug fit. You shouldn't have to whale on the parts to (continued on next page)

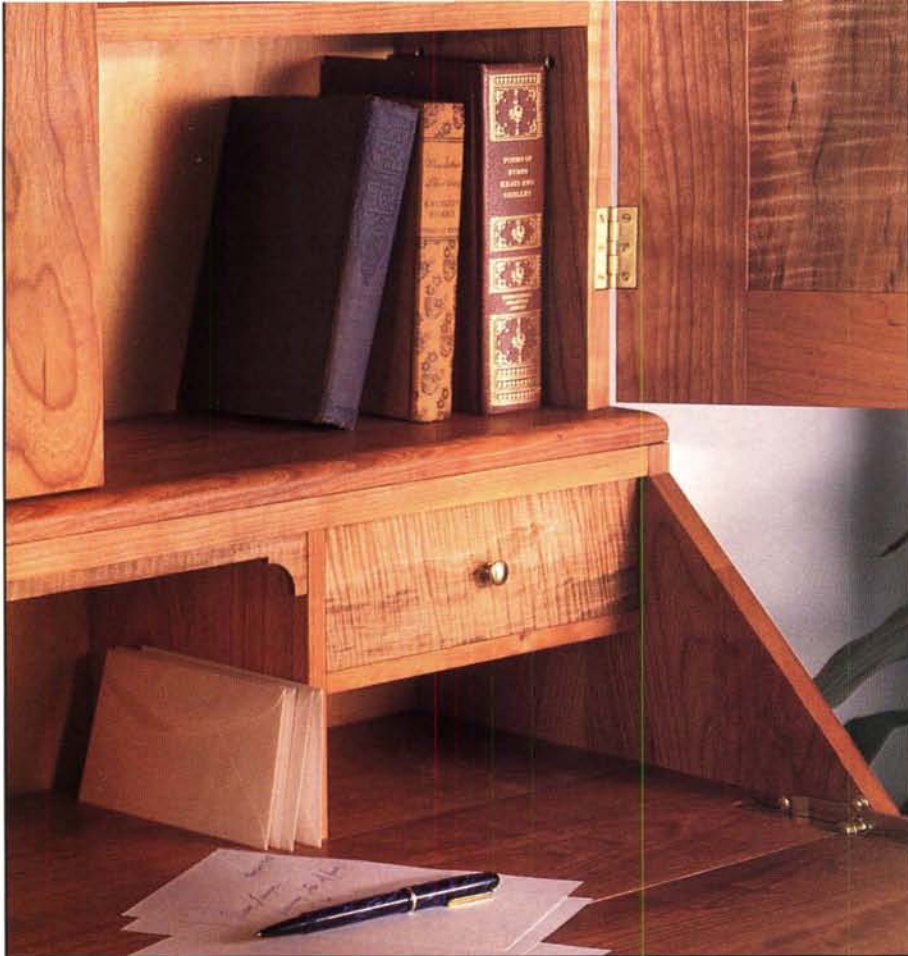


Bill of Materials (all dimensions actual)

Part	Description	Size	No. Req'd.
Desk Unit			
A	Desk Top	$\frac{3}{4} \times 8\frac{1}{2} \times 34$	1
B	Desk Bottom	$\frac{3}{4} \times 16 \times 34$	1
C	Desk Side	$\frac{3}{4} \times 16 \times 8\frac{3}{4}$	2
D	Desk Back	$\frac{1}{4} \times 8 \times 33\frac{1}{4}$	1
E	Desk Lid	$\frac{3}{4} \times 11 \times 33$	1
F	Breadboard End	$\frac{3}{4} \times 1\frac{1}{2} \times 11$	2
G	Divider	$\frac{1}{2} \times 8 \times 7\frac{3}{4}$	2
H	Shelf	$\frac{1}{2} \times 8 \times 10\frac{3}{4}$	2
I	Valance	$\frac{1}{2} \times 1\frac{1}{2} \times 11$	1
J	Drawer Guide	$\frac{1}{4} \times \frac{1}{2} \times 7\frac{5}{8}$	2
K	Drawer Stop	$\frac{1}{4} \times \frac{3}{4} \times 2$	2
Base			
L	Leg	$1\frac{1}{2} \times 1\frac{1}{2} \times 29\frac{1}{4}$	4
M	Front Apron	$\frac{3}{4} \times 6 \times 32\frac{1}{2}$	1
N	Back Apron	$\frac{3}{4} \times 6 \times 32\frac{1}{2}$	1
O	Side Apron	$\frac{3}{4} \times 6 \times 14\frac{1}{2}$	2
P	Corner Block	$\frac{3}{4} \times 3 \times 9$	4
Bookcase			
Q	Case Top	$\frac{3}{4} \times 9\frac{1}{4} \times 35\frac{1}{2}$	1
R	Case Side	$\frac{3}{4} \times 7\frac{1}{8} \times 28\frac{1}{4}$	2
S	Case Bottom	$\frac{3}{4} \times 8\frac{1}{2} \times 34$	1
T	Adjustable Shelf	$\frac{3}{4} \times 6\frac{7}{8} \times 31\frac{1}{4}$	2
U	Case Back	$\frac{1}{4} \times 32 \times 28\frac{1}{4}$	1
V	Rail	$\frac{3}{4} \times 1\frac{5}{8} \times 32\frac{3}{4}$	1
W	Cove Molding	$\frac{3}{4} \times \frac{3}{4} \times 52\frac{1}{8}$	*
X	Door Stile	$\frac{3}{4} \times 3\frac{1}{8} \times 25\frac{7}{8}$	4
Y	Rail	$\frac{3}{4} \times 2\frac{7}{8} \times 12\frac{1}{8}$	4
Z	Door Panel	$\frac{3}{4} \times 10\frac{5}{8} \times 20\frac{5}{8}$	2
AA	Doorstop	$\frac{1}{4} \times 1\frac{1}{4} \times 31\frac{1}{4}$	1
Drawers			
BB	Drawer Front	$\frac{3}{4} \times 3\frac{3}{8} \times 10\frac{3}{16}$	2
CC	Drawer Side	$\frac{3}{8} \times 3\frac{3}{8} \times 7\frac{5}{8}$	4
DD	Drawer Back	$\frac{3}{8} \times 2\frac{7}{8} \times 9\frac{5}{8}$	2
EE	Drawer Bottom	$\frac{1}{4} \times 7\frac{5}{16} \times 9\frac{5}{8}$	2
Hardware*			
FF	Door Knob	$\frac{3}{4}$ dia. brass as shown	2
GG	Drawer Knob	$\frac{1}{2}$ dia. brass as shown	2
HH	Lid Hinge	$\frac{3}{4} \times 7$ as shown	2
II	Door Hinge	$2 \times 1\frac{1}{8}$	4
JJ	Bullet Catch	$\frac{5}{16}$ dia. as shown	2
KK	Shelf Pegs	$\frac{1}{4}$ dia.	8

* As required.

** Hardware available from Paxton Hardware, 7818 Bradshaw Rd., Upper Falls, MD 21156; 301-592-8505. Door knob (FF) is catalog no. 915, \$2.08 each; Drawer knob (GG) is no. 913, \$1.62 each; Lid hinge (HH) is no. 5009, \$9.98 a pair; Door hinge (II) is no. 4102, \$3.59 a pair; Bullet catch (JJ) is no. 4426, \$.50 each; Shelf pegs (KK) are no. 5521, \$.66 for eight. Prices don't include handling and postage. Call Paxton for exact shipping costs, which will vary with destination and parts ordered.



get them to go together.

With the desk case held together with clamps — but still not glued — make the lid to fit the case. Cut the panel to size and form a 1 in. long tenon as shown on each end. Mortise on the breadboard ends using three pegs. Make slots as shown for the two outboard pegs to allow the panel to move in relation to the ends. Note that the 1 in. tenon is a tad shorter than the length of the groove in the ends. This also allows for expansion. (For more on making breadboard ends, see our January/February 1989 issue.)

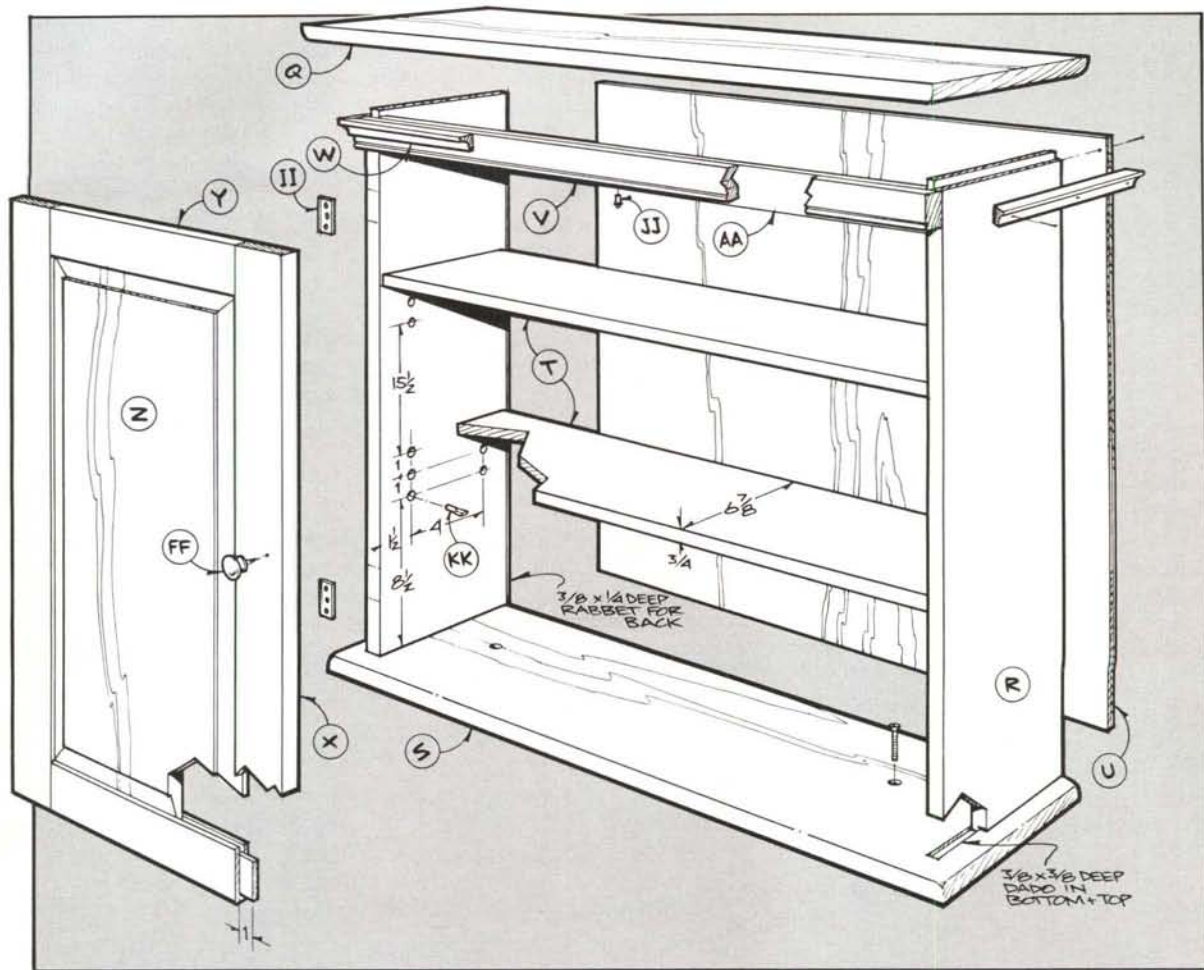
After gluing on the ends and allowing them to dry, sand the ends flush if needed. Then bevel the top edge and test fit the lid to the case. Shape the $\frac{3}{16}$ in. radius bead on the edges of the lid on the router table. Gauge off a fence for the roundover instead of a ball bearing. The bevel cut on the top edge won't allow you a flat for the bearing to ride on.

Then use a $\frac{3}{8}$ in. diameter core box cutter to cut a $\frac{1}{8}$ in. deep finger recess in the sides of the breadboard ends. Again use the router table and drop the lid onto the core box bit. Use a high fence so it's easy to control the cut. Also mortise in the hinges, and check the fit of the lid to the case. The hinge

joint needs to be mortised in so that half of the thickness fits within the lid and half within the bottom. (For more on mortising hinges see "Woodworking Basics" on page 21.) If the lid doesn't lie perfectly flat, you can adjust it somewhat by slightly changing the position of the hinges.

Next, remove the lid, take the case apart, and start on the cubbyhole details. The vertical dividers (G) are notched and dadoed into the top and bottom of the case. The horizontal shelves (H) also have blind dados where they fit into the dividers and the sides. The decorative valance (I), also made of curly maple, is glued and nailed in place. The drawer guides (J) are screwed in place. Use oversized shank holes to allow the case to move in relation to the guides. The drawer stops (K) are glued in place $\frac{3}{4}$ in. back from the edge. Dry-fit the case and all the cubbyhole parts before final assembly and gluing.

When you're sure everything fits, sand all the parts thoroughly, using successively finer grits of 120 to 220 paper. It's a lot easier to sand now than after all the parts are assembled. When you assemble the desk section, use glue sparingly in the dados and dovetails. You want enough to hold the parts



in. radius roundover bit in the router. Then, use the drill press to cut the holes as shown in the sides for the adjustable shelf pegs (KK).

Dry-fit the parts, and if everything fits, sand the parts and assemble the bookcase. The rail, molding and doorstop (AA) go on after the case itself is out of clamps. The rail and doorstop are just glued in place. The side molding is nailed in place with finish nails, with glue only on the first few inches near the corners. The front molding is glued along its entire length.

With the case complete, move on to the doors. Mortise the stiles and rails together, leaving a $\frac{1}{4}$ in. shoulder on the tenon sides and a $\frac{3}{8}$ in. shoulder top and bottom. Cut the raised panel using the table saw with the blade set $\frac{1}{16}$ in. high and 23 degrees from vertical. Be sure to use a high auxiliary fence when cutting the raised panel. Note that the grooves in the stiles should allow some room for the panels to expand and contract with seasonal moisture changes. The side-to-side movement is much more pronounced than the top to bottom movement. You don't really need to allow extra room in the rails grooves, but in practice many woodworkers do. It's easier to cut all the

grooves at the same depth rather than changing settings.

When you assemble the doors, remember not to glue the panels in place. They float in their grooves.

Drawers

The drawers employ a dado and rabbet to hold the fronts (BB) onto the sides (CC). A $\frac{1}{16}$ in. lip on one side of each drawer helps prevent the drawers from rubbing against the sides of the desk and creating visible wear. The drawer side instead rubs against a $\frac{1}{4}$ in. thick drawer guide, which is hidden by the lip.

Both the dado in the sides and the rabbet in the fronts are made with the $\frac{1}{4}$ in. wide dado head cutter. First set the dado $\frac{1}{4}$ in. from the fence and $\frac{3}{16}$ in. high, then cut the dados on the front of all the sides, as well as the rabbets in the backs. You'll need to run the backs through on end, using a tenon jig for support. Adjust the fence to $\frac{1}{8}$ in. from the dado blade and cut dados in the back of the sides.

Raise the dado to $\frac{3}{8}$ in., reset the fence to $\frac{1}{4}$ in., and establish the grooves on the insides of the fronts, again running the pieces through on end. Then raise the dado to $\frac{5}{16}$ in. and

cut the grooves for the outsides of the fronts. Remove the dado head, replace it with the saw blade and cut the tongues back, as shown, to fit the dados. The inside tongues are cut back $\frac{3}{16}$ in. while the outside tongues are cut back $\frac{3}{8}$ in. to allow for the $\frac{3}{16}$ in. overhang.

Use the dado head or router table to cut the $\frac{1}{4}$ in. wide by $\frac{3}{16}$ in. deep grooves in the front and sides for the drawer bottoms (EE). The drawer bottom is slid into place and secured with three small brads driven through the bottom and into the bottom edge of the back.

Finishing Up

Finish sand the three sections and apply three coats of tung oil. Then apply the various hardware elements: the door knobs (FF), drawer knobs (GG), lid hinges (HH), door hinges (II), bullet catches (JJ) and the shelf pegs. Apply the backs to the sections with finishing nails and a small bead of glue. Use threaded inserts to hold the bookcase section onto the desk section. Screws through the corner blocks into the desk bottom secure the desk section. With threaded inserts, the bookcase is easily separated for moving. 

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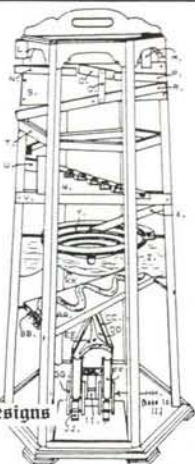
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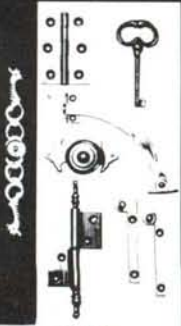
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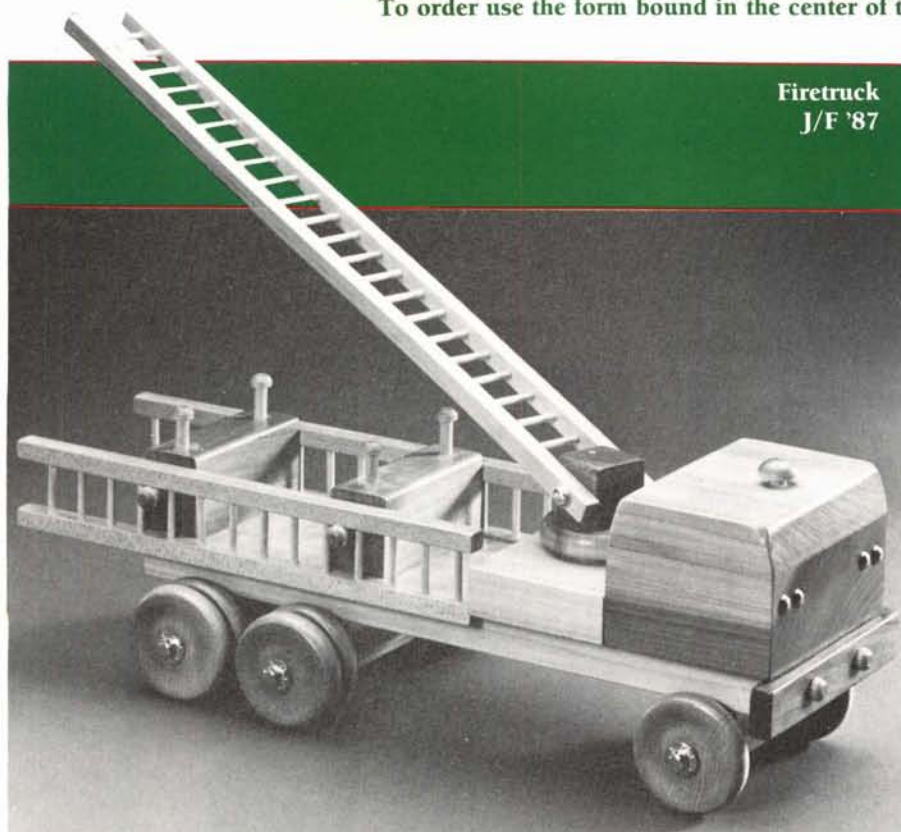
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Vol. 9 No. 5 Sept-Oct '85

Colonial Schoolmaster's Desk, Contemporary Sideboard, Mahogany End Table, Victorian Hall Tree, Cutlery Wall Cabinet, Swing-out Plant Hanger, Prancing Horse Silhouette, Block Puzzle, Iron Caddy, Toy Ironing Board, Early American Water Bench, Wooden Smooth Plane, Shaker Sewing Box, *Articles*: A Craft Fair Visit; How to Use Stick Shellac; A Guide to Circular Saw Blades; Making Bent Laminations; Country Colonial Furniture.

Vol. 9 No. 6 Nov-Dec '85

Moravian Chair, Dulcimer, Oak Dining Table, Shaker Washstand, Marking Gauge, Veneered Wall Clock, 4 x 4 Off-Roader, Teddy Bear Puzzle, Duck Pull-toy, Landscape Cutting Boards, Early American Tall Clock, Pine Desk Organizer, *Articles*: Secrets of Success; Weaving a Fiber Rush Seat, Part I; Table Saw Ripping Problems and Their Solutions; 4-Piece Book Match Veneering; Pennsylvania Dutch Furniture.

Vol. 10 No. 1 Jan-Feb '86

Freestanding Shelf System, Chippendale Bachelor's Chest, Oriental Serving Tray, Country Bench, Antique Knife Tray, Tape Dispenser, Valentine Box, Toy Tow Truck & Car, Shaker Drop-leaf Table, Shop-made Bow Saw, Child's Settle Bench, Plate Shelves, *Articles*: On Getting Paid for Your Work; Weaving a Fiber Rush Seat, Part II; Table Saw Crosscutting: Techniques & Tips; Router-Lathe Fluting: A Shop-made Approach; Chippendale Furniture; *Special Section*: Back Issue Index.

Vol. 10 No. 2 Mar-Apr '86

Not Available

Vol. 10 No. 3 May-June '86

Victorian Whatnot Shelf, Contemporary Lamp, Early American Bench, Steam-bent Clock, Pine Hutch/Cupboard, Canada Goose Basket, Toy Crane, Condiment Holder, Shop Workstation, Parsons Table, Shaker Lap Desk, *Articles*: An Interview with Toymaker Clare Maginley; How to Flatten a Warped Board; A Guide for Choosing Your First Router; Supported Steam Bending; Victorian Period.

Vol. 10 No. 4 July-Aug '86

Shaker Slat-Back Side Chair, Wall-Hung Display Cabinet, Lattice-work Planter, Country Bucket Bench, Adirondack Chair, Coffee Mill, Clamdigger's Basket, Box of Shapes Toy, Disk Clock, Tenon Jig, Dictionary Stand, *Articles*: Selecting the Right Project for Production; More About Warped Boards; All About Router Bits; The Sliding Dovetail Joint; Furniture Kits Suppliers.

Vol. 10 No. 5 Sept-Oct '86

Desk with Tambour Top, Vanity Case, Stool, Coffee Table, Blanket Chest, Mortar and Pestle, Whale Folk Art Silhouette, Toy Wagon, Cran-

berry Rake, Router Bit Box, Shaker Drop-leaf Table, *Articles:* Are Your Prices Competitive?; Restoring a Rosewood Chair; Basic Router Operations; Making Tambour Doors; General Woodworking Suppliers.

Vol. 10 No. 6 Nov-Dec '86

Early American Hamper, Cube Table, Rabbit Pull Toy, Old-Time Sled Wall Shelf, Cassette Tape Holder, Dog/Cat Bed, Vanity Mirror, Early American Washstand, Router Table, Victorian Sleigh, *Articles:* Wholesale and Discount Sources of Supply; Sandpaper Abrasives; Using the Router Table; The Mitered Bead Frame and Panel; Clock Parts Suppliers.

Vol. 11 No. 1 Jan-Feb '87

Shaker Blanket Chest, Glass-Top Dining Table, Dovetailed Stool, Jewelry Box, Door Harp, Toy Firetruck, Canada Goose Mobile, Balancing Sawyer Folk Toy, Early American Style End Table, Jointer Push Board, *Articles:* Direct Mail Promotions — Defining the Market for Your Work; Old Wood; The Mortise and Tenon, Part I; Combination Hand/Router Dovetailing; *Special Section:* Back Issue Index.

Vol. 11 No. 2 Mar-Apr '87

Shaker Sewing Desk, Garden Bench and Table, Mirrored Wall Shelf, Rhombohedron Puzzle, Wood Sawyer Whirligig, Folk Art Door Stop, Kangaroo Pull Toy, Colonial Pine Wall Shelf, Contemporary Hall Table, *Articles:* How to Create a Direct Mail Promotion; Types of Finish — An Overview; The Mortise and Tenon, Part II; Making Bevel-Edged Drawer Bottoms.

Vol. 11 No. 3 May-June '87

Display Pedestal, Kitchen Canister Set, Riding Biplane, Contemporary Serving Cart, Napkin Holder, Decorative Planter, Country Vegetable Bin, Pine Medicine Cabinet, Shop Drum Sander, Vienna Regulator Clock, *Articles:* Penetrating Oils and How to Use Them; The Jointer; Veneer, Part I; Decorative Joinery: Dovetail Key Butt-Miter; Caning and Wood Finishing Suppliers.

Marking Gauge
N/D '85



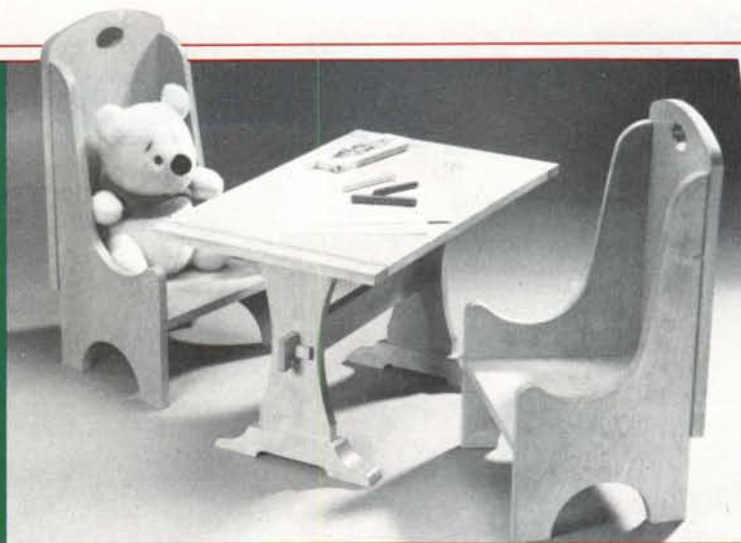
Vol. 11 No. 4 July-Aug '87

TV/VCR Cabinet, Early American Style Bookcase, Pine Trash Container, Sturdy Low-cost Workbench, Country Basket, Desk Calendar with Pen & Pencil, Butterfly Pull Toy, Vanity Mirror with Drawer, Apothecary Chest, *Articles:* Shellac; The Hand Plane; Veneer, Part II; Incised Carving; Hardwoods Suppliers.

Vol. 11 No. 5 Sept-Oct '87

Pine Woodbox, Contemporary Love Seat, Two-Drawer Oak Platform Bed, Snail Pull Toy, Routed Trivets, Spice Rack with Chip Carving, Joiner's Tool Chest, Shaker-style Step Stool,

Child's
Table
and
Chairs
J/F '89



Turned Shop Mallets, *Articles:* French Polishing Made Easy; Plane Iron Sharpening; Making a Splayed Leg Drill Guideblock; Traditional Chip Carving; Shop-Tested: 12 Jigsaws.

Vol. 11 No. 6 Nov-Dec '87

Curio Cabinet, Rocking Horse, Three-drawer Jewelry Chest, Tapering Jig, Rolling Toy, Folk Art Silhouette, Two Towel Racks, Early American Style Wall Shelf, Corner Cupboard, Stacking Wine Racks, *Articles:* On Glues and Gluing; Band Saw Setup; Making the Continuous Bracket Foot; Step-By-Step To A Flawless Finish On Pine (Or Any Other Wood); Hardware Suppliers.

Vol. 12 No. 1 Jan-Feb '88

Early American Pierced Tin Cabinet, Contemporary Coffee Table, Puss 'n Books Bookends, Cookbook Holder, Wooden Jewelry, Child's Duck Puzzle, Shaker Wall Clock, Stereo Cabinet and Speakers, Country Occasional Table, Drill Press Jig, *Articles:* Edge-gluing; The Drill Press; Pierced Tin; Four Shopmade Finishes; General Woodworking Suppliers.

Vol. 12 No. 2 Mar-Apr '88

Folk Harp, Oak & Glass Tier Table, Crystal Regulator Clock, Early American Candlesticks, Arrow Wall Decoration, Three-Drawer Country Wall Box, Key Cabinet, Contemporary Box, Shaker Carrier, *Articles:* Use and Sharpening of the Hand Scraper; The Lathe: Basic Setup; Quartered Turnings; Lacquer; Stationary Tool Suppliers.

Vol. 12 No. 3 May-June '88

Hunt Table, Loon Carving, Early American Dry Sink, Contemporary Dresser, Old-Time Pipe Box, Antique Knife & Fork Tray, Dutch Tulip Folk-Art Silhouette, Colonial Salt Box, Bud Vase, Miter Gauge Stop, *Articles:* Spindle Turning; Selecting and Sharpening Lathe Tools; Recessed Finger Pull Step-By-Step; Types of Stain; Clock Parts Suppliers.

Vol. 12 No. 4 July-Aug '88

Four-Drawer Lamp, Oak Magazine Rack, Occasional Table, Mitered-Corner Box, Heart Stool, Decorative Cutting Boards, Kids' Piggy Bank, Turned Bowl, Country Cupboard, *Articles:* Faceplate Turning; Workshop Layout; Cutting Dovetails on the Table Saw; Staining Basics; Schools and Craft Centers.

Vol. 12 No. 5 Sept-Oct '88

Oak Bookcase Desk, Miter Cutting Jig, Captain's Clock, Country Coffee Table, Rooster Folk-Art Silhouette, Harvest Basket, Bird Push Toy, Pencil Post Nightstand, 18th-Century Pencil Post Bed, *Articles:* Why Worry About Wood Movement?; Joining Ring Segments; Drill Bits and Boring: The Hole Story; Filling Open-Grained Woods; Hardwood Suppliers.

Vol. 12 No. 6 Nov-Dec '88

Child's Carousel Lamp, Shaker High Chest, Table Saw Crosscut Box, Country Vegetable Bin, Whale Pull Toy, Colonial Wall Sconce, Treetop Christmas Ornament, Classic Pickup Truck, Contemporary Cradle, *Articles:* Flattening Wide Surfaces with the Hand Plane; Making a Cove-Edged Raised Panel: Core-Box Bit Method; Polyurethane; A Sander For Large Surfaces; Caning and Wood Finishing Suppliers.

Vol. 13 No. 1 Jan-Feb '89

Shaker Wall Cabinet, Shop-Built Disk Sander, Cherry Table, Pine Wall Clock, Rock and Roll Toy, Contemporary Candlesticks, Merganser Decoy, Child's Table and Chairs, *Articles:* Buying Hardwood Lumber: What You Need to Know; The Thickness Planer; Making Breadboard Ends; Ebonizing; Hardware Suppliers; *Special Section:* Back Issue Index.

Vol. 13 No. 2 Mar-Apr '89

Oriental Mirror, Adirondack Settee, Country Village, 18th-Century Tilt-Top Table, Toy Fishing Trawler, Two Trivets, Folk-Art Cow, Greek Revival Birdhouse, Pine Armoire, *Articles:* Transferring and Enlarging Patterns; Making Tripod Legs; Three Easy Finishes for Pine; The Portable Circular Saw; Schools and Craft Centers.

Vol. 13 No. 3 May-June '89

Jewelry Chest, Storage Seats, Table Saw Gauge, Oval Extension Table, Nessel Pull Toy, Back Massager, Decorative Wall Key, Country Wall Shelf, Contemporary Mirror, *Articles:* Panel Retainer Disk System; Understanding Circular Saw Blades; Cutting Box Joints; Non-Toxic Finishes; Massachusetts Woodworker Paula Garbarino; General Woodworking Suppliers.

Vol. 13 No. 4 July-Aug '89

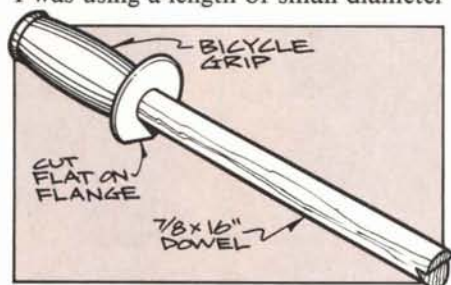
Country Pie Safe, Shaker Long Bench, Folk-Art Sign, Toy Farm Tractor and Wagon, Miniature Flower Cart, Kitchen Tongs, Pine Wall Cabinet with Tinsel Art, Stacking Bookshelves, *Articles:* Dealing with Uneven Wood; Tinsel Art; Coping with Your Radial-Arm Saw; Brushing Lacquer; Tools on Display: A Visit to a Woodworking Show; Stationary Equipment Suppliers.

Vol. 13 No. 5 Sept-Oct '89

Oak Globe Stand, Country Bake-Room Table, Chippendale Small Chest, Stacking Desk Trays, Pencil Box, Apple Doorstop, Space Shuttle Toy, Marquetry Coasters, Ice Chest with Marbleized Top, *Articles:* The Table Saw: Basic Adjustments; Cutting Full-Blind Dovetails; Marquetry: The Pad Method; Marbleizing: Creating a Faux-Marble Finish on Wood; Mount Lebanon Shaker Village: A Museum in the Making; Tool Review: Shop Test — Four Portable Planers; Clock Parts Suppliers.

Shop Tips

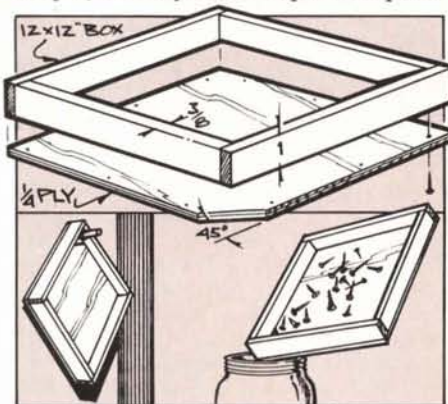
I designed this pushstick after suffering a serious hand injury while using a molding head on the radial-arm saw. I was using a length of small diameter



dowel as a pushstick when the molding head suddenly kicked the workpiece back at me and drove the pushstick through my hand. I feel more comfortable with my new design. It uses a flanged bicycle handlebar grip, which fits tightly over a 16 in. length of $\frac{7}{8}$ in. dowel stock. The dowel end is notched to grip the stock. Should kickback occur, the large flange would help carry the hand back with the pushstick. I cut a flat on the flange to keep it from rolling when placed on a flat surface.

Harold Nachlin, San Diego, Calif.

Most workshops have at least one jar or coffee can that's filled with a hodgepodge of screws, nails, nuts, bolts, and the like. To find a part buried in the jar usually means dumping the contents on the workbench. If you're lucky enough to find what you are looking for, you then have the task of getting all those little parts back in the jar. This homemade tray makes the job much easier. When you dump out the jar, the tray sides keep all the parts

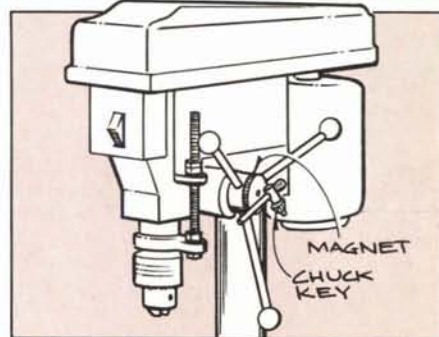


contained, and the corner cutout in the bottom makes it quick and easy to pour the parts back. The cutout also provides a means to hang the tray.

The tape measure is one of those tools that seems to get easily misplaced

in a busy workshop. To make it easier to find, try spray painting the tape measure case with a coat of bright iridescent paint.

I was forever misplacing the chuck key for my drill press. My solution was to remove the magnet from an old



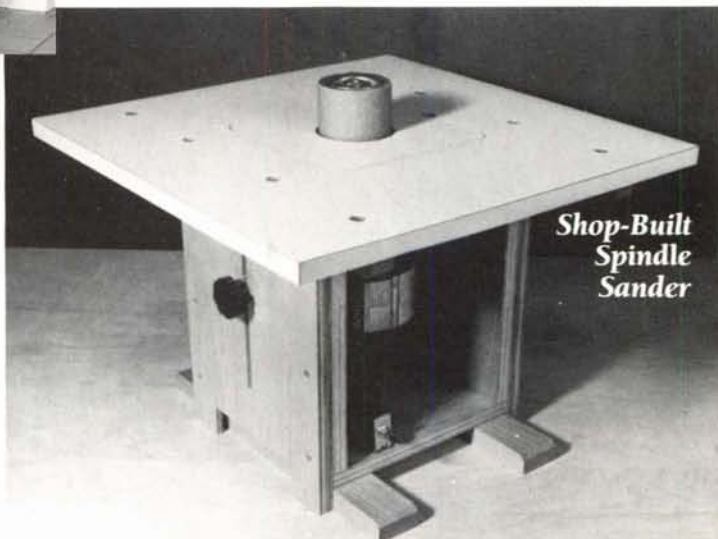
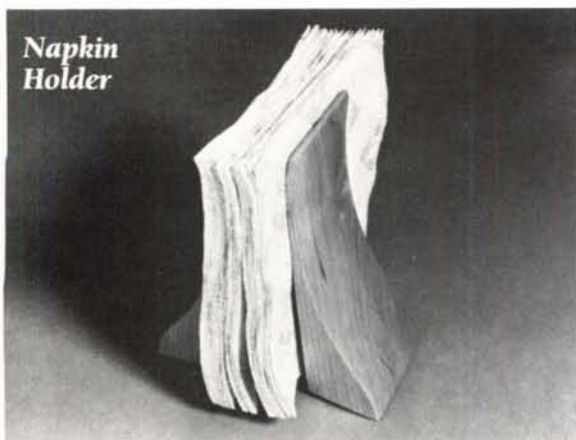
stereo speaker, then glue the magnet to the drill press feed handle hub. Now, stuck to the magnet, the key is always close at hand.

Pat Souders, Lake Park, Fla.

The Woodworker's Journal pays \$25 for reader-submitted shop tips that are published. Send your ideas (including sketch if necessary) to: *The Woodworker's Journal*, P.O. Box 1629, New Milford, CT 06776, Attention: Shop Tip Editor. We redraw all sketches, so they need only be clear and complete. If you would like the material returned, please include a self-addressed stamped envelope.

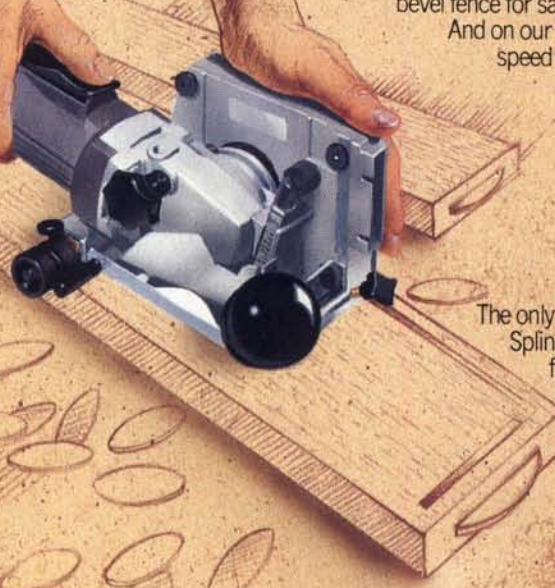
Next Issue . . .

We've lined up some great projects to start your new year off right. The Shop-Built Spindle Sander is a useful addition to any shop. It's the perfect tool for sanding curves . . . like those on the Napkin Holder. The Weaver's Chest of Drawers, with its milk-painted frame and butternut drawer fronts, is based on a similar Shaker chest in Mt. Lebanon, New York. These are just three of the many projects you'll find in the January/February 1990 issue of *The Woodworker's Journal*.

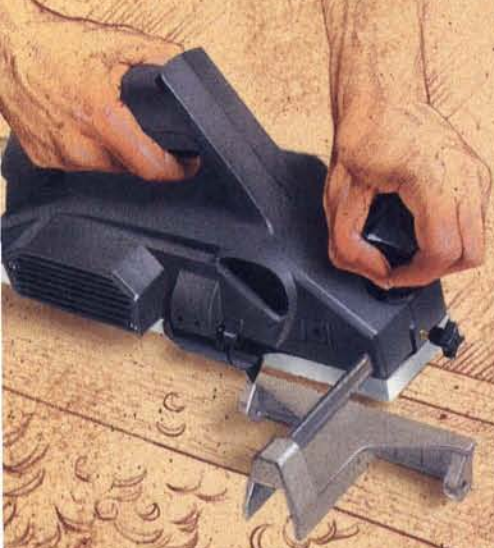




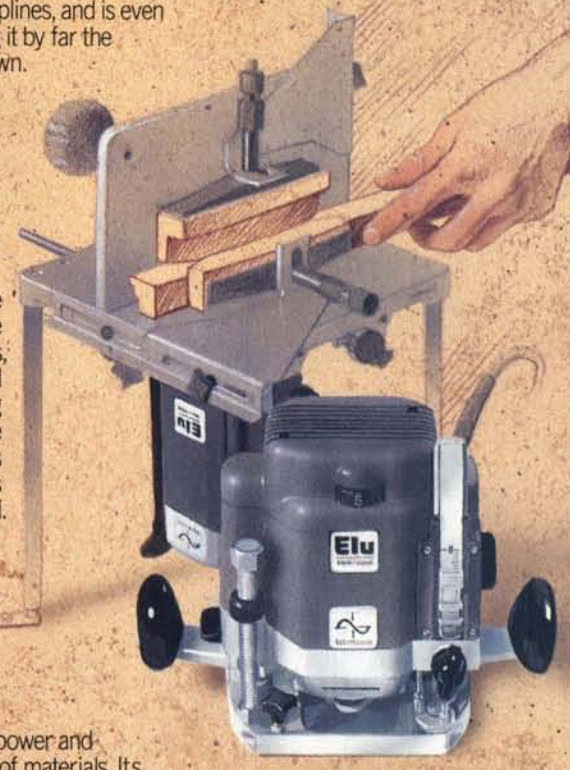
Elu Belt Sanders are designed to provide maximum precision. Each one is available with not only an attachable sanding frame to prevent gouging and rocking, but a compatible inversion stand or bevel fence for sanding from any position. And on our electronic model, variable speed selection gives you an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



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



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



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

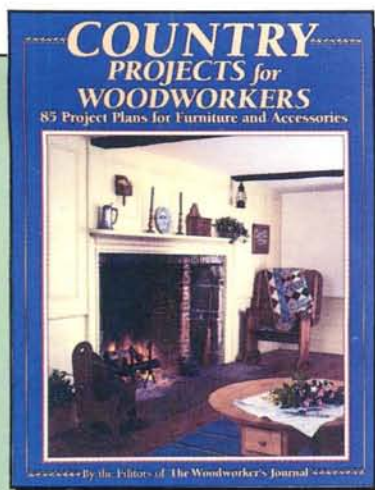
The Elu System. A tradition of painstaking craftsmanship and modern technology combined to create the benchmark for woodworking accuracy.

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



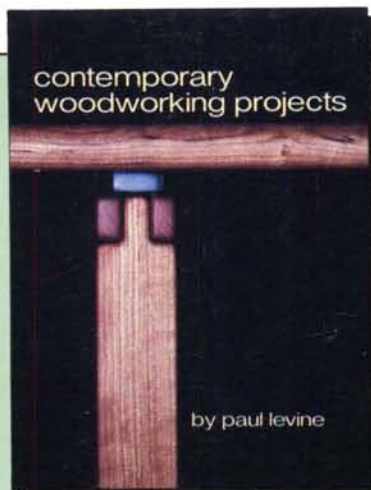
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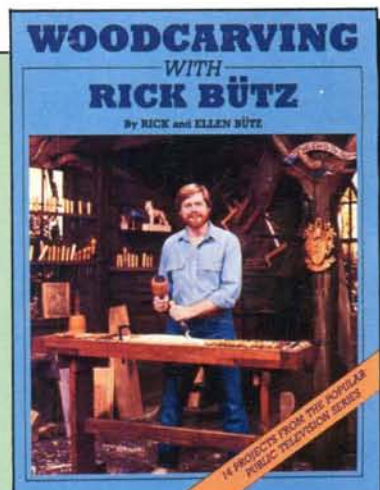
Country Projects For Woodworkers

If building the simple, sturdy furniture of the old cabinetmakers appeals to you, then you'll want this collection of the best country projects from the 1980-84 issues of *The Woodworker's Journal*. 85 complete plans range from weekend projects like Colonial Candlesticks and Fireplace Bellows to more challenging projects such as a Shaker Chest of Drawers, a Stepped-Back Hutch, and an 18th Century Trestle Table. Some plans are also found in *Projects for Woodworkers*, Volumes 1 and 2.



Contemporary Woodworking Projects

Paul Levine guides woodworkers of all skill levels through room-by-room chapters of coordinated furniture and accessories. The clean angles, sturdy joinery and special techniques are made easy to master with step-by-step instructions and illustrations. Among the 40 handsome projects are a matching Love Seat, Chair and Ottoman set, an Oak Credenza, a Platform Bed, and a Japanese Shoji Lamp. Children will enjoy their own table and chair set, puzzles and a great box of dominoes.



Woodcarving With Rick Bütz

Learn woodcarving! With just a few tools and a few hours to spare, you can share in the simple pleasures of carving. Wander into the Black Forest of Germany with a traditional carving of St. Nick, or into a small Russian village with a Dancing Bears folk toy. You'll enjoy a chip-carved Quilt Rack, wildlife carvings, and a Tobacconist's Indian. All 14 projects are fully detailed with step-by-step photos. There are also chapters on tool selection, sharpening, whittling, chip and relief carving.

BOOKS



GREAT GIFT IDEAS!

FROM *The Woodworker's Journal*

You'll find the order form for these books bound in the center of this issue.

Projects For Woodworkers, Volume 1

Beginning and advanced woodworkers alike will appreciate the full range of styles in furniture, accessories, lamps, clocks, toys and gifts. Of the 75 projects selected from the 1980-81 issues of *The Woodworker's Journal*, plans include a Cabinetmaker's Workbench, Pine Shaker Cupboard, Old-time Icebox, a Cobbler's Bench Coffee Table and a Child's Victorian Sled. Fully detailed instructions, illustrations, and photos.

Projects For Woodworkers, Volume 2

Originally published in the 1982 issues of *The Woodworker's Journal*, all 60 projects were chosen with a wide variety of styles and skill levels in mind. Each project is presented with complete instructions and thorough illustrations. You'll find household accessories like the Desk Caddy, Casserole Dish Holder, and Breakfast Tray easy to build. And you're sure to enjoy the reward of completing more involved projects like the Tambour Desk, Old Danish Chest of Drawers and Swinging Cradle.

101 Projects For Woodworkers

For the eager amateur just starting out or the craftsman with a shop full of tools, **101 Projects For Woodworkers** features an unparalleled variety of classic projects for everyone. Included in this collection of plans from the 1977-80 issues of *The Woodworker's Journal* are a classic Rolltop Desk, an old-fashioned Porch Swing, traditional and contemporary furniture, clocks, mirrors, home accessories, toys and novelties. Complete instructions and illustrations.

