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SHOP-ORGANIZER HUNT
See page 6

THE #1 MAGAZINE FOR HOME WOODWORKERS

FEBRUARY 1991 • ISSUE NO.41
Display until February 14

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GUIDE TO
WOODWORKING
CLAMPS**

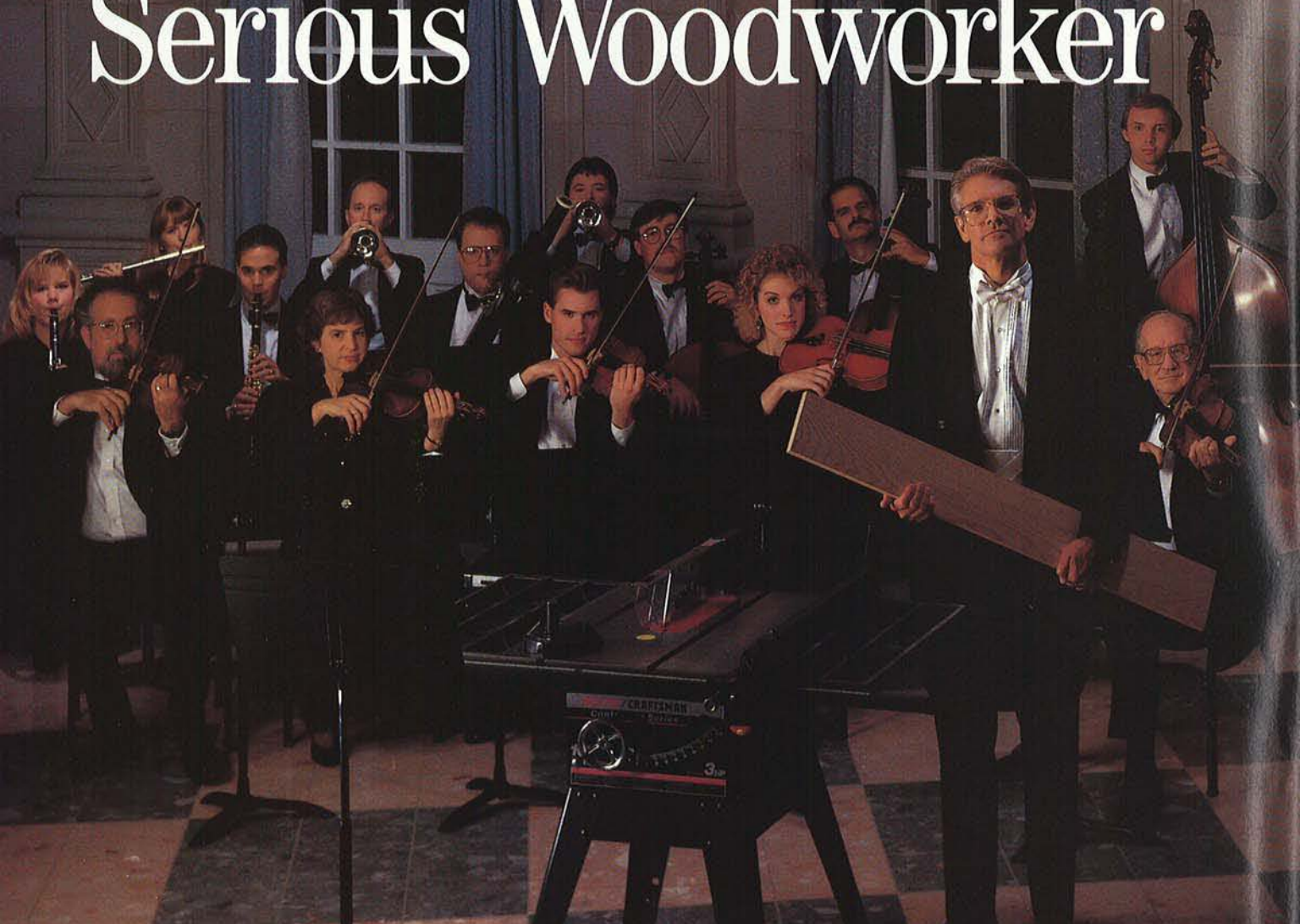
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Power tool caddy
Turned flowers
Balloon wall plaque
Cherry wall cabinet
Dandy door harp
Country napkin
holder

EXECUTIVE'S BRIEFCASE
with a luxurious leather lining
See page 44



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#601		1/8" Spiral Cutter		1/8"	1/2"	1/4"	\$ 9.00
#602		3/16" Spiral Cutter		3/16"	5/8"	1/4"	\$12.00
#603	Solid Carbide	1/4" Spiral Cutter		1/4"	3/4"	1/4"	\$12.00
#903		1/4" Spiral Cutter		1/4"	3/4"	1/2"	\$12.00
#904		3/8" Spiral Cutter		3/8"	1"	1/2"	\$24.00
#905		1/2" Spiral Cutter	1/2"	1 1/2"	1/2"	\$29.00	
			*Proper Adaptor Will Be Supplied				
#350		1/8" Round Over	1/8" R	3/4"	3/8"	1/4"	\$11.00
#351		3/16" Round Over	3/16" R	7/8"	1/2"	1/4"	\$11.00
#230		1/4" Round Over	1/4" R	1"	1/2"	1/4"	\$12.00
#353		5/16" Round Over	5/16" R	1 1/8"	1/2"	1/4"	\$14.00
#209		3/8" Round Over	3/8" R	1 1/4"	5/8"	1/4"	\$15.00
#355		1/2" Round Over	1/2" R	1 1/2"	3/4"	1/4"	\$17.00
#656		3/4" Round Over	3/4" R	2"	7/8"	1/2"	\$21.00
#199		Multiform Mounding	Unlimited Patterns	2 1/4"	2"	1/2"	\$40.00
#340		1/8" Cove	1/8" R	5/8"	3/8"	1/4"	\$12.00
#205		1/4" Cove	1/4" R	1"	1/2"	1/4"	\$12.00
#206		3/8" Cove	3/8" R	1 1/4"	5/8"	1/4"	\$13.00
#207		1/2" Cove	1/2" R	1 1/2"	3/4"	1/4"	\$14.00
#208		3/4" Cove	3/4" R	1 7/8"	3/4"	1/2"	\$28.00
#460		1/4" Bull Nose	1/4" Dia. of Circle		3/8"	1/4"	\$14.00
#461		3/8" Bull Nose	3/8" Dia. of Circle		3/4"	1/4"	\$15.00
#462		1/2" Bull Nose	1/2" Dia. of Circle		7/8"	1/4"	\$16.00
#464		3/4" Bull Nose	3/4" Dia. of Circle		1 1/8"	1/4"	\$19.00
#506		1/2" Pattern	Flush Trim	1/2"	1"	1/4"	\$15.00
#507		5/8" Pattern	Flush Trim	5/8"	1"	1/4"	\$16.00
#508		3/4" Pattern	Flush Trim	3/4"	1"	1/4"	\$17.00
#366		1/8" Slot Cutter	3/8" Deep	1 1/4"	1/8"	1/4"	\$14.00
#368		1/4" Slot Cutter	3/8" Deep	1 1/4"	1/4"	1/4"	\$14.00
#204		3/8" Rabbeting	3/8" Deep	1 1/4"	1/2"	1/4"	\$13.00

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#210		1/4" Core Box	round nose	1/4"	1/4"	1/4"	\$ 9.00
#211		3/8" Core Box	round nose	3/8"	3/8"	1/4"	\$10.00
#212		1/2" Core Box	round nose	1/2"	1 1/2"	1/4"	\$13.00
#418		3/4" Core Box	round nose	3/4"	5/8"	1/4"	\$15.00
#213		1" Core Box	round nose	1"	3/4"	1/2"	\$17.00
#214		1/4" Straight	plunge cutting	1/4"	3/4"	1/4"	\$ 6.50
#215		5/16" Straight	plunge cutting	5/16"	1"	1/4"	\$ 6.50
#216		3/8" Straight	plunge cutting	3/8"	1"	1/4"	\$ 6.50
#217		7/16" Straight	plunge cutting	7/16"	1"	1/4"	\$ 6.50
#474		1/2" Straight	plunge cutting	1/2"	1"	1/4"	\$ 7.00
#775		1/2" Straight	plunge cutting	1/2"	2"	1/2"	\$14.00
#218		5/8" Straight	plunge cutting	5/8"	1"	1/4"	\$ 7.00
#219		3/4" Straight	plunge cutting	3/4"	1"	1/4"	\$ 9.50
#220		1" Straight	plunge cutting	1"	1 1/2"	1/2"	\$11.00
#500		3/8" Flush	Trimming	3/8"	1/2"	1/4"	\$ 7.00
#502		1/2" Flush	Trimming	1/2"	1/2"	1/4"	\$ 7.50
#503		1/2" Flush	Trimming	1/2"	1"	1/4"	\$ 8.50
#221		1/2" Flush	Trimming	1/2"	1 3/16"	1/2"	\$ 8.00
#545		Tongue & Groove	Straight	1 5/8"	1"	1/4"	\$29.00
#845		Tongue & Groove	Straight	1 5/8"	1"	1/2"	\$29.00
#546		Tongue & Groove	Wedge	1 3/16"	1"	1/4"	\$29.00
#846		Tongue & Groove	Wedge	1 5/8"	1"	1/2"	\$29.00
#450		1/8" Beading	1/8" R	3/4"	3/8"	1/4"	\$11.00
#451		3/16" Beading	3/16" R	7/8"	1/2"	1/4"	\$11.00
#233		1/4" Beading	1/4" R	1"	1/2"	1/4"	\$13.00
#453		5/16" Beading	5/16" R	1 1/8"	1/2"	1/4"	\$14.00
#454		3/8" Beading	3/8" R	1 1/4"	5/8"	1/4"	\$15.50
#455		1/2" Beading	1/2" R	1 1/2"	3/4"	1/4"	\$17.00
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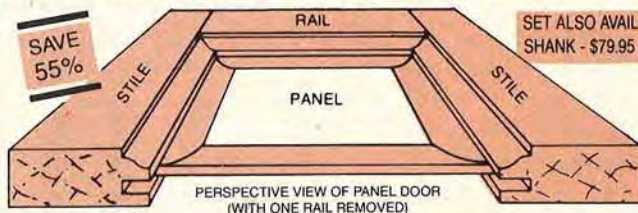
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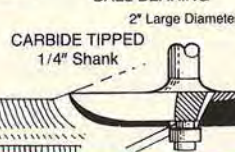
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February 1991 • Vol. 8, No. 2 • Issue No. 41

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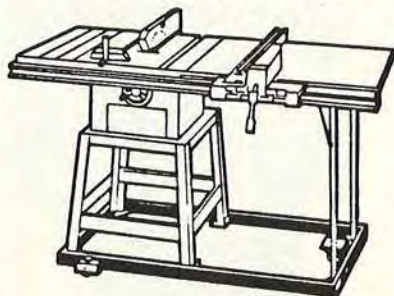
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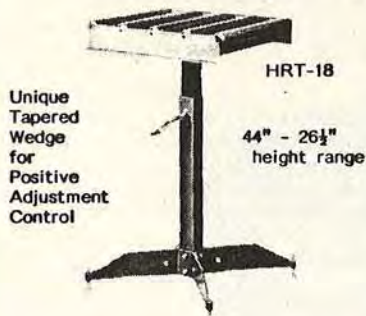


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This issue's cover wood grain: Aspen

Cover photo: Hopkins Associates

FEBRUARY 1991

ISSUE NO. 41



CRAFTSMAN CLOSE-UP

Down-home dough bowls 25

Typically, you turn bowls, but John Sadler of Tennessee's Cumberland Mountains begs to be different. He shapes his rustic creations with a chainsaw and hewing hatchet.

CARVING PROJECT

The Norwegian bachelor farmer 30

Learn Scandinavian flat-plane carving while shaping our amiable, rough-hewn caricature. Send for the basswood blank for a head start.

Fat Cat™ front-end loader 34

Our rugged construction toy lets youngsters dig in when the going gets tough and scoop up soil, sand, and gravel—just like the real thing.

DEVELOP YOUR SHOP SKILLS

10 tips for improving your scrollwork 38

No need to scroll in the dark with this short course. It shows you how to sink your tool's teeth into any number of projects with great success.



Hardwood briefcase 40

Get down to business with the plans for this executive's companion. The end result will impress your associates—we guarantee it. Use our source for the hardware and liner.

A handcrafted legacy lives on 47

Meet a company that makes guitars for the stars the old-fashioned way—Martin Guitars of Nazareth, Pennsylvania, established in 1839.

IN SEARCH OF THE PERFECT FINISH

Lacquer that's music to your ears 52

When applied to musical instruments, a finish must sound as good as it looks. Discover Martin Guitars' formula for an exquisite, lasting finish.

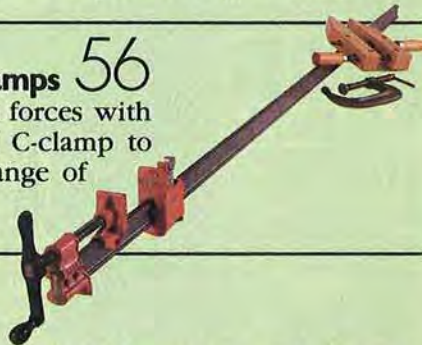
Super-simple tool transport 54

Allow your benchtop tools to roam by building our roll-around home for three. Casters and convenient handles make for easy mobility.

TOOL BUYMANSHIP

The smart shopper's guide to clamps 56

A new generation of specialists joins forces with the likes of the handscrew, bar and C-clamp to give woodworkers the widest-ever range of holding-power options.



TURNING PROJECT

Fanciful flowers 61

Don't wait till spring to surprise your favorite person with flowers when you can turn a beautiful bouquet from found wood in no time.

Arizona turning showcase 62

Selected vases and bowls prove the talents of this state's woodturners.

THE CRAFT SHOP

Ride the wind 64

You'll fly high after seeing our balloon wall plaque, and that's no hot air!

Graceful geese napkin holder 66

Country's come home to roost with this charming, one-evening scrollsawed project.

Cheery, cherry door harp 68

Dowels, not strings, support the wood balls that make this melodious project sing.



Washed-up wood 70

Business is picking up for a father and son who collect driftwood.

SURVIVAL GUIDE

Buying Forstner bits 72

Discover the quality difference between high- and low-priced bits

Cabinet, cabinet on the wall 74

Balanced in design from top to bottom, this cherry accent piece lets you perk up an otherwise plain-Jane wall.

Test your woodworking IQ 78

Sharpen your pencils and try your smarts on 18 challenging questions.

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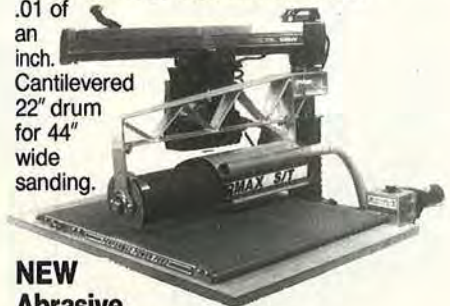
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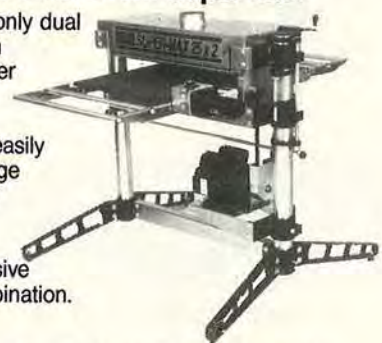


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THE EDITOR'S ANGLE

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Above: Just a few of the organizers in the WOOD magazine shop.



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Be honest, now. Wouldn't you like it a lot if your shop was just a bit more organized, a bit tidier? I sure would. And I think I've come up with an idea that can help all of us get our shops shaped up in a hurry.

Here's the plan. I'd like you to send in a snapshot of one or more of the best original ideas you've ever come up with to organize your shop—and the tools and supplies in it. (Be sure that you put your name, home address, and daytime telephone number on each photo.) Big solutions, small solutions—I'd like to see them all.

Just for taking the time to share your idea(s) with us, I'll send you a complimentary copy of the ever-so-handy WOOD magazine Cumulative Index (a \$4.95 retail value). You say you want more of an incentive? Then, how's this? If yours is one of the dozen ideas we select for publication in an upcoming issue of the magazine, you can choose

between a Delta 34-080 10" motorized miter box or a Ryobi RE 600 3-hp router (both shown in the photo *above* and valued at over \$250). Or, if you prefer, I'll write you a check for \$150 in payment for your idea. Not bad, huh?

OK, ladies and gentlemen, start your shop-organizer-idea engines. I'm counting on you for some really terrific input. Quebec residents not eligible. Send your entries (by April 1, 1991) to:

THE GREAT SHOP-ORGANIZER HUNT

c/o WOOD MAGAZINE

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P.S. I'll make sure you have your free Cumulative Index in hand, as well as notification about whether or not we have selected your idea for publication, by June 1, 1991. ♣

Larry Clayton



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- Item # L40 **On Sale \$249.95** (UPS \$20)

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TALKING BACK

We welcome comments, criticisms, suggestions, and even compliments. Send your correspondence to: Talking Back, Better Homes and Gardens® WOOD® Magazine, P.O. Box 11454, Des Moines, IA 50336-1454.



Japanese reader has yen for WOOD®

Your magazine greatly interests me and I would like to subscribe. Would you accept a credit card? Otherwise, I have to exchange Japanese yen for the U.S. dollar.

Woodworking has been my favorite hobby since I was a teenager. It started, of course, with Japanese-style hand tools. Power tools were introduced into my workshop in 1957, while I was living in Portland, Oregon. I have been strongly interested in wood turning, mostly bowls, because the turned products are clearly dependent on my skill. I look forward to retiring from my position as president of the University of Tsukuba in March 1993 when I turn 68.

—F.K. Anan, M.D., Tokyo

Thanks, Doc. Our circulation staff would be overrun if readers used charge cards for subscriptions and renewals, according to our circulation manager, Alan Brush. In the case of overseas readers, when currency exchange poses a problem, we can make an exception. Send a letter with information including your charge-account name and number, your name, mailing address, and signature to WOOD Customer Service, P.O. Box 10667, Des Moines, IA 50336-0667. We are pleased that our WOOD family extends beyond North America. See page 10 for further evidence.

Reader gets his bearings in Buffalo—and so can you

I have made many adjustable roller stands for my workshop and for my friends' shops. Instead of using wooden ends for the bearing in the end of the plastic pipe, I used 1½" pipe with a plastic bearing I bought through Buffalo Bearing (2205 Kenmore Ave., Buffalo, NY 14207).

Order item number 12P40D. The cost is \$1.60 plus tax. They also carry other types of rollers already made up for conveyer systems.

—Thomas Klass, Hamburg, N.Y.

Tom, thanks for your letter. We spoke to company president Greg Winkelman, who reminded us that the bearings should be ordered in pairs since two would be needed for each roller. The cost is \$3.20 per pair, plus shipping and handling and, for New York residents, an 8 percent tax. Buffalo Bearing, although not a woodworker's store, also sells router-bit bearings, shaper guides, and similar hardware. For information or for ordering, call 800-669-8019.

WOOD® readers are safe at home

A pair of sharp-eyed readers called our bluff regarding the September 1990 woodshop safety quiz, one with a letter concerning router setup, the other writing about circular-saw safety.

In reading your September issue, I noticed one potentially harmful situation in the article "How Safe are your Woodworking Habits?" Picture No. 1 displays the router bit being changed while the tool is still plugged in [as cited in the quiz answer], but notice also the position of the user's right hand. If it were to slip off the wrench, the protruding router bit could make an ugly cut on the bottom of his hand.

Solution: Some routers allow the base assembly to be lowered, safely covering the bit while still allowing access to the collet-locking nut. Or, secure the router, base assembly up, in a padded vice.

—William Young, Hopkinsville, Ky.

Bill, yours sounds like the voice of experience, and, as it turns out, you weren't the only reader to notice safety violations we overlooked. Read on.

When operating a circular saw, I always try to place the wide part of the saw shoe on the supported stock. Figures No. 5 and 6 on page 71 both show the wide part of the shoe on the piece that will fall away. With the wide part of the shoe on the supported piece, the saw will remain much more stable when the cut is completed, thus producing a cleaner cut and reducing the possibility of injury. Both pictures show a right-handed person using a left-handed saw.

Also, in shopping for a circular saw, I found that most of the cheaper saws are rated in horsepower, while the more expensive saws are rated in amps. This makes it difficult to compare the power output. Your October issue listed manufacturer's ratings for several power tools, but I am afraid that they may be using different methods to obtain the rating. The issue did a fine job of highlighting the features most useful in a power tool.

—Lester Bartel, Madison, Ala.

Looking good, Lester. The wide part of the saw shoe should, whenever possible, be on the supported stock. Of course, if a right-handed saw had been used for the photos, the setup shown would have been proper. As for horsepower ratings, our tool-buyership specialist, Bill Krier, already is planning such an article in response to yours and other letters.

Continued on page 10



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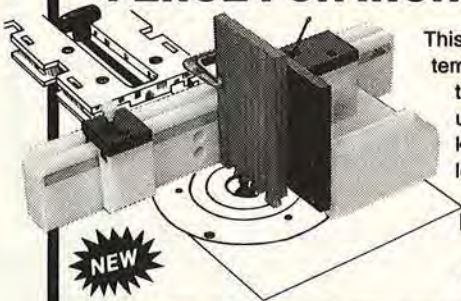
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TALKING BACK

Recycle jigs by fastening with screws instead of nails

Thank you for the article "How to Transform Found Wood into Usable Stock," in Issue No. 37 (September 1990). For many years I have been looking for a way to true-up warped, bent, and twisted pieces of wood from my scrapbox. You have an elegant solution.

Why do you use nails to assemble the jig? I use drywall screws for almost every job, especially for jigs, which are sometimes used for only a short time. With screws I can more easily salvage the wood. Perhaps I am overlooking something.

As a senior on pension, I buy magazines from the newsstand, and only after checking each issue against several competing magazines. You will be pleased to know that my increasing stack of WOOD magazines strongly suggests that WOOD is indeed number one. Do not change anything.

—Colin Adams, Woodbridge, Ontario.

Colin, thanks for the kind words. Your point about using screws for jigs is a good one, especially if you might want to reuse the jig wood later.

Magazine makes its mark in Germany

During a stay in the U.S., I read some issues of your magazine. I'm so interested in it that I don't want to miss it in Germany. Two features particularly interest me. One is the wood profile, and the other is the Collector's-Edition tools. I already have made the try square and the clamps.

Can I get copies of magazines with any other Collector's-Edition tools? I would like to suggest for inclusion a German version of a carpenter's mallet.

—Egan Weeks, Nordenham, Germany

Egan, thanks for your vote of confidence in WOOD. And yes, we can provide you with the information you missed out on.

The series began with a sanding block (December 1986), followed by a depth gauge (December 1988), a hand scraper (April 1989), and a strip sander (August 1989). The handscrew clamp (June 1990) came next, and then we presented the try square (September 1990.) We detailed the center finder in the January 1991 issue. Yet another one in our line is on the drawing board even as we write. You can buy plans for any of these projects for \$2 each, or the back issue of WOOD containing the plan for \$4.95 each, postage paid, by writing to: Back Issues, WOOD Magazine, P.O. Box 11454, Des Moines, IA 15336-1454. We accept VISA, MasterCard, check, or money order.



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Carvers take shine to elusive polish

Thank you for the article on Santa by Ron Ransom in the December 1990 issue. I have sent for the full-



sized pattern. My question is, "where do you purchase Griffin Shoe Polish?" I have been unable to find it, and some stores have told me

they are out of business. Could you find out where Mr. Ransom purchased this product, or maybe he can recommend a substitute. I would appreciate any information you can forward to me.

—Mary Post, Lake Orion, Mich.

Mary, you are not alone in your search for the Bark-Brown Griffin Shoe Polish recommended by

carver Ron Ransom as an anti-queing finish.

David Draves, senior merchandise manager at Woodcraft Supply Corp. in Boston, reports that his company could have sold more than 300 cans of the polish since September—if they had stocked it.

Some shoe repair professionals we talked to never had heard of it, while others thought Griffin had gone out of business long ago. Not so, says Draves, who located the company in Central Islip, New York, and arranged to sell that elusive product as a mail-order item.

A 1⁵/₁₆ oz. can of Bark Brown, catalog No. 50I08, or Neutral Paste Wax, catalog No. 50I09, costs \$2.50, plus a \$4 shipping and handling charge. To order, call 800-225-1153 or write to Woodcraft Supply Corp., P.O. Box 1686, Parkersburg, WV 26102.

Smaller vacuum hoses need taming, too

On page 26 of the September 1990 issue, you recommended a Sears hose lock for use on shop vacs. I tried to buy a



hose lock in a smaller size at Sears, but they only make them in the large (2½") size. A lot of us hobbyists use the small shop vac with the 1½" hose, so I resorted to another idea. I simply used self-adhesive Velcro™. By coiling the hose into its stored position, I was able to determine where on the hose end to stick one piece of Velcro™—put it where it won't interfere with any attachments—and where on the vacuum to stick the matching piece. It works beautifully. 🌲

—William McCollum Oakdale, Minn.

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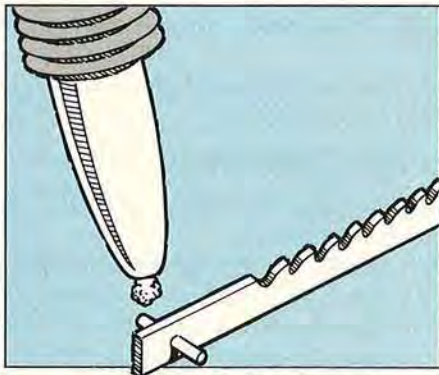
Do you have a great shop tip (or two) you'd like to share with other WOOD® magazine readers? For each published submission, you will get at least \$25 from WOOD magazine (up to \$200 if we devote a page or more of space elsewhere in the magazine to your idea). You also may earn a woodworking tool for submitting the top shop tip for the issue.

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An answer for loose scrollsaw-blade pins

Many woodworkers prefer pin-type scrollsaw blades because they mount so quickly and easily. Unfortunately, the pins occasionally work themselves loose from the blades.



TIP: Add a drop of Loctite or cyanoacrylate (instant) glue to each side of the pin and allow to dry overnight. That's it—no more loose pins to worry about.

—R. I. Smith,
Halifax, Nova Scotia

Put a grinding halt to motor costs

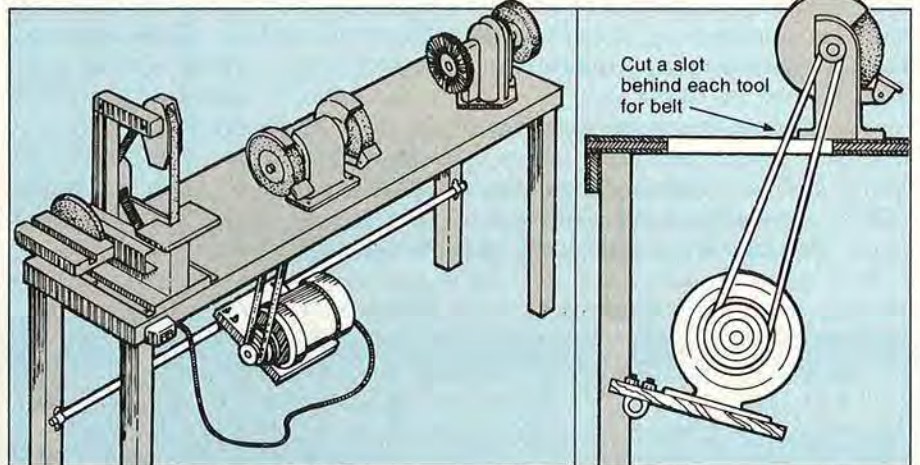
A motor adds mightily to the cost of benchtop power tools such as grinders, buffers, and strip sanders. Since you can't use more than one of these machines at once, it's a shame to tie up a lot of money in a motor for each machine.

For his tip, Dennis receives a Porter-Cable model 693 router.



TIP: You can mount these benchtop tools alongside each other and run them with one motor that slides from tool to tool as shown below. Fasten a ½-1 hp motor to a length of ¾" pipe with eye- or U-bolts and a plywood base. Add a step-down pulley to the motor and a switch along the front of the bench. Cut holes into the bench top for the belts to run through.

—Dennis Baer, Fayetteville, Ga.



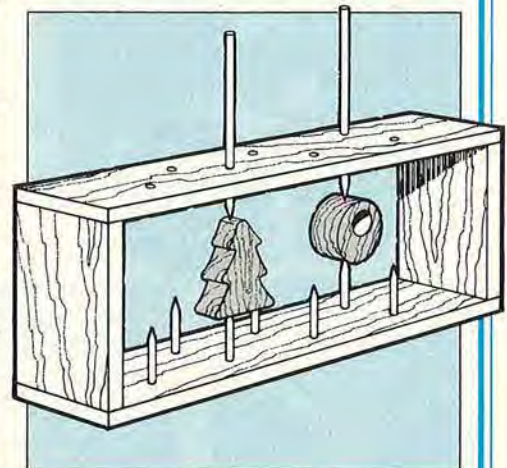
Another solution for small-part finishing

Painting, staining, and finishing small pieces frustrates most woodworkers because the objects refuse to stay put as you brush or spray them. Using your fingers to hold the pieces can be messy, and the finish may adhere the objects to your work surface.

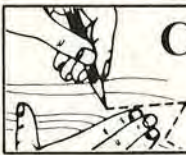
movement of 8"-long sharpened rods. With the box assembled, you can coat small pieces of most any shape without fear of fingerprints and smudges.

—W.P. Locke, Huntington Beach, Calif.

TIP: Build a finishing box such as the one shown at right. From ¾" stock, cut the sides, top, and bottom of a 4×10×20" box (or larger if necessary). Clamp the top and bottom pieces together and drill ¼" through holes simultaneously to ensure alignment. Unclamp the assembly, and epoxy 3" lengths of ¼" steel rod with sharpened points into the bottom holes. Enlarge the top holes just slightly to permit free, but not sloppy, up-and-down



Continued on page 14



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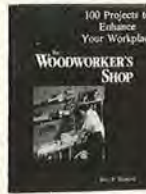
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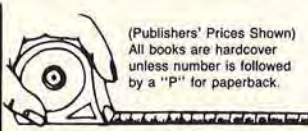
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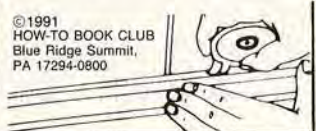
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TIPS FROM YOUR SHOP (AND OURS)

Continued from page 12

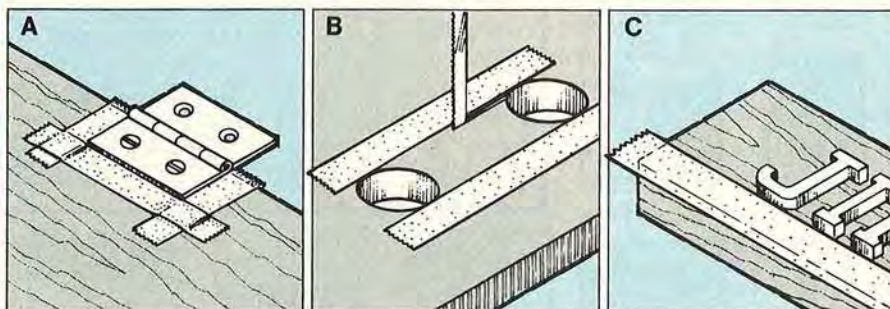
Making the most of masking tape

If you only use masking tape for painting tasks, you've just scratched the surface of potential applications.

TIP: As shown in the three examples below, you can use masking

tape for many marking and alignment tasks. Here, we lay out the position of a hinge, mark the cutting lines for a slot after drilling the two end holes, and align letters on a wood surface. Unlike pencil marks, the masking tape lifts off easily.

—From the WOOD magazine shop



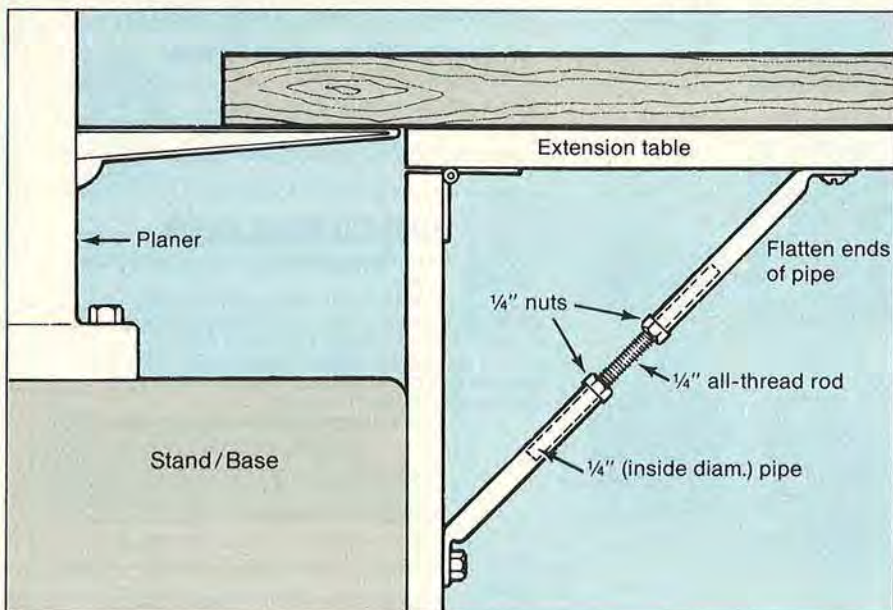
Struttin' your stuff for smoother planing

Many planers have infeed and outfeed tables that provide little support for long stock. Extension tables help, but you need to level them with the planer tables.

TIP: You can minimize chances of snipe at the end of your boards by building hinged extension tables such as the one shown below. These work well with planers that have stationary tables.

A hydraulic press works nicely for flattening the pipe ends, but you also can do the job with a hammer. Once assembled, adjust the pitch of the extension table by turning the 1/4" nuts. With a level or long straightedge, check to make sure the planer table and extension table form a single plane. These homemade struts also work well to support extensions for radial-arm saws and tablesaws.

—John Patton, St. Louis

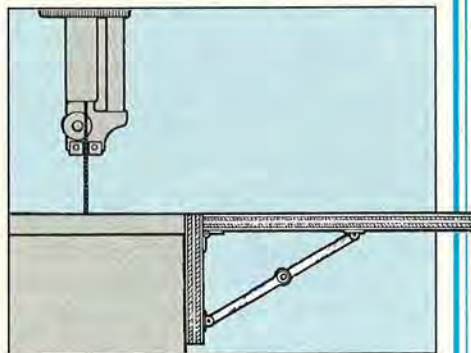


Foldaway tabletop extender for bandsaws

Most bandsaws come with small tabletops that don't adequately support large workpieces. You could bolt on an extension table, but what if you work in tight quarters and can't afford the space?

TIP: With 3/4" plywood and drop-leaf hardware, you can fashion an extension table. When not needed, the table drops to the side of the bandsaw.

—Ray W. DeVore, Caledonia, N.Y.

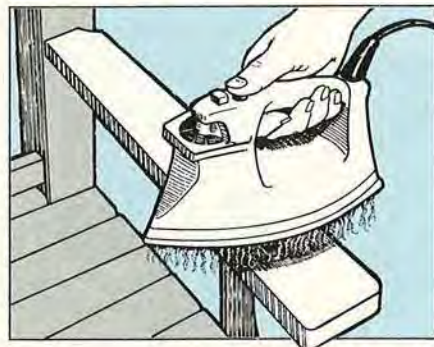


A steamy solution for wood indentations

Small dents often crop up on the surfaces of workpieces before you complete a project. You could fill the indentations with putty, but these repairs rarely blend in naturally. Applying a wet cloth to the dent and heating it with an iron sometimes raises the wood fibers, but not always.

TIP: With a hand-held clothing steamer or iron, shoot some steam onto the affected area. The steam will raise the wood fibers of shallow indentations, allowing you to re-level the area with a little sanding.

—Kerry Kumlien, Milton, Wis.



Continued on page 16

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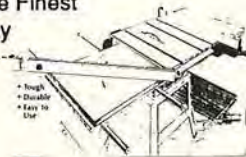
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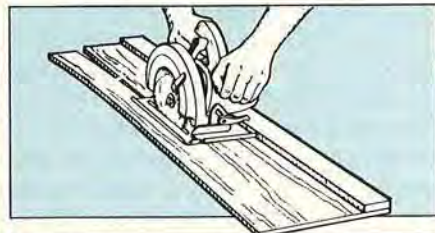
Continued from page 15

This straightedge helps you rout and rip accurately

A straightedge aids ripping a large sheet of plywood with a portable circular saw, or routing dados into a panel, but it takes time to adjust the straightedge so the blade or bit cuts exactly on your layout line.

TIP: Make a smarter straightedge by gluing a 2"-wide strip of 1/2"-thick stock to an equally long piece of 1/4" plywood or tempered hardboard. Both pieces should be a few inches longer than your longest cuts, and the 1/4" piece should be wider than the distance from your saw's blade (or router's straight bit) to the edge of the tool's base. When the glue dries, rip or rout the 1/4" stock as shown below. Now, you can align this just-cut edge with your layout mark and know where the cut will start.

—Roger Boulet, Winnipeg, Manitoba

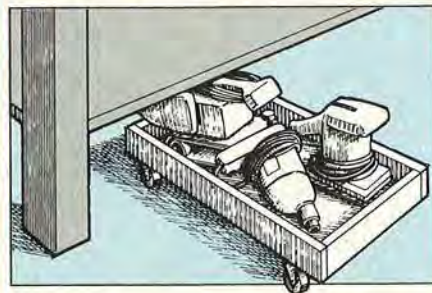


A handy storage spot for your tools

Tools that get occasional use don't deserve premium bench or shelf space in a tight-quarters workshop. Where do you put them?

TIP: Make better use of available space by storing tools on carts that roll under your bench as shown below. Assemble the cart from 3/4" stock for the sides, 1/2" plywood for the bottom, and four casters.

—Janeil Johnson, Whitehorse, Yukon



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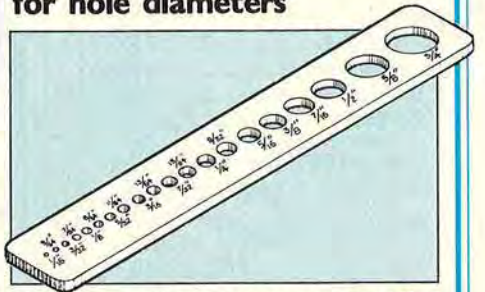
How many times have you worked on a large project and wished you had a try square as big as a carpenter's framing square?

TIP: By adding blocks of wood as shown below, you can convert a framing square into an oversized try square for those big jobs. First, cut the blocks to size from 1/4" - 3/4" stock and clamp them in position on the

square. Then, drill 1/8" holes completely through the blocks and square blade. Remove the clamps, scuff the blade with 80-grit sandpaper, apply epoxy glue to the mating surfaces, and reassemble. Insert 1/8" brass or steel pins of the appropriate length. Hold the assembly together with masking tape until the glue sets, then sand the pins flush with the surfaces of the blocks.

—Leslie Douette, Prince Edward Island, Canada

Quick reference for hole diameters

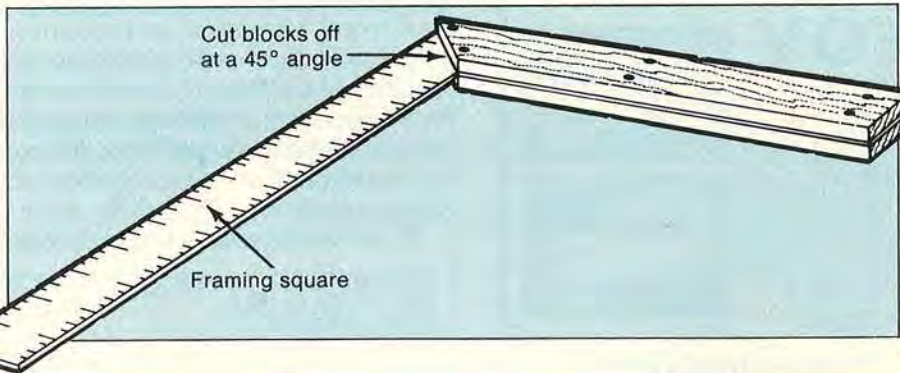


How many times have you stared at a drill bit, dowel, bolt, or one of a million other workshop tidbits and tried to guess its diameter?

TIP: Drill holes of graduating sizes as shown above into a piece of scrap plywood (1/4x1 1/2x18" works fine.) Now, you can quickly determine the diameter of all those odds and ends. Don't forget to carry this handy aid to the store to help you make the correct purchase.

—Jackie Ramirez, Long Branch, N.J.

Continued on page 18



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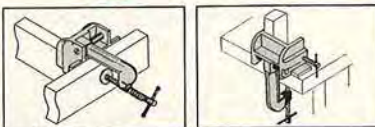
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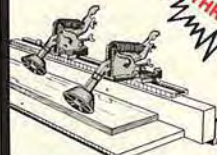


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TIPS FROM YOUR SHOP (AND OURS)

Continued from page 17

Scrollsawing small letters
Stencils and templates work fine as guides for scrollsawing 1" or larger letters, but not so well for smaller letters—if you can even find small sizes. Accurately marking smaller letters with a pencil and following those layout lines with your scrollsaw can prove taxing.

TIP: Purchase vinyl press-on letters from office-supply or art stores. The letters come in many different sizes, styles, and colors. Once applied to the wood, you can follow the outline of these letters easier than you can split a pencil line. To remove the vinyl, gently lift the letters with an X-acto knife, or sand the surface of the letters after mounting them to a workpiece.

—Dick Foxworthy, Widefield, Colo.



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More tips from our woodworking pros

You'll find more useful shop tips scattered throughout this issue of WOOD magazine:

- For a simple, shop-proven box-joint jig, see page 42.
- You say you've got only one rabbit bit and it's the wrong size for your project? Try the method shown on page 42 for placing spacers between the workpiece and the rabbit bit.
- Attention toy builders: See page 36 for a simple way of producing wheels.
- To keep faceplate screws away from your turning project, attach a wooden auxiliary faceplate as shown on page 61.
- For a simple technique to make a project looked aged, see the finishing method on page 66. 🌲



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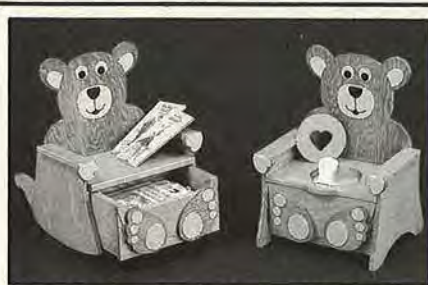
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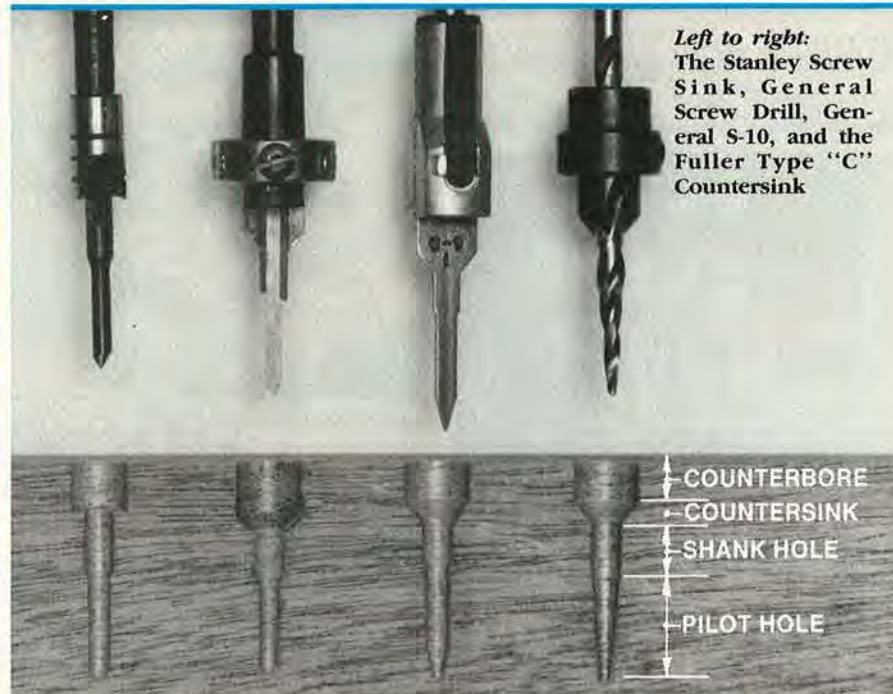
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SHOP SENSE

Print this article



Left to right:
The Stanley Screw Sink, General Screw Drill, General S-10, and the Fuller Type "C" Countersink

SCREW DRILLS

Tired of drilling four separate holes—one for the pilot, another for the screw shank, a third for the countersink, and yet another for the plug—to keep wood screws from cracking your project? With one of the screw-hole bits on the market, you can drill all four holes in one easy step.

Sizing up screws

Regardless of size, screws have the same basic components: the head, shank, and threads. A screw-hole bit accommodates all three. As shown *above*, the screw head fits into the countersink. Drill deeper to counterbore if you wish to plug the hole. The shank hole houses the nonthreaded portion of the screw. At the bottom, the pilot hole is the same size as the root diameter—the diameter of the screw between the threads—of the screw. Here the threaded portion of the screw takes hold and bites into the wood.

The all-in-one answer to perfectly prepared screw holes

The choice: A one- or multiple-piece bit

The screw-hole bits on the market today fall into one of two categories: one-piece bits and multipiece bits. The differences are worth learning about.

You'll find *one-piece bits* (see the bit on the far left *above*), usually made from tool steel, in sizes ranging from #4 to #12. One-piece bits are limited to drilling a specific screw size and length. Optional stop collars control the depth of the countersink and counterbore. To fit several screw sizes and lengths, you'll need a handful of one-piece bits.

Multipiece bits have a blade or a high-speed twist-steel bit to drill the pilot hole. Note that the General Screw Drill and the General S-10 shown *above* both have pilot blades; compare each with the taper drill pilot of the Fuller Type "C" Countersink. An adjustable, locking collar fits over the pilot bit to cut the hole for the screw shank and countersink.

Stop collars control the depth of the countersink/counterbore.

Multipiece bits (\$8 to \$12 each) cost about two times more than one-piece bits (\$4 to \$6 apiece). However, they have several advantages over one-piece bits in that each multipiece bit adjusts for several screw lengths by moving the locking collar on the pilot bit. They also tend to cut cleaner with less burning.

Rhode Island manufacturer W.L. Fuller, Inc., offers a tapered twist drill bit, shown on the far right in the photo at left. According to company president Warren Fuller, the tapered bits drill a hole proportioned to the shape of the screw. The screw drives easily, yet provides holding power the entire length of the thread.

You can use both types of bits in either a portable drill or drill press. We suggest drilling at slow speeds (250-500 rpm). Gradually feed the bit into the wood and clear the bit often to prevent heat build-up. Forcing the bit causes it to overheat and burn the wood. In repeated heavy use, the pilot tips of one-piece bits can get hot, lose their temper, and snap off in the workpiece.

What bit's right for you

If you occasionally drill just a few holes for standard-size screws, a one-piece set of four bits, at about \$10, will do.

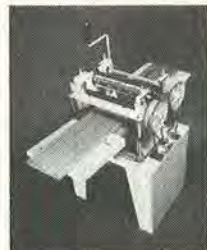
If you drill lots of holes, use many different screw lengths and sizes in your projects, or work primarily in hardwoods, you'd be much better off investing in a multipiece set. Four-bit sets (for #6, #8, #10, and #12 screws) with straight-shanked pilot drills cost about \$13. A set of four tapered bits with countersink collars costs about \$35. For about \$60, you can get a tapered-bit set that includes plug cutters to drill the right-sized plug for filling the counterbored screw hole. 🌿

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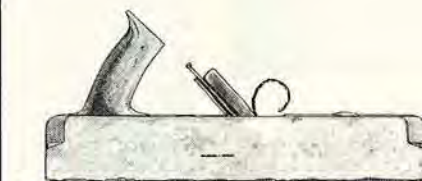
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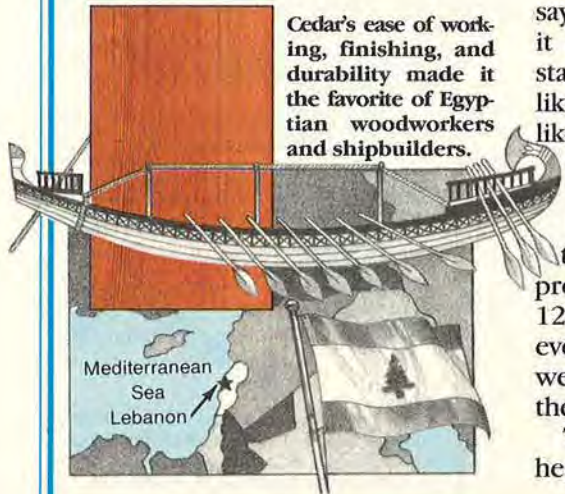


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THE WOOD OF THE BIBLE

Cedar's ease of working, finishing, and durability made it the favorite of Egyptian woodworkers and shipbuilders.



Of the many building materials used in the ancient world, one stands out—the cedar of Lebanon (*Cedrus libani*). Wood historian Albert J. Constantine, Jr., in his book *Know Your Woods* (Charles Scribner's Sons, New York, 1975), says the Old Testament alone cites it nearly 50 times. Psalms 92:12 states, "The righteous shall flourish like the palm tree: he shall grow like a cedar in Lebanon."

In Lebanon and Syria during those early times, vast cedar forests grew. And there's no doubt that this Lebanese cedar was impressive. A mature tree could stand 120' tall and 8' in diameter. However, neighboring countries that were not similarly blessed coveted the towering timbers.

The Egyptians, for instance, drew heavily on the Lebanese cedars.

During the reign of Pharaoh Snefru alone (2,000 B.C.), it is recorded that a fleet of 40 ships carried Lebanese logs to Egypt.

There, laborers hewed the cedar into timbers for royal river barges and seagoing vessels. An entire ship discovered by archaeologists inside a pyramid in 1954 contained cedar planks 75' long and 5" thick! Egyptian cabinetmakers and carpenters favored cedar of Lebanon, too, because of its workability and aroma. In fact, ancient tombs containing expertly crafted cedar furniture, shrines, and coffins bear this out.

Today, remnants of the once-vast cedar forest remain protected in the Cedars of Lebanon National Park, located about 90 miles north of Beirut. And the Lebanese still revere the tree—it appears on their flag as a national symbol. 🌲

Illustration: Jim Stevenson

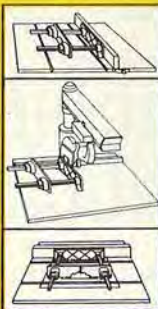
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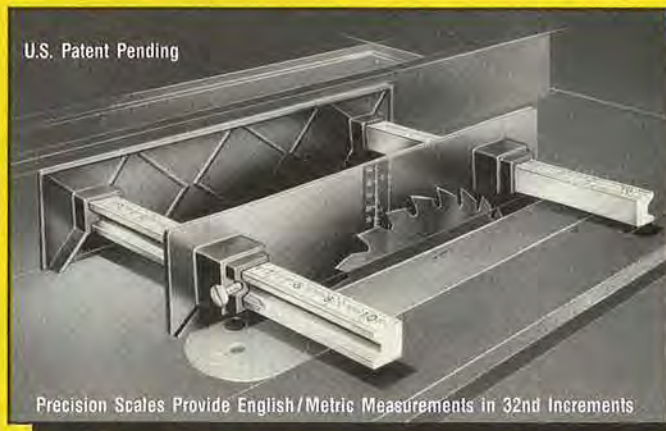
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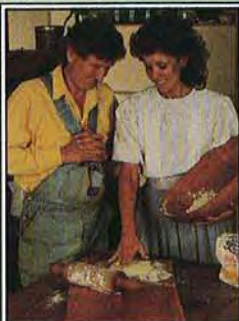
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DOWN-HOME DOUGH BOWLS

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John Sadler helps his wife, Linda, roll out biscuit dough in their 1800s-vintage cabin down in Billy Hill Hollar.

Paul Warner, a reader from Perry, Georgia, sent us quite a letter awhile back. Paul, a woodturner, had met a fellow craftsman who impressed him—so much so that he suggested an article. Taking his advice, we traveled to central Tennessee to visit bowl maker John Sadler and Linda, his wife.

There, in the ridged country around Bradyville, we found a 20th-century man sharing time with the past. At

day's end, John, a plumber by trade, walks into the last century to practice a craft mastered by his great-grandfather and grandfather before him.

Deep in a wooded hollow behind the family ranch house, John, 47, cleaves wood and works it into the large bowls that generations have used to mix the daily dough. For him, the work has become a link to simpler times. To others, his bowls represent examples of old-time craftsmanship.

Continued

Rugged people settled the Tennessee hill country. They scraped a living off the land, planting crops of corn and cotton in clearings hewed from the forest. Luxuries were rare, and skills became commodities to trade for necessities.

"Nearly every community back then had a blacksmith," says John Sadler, his drawl softening the spaces between words. "There was somebody who built barns, and one who made bowls, and like that. And it's my understanding that they generally swapped out rather than bein' paid."

John pauses to refresh his pinch of snuff, then continues. "Boy Lemons was a right handy old bowl maker in these parts—he taught my kin. He lived up at the top of the hill there, in what we called Old Boy House. That house was so open. Why, my Daddy said you could throw a cat through the roof and count chickens through the floor. Hard to believe

people was raised like that, but they made do."

Today, only crumbling supports mark the site of Boy Lemons' house. And, according to John, the dough bowls Boy made from buckeye or yellow poplar have vanished, too—no doubt worn thin, then through, from twice-a-day biscuit making over the years. But, just as stories from yesterday have passed down, so has the bowl-making tradition—from grandfather directly into the hands of John Sadler.

Whistling up dead man's wood

Out of every 100 dough bowls John makes annually, about 30 will be of buckeye—a white, easily worked wood—and the rest come from cherry, butternut, black walnut, and some persimmon. In the old days, bowl makers didn't offer such variety.

"My granddaddy, when he made bowls, used buckeye," John

says. "It's native to this part of the country, it's soft wood, and light. The womenfolk, you know, didn't want a really heavy bowl to tote. Buckeye's a hill tree—you won't find it in the flat country very often. At one time, it went for making caskets. That's why some of the old-timers around here still call it 'dead man's wood.'"

In the hill country, "whistlin' up" means to fetch, gather, or get, and it covers how John obtains much of his bowl wood. Yet, it doesn't always come for free.

"I always keep my eye out for a good tree, even when I drive to work," John explains. "Folks around here know that I make these bowls, and volunteer where there might be a good tree. I do run across a deal once in awhile. Why, matter of fact, I've traded two, three bushels of apples for a walnut tree. They's my wife Linda's apples, of course," he adds, the family humor in the tale evident on his face.

John's dough bowls come in round, oval, and the traditional oblong shapes, and in buckeye, butternut, cherry, and walnut. He also makes breadboards and rolling pins to match.



John ambles over to a BIG log, and kicks away the protective sawdust piled against one cut end to expose dark orange wood. "I was looking for some white walnut [butternut] on an old boy's place down in the barns [barrens, flat country] when I spotted this big old cherry," he says. "I've made a deal with the wife to make her some bowls in exchange for the tree. That's how this wood come about—one of the biggest cherries I've worked—it'll turn out 25–30 bowls."

What does a good bowl tree look like? Quite different from one destined for furniture stock. Says John, "The main thing is size, 'cause you can't get a big bowl out of a little tree. And, you'd think that a real straight log would make the prettiest bowls, but many times that's not the case. Some of the best lookin' cherry bowls I've made came from an old rough log that my brother-in-law give me. Before I was makin' bowls, I wouldn't have carried it home for firewood—lots of knots. But, when I opened that log up, I found I could ease a bowl right up to a knot or a defect, and pick up a lot of curly grain."

Down in Billy Hill Hollar

As a stone rolls, it's about 200 yards from John and Linda's home atop the ridge to the cabin in the hollow. By foot down the switch-backed road, it's twice that.

The cabin rests in the shade of tall tulip poplars. A brook tinkles by. Ferns flourish. A split-rail fence defines the yard-turned-work-area. And although the building is less than 10 years old, it looks as if it has always been there. A high-pitched, tin-covered roof, wide-open pillared porch, and stone steps mark it as down-home. John seeks seclusion there to hew his bowls, and keep touch with his roots.

"There was an old feller by the name of Billy Hill—in fact that's



John likes to rough-shape his bowls at his cabin in the hollow. There's no telephone to interrupt him as he works the inside of the bowl with a hand adz.

what we call this place now—Billy Hill Hollar. Yup, he got out a corn crop and raised a family down here. When I built my cabin, I thought of him," John says, introducing his hideaway. "There's no electricity, just kerosene lamps and a wood stove. I don't have to listen to phones a-ringin', or worry about someone's leaky faucets. I built the cabin to look like it just grewed here."

John stops, letting nature's sounds briefly take over—a whippoorwill's call, wind in the poplars, water over rocks in the brook. "You step back in time when you come down over the hill. It makes me feel a little bit closer to my raisin'."

And, for working wood to make his bowls, John doesn't need electricity in the hollow. Boy Lemons would approve.

Continued

Shaping up a dough bowl

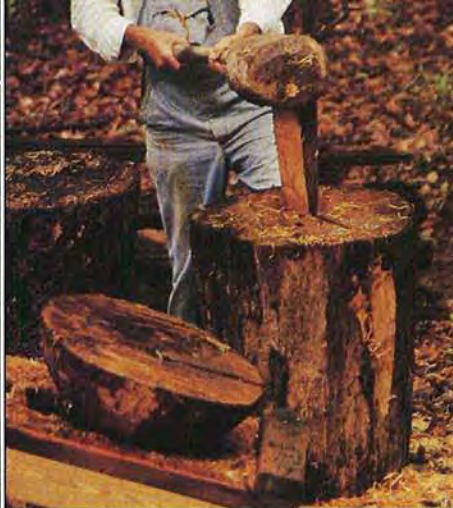
"As Boy taught him, Grandad would have cut the log off with a crosscut saw, then split it open with a maul and a large wedge called a glut," John says, describing the hand-me-down methodology. "Probably, he would have used a broad ax to work his bowl down into a chunk. Next, he'd have stepped up to a hewing hatchet—sharp on one side—to shape the outside of the bowl, then maybe a hand plane. On the inside, he'd work with a hand adz and a scorp. To smooth it up, he'd have sanded with a piece of glass or pottery. Old bowls won't be slick," he adds, "just smooth enough to keep from gettin' a splinter in your hand."

For roughing out his bowls at the cabin, John substitutes a chainsaw for much of the ax, hewing hatchet, and adz work. But, the process begins almost as it did 100 years ago.

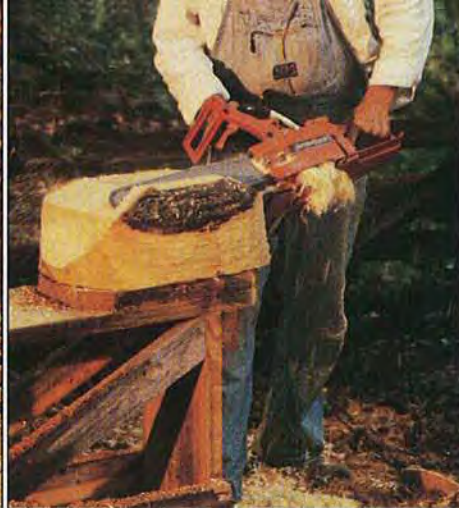
"I used to take my logs to a local sawmill to open up, but it got so that those old boys would see me comin' and just shake their head," says John. "So, I've been doing it myself, sawing off two-foot chunks and splitting them with a chainsaw part way, then taking a glut and a maul to rive them open. I can read the grain better, anyhow," he says, bending over to run his hand across the clean, cut end of a walnut log. "Trees are just like human beings, you know, they're not perfect by no means. Often the heartwood will be at different places from one end of the log to another."

John's dough bowls run big—a standard oblong one measures 23" long, 15" wide, and about 6" deep, with $\frac{5}{8}$ "-thick walls. It takes a good-sized tree for raw material because he won't use the pith ("I step back from the heart at least two inches.").

With the split chunk of wood before him, John begins rough-shaping. "Just like buildin' a house, with bowl carvin' you got



With a glut and a one-piece maul made from hickory, the bowl maker opens up a butternut log.



After drawing the bowl's rim outline on the wood, John shapes the outside by shaving with his chainsaw.



With a technique similar to cutting a mortise, the craftsman saws deep incisions, then clears them away. The bowl won't shift in the form-fitting saddle.

Sitting on the steps of his cabin, John cleans up uneven surfaces on the outside of his bowl with a hewing hatchet.





Situated near the house, John's outdoor shop with its different workstations resembles a merry-go-round.



Grinding, then sanding, removes all the saw and adz marks from the bowl, as well as fine-tunes the shaping.



After belt-sanding, John hand-sands with 320-grit paper for super-smoothness, all the while taking off tiny high spots that his hands notice.

"It makes sense to put tree oil on a tree," says John about his walnut-oil finish. Pioneers left the bowls unfinished, or rubbed in lard.



to start with a good foundation. And my foundation is the rim."

A template gives him the bowl outline, which he draws on the wood. Then, with $\frac{3}{4}$ " deep plunge cuts of the chainsaw, he follows the pattern. From there, he takes the bowl over to the shaving horse where he clamps it in place and makes angled cuts to trim the ends and sides, as shown in the photo, *opposite page, top right*.

John's practiced eyes know exactly how much wood to take off to keep the bowl in proportion. Once he has worked the outside to form, he turns over the bowl-to-be, sets it in a form-fitting, custom-made saddle to hold it steady, and commences to cut out the inside, as shown *opposite page, center*. He trims with the hand adz.

Finally, the bowl—its walls whittled to $\frac{3}{4}$ " thick and the bottom to about $1\frac{1}{2}$ "—is ready for the curing shed, a storm cellar next to the house. "Open-grain woods like buckeye," John notes, "cure out in $2\frac{1}{2}$ to 3 months. Cherry and walnut take twice as long. And, no wood moves enough while dryin' to hurt the appearance. When I go to finishing, I can shape it up. Course," he adds, "I leave the rim uneven so it won't look machined."

A tree-to-tree finish

At his electrified workstation atop the hill, John smooths up his cured bowls. He removes saw and adz marks from the inner and outer surfaces with power tools, and finally hand-sanding, see photos *left*, with grits from 60 to 320. "All the time I continue to shape that bowl," John says.

John believes most bowls were left unfinished. That won't do for his, however, since those who pay \$150 to \$250 for them want a display piece. "I've used olive oil and mineral oil, but walnut oil accents the grain the best," he says. "And, it seems natural to put a tree oil on a tree." 🌲

Written by Peter J. Stephano
Photographs: Jim Hale

THE NORWEGIAN BACHELOR FARMER

A ROUGH-HEWN CARICATURE THAT TEACHES YOU SCANDINAVIAN, FLAT-PLANE CARVING

Flat-plane carving had its origins in the rustic and rugged peasant carvings done in Scandinavia 150–200 years ago, according to Harley J. Refsal, carver and instructor in Scandinavian folk art at Luther College, Decorah, Iowa. “The style takes its name from the flat planes created with the knife cuts, a technique that at first glance seems rough and unsophisticated. But, the knife marks that shape the piece become a part of it—when you take away wood with the blade or gouge, you create an element,” he explains. “A cut to remove wood from the leg becomes a heavy crease in the pants. In flat-plane carving you don’t shape the figure, then go around putting knife cuts in to smooth it.”

Harley learned flat-plane carving in Norway in 1965, and has practiced the style ever since. In fact, in 1989 and 1990, he returned to the land of its origin to teach the technique to Norwegians—all the folk-art carvers had passed away.

The figures Harley carves represent the kinds of people he grew up with in rural Hoffman, Minnesota. And the flat-plane style suits them. “It’s a rough-hewn way of depicting rough-hewn people,” Harley says, “like this Norwegian bachelor farmer, made famous by Garrison Keillor’s book,



Harley Refsal

Lake Wobegon Days. But remember, a caricature isn’t supposed to be realistic, so features that stick out, such as ears, feet, cap, etc., must be larger than life.”



 [Print this article](#)

You'll need these tools and supplies

The farmer requires a $2\frac{1}{4} \times 2\frac{1}{4} \times 6\frac{1}{2}$ " block of basswood on which to transfer the pattern shown on page 83. Or, start with the prime northern basswood blank sawn from two directions, shown *below*. It has lines drawn on to get you going. Send \$9.95

(U.S.) ppd. (two for \$17.50) to: *Harley Refsal Woodcarving, 619 North St., Decorah, IA 52101. Allow 4-6 weeks for delivery.* For a booklet containing 20 patterns of Harley's favorite figures, add just \$9.95 and request "Patterns."



Pre-sawn blank

You'll need the carving tools illustrated *below*:



Knives

- bench-type carving knife



Gouges

- $\frac{1}{2}$ " No. 6 or 7 palm gouge
- $\frac{1}{4}$ "- $\frac{3}{8}$ " No. 4 or 5 gouge
- $\frac{1}{8}$ "- $\frac{3}{16}$ " No. 9 gouge
- $\frac{1}{8}$ " 45° V-tool



Finish Materials

- Water-soluble, acrylic artist's paints in white, red, blue, green, brown, and yellow (or any other colors you care to substitute)
- No. 7 or No. 8 brush
- No. 000 brush
- Boiled linseed oil
- Burnt-umber artist's oil color (or brown oil stain)

After assembling all the tools and supplies you'll need for this project (see list, *left*), study the front- and back-view photographs of the completed farmer. And, turn to the closeup photograph of the figure's face on page 33. In the full-figure photos, note the sharp, prominent cuts that produce creases and folds, elbows and knees. Study the facial close-up to see how each angular cut of the knife defines a feature—nose, cheeks, ear. Now, you're ready to start carving.

Carve from the bottom up

With your knife, shape the figure's legs, as in photo *below*. Be sure that you don't round the legs so they resemble perfect cylinders—the goal is to leave as many large, flat planes as possible. Take advantage of the cuts to make folds and creases. Imagine that if you sawed off one of the figure's legs midway between knee and ankle, and looked at the cross-section, the shape would be octagonal rather than round.



Bold knife strokes shape the leg. Remember, the cut you create stays there.

For the crotch of the farmer's pants, make two strongly defined cuts in an upside-down "V" shape. And, don't cut the crotch in too high. Locate it no more than $\frac{1}{2}$ " from the spot where his legs join the trunk of his body.

Now, turn the figure over and shape the seat of the farmer's overalls with your knife blade. In the photo *below* you can see the bold V-cuts required to form a crease—one cut down and in, the next up and in to meet it.



One cut down and in, another up and in make a fold in the cloth.

Now that you have carved his seat, turn your attention and your blade to the feet. Note how large the shoes appear in the photos. There's a double reason for this. First, you must leave them large to provide a solid base for the figure to stand on. Second, their size is part of the caricature.

Carve the shoes without attention to detail, avoiding the natural tendency to round them. Let a minimum number of flat cuts define their shapes. For the soles, for instance, you need only to trim the wood with flat, thin, vertical cuts around the edge of the shoe. Any attempt to accent the sole by making it a protrusion can result in a break-off of the cross grain (something to remember when you get to the cap visor, too). Let the farmer's pant legs fall all the

Continued

NORWEGIAN FARMER

way to the ground in back (see rear-view photo), but make cuts to represent folds where his pants break on top of his shoes (see front-view photo).

Put his hands in his pockets

Before carving the farmer's arms, plan your cuts so his hands will disappear into his overall pockets. And, as with the legs, avoid carving perfect cylinders. Instead, try to make large, flat cuts that meet sharply at the edge of the wood, as if his shirt had been starched and ironed.

Separate the arms from the body at the chest with cuts to form a wide-legged "V" on the inside of the elbow (for detail, see photo on the next page, *top right*).

These cuts also narrow and define the width of his chest.

The widest part of the figure is the area where the hands enter the pockets. And, the hands in those pockets tend to push out the overalls, so leave more wood at those points.

When you're satisfied with the look and shape of his arms, turn the farmer over to work on the back.

With a $\frac{1}{2}$ " No. 6 or No. 7 gouge, cut across the grain (horizontally) with scooping motions to remove wood between the arms. This creates the small of his back. (Here, the gouge makes it difficult to leave flat planes, but try to keep gouge marks to a minimum.) Leave each arm $\frac{1}{2}$ " wide at the outer elbow. Then, clean up the elbows with the same type of cuts you used on the inner elbows—sharp edges on the elbows are okay (see elbow, *left and top right*). After the elbows, you will have shaped your farmer from the neck down.



A gouge removes wood to form the small of the back.

Character for a caricature

Before starting to carve the head, draw on large ears and sideburns as shown on the pattern and the photo *above right*. Don't be afraid to exaggerate. Place the ear at least two-thirds of the way back on the side of the head. Then, with your knife, remove wood from in front of, on top of, and behind the ear so that it protrudes about $\frac{1}{4}$ " at the thickest point (just below and behind the top).

Next draw on the line for his seed cap. (Note that the cap goes all the way down to his collar behind the ears). Then, narrow the wood of the cap over the face so the visor ends up sticking out about $\frac{1}{32}$ " from the side of the farmer's head, as shown in the photo *far right*.

By now, you have probably trimmed off the sideburn outlines, so draw them in again. *Note: While working on the ears and sideburns, constantly check both sides of the head to see that the ears are level with each other and the same approximate size.* Then, recess the area below and in front of the ears about $\frac{1}{32}$ ", as in the photo of the finished face, *right*.



Pencil lines define the exaggerated ears and sideburns.

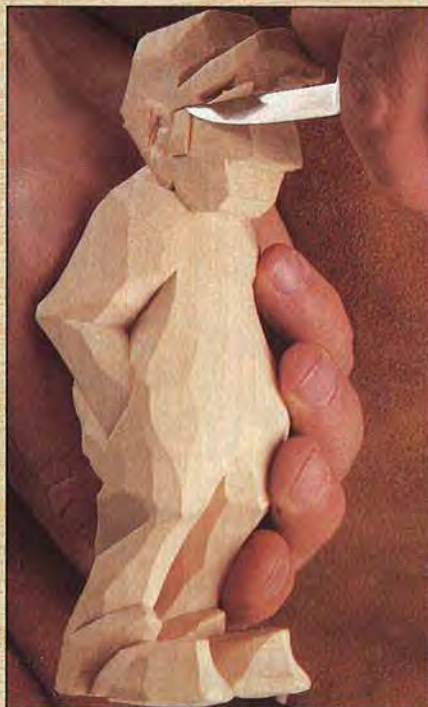
Taper the front part of the ears so that they disappear under the sideburns. To detail the inside of the ear, make a stabbing cut with the point of a $\frac{1}{8}$ "– $\frac{3}{16}$ " No. 9 gouge, as in photo *below*. Then, with the same tool, make a few shallow sweeps from the surrounding wood and into the cut.



Detail ears with a simple stab cut from a small gouge.

Next, shape the underside of the cap visor with a shallow $\frac{1}{4}$ "– $\frac{3}{8}$ " No. 4 or 5 gouge. Run the tool carefully from front to back and toward the forehead. With your knife, remove wood from the top side of the visor to follow the curvature you carved on the underside. *Use caution at this stage.* You're carving across grain, and if you make the visor thinner than $\frac{3}{16}$ ", or exert too much pressure with a tool, it can break off. Make a stop cut on the forehead under the visor to help shape the face.

Thinned acrylic paints allow the wood grain to show. Add a patina by slightly darkening linseed oil with stain.



Note the thick cap visor. If you carve it too thin, though, or use excess pressure, the cross-grained wood could break.

Now, you're ready to tackle the face—often thought of as the most difficult step in carving. So, proceed slowly and refer to the photo of the finished face, *below*.

Begin by drawing a vertical centerline down the front of the face. Then, remove wood with your knife at an outwardly slop-

ing angle toward the back of the head. (If you look at someone's face, it isn't flat, but tapers toward the tip of the nose.)

To form the smile lines on both sides of the nose, make V-cuts with your knife. Note that they begin at the bulb or fattest part of the nose, then run down and outward like the legs of the letter A.

With a shallow V-cut, make the mouth, noting that it's located on the face slightly closer to the nose than to the tip of the chin. Accent the lower lip by cutting a shallower and shorter V-cut below and parallel to the mouth.

Using the same V-cuts as above, shape the eye sockets, at the same time thinning and forming the nose. With your small No. 9 gouge, scoop out the final sockets. You'll paint in the eyes later.

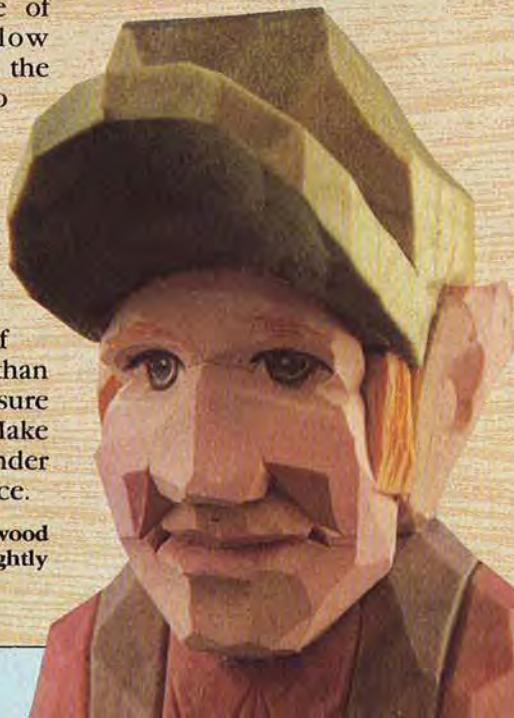
Now, it's time to add a few details. For the overall suspenders, first draw on lines, then vein (lightly cut) them with your V-tool. Vein the eyebrows, sideburns, and shirt collar as well. To make the brass buttons on his overalls, use the same stab technique you did to detail the inner ear. And, before you put away your tools, take the V-tool and add your name and the date to the bottom of one of the carved figure's shoes.

Paint that shows the grain

Referring to the photos here and on page 31, paint your farmer. Remember to thin the paints with water so the grain will show through (except the colors you use for the eyes, which should be opaque). Experiment first.

After the paint on your carving has thoroughly dried, liberally apply boiled linseed oil to which you've added just a hint of brown oil-stain or burnt umber artist's oil color. This gives your figure a protective patina. 🍷

Written by Peter J. Stephano
with Harley J. Refsal
Project design: Harley J. Refsal
Photographs: Bob Calmer
Graphic design: Perry A. McFarlin



 Print this article

FOR LOADS OF FUN
THE FAT CAT[®]

FRONT-END LOADER

Our latest piece of heavy equipment may be pint-sized, but this tough-as-nails toy will be **BIG** with the sandbox set. Its pivoting-bucket assembly, in the skillful hands of an imagina-

tive child, will move “mountains” of material. For information on how to obtain plans for the other Fat-Cat toys we’ve published, please see the box on page 37.



Note: You'll need thin stock for this project. You can either plane or resaw thicker stock to size.

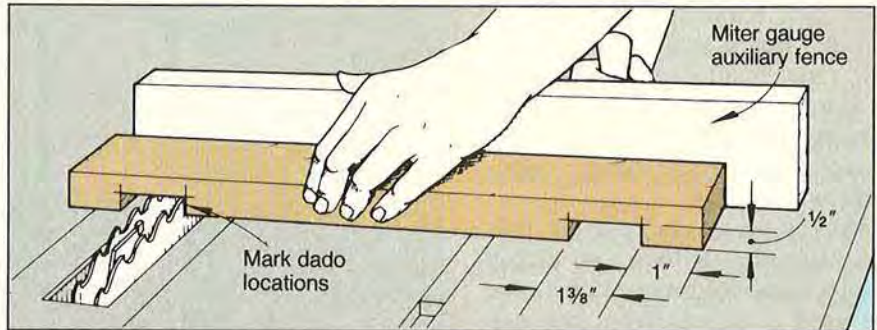
First, the cab and chassis

1 Cut a piece of $\frac{3}{4}$ " pine to $2\frac{1}{8}$ " wide by 12" long for the cab (A).

2 Measuring 1" from each end of the pine, mark the locations for a pair of $1\frac{3}{8}$ "-wide dadoes. Using your tablesaw and a miter gauge, cut the dadoes $\frac{1}{2}$ " deep where shown in the drawing at right.

3 Crosscut the pine into two equal lengths. Mark the windshield location on one piece (see the Window detail below for reference). Mark the top of the windshield flush with the top of the dado.

Continued



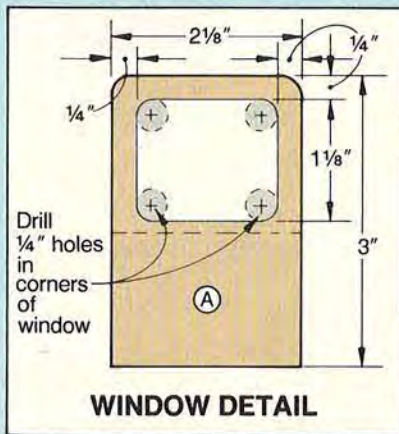
Bill of Materials

Parts	Finished Size*			Mati.	Qty.	Parts	Finished Size*			Mati.	Qty.
	T	W	L				T	W	L		
A* cab	1 1/2"	2 1/8"	3"	LP	1	BUCKET ASSEMBLY					
B chassis	3/4"	2 1/8"	4 1/4"	P	1	F bottom	1/4"	2"	3"	P	1
C hood	1 1/2"	1 1/2"	1 1/2"	LP	1	G back	1/4"	2 1/4"	3"	P	1
D support	1"	1 1/8"	1 5/8"	LP	1	H ends	1/4"	2 1/4"	2 1/4"	P	2
E* wheels	3/4"	2" dia.		P	4	I arms	1/2"	1"	2 5/8"	P	2

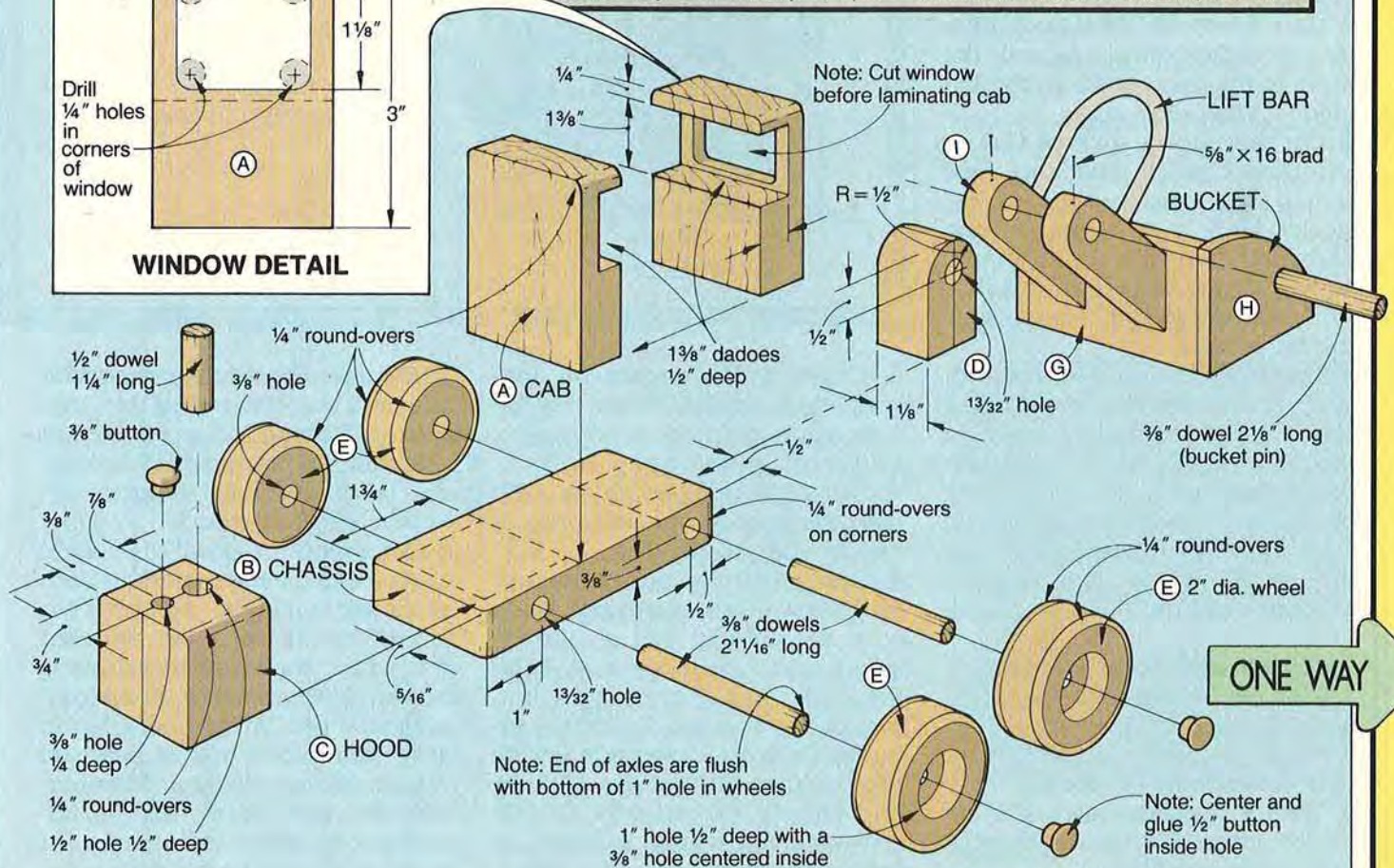
*Initially cut parts marked with an * oversized. Then, trim each to finished size according to the how-to instructions.

Material Key: LP-laminated pine, P-pine

Supplies: $\frac{3}{8}$ " dowel stock, $\frac{1}{2}$ " dowel stock, $\frac{3}{8}$ " wood button, $\frac{1}{2}$ " wood buttons, $\frac{3}{8}$ " all-thread rod $5\frac{1}{2}$ " long with nuts and washers for sanding arbor, $\frac{1}{4} \times 1\frac{1}{2}$ " U-bolt, #4 $\times \frac{1}{2}$ " flat-head wood screws, $\frac{5}{8}$ " \times 16 brads, clear finish.



WINDOW DETAIL



FRONT-END LOADER

Now, drill four $\frac{1}{4}$ " holes at each corner on the inside of the marked windshield. Cut the opening to shape with a scrollsaw or coping saw. Sand or file the cut edges of the windshield.

4 Apply glue to the mating surfaces, align the dadoes, and clamp the cab parts. Remove excess glue (we used a chisel) from the cab interior before it dries.

5 Trim the top and bottom of the cab lamination to length where dimensioned on the Window detail on the previous page. Sand $\frac{1}{4}$ " round-overs along the cab top where shown on the drawing.

6 Cut the chassis (B) to size.

Add the hood and bucket support

1 Glue and clamp two pieces of $\frac{3}{4}$ "-thick pine for the hood (C). Sand $\frac{1}{4}$ " round-overs on the top edges where shown on the Exploded View drawing.

2 Mark the smokestack and radiator-cap centerpoints, and drill the holes to the sizes stated on the Exploded View drawing.

3 Cut the bucket support (D) to size from 1"-thick pine stock (we laminated two pieces of $\frac{1}{2}$ " stock). Mark a $\frac{1}{2}$ " radius on one end, and bandsaw it to shape. Mark the centerpoint, and drill a $1\frac{3}{32}$ " hole through the support for the bucket pin.

4 Sand the chassis, hood, and support. Spread glue on the mating surfaces, and clamp the support to the front of the chassis, positioning it flush with one end of the chassis and centered from side to side. Next, glue and clamp the cab to the chassis and support, and then add the hood.

Time to add some wheels

1 To make four wheels (E), cut a piece of $\frac{3}{4}$ "-thick pine to 4×14 ". Starting 3" from one end, mark four centerpoints 3" apart.

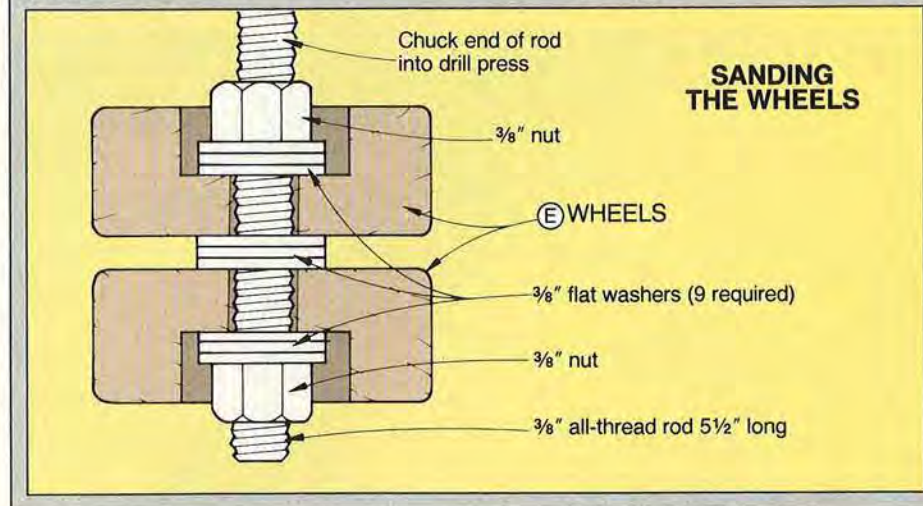
2 With a compass, mark a 2"-diameter circle (1" radius) at each marked centerpoint.



Mark the wheel centerpoint locations 3" apart on the pine, and drill holes $\frac{1}{2}$ " deep for each wheel.



Center the circle-cutter pilot bit over the Forstner-bit depression, and cut the wheels to shape.



SANDING THE WHEELS

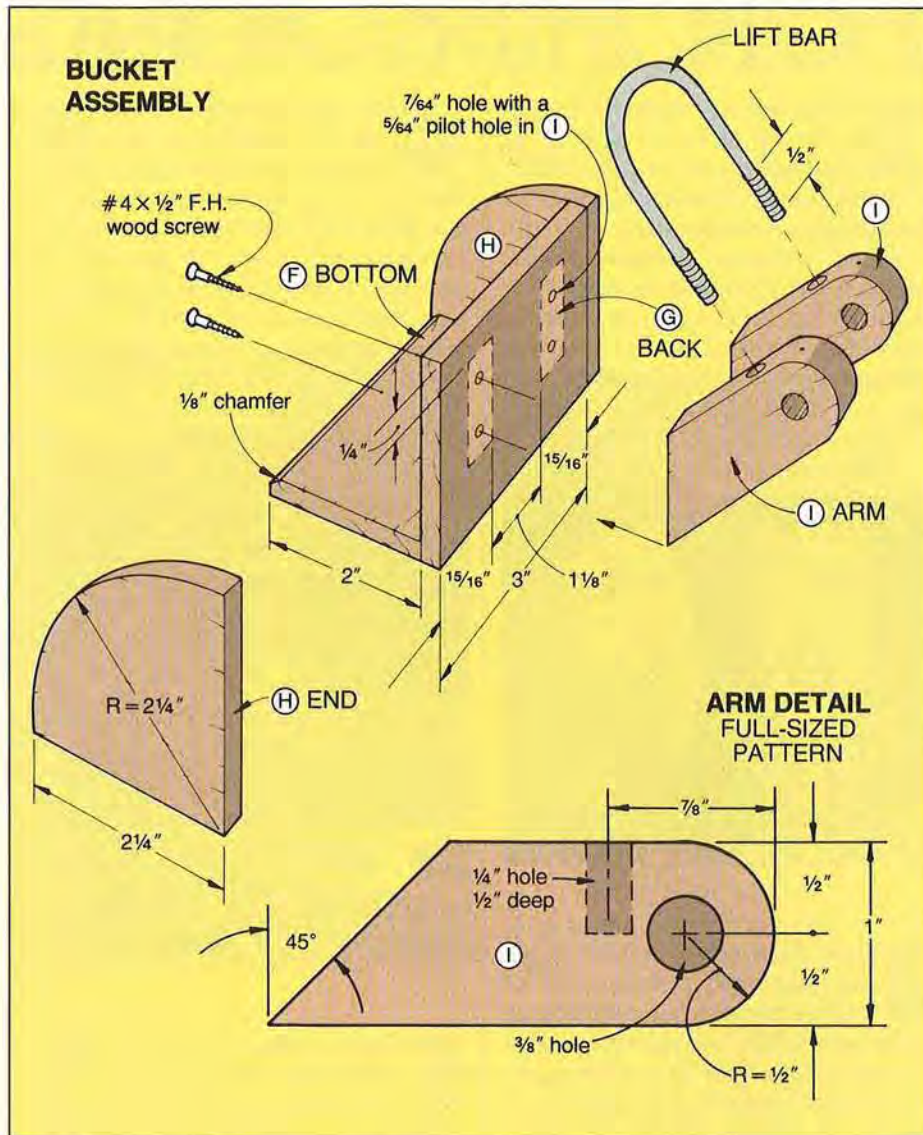
3 Chuck a 1" Forstner bit into your drill press. Center the bit over each marked centerpoint, and bore a $\frac{1}{2}$ "-deep hole as shown in the photo *above*. (We used the stop on our drill press to ensure uniform depth.)

4 Chuck a circle cutter into your drill press. Turn the cutter blade with the pointed end on the inside to cut a perfect wheel. Raise the blade $\frac{5}{8}$ " higher than the bottom of the pilot bit. Center the pilot bit over the depression left by the Forstner bit in each 1" hole, and slowly—about 250 to 500 rpm—cut the wheels to shape as shown in the photo *above right*.

5 Remove the circle cutter, and chuck a $\frac{3}{8}$ " twist drill bit into your drill press. Secure a wheel in a handscrew clamp, and enlarge the $\frac{1}{4}$ " pilot (axle) hole to $\frac{3}{8}$ ". Repeat for each wheel.

6 Cut a piece of $\frac{3}{8}$ " all-thread rod to $5\frac{1}{2}$ " long, and chuck it into your drill press. Attach two wheels at a time to the threaded rod where shown in the drawing *above*. With the drill press running at about 750 rpm, hand-sand a $\frac{1}{4}$ " round-over on each wheel where shown in the drawing. (We found sanding the round-overs safer than trying to rout them on a router table.)

BUCKET ASSEMBLY



Next, assemble the bucket

1 Cut the bucket bottom (F), back (G), and ends (H) to size and shape from $\frac{1}{4}$ " stock. Sand a $\frac{1}{8}$ " chamfer along the top front edge of the bucket bottom.

2 From $\frac{1}{2}$ " stock, cut the arms (I) to size, mitering the front ends at 45° . See the drawings *above* for reference and the Bill of Materials for sizes.

3 Mark the centerpoints, and drill a $\frac{1}{4}$ " hole $\frac{1}{2}$ " deep in each arm for the lift-bar U-bolt and a $\frac{3}{8}$ " hole through each bucket arm.

4 Sand the pieces. Then, with the edges and ends flush, glue and clamp the bucket parts (F, G, H).

5 Using a hacksaw, trim the ends of a $1\frac{1}{2}$ " U-bolt so only $\frac{1}{2}$ " of threaded portion remains on each end (see the Bucket Assembly drawing for specifics).

6 Set the arms on a flat surface, and epoxy the threaded ends of the U-bolt into the $\frac{1}{4}$ " holes in the arms, checking that the arms are parallel to each other and that the mitered front ends remain flush. (You want the bucket support to fit easily between the arms.)

7 Hold the arm assembly against the back of the bucket assembly, and trace the arms outlines onto the bucket back. Drill four $\frac{7}{64}$ " holes through the back and $\frac{5}{64}$ "

pilot holes into the arms. Screw the arms to the bucket back.

8 Cut a $\frac{3}{8}$ " dowel to $2\frac{1}{8}$ " long for the bucket pin. Position the arms on both sides of the bucket support, and slide the dowel pin in place. Snip off the head of a $\frac{5}{8}$ " \times 16 brad and chuck it into your portable drill. Drill a pilot hole through each arm and into the dowel pin. Drive a $\frac{5}{8}$ " \times 16 brad through each pilot hole to secure the arms to the bucket pin.

Mount the wheels, and move some gravel

1 Cut the axles to length from $\frac{3}{8}$ " dowel stock as dimensioned on the Exploded View drawing.

2 Glue one wheel onto each dowel axle so that the end of the dowel is flush with the inside of the counterbore. After the glue dries, slide the axle through the axle hole and glue another wheel to the end of the axle dowel, leaving enough free play so the wheels turn easily.

3 To add the hubcaps, set the loader on its side. Place a drop of glue on the ends of the axle dowels, and glue a $\frac{1}{2}$ " wood button to the end of the dowel. After the glue dries, flip over the assembly and repeat for the other hubcaps.

4 Add the radiator cap and smokestack. Mask the U-bolt and apply the finish. 🐱

Fat-Cat-Toy Plans

We've presented plans for the following Fat-Cat toys: 1) semi-trucks and trailers, 2) excavator, 3) bulldozer, 4) dump truck and lowboy. To order the instructions, send \$2 per plan (four plans available) and a self-addressed envelope with one first-class stamp *per* plan to Fat Cat Toys, WOOD Magazine, P.O. Box 11454, Des Moines, IA 50336-1454.

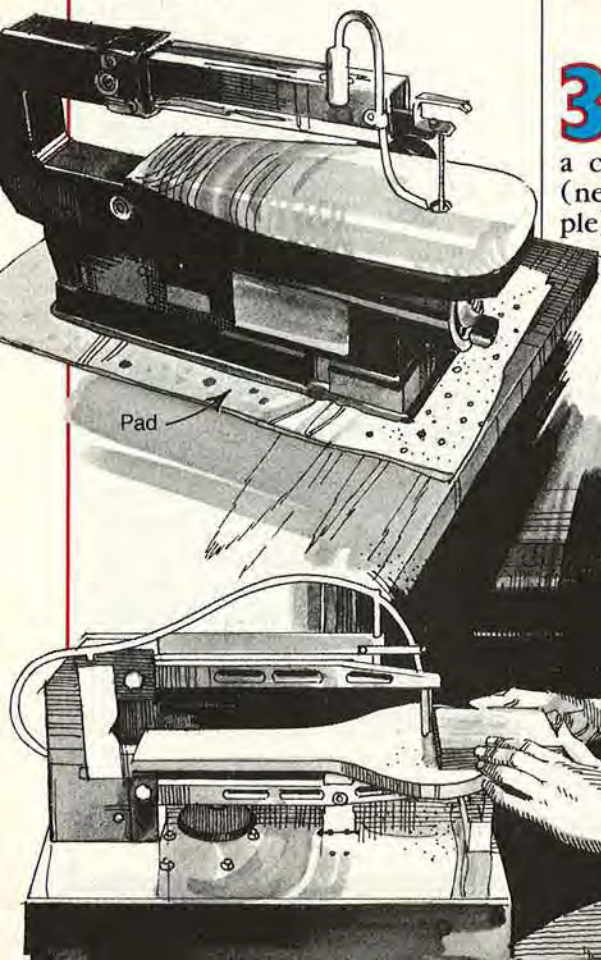
Produced by Marlen Kemmet
Project Design: Steven Bruni
Photographs: Bob Calmer
Illustrations: Kim Downing; Mike Henry

10 TIPS FOR IMPROVING

Next time you attend a wood-working show, check out the scrollsaw booths. You'll meet demonstrators who can scroll rings around most woodworkers. What do they know that you may not? Just a few tricks, such as the tips on these pages.

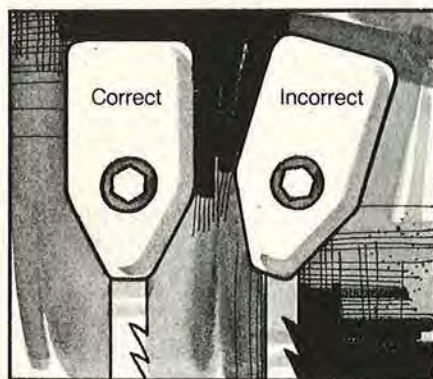
1 Because of the rapid up-down strokes of its arms, a scrollsaw vibrates excessively when not securely fastened to a stand. If your machine doesn't have such a perch, bolt the scrollsaw to a sturdy surface. If you need to store your scrollsaw between uses, clamp it down.

If you can't clamp or bolt down the machine, try placing a thin foam pad, such as a carpet pad, underneath the machine as shown below.



2 Scrollsaws come with a variety of blade clamps, but whatever the style, make sure the blade sits straight in the clamps as shown below.

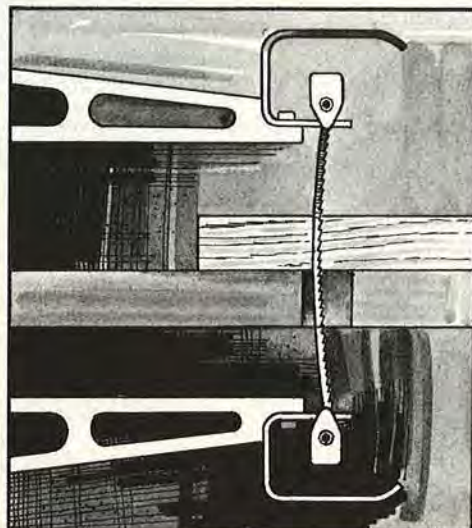
With that accomplished, set the blade for the correct tension. Remember that you can tension a wide blade more than a narrow blade and that overtightening will lead to excessive blade breakage. On the other hand, a loose blade will flex sideways and backwards.



3 Time flies when you're having fun with a scrollsaw, so adjust the machine's table to a comfortable working height (near elbow level for most people). You'll also find it helpful to sit on a chair or stool.



4 As shown below, scrollsaw blades will flex under even slight feed pressure, so you need to occasionally slow down the feed rate and allow the blade to straighten itself. If you don't, you may cut a kerf that's not perpendicular to the table or bowed slightly. While cutting thick or dense stock, you may need to pause every 1/2" or so.

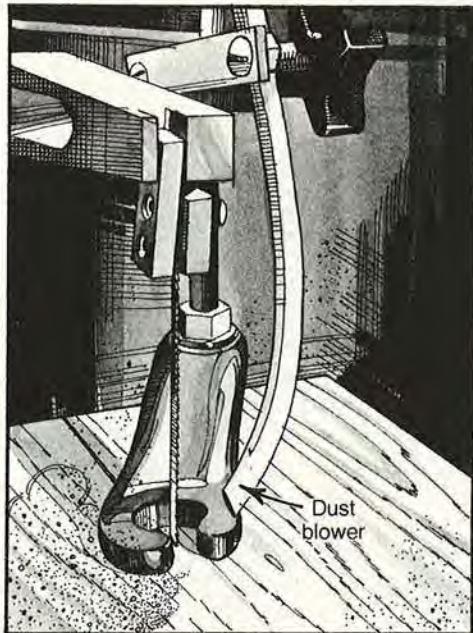


5 We've found that paper patterns are easier to see than patterns transferred directly to the wood surface by carbon paper or other means. Adhere the paper to the workpiece with adhesive spray or double-faced tape.

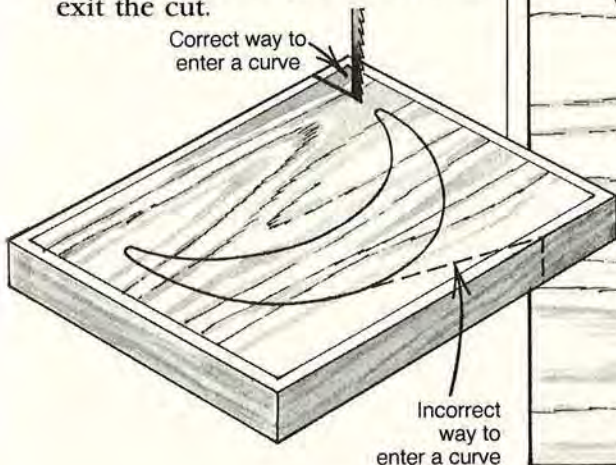


YOUR SCROLLWORK

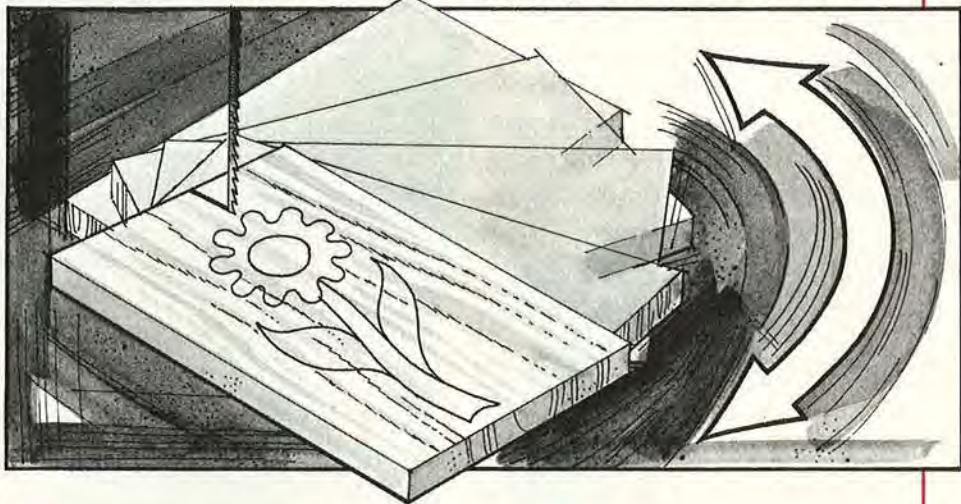
6 A dustblower helps you see exactly where you're cutting, but for it to be effective, you must reposition it for each stock thickness. Most blowers put out a small volume of air, so place the hose tip no more than 1/2" from the cutting action.



7 As you move the workpiece into the blade, start and exit the cut at a sharp point on the pattern rather than along a smooth line as shown *below*. Otherwise, your lines will have small "humps" where you enter and exit the cut.



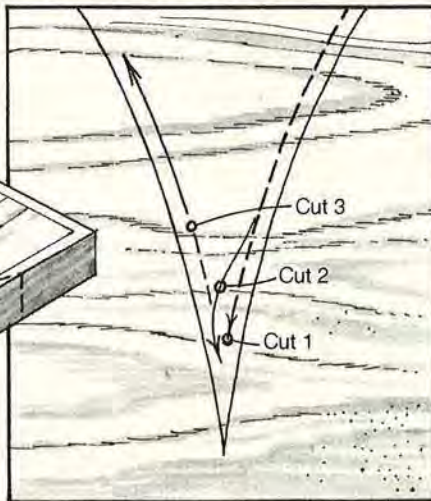
8 Because many of us have become accustomed to following layout lines on a bandsaw—a machine that doesn't allow cutting extremely tight curves—we're not used to rotating a workpiece as shown *below*. Experienced scrollers often spin their workpieces in full circles to



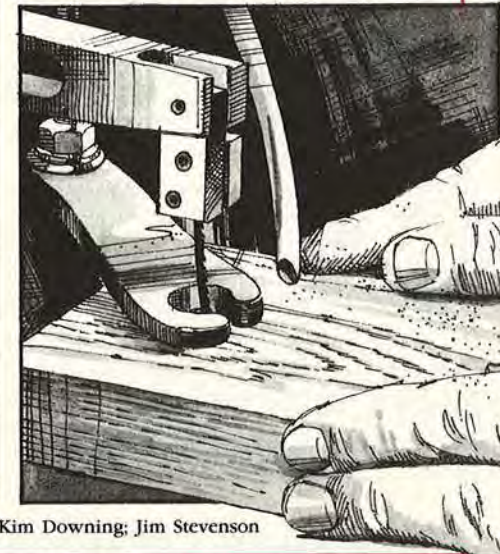
precisely follow tight twists and turns. When carefully executed, this maneuver may look tricky, but it just requires some practice.

To train yourself, draw some squiggly lines on a scrap piece and see how closely you can follow your markings. Soon you'll be spinning with the best of 'em.

9 Sometimes, you can't spin your way through extremely tight spots such as the narrow corner shown *below*. To smoothly execute this maneuver, first cut all the way into the corner, then back up the blade for Cut 2. Now you have enough room to turn the blade around and make the exit cut.



10 We hear from a lot of readers who have problems cutting thick, hard stock with a scrollsaw. If that sounds like you, try a wider, skip-tooth blade. (For more about blades, see the April 1990 issue.) Go slow and clear away cutting debris by backing the blade out of the cut often. ♣



Illustrations: Kim Downing; Jim Stevenson

HARDWOOD

Off and on for about five years, we've fiddled with various briefcase designs. But until now, we just weren't satisfied with the results.

Designing a sturdy handle proved to be the biggest hurdle: leather wouldn't do, plywood was out of the question, and solid stock split too easily. We hope you'll like how we licked that problem, and put together an affordable Buying Guide for the top-notch brass hardware and leather liner. Now, it's time to get down to business!



Note: You'll need some 1/4"-thick oak for the case frame. You can resaw or plane thicker stock to size, or see the Buying Guide at the end of the article for our source of solid stock and plywood. If you resaw or plane your own stock, let the milled wood acclimate a couple of days before proceeding. The stock you build with must remain flat.



Print this article

Start with the case frame

1 From 1/4" stock (we used quarter-sawed red oak), cut the briefcase sides (A) and front and back (B) to the sizes listed in the Bill of Materials.

2 Fit your tablesaw with a zero-clearance insert (our Delta requires a 1/2"-thick insert; we used plywood). Attach a 1/4" dado blade to your tablesaw. Raise the blade through the insert 1/4" above the surface of the saw table.

3 Construct the jig and stop block shown on the Box Joint Jig drawing on page 42. Carefully locate and cut the two 1/4" kerfs in the jig. For snug-fitting box joints, the distance between the guide pin and kerf must be exactly 1/4".

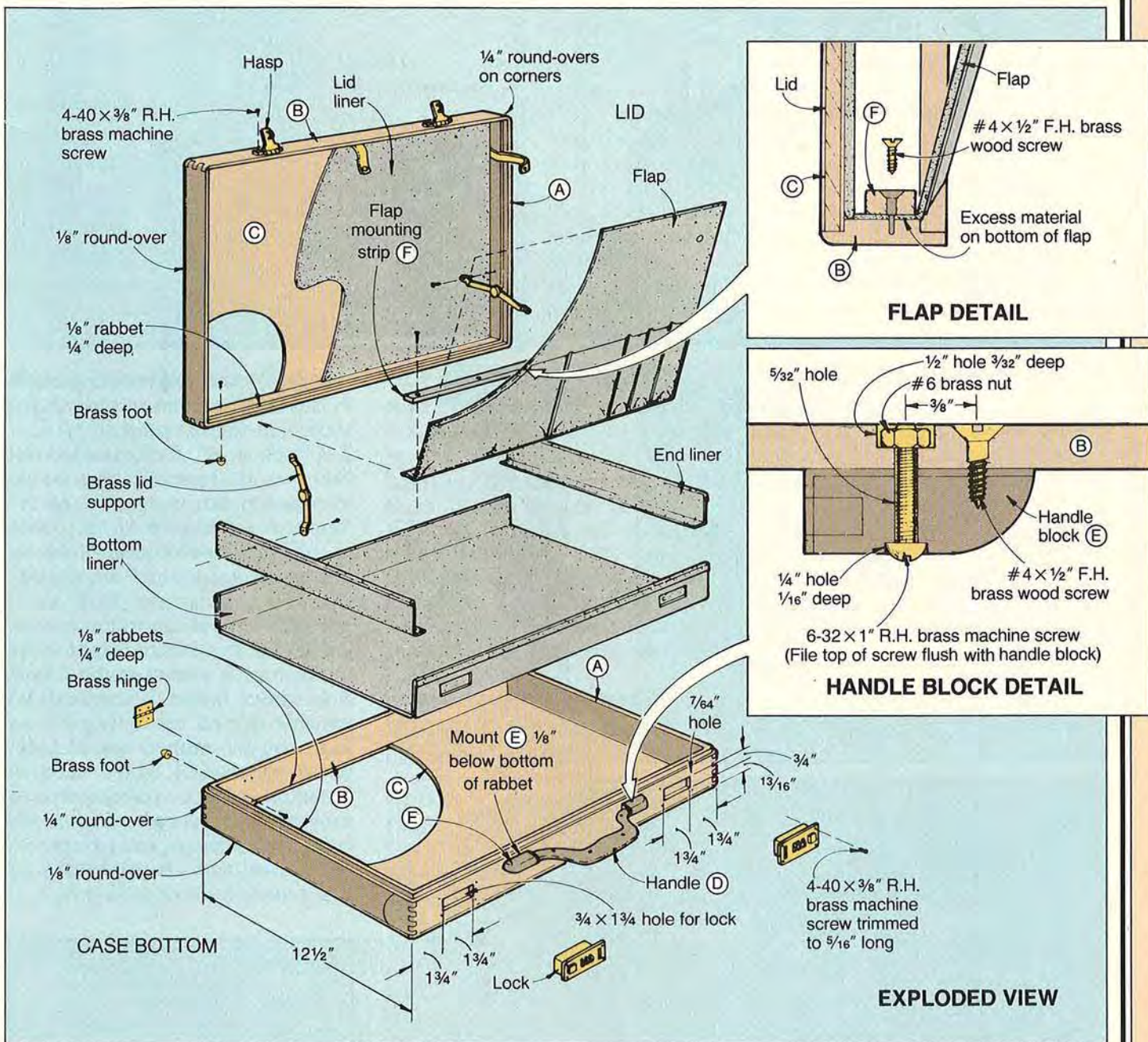
Note: To check the accuracy of your jig, test-cut box joints in scrap stock the same thickness and width as parts A and B; adjust if necessary.

4 Machine the frame sides and then the front and back as shown in the two-step drawings titled Box-Jointing the Side and Box-Jointing the Front and Back.

5 Cover the mating surfaces of the box joints with glue (we used woodworker's glue and a small brush). Glue and clamp the pieces (A, B) and check for square. Caution: overclamping can cause the pieces to bow. Immediately wipe off excess glue with a damp cloth.

Continued

BRIEFCASE



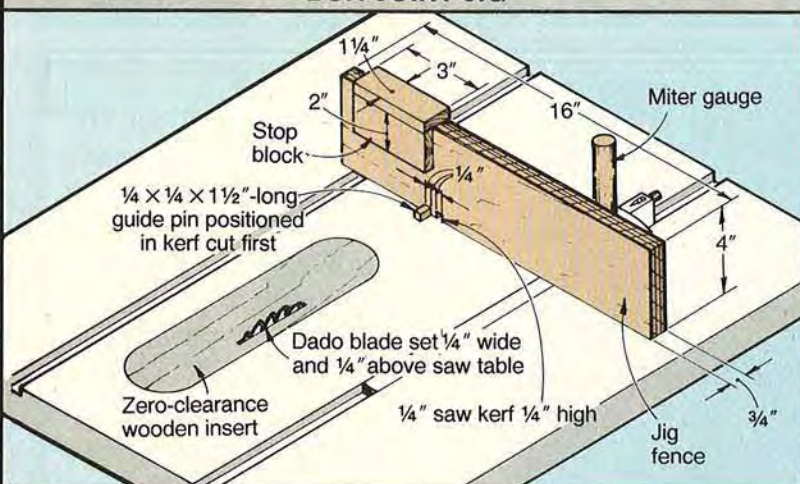
Bill of Materials											
Parts	Initial Size			Mati.	Qty.	Parts	Initial Size			Mati.	Qty.
	T	W	L				T	W	L		
A sides	1/4"	3 3/4"	12 1/2"	O	2	D handle blanks	3/8"	2 3/8"	6 3/8"	W	2
B front & back	1/4"	3 3/4"	18"	O	2	E handle blocks	1/2"	5 3/8"	1 1/2"	W	2
C panels	1/4"	12 1/4"	17 3/4"	OP	2	F flap strip	1/4"	1/2"	16 1/2"	O	1

Material Key: O-oak, OP-oak plywood, W-walnut

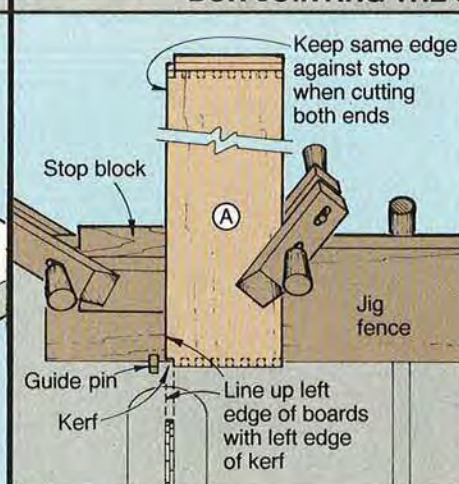
Supplies: 4-40 × 3/8" roundhead brass machine screws, 6-32 × 1" roundhead brass machine screws, 6-32 × 1/4" brass machine screws, 6-32 brass nuts, #4 × 1/2" flat-head brass wood screws, #4 × 3/8" roundhead brass wood screws, #4 × 1/4" roundhead brass wood screws, .032" brass 2 3/8 × 6 3/8" for handle, .032" brass 1/2 × 8" for handle blocks, 1/8"-diam. brass rod 6" long, epoxy, finish.

HARDWOOD BRIEFCASE

BOX-JOINT JIG

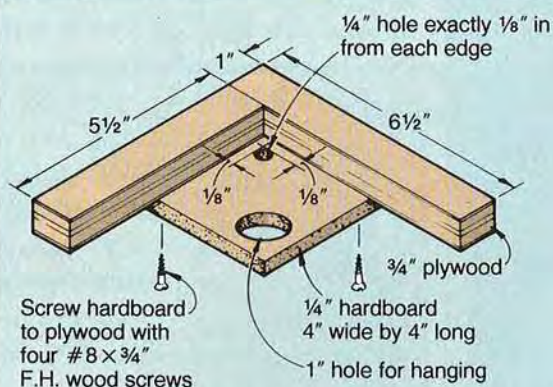


BOX-JOINTING THE SIDES

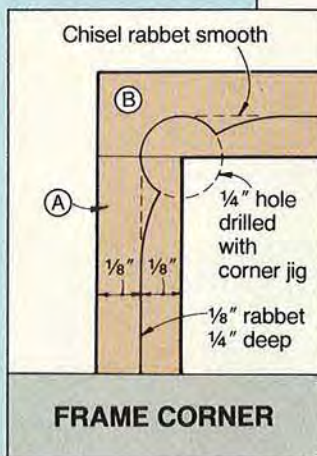


STEP 1.
Cut $\frac{1}{4} \times \frac{1}{4}$ notch in corner.

STEP 2.
Slide corner of notch firmly against guide pin and cut second notch in both boards.



CORNER RADIUS JIG
View from bottom side



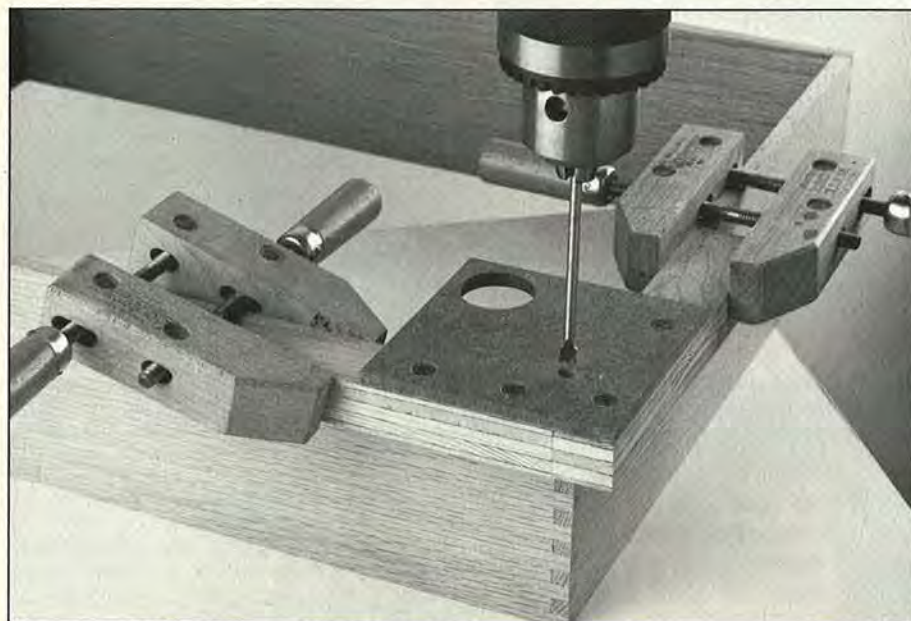
FRAME CORNER

Now, fit the plywood panels

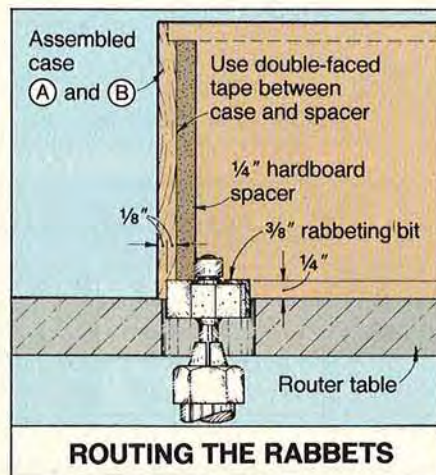
1 Build the corner-radius jig shown in the drawing at left.

2 Chuck a $\frac{1}{4}$ " flat-bottomed bit into your drill press. Clamp the jig in position on one corner of the frame where shown in the photo at left. The inside corner of the jig must be snug against the outside corner of the frame. Drill a $\frac{1}{4}$ " hole $\frac{1}{4}$ " deep in the frame corner. Repeat the procedure (eight times total) at each corner of the frame.

3 In order to use a standard $\frac{3}{8}$ " carbide-tipped rabbeting bit to form the $\frac{1}{8}$ " rabbets for the plywood panels (C), you'll need to insert $\frac{1}{4}$ "-thick spacers where shown on the drawing below. To form these spacers, cut two pieces of $\frac{1}{4}$ " hardboard to $3\frac{3}{4} \times 12$ " and two pieces to $3\frac{3}{4} \times 17$ ".

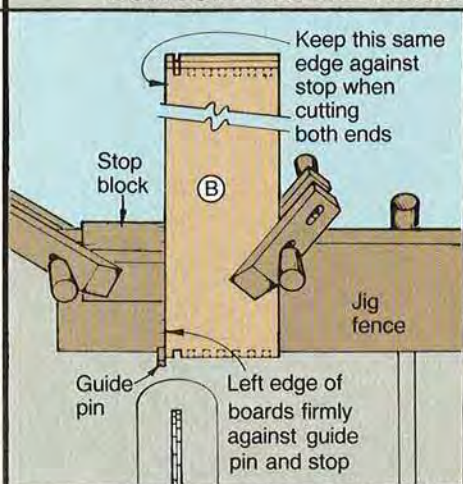


Clamp the radius jig to the corners of the case frame, and use a $\frac{1}{4}$ " flat-bottomed bit to form the round inside corners for the rabbets.



ROUTING THE RABBETS

BOX-JOINTING THE FRONT AND BACK



STEP 1.
Cut first notch.

STEP 2.
Place notch over guide pin and cut second notch.

4 Secure the spacers against the inside surfaces of the case pieces with double-faced tape. Fit your router with a $\frac{3}{8}$ " carbide-tipped rabbeting bit, and raise it $\frac{1}{4}$ " above the router table. Then, rout a $\frac{1}{8}$ " rabbet around the top and bottom inside edges of the case assembly where shown *below left*. Remove the spacers and set them aside; you'll use them to rout the rabbet on the inside of the lid.

5 Chisel the waste between the rabbets and $\frac{1}{4}$ " holes in each corner where shown on the drawing titled *Frame Corner at left*.

6 From $\frac{1}{4}$ " oak plywood, cut the two panels (C) to fit the rabbeted openings in the oak case. Using a circle template, mark a $\frac{1}{8}$ " radius on each panel corner. Sand to the line until each panel fits the open-

Cut the case apart and form a lip

1 Make four cuts where shown in Step 1 of the three-step drawing *below*. (After making each cut, we taped two $\frac{1}{8}$ " spacers in each kerf to keep the case from binding when making the final cut.)

2 Reposition the fence where shown in Step 2 of the drawing *below*, and trim the top edge of the case bottom even with the outside finger.

3 To create the lip on the case bottom, fit your tablesaw with a $\frac{3}{8}$ " dado blade and an auxiliary wooden fence, and cut the $\frac{1}{4}$ " rabbets $\frac{1}{8}$ " deep where shown in Step 3 of the drawing *below*.

4 Rip the hardboard spacers you used earlier to 1" wide and tape them in place in the lid. Now, us-

ing. Now, glue the panels into the openings.

7 Fit your router table with a $\frac{1}{4}$ " round-over bit and fence, and rout the four corners (not edges) of the case (see the Exploded View drawing for reference).

8 Rout a $\frac{1}{8}$ " round-over along the case edges.

ing the corner radius jig and the drawing titled *Routing the Rabbets for reference*, drill the corners, and rout a $\frac{1}{8}$ " rabbet $\frac{1}{4}$ " deep along the bottom *inside* edge of the lid. File or sand the four corners of the lip in the case bottom to fit into the radiused corners of the lid.

5 Mark the lock-hole locations on the case bottom (see the Exploded View drawing). Drill blade-start holes and cut the lock holes to shape. (We used a portable jig-saw—some call it a sabersaw—and a smooth-cutting blade.)

One classy custom handle coming up

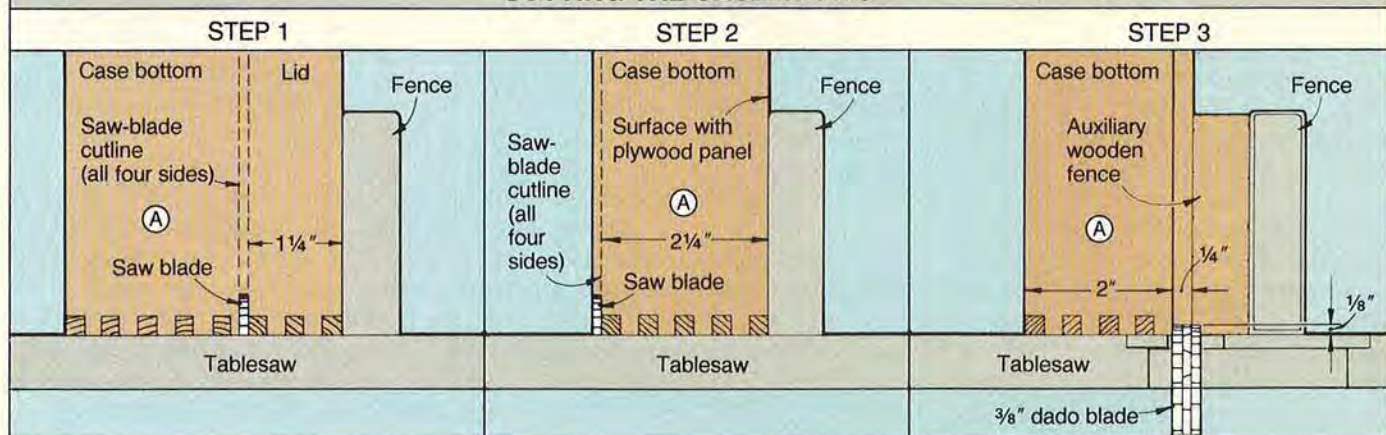
Note: Our prototype wood handles eventually split along the grain. Epoxying brass between solid stock solved that problem. When drilling and sanding the handle, use slow speeds to prevent overheating. Excessive heat will soften the epoxy, causing the brass to delaminate from the walnut.

1 Cut two pieces of $\frac{3}{8}$ " walnut and one piece of .032" brass to $2\frac{3}{8} \times 6\frac{3}{8}$ " (we used a bandsaw to cut the brass). For better adhesion to the epoxy and walnut, rough up both sides of the brass with 80-grit sandpaper.

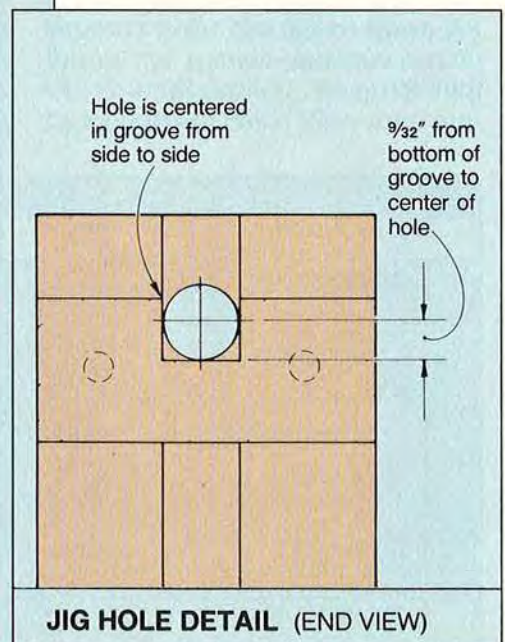
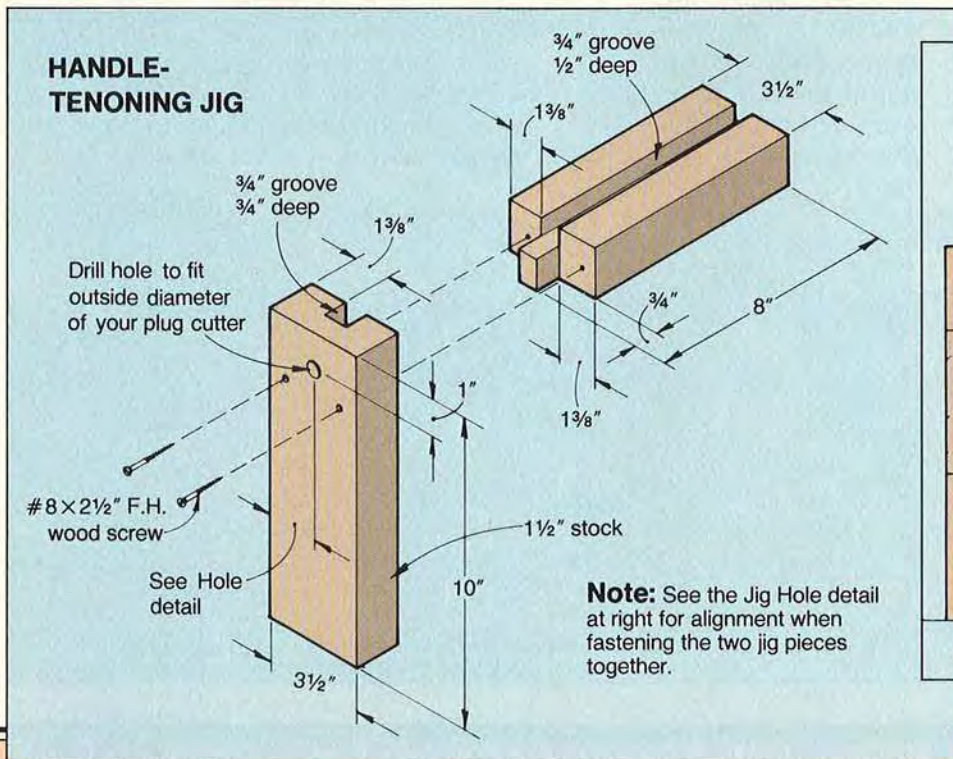
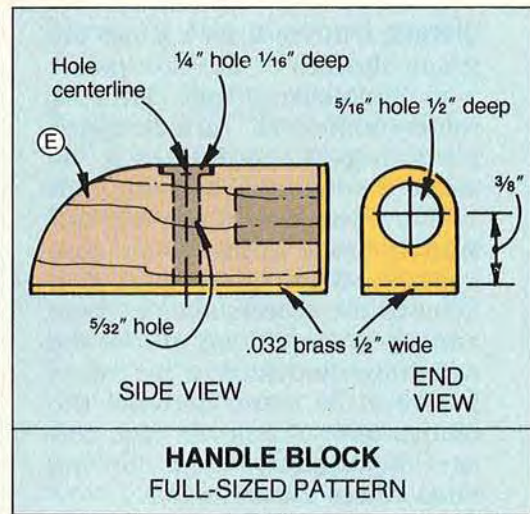
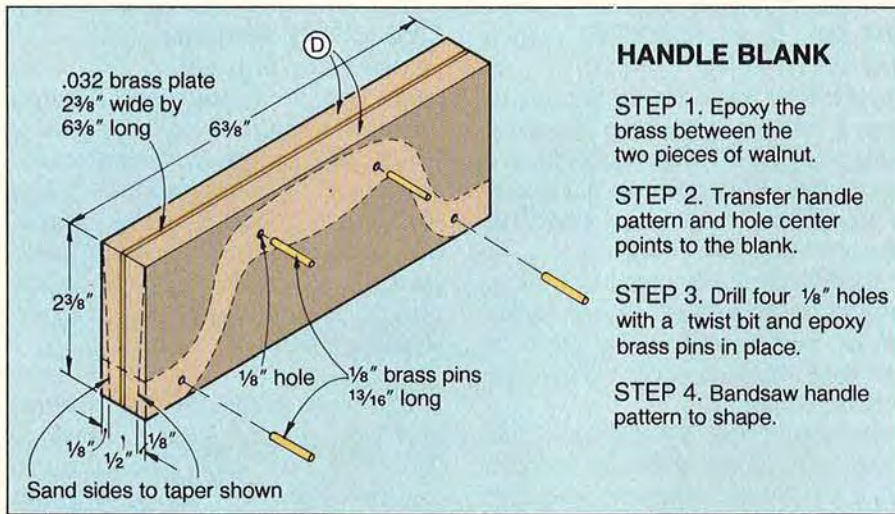
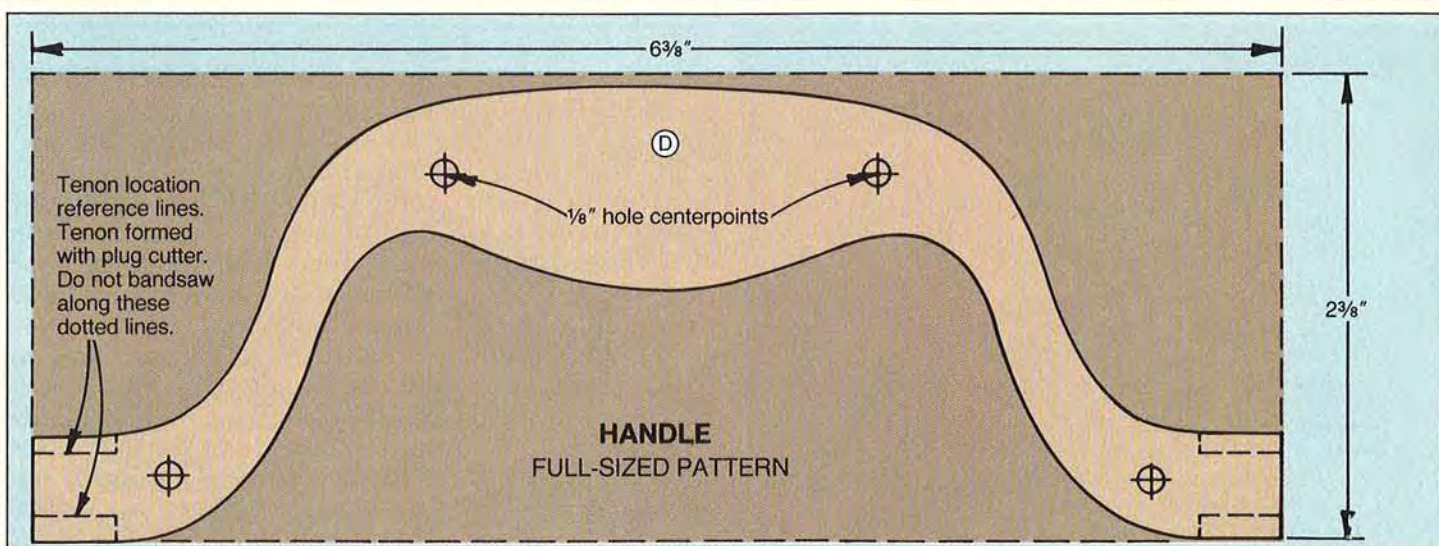
2 Follow the 4-step drawing on the following page to form the brass-and-walnut handle.

Continued

CUTTING THE CASE IN TWO



HARDWOOD BRIEFCASE



3 Build the handle-tenoning jig shown on the drawing *far left, bottom*. (We constructed ours from an 18"-long piece of 2×4.)

4 Sand both walnut surfaces until the handle fits snugly into the $\frac{3}{4}$ " groove in the handle-tenoning jig.

5 Fit your portable drill with a $\frac{5}{16}$ " plug cutter. Slide the handle into the jig and clamp it in place. Now, use the plug cutter to cut a $\frac{5}{16}$ " tenon $\frac{7}{16}$ " long on both ends of the handle as shown in the photo at *right*.

6 Sand the handle to the tapered shape shown on the Handle Blank drawing. Then, rout or sand $\frac{3}{16}$ " round-overs on all edges of the handle except at the tenons.

7 Cut two pieces of walnut to $\frac{1}{2} \times \frac{5}{8} \times 1\frac{1}{2}$ " for the handle blocks (E). Then, cut two pieces of .032" brass to $\frac{1}{2}$ " wide by 4" long. Form a 90° bend in the middle of the brass. Sand both surfaces of the brass for better adhesion, and then epoxy a handle block (E) to each brass piece.

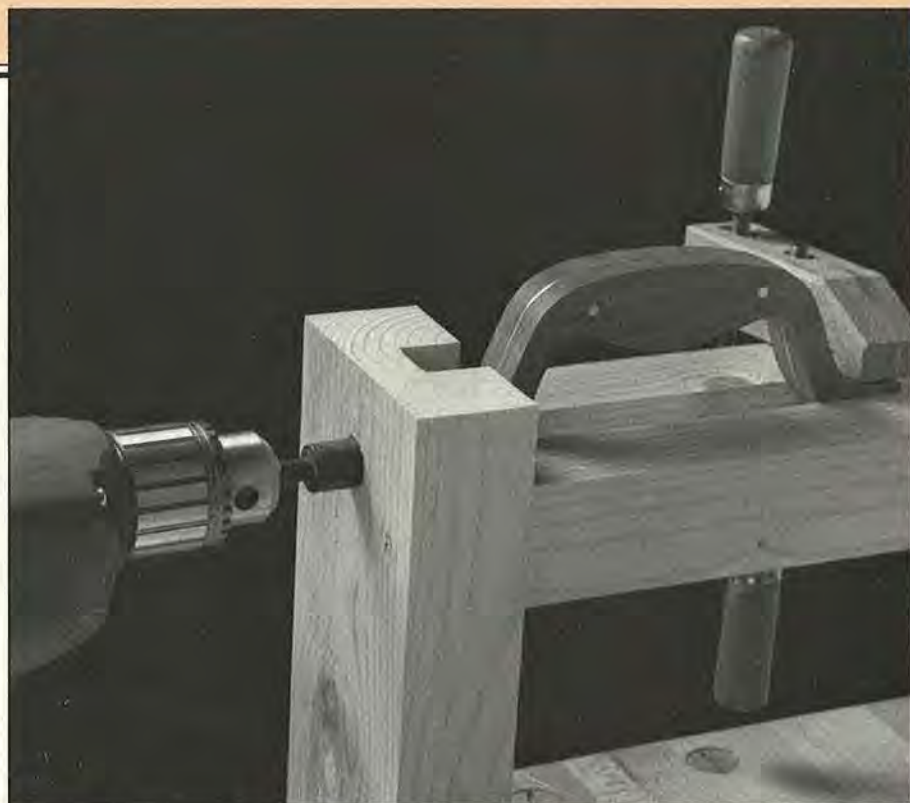
8 After the epoxy has cured, hold the block/brass assembly in a handscrew clamp, and drill a $\frac{5}{16}$ " hole $\frac{1}{2}$ " deep through the brass and into the walnut where shown at *left*.

9 Trim the brass flush with the ends of the walnut. File and sand a $\frac{1}{4}$ " round-over on each handle block. See the Handle Block drawing at *left* for reference. Now, drill the $\frac{5}{32}$ " and $\frac{1}{4}$ " holes in each block where shown.

It's time to attach the handle

1 Position the handle blocks on the handle tenons. Sand the handle tenons slightly if necessary for a good fit into the block holes. Center the assembly from side to side on the case and $\frac{1}{8}$ " below the routed rabbet where shown on the Exploded View drawing. Tape the assembly in position.

2 Using the previously drilled $\frac{5}{32}$ " holes in the blocks as guides, drill the same-sized holes through the



Use a $\frac{5}{16}$ " plug cutter and the tenoning jig to form the round tenons on the ends of the laminated brass-and-walnut handle.

case. Counterbore the hole on the inside of the case with a $\frac{1}{2}$ " Forstner bit.

3 Referring to the Handle Block drawing for reference, epoxy the machine screw and nut to secure the blocks and handle to the case. Then, mark the centerpoints and drill $\frac{5}{64}$ " holes through the case and $\frac{1}{4}$ " into each block. Counter-sink the holes. Epoxy and drive a #4 × $\frac{1}{2}$ " brass flathead wood screw into each to further secure the blocks to the case.

4 Remove the machine-screw slot by filing and sanding.

Apply the finish, and install the hinges and locks

1 Finish-sand the case and apply the finish to the interior and exterior. (We left the wood natural and applied three coats of polyurethane.)

2 Chuck the threaded end of one of the hinge screws into a portable drill. Turn on the drill and hold the rotating head against a belt sander to sand the slotted head flat. Then, polish the head with 320-grit wet/dry sandpaper.

Remove the screw from the drill chuck and repeat with the seven remaining screws.

3 Spray the polished screw heads with clear lacquer. Let dry.

4 Referring to the drawing titled Mounting the Hinge for reference, tape the hinges in position and drill $\frac{3}{32}$ " pilot holes into the case.

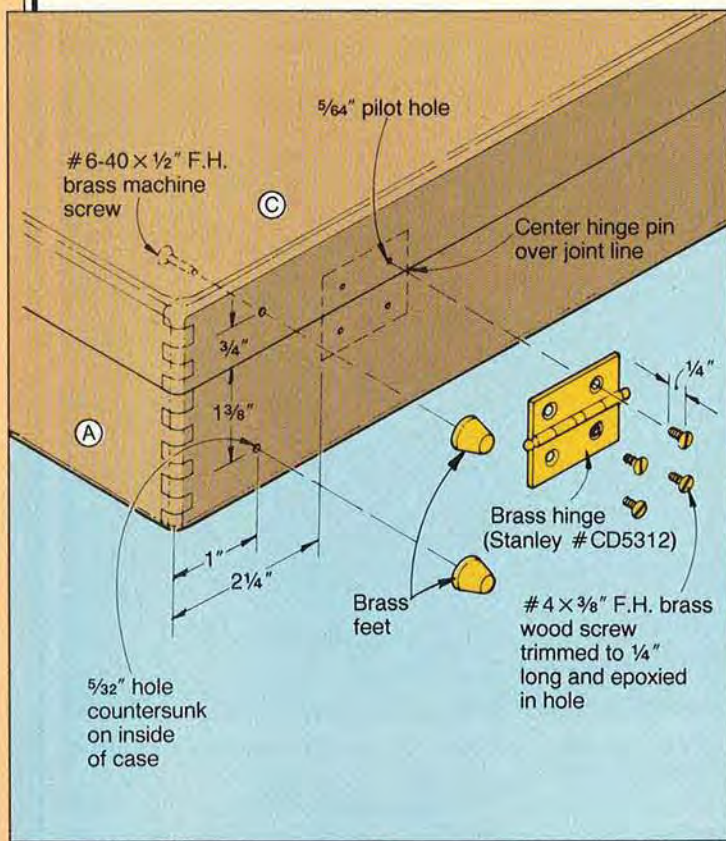
5 With a toothpick, fill the hinge-mounting holes with epoxy. Then, use the toothpick to apply epoxy to the threads of each screw. Thread the screws through the holes and into the mounting holes. Let the epoxy cure.

6 Tape a lock in position in one of the rectangular holes previously cut in the case. Using the lock holes as a guide, drill $\frac{7}{64}$ " holes through the case. Refer to steps 2, 3, and 5 above to fasten the locks to the case.

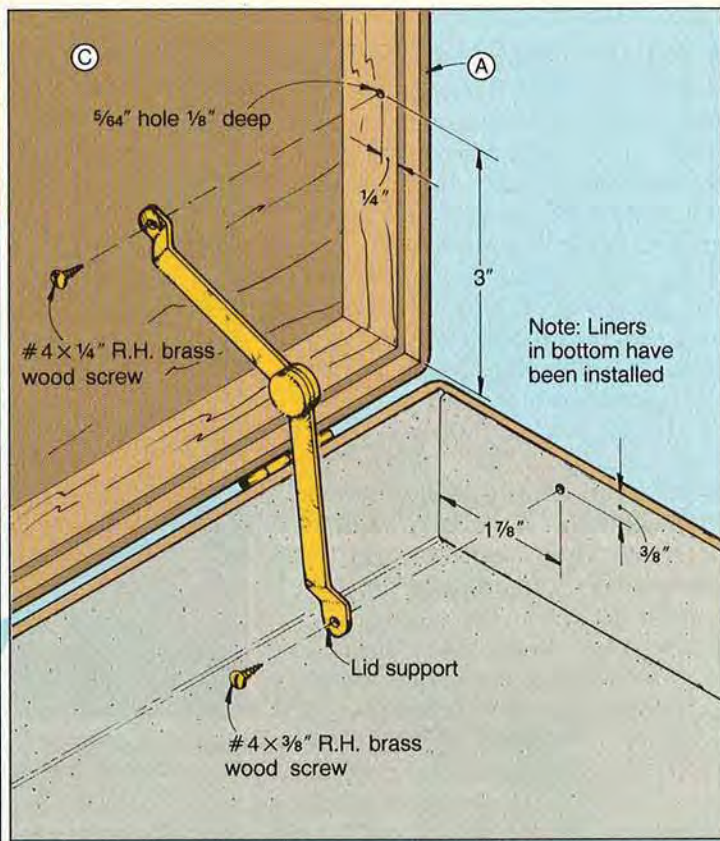
7 Push the hasps into the locks. Using the holes in the hasps as guides, mark the hasp-hole locations on the case. Drill a $\frac{7}{64}$ " hole at each mark. Refer to the method previously described to remove the screw slots and then epoxy the hasps to the case.

Continued

HARDWOOD BRIEFCASE



MOUNTING THE HINGE



MOUNTING THE LID SUPPORT

Add the feet and liner and head for the office

1 Using the drawing titled Mounting the Hinge, drill the mounting holes and fasten the feet to the case. (To secure the feet, we placed a drop of epoxy into each foot before threading the mounting screw in place.)

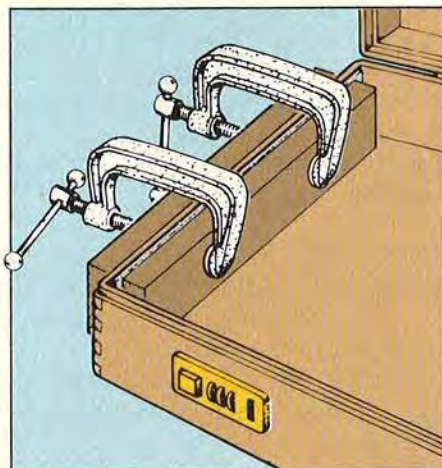
2 Cut the flap-mounting strip (F) to size. Drill and countersink four 7/64 inch holes through the strip.

3 To get the liner to stick to the case, lightly rough up the mating interior surfaces with 80-grit sandpaper. Sand all but the side edges of the lid—they don't get covered with the leather lining.

4 With woodworker's glue or epoxy, glue the end-liner pieces first. (As shown below, we used two pieces of stock to hold the end-liner pieces firmly against the case until the glue dried.) Be careful not to get any adhesive on the good face of the liner pieces. Now, install the bottom liner, us-

ing a stack of books or other heavy objects to hold the liner flat until the glue dries.

5 Attach the lid supports where shown above.



6 Adhere the liner to the lid interior. Then, using the Flap detail accompanying the Exploded View drawing and the flap mounting strip (F), attach the bottom edge of the flap to the lid.

Buying Guide

• **Briefcase hardware.** Pair of brass combination locks with hasps, pair of lid supports, four feet, pair of hinges, .032 x 4 x 10" brass, 6" of 1/8" diameter brass rod. \$39.40 (U.S.) ppd. For the pigskin liner, add \$78 (U.S.). Broman's Luggage, 209 Central Avenue, Osseo, MN 55369.

• **Hardwood kit.** Two pieces of 1/4 x 4 x 12 1/2" oak, two pieces of 1/4 x 4 x 18" oak, and two pieces of 1/4 x 12 3/4 x 18" oak plywood. Kits also available in genuine mahogany and walnut. Red oak kit \$24.95 ppd., genuine mahogany kit \$27.95 ppd., or walnut kit \$34.95 ppd. (All funds U.S.) Woodworkers' Dream, 510 Sycamore Street, Nazareth, PA 18064. Call 800-247-6931 or 215/759-2837 to order. ♣

Produced by Marlen Kemmet
Project Design: James R. Downing; Jim Boelling
Photographs: Hopkins Associates
Illustrations: Kim Downing; Bill Zaun



AT THE C. F. MARTIN COMPANY

A HANDCRAFTED LEGACY LIVES ON

Name some music stars—Paul McCartney, Bonnie Raitt, Arlo Guthrie—and you can bet they own Martin guitars. So do country music's Ricky Skaggs and Johnny Cash. In fact, the roster of Martin guitar owners reads like a musical Who's Who. Some, in fact, have been responsible for the adoption of popular Martin models—the mother-of-pearl inlaid D-45 shown on this page, for instance, was first created for Gene Autry.

Continued

The C. F. Martin Company has made guitars since 1833, and basically, hasn't changed its tune in the hand-building process responsible for the acclaim of its instruments.

That's because the words written by Frank Henry Martin in the company's 1904 catalog strike a familiar chord with employees even today: *"How to build a guitar to give this tone is not a secret. It takes care and patience. Care, in selecting the material, laying out the proportions, and attending to the details which add to a player's comfort. Patience, in giving the necessary time to finish every part. A good guitar cannot be made for the price of a poor one, but who that has used a good one regrets the extra cost?"*

Sound from six generations

In the early 1800s, Markneukirchen, a village in northern Germany, was known for its violin makers. But there were other talented wood craftsmen living there, too. Among them, a skilled carpenter and cabinetmaker named Georg Martin.

One day Georg happened upon a traveler carrying a stringed instrument he had never before seen. It was a guitar. Fascinated by its sound, he decided to build one.

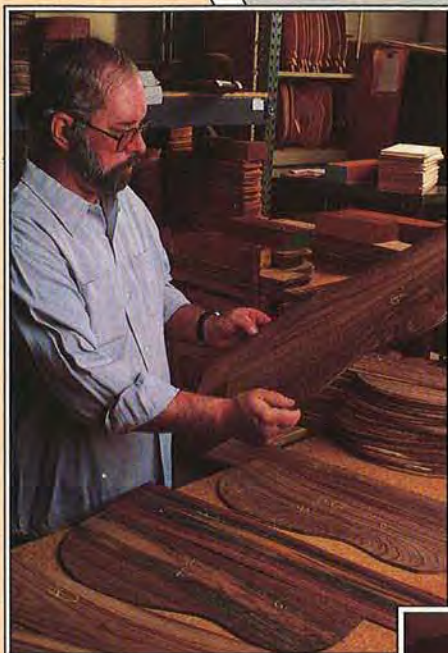
Over the years, Georg Martin became an accomplished guitar maker. When his son, Christian Frederick, became old enough to work wood, he too, built guitars.

The Martin's reputation for quality instruments grew, much to the dismay of the violin makers guild, which the Martins refused to join. The friction built until 1833, when Christian Frederick Martin, finally fed up with the bickering, packed his tools and sailed for the United States to set up shop in New York City.

A growing instrument repair and guitar-making business, plus a desire for the country,



Details make the Martin D-45 worth \$5,300. A rosewood headplate and an ebony fingerboard feature abalone-pearl inlay and gold-plated tuning machines for the strings.



◀ “I match the Brazilian rosewood backs and sides by color and grain pattern,” says George Savercool. That’s a demanding job since the thin-sawed stock rarely comes from flitches of the same log. Although the Martin company prefers quarter-sawed stock to avoid wild grain, it’s not always available.

▶ “Only two Martin guitar models have sides bent in a heated press,” notes Larry Fehnel. “All others must be bent to shape by hand on a stationary, electric bending iron heated to about 375–400 degrees.”

▼ Bracing a guitar top strengthens it against the pull of the strings, but over-bracing can jeopardize the tone. “To increase treble response and volume, I use a chisel to feather the spruce braces where strength isn’t as critical,” notes Ralph Miller.



eventually led C. F. Martin to the green, rolling hills around Nazareth, Pennsylvania, in 1839. There, in a setting much like that he loved in his native Germany, he built guitars and sent them to New York to sell in the United States, and in time, in shops around the world.

During the 1850s, C. F. Martin’s son, Christian Frederick, Jr., entered the business. In 1867, he succeeded his father as company president, as would other Martins after him. Today, in the sixth generation, Christian Frederick Martin IV heads the company. And, out in the shop, among the 100 employees who produce 9,300 guitars a year, he’s called “Chris” as he makes the rounds.

Guitar players prove plenty picky

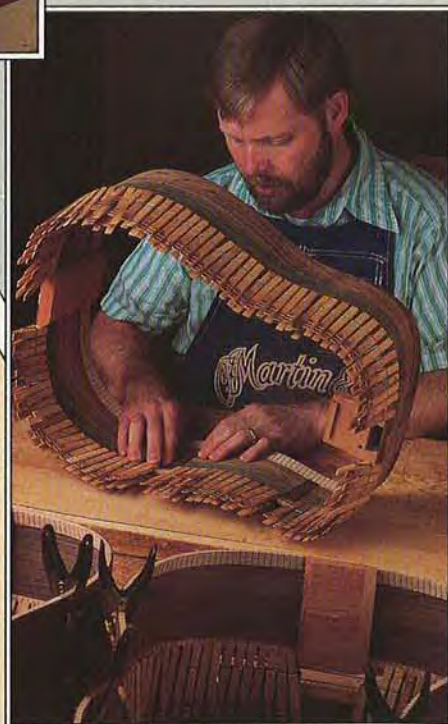
“Anything you do to or with a guitar has an effect. You even change the sound when you wrap your arm around it,” notes Mike Longworth, musician, craftsman, guitar historian, and Martin’s customer-relations manager.



That’s why the choice of wood plays such an important part in the making of an acoustic guitar—different woods have different tones. And appearance, too.

“Martin guitar owners tend to be extremely picky, not only in the sound of an instrument, but in how it looks,” notes Dick Boak, a guitarist as well as the company’s advertising manager. “If they see any character or figure in the wood whatsoever, they think it must be a defect! And, I guess that’s our fault because we like to think our quality control has been the most stringent of the industry.” That’s why only certain woods have become part of the company tradition.

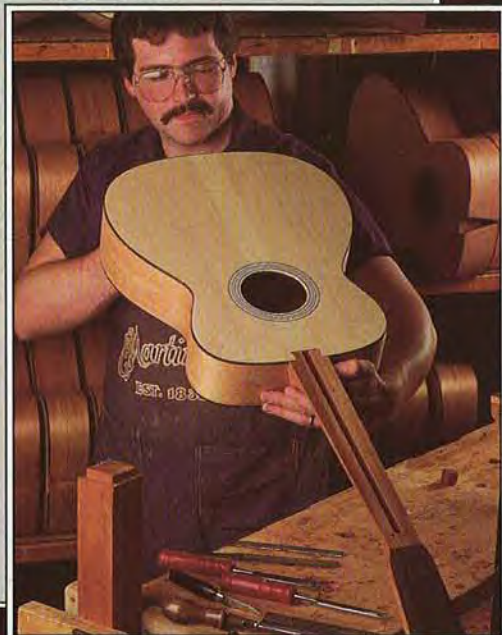
▼ David Anthony glues a ribbon inside a rosewood guitar body. “It’s made from ¼”-thick Spanish cedar, kerfed at regular intervals so it bends easily,” he says. The ribbons—one at the top edge and another at the back—act as stiffeners as well as a gluing surface for the top and back. Ordinary clothespins clamp the ribbons in place.



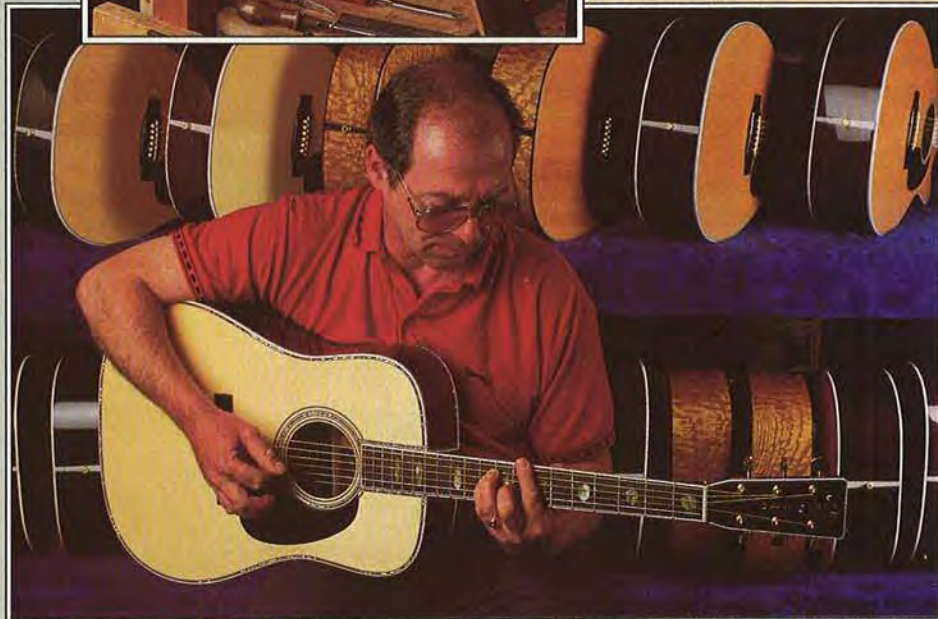
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►With a drawknife and 15 minutes of time, Willard Silvius will bring the semi-shaped, mahogany neck to within $\frac{1}{16}$ " of final dimension, then it will be finish-sanded. "We hand-shape all guitar necks from a bandsawed and partially machined roughout," he says from his carefully arranged work space.

▼ Tim Teel eyes the crucial alignment of the neck to the body. "To get the two compound angles at the base of the neck, I make a few deft cuts with a chisel. Then, it fits perfectly into the body's dovetail," he notes. After fitting the neck, the parts go separate ways for finishing before final joining.



▼ "I play guitar at home for my own enjoyment, as I have for about 20 years," says Al Realo, "but it's part of my quality control job here." The D-45 model he's checking could be rejected for a speck in the finish or slight fretting inaccuracy. "Sometimes, nothing shows up until the strings start pulling on the body," Al adds, as he strums a popular tune.



Tops—finished to a thickness of less than $\frac{1}{8}$ "—must be strong enough to withstand the 190 pounds of pull applied by the steel strings. Yet, tops must have the flexibility to vibrate. "We've used spruce from all over the world," says Boak, "but quarter-sawed, vertical-grain Sitka spruce from Alaska and the Canadian Northwest makes an ideal top on steel-string guitars.

"The sides [$\frac{5}{64}$ " thick] and backs [$\frac{1}{8}$ " thick] of guitars are designed to absorb sound as well as reflect it," he continues. "Generally, hardwoods flavor the sound by doing both."

For sides and backs, Martin craftsmen prefer Brazilian rosewood, when they can get it. That hasn't been easy, though, since a 1969 export embargo made the wood practically unobtainable in quantity. Why does this species work so well? Besides being extremely strong and stable when quarter-sawed, the wood produces a deep, warm, and resonant bass, according to Boak. Other popular woods include East Indian rosewood (with tonal qualities similar to its Brazilian cousin), tropical American mahogany, Hawaiian koa, and European fiddleback maple.

Martin's traditional woods may eventually be supplemented by other species, though. "Given the dwindling supply of material resources," says Boak, "Martin is making a concerted effort to educate our guitar customers regarding the differences between the natural character markings of wood versus actual defects."

Old-fashioned hand craftsmanship lingers on

Inside the modern one-story, powder-blue Martin guitar plant on Sycamore Street, all pre-conceived assembly line impressions vanish. Instead of factory-like conveyor belts moving partially completed guitars from place to place, men and women ply their special

skills at individual work benches. The atmosphere belongs to the last century.

"What we do is teach someone to do one job, and they stay with that job until they are adept at it," explains Martin historian Mike Longworth. "Martin's philosophy creates master craftsmen and an unequaled product."

Highlighted by this individual craftsmanship, guitar making at Martin takes on the aura of a custom operation. Unlike the lonely luthier crafting single instruments, at Martin, stock models are built in batches of 6, 12, and 25.

Each neck begins as raw stock, and then is bandsawed and machine-shaped before the crucial fitting of one to the other (shown *opposite center*). At this step, Tim Teel must shave the wood from the compound-angled base of the neck so that it slips into the dovetail and aligns perfectly. That done, the neck is handcarved to its final shape with a drawknife, *opposite top*. Then, the neck and body part company, not to join again until they've been finished (see pages xx), detailed, and polished to perfection. When the two meet again, they'll make music.

Ralph Miller, Martin's bracing specialist, sums up the company approach to guitar making, "Martin has a special way they want it, and that hasn't changed much in the 43 years I've been here."

Want to tour the Martin Guitar Factory?

Tours of the Martin plant at 510 Sycamore St. in Nazareth, begin at 1:15 p.m., Mon.-Fri. There's also a small museum and The 1833 Shop, a retail outlet, offering souvenirs, used instruments, and accessories. The Woodworkers Dream, at 10 W. North St., sells native and exotic hardwoods, guitar parts, and kits. For a catalog, write C. F. Martin Co., P.O. Box 329, Dept. W, Nazareth, PA 18064 (call 215-759-2064). ♣

Written by Peter J. Stephano
Photographs: Steve Uzzell

The hands of Dennis Kromer skillfully insert the thin metal frets into an ebony fingerboard. "This one has a custom abalone-pearl inlay of our 'tree of life' design," he notes.



LACQUER THAT'S

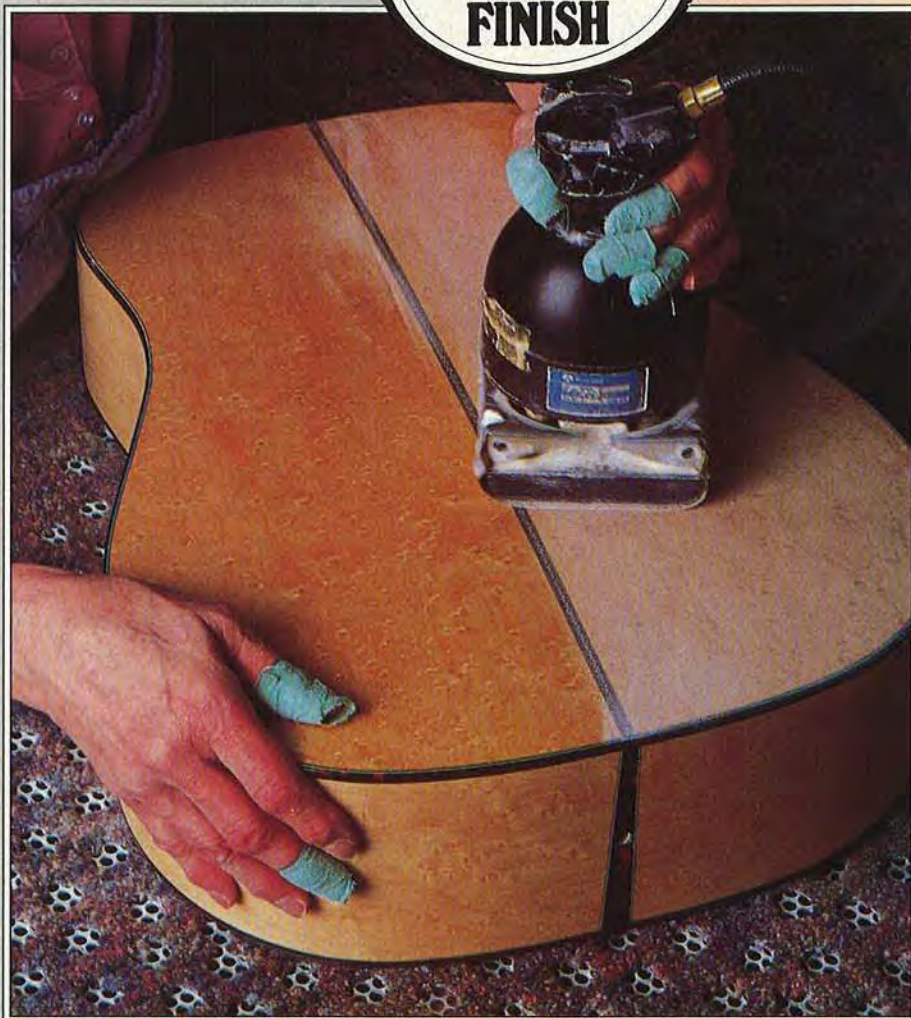


A vacuum clamp holds the guitar in position so walnut-colored filler can be rubbed into the back and sides with a soft cotton bun.

At the C. F. Martin Company, a guitar not only has to look super and take abuse, it must sound great, too. But, you don't have to be a guitar maker to appreciate the finish they've refined over the last 60 years. Their tried and true lacquer sure performs!



IN SEARCH OF
THE
PERFECT
FINISH



Jeanette Smith sands a maple guitar body with 220-grit paper between lacquer coats. The bench top has dust evacuation.

There's no way around it: Attaining the perfect finish on a guitar takes time. That's because a finish on a musical instrument has to do several things. Says Dick Boak of the Martin company, "It has to be thin so as not to disturb the tone, beautiful to enhance the wood, durable enough to stand up to the instrument's often-rigorous handling, and stay flexible over time."

The rosewood Martin uses in their guitars made finding the perfect finish a double challenge. That's because rosewood has a high resin content that can contribute to adhesion problems, pigment bleeding, fisheyes, and sinking pores. And, the resin can impede the drying of some finishes, such as polyurethane.

So, Martin finishing centers on spray application of successive thin coats of nitrocellulose lacquer, with some twists. And, although you won't be able to exactly duplicate their factory process, there are some products that enable you to come close (see Buying Guide at end of article). Even if you don't make guitars, you'll find that this type of finish works great on anything that must look super, yet take use.

Wood awash in vinyl

"The final finish will only look as good as the wood underneath," Boak comments. At Martin, finish-sanding starts with 60-grit paper and ends with 180-grit, because too fine a grit would make the surface so smooth the finish wouldn't adhere. (A sponge and plastic cup in the sound hole keeps the guitar's inside free of sanding dust and finish.)

Martin does not stain the rich-grained rosewood on their guitars. But, an alcohol-based aniline dye on mahogany parts helps them match the rosewood. Oil-based stains, which react with lacquer, are avoided.

MUSIC TO YOUR EARS

To ensure that rosewood's natural resins don't bleed through the lacquer finish, a worker sprays on a wash-coat of specially-formulated vinyl sealer immediately after the guitar has been sanded. "As well as holding in the rosewood resin, the sealer keeps our walnut-colored pore filler—which goes on next—from staining the wood," says Boak. "And, it actually helps the lacquer adhere."

Following a light scuffing or sanding with 400-grit paper, the guitar body receives the filler coat, used on all porous woods to provide a uniform base for the lacquer finish. "We brush the walnut-colored filler onto the back and sides [closed-grain woods like maple and spruce don't require filling]," Boak explains. After five minutes or so, when the filler develops a leathery texture, it's forced into the pores by hand with a bun made of T-shirt material filled with cotton wadding [photo, top left opposite]."

Guitar tops at this point get a fine sanding with 180-grit paper. After sanding, a finisher wets the top slightly with water to raise the grain, lets it dry, then sprays it again with sealer. When dry, the sealer coat undergoes another light sanding with 400-grit paper.

After that sanding, the entire guitar body gets a final sealer coat. This covers the colored filler on the back and sides, and adds protection to the top. Then two hours later, the guitar receives a spray-coat of lacquer sealer. "This cancels out the slight dissimilarity between the vinyl and the lacquer coats yet to come," notes Boak.

Warm lacquer and elbow grease

Within an hour after spraying on the lacquer sealer, another employee adds a coat of clear gloss lacquer. If dried overnight, the bodies would have to be resanded for the next coat to adhere.

Polishing the body with buffing compound and a lamb's-wool bonnet is Ed Morper's specialty. He's been creating mirrorlike finishes on Martin guitars for 18 years. Here, he works on rosewood.



The Martin company uses a nitrocellulose lacquer with a high solids content that is specially formulated to be sprayed warm, a technique that reduces viscosity for better flow. (Immersing a can of spray lacquer in 110–120 degree tap water does the same thing. *Never* heat it on the stove.)

"Depending on the coarseness of grain, we'll give the instrument two to three coats of gloss, allowing it to dry 45 minutes between," he says. "It's important to get a good buildup before sanding. Otherwise, you might break through to the vinyl layers, which shows up in the finish. So, after the lacquer cures for 48 hours, it's sanded with 220- to 280-grit paper [photo bottom left opposite]."

The back and sides of each guitar then go through the sequence of lacquering and sanding two more times, for a total of six coats. Tops, because their non-porous wood requires less finishing, receive four coats. According to Boak, "A thin finish aids the tone and won't check as easily."

Finally, to achieve the mirrorlike, high-gloss finish Martin guitar buyers expect, the instruments are polished first at low speed

Finishing Buying Guide

● **Sealer.** Behlen's Qualalacq clear sanding sealer, qt., no. 854, \$7.95.

● **Filler.** Behlen's Pore-O-Pac tintable paste wood filler, qt., no. 748 med. brown or no. 776 natural, \$10.90.

● **Lacquer.** Behlen's Qualalacq nitrocellulose, clear spraying lacquer, qt., no. 853, \$8.95. (Also Behlen's Jet-Spray 13-oz. aerosol cans, no. 739, \$5.95.)

● **Polish.** Mirro-Glaze Professional Cleaner No.4, 16-oz. bottle, no. 540 and Professional Cleaner No.7, same size, no. 541, \$8.50 each.

From Stewart-McDonald's Guitar Shop Supply. For catalog, write 21 N. Shafer St., Box 900, Athens, OH 45701. 800-848-2273 (614/592-3021).

● **Lemon oil, linseed oil (raw).** To protect and preserve exotic wood fingerboards. About \$3 pint at hardware stores and paint centers.

Photographs: Steve Uzzell

with a lamb's-wool buffing bonnet and a medium-grit, liquid, polishing compound, see above. After a final buff of the body at higher speed with a fine-grit compound, the guitar's neck is joined, the bridge located and glued, then it is strung, finely tuned, inspected, and shipped on its way.

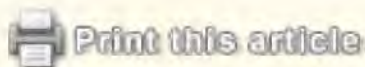
Note: Guitar necks are finished the same as bodies, except that the ebony or rosewood fingerboards receive a special, non-hardening oil rather than lacquer. ♣

SUPER-SIMPLE TOOL

Most woodworkers we know have the same problem: not enough shop space. Well, we can't expand your shop, but we've come up with a tool cart guaranteed to make the most of the space you do have. Just mount three benchtop tools to the interchangeable shelves, put the tool you need on top, and store the others below deck until you need them.



Sensible
storage
on wheels
for your
benchtop
machines



Start with the basic cabinet

1 Cut the cabinet sides (A) and fixed shelves (B) to the sizes listed in the Bill of Materials.

2 Using the Exploded View drawing for reference, mark the dowel-hole centerpoints on each of the three shelves, and drill $1\frac{3}{16}$ " holes $\frac{1}{2}$ " deep where marked. From $\frac{3}{4}$ " dowel stock, cut four dowels 2" long each. Sand a slight chamfer on each end of each dowel. Set the dowels aside.

3 Cut or rout $\frac{3}{4}$ " dadoes and rabbets in the sides where dimensioned on the Exploded View drawing. Then, cut a $\frac{1}{4}$ " rabbet $\frac{1}{4}$ " deep along the back inside edge of each side piece to house the back panel (C).

4 Dry-clamp the parts (A, B) together, and check for square. Also, make sure that the front edges of the sides and fixed shelves are flush. Measure the opening, and cut the back panel (C) to size from $\frac{1}{4}$ " plywood or hardboard. Glue and clamp the shelves between the sides, and then glue and nail the back panel in place, checking for square.

Now, for the handles, foot, and casters

1 Rip and crosscut two pieces of $\frac{3}{4}$ "-thick solid stock (we used birch) to $1\frac{1}{2}$ " wide by $31\frac{1}{2}$ " long for the handles (D).

2 Transfer the Handle pattern to one end of each handle blank. Cut and sand the handle ends to shape. Drill the mounting holes, and glue and screw the handles to the cabinet where shown on the Exploded View drawing.

3 Now, cut the foot (E) to shape (we cut this from a piece of 2×4 stock). Drill the mounting holes and screw the foot to the cart. Then, drill the mounting holes and fasten a pair of casters to the opposite end. (We used regular casters; you might want to consider using locking-type casters.)

Add the shelves; you're nearly finished

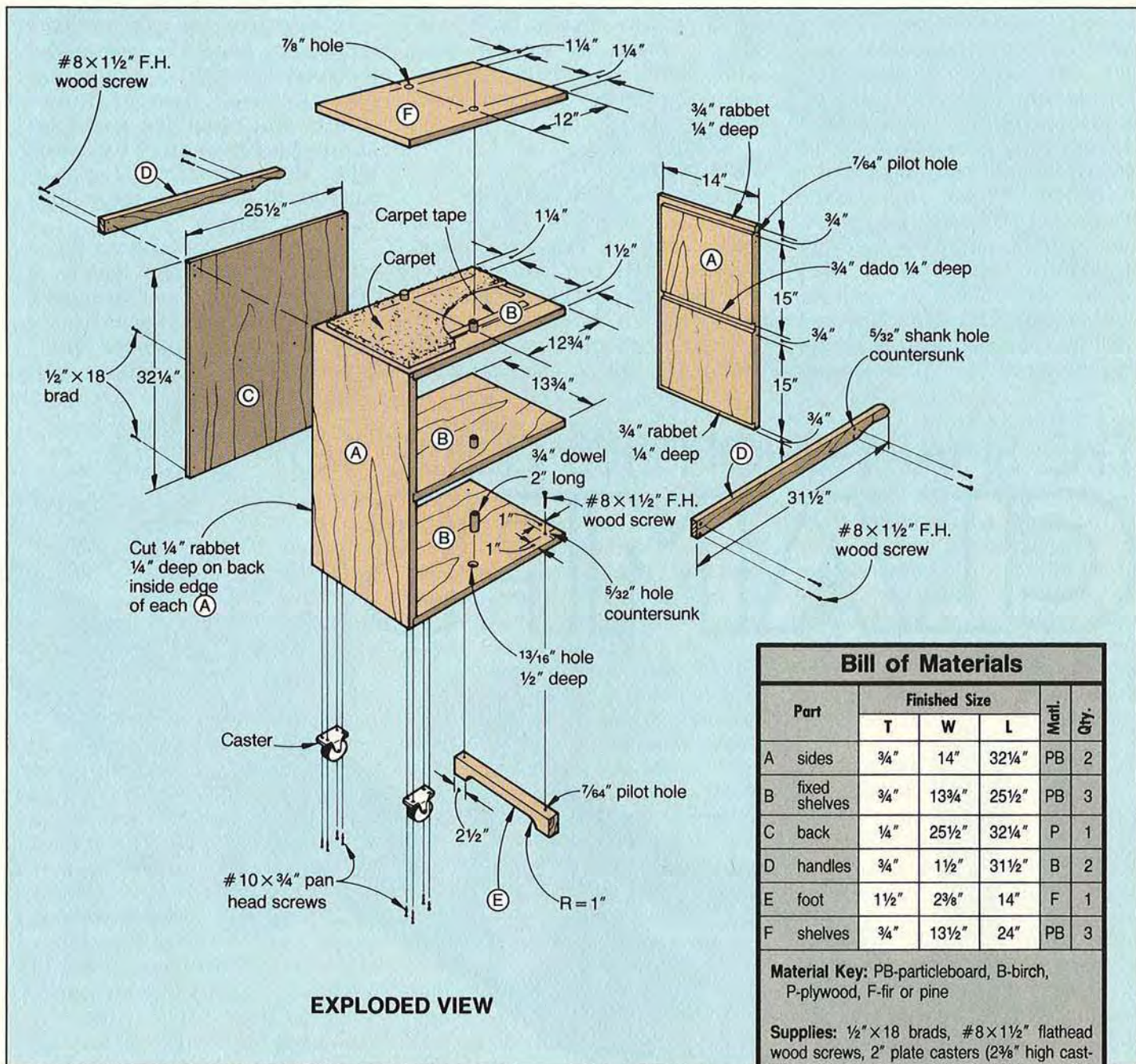
1 Cut the interchangeable shelves (F) to size. Bore a pair of $\frac{7}{8}$ " holes through each shelf where shown on the Exploded View drawing. The holes need to be centered over the $1\frac{3}{16}$ " holes in the fixed shelves.

2 For a glass-smooth finish, fill the voids and edges of the particleboard. (We applied Durham's Rock Hard Putty and let it dry for a couple hours. Then, we sanded the filled areas and added more putty where necessary.) Sand and paint the cart and shelves. (We applied several coats of sanding sealer, sanding between coats with 220-grit paper. We sprayed on a coat of semi-gloss enamel paint, allowed it to dry, and then sprayed on a second coat.)

3 To reduce vibration, cut a piece of carpet to the same size as an interchangeable shelf ($13\frac{1}{2}\times 24$ "). Mark the locations and cut a pair of $\frac{7}{8}$ " holes in the carpet, and stick the carpet to the top shelf with double-faced tape.

4 Position your machines on the shelves, mark the locations on the shelves for the mounting holes, and drill the holes. Fasten the machines to the shelves. 🌲

TRANSPORT



Part		Finished Size			Mater.	Qty.
		T	W	L		
A	sides	3/4"	14"	32 1/4"	PB	2
B	fixed shelves	3/4"	13 3/4"	25 1/2"	PB	3
C	back	1/4"	25 1/2"	32 1/4"	P	1
D	handles	3/4"	1 1/2"	31 1/2"	B	2
E	foot	1 1/2"	2 3/8"	14"	F	1
F	shelves	3/4"	13 1/2"	24"	PB	3

Material Key: PB-particleboard, B-birch, P-plywood, F-fir or pine

Supplies: 1/2" x 18 brads, #8 x 1 1/2" flathead wood screws, 2" plate casters (2 3/8" high casters mounted with #10 x 3/4" pan-head screws), 3/4" dowel stock, carpet, double-faced tape (carpet tape), paint.

Project Design: James R. Downing Photograph: Bob Calmer Illustrations: Kim Downing

HANDLE (D)
FULL-SIZED PATTERN
OF END

At one time or another, you've probably heard a fellow woodworker advise, "You can never have too many clamps." How true! It's a rare woodworking project that doesn't demand the use of one or more of these invaluable shop aids. And, some projects require oodles and oodles of clamps. What's a woodworker to do? Though each person's needs differ, we thought you might find it helpful to know about each clamp that has earned a permanent spot in the *WOOD*® magazine shop. And, because "Buy another clamp" isn't the right answer to many clamping dilemmas, we'll also share some tips for getting the most from your clamps.

THE OLD RELIABLES

Some clamps, such as those shown on the first three pages of this article, have helped woodworkers for decades. And with good reason—they're indispensable in most any woodworking shop. Here's some help in building an inventory of these time-tested shop helpers.

Pipe clamps: inexpensive and versatile


If you can afford only one type of clamp over two feet long, we recommend that you buy a set of **standard 3/4" pipe clamps** such as those shown *below*. These all-around performers, which cost about \$12 apiece (not counting

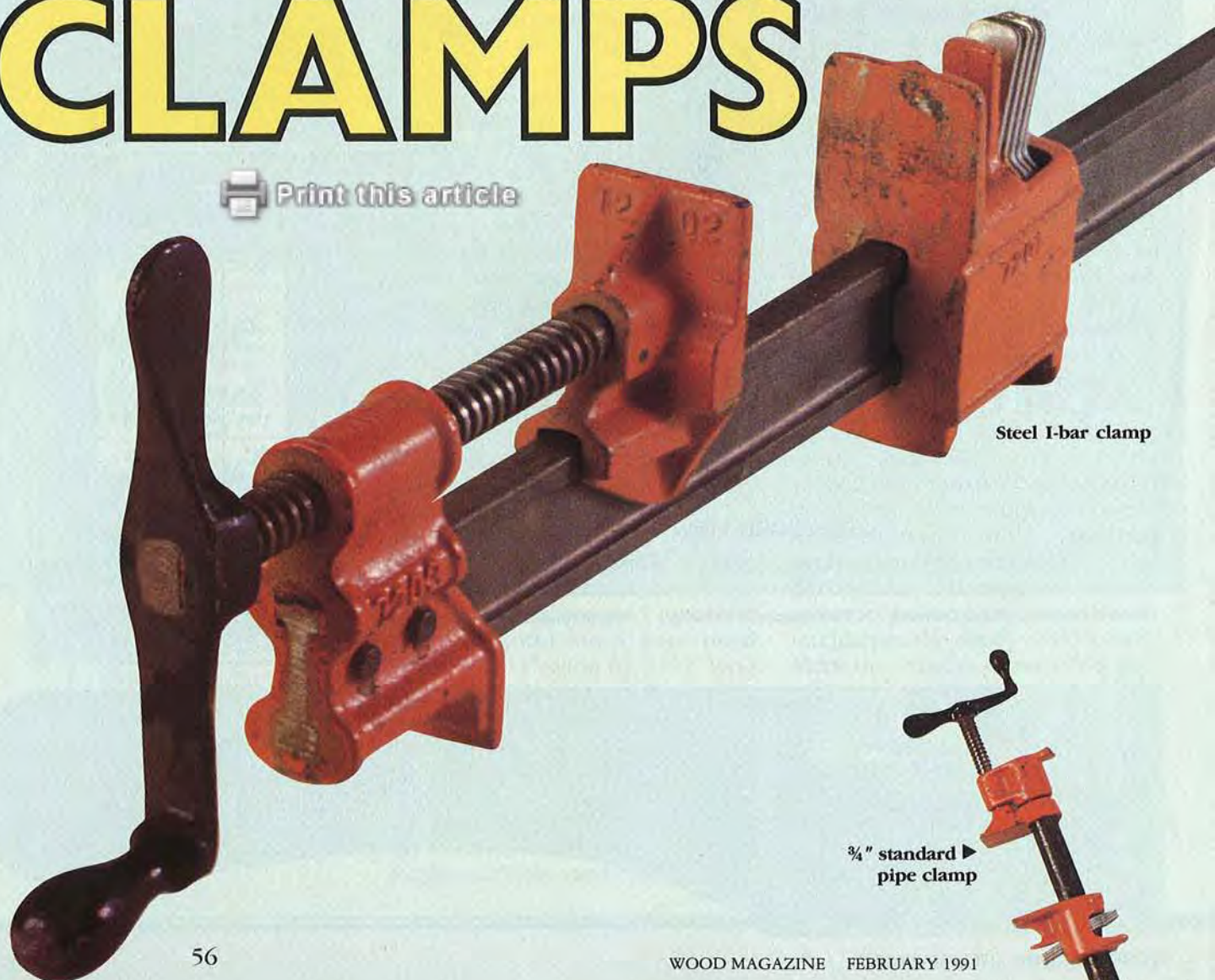
the pipe), consist of a tail-stop that quickly adjusts along any length of 3/4" pipe and a stationary head with tightening screw.

In addition to the fixtures themselves, you'll also need some threaded black pipe, which you can purchase at most home-centers and plumbing stores for about \$1 per foot. Why black pipe? This variety costs less than galvanized and holds the adjustable stop better.

For most woodworkers, a set of 10 pipe clamps in pipe lengths of 30" (four pipes), 42" (four pipes), and 62" (two pipes) will handle most jobs. To save storage space, it makes sense to postpone pur-

THE SMART-SHOPPER'S GUIDE TO CLAMPS

 Print this article



Steel I-bar clamp

3/4" standard pipe clamp

chasing the clamp fixtures and pipes until a job demands them.

For a few dollars more, you can purchase fixtures for a **reversible pipe clamp** such as the one shown *below*. With this variation, the sliding end has a screw, so you can turn around the two heads and spread apart workpieces for quick disassembly.

Bar clamps: plenty of choices

For maximum rigidity over long spans, nothing tops a **steel I-bar clamp** such as the one *below*. We have four 5-footers in the

WOOD magazine shop for clamping edge-joined tabletops.

Although superior to pipe clamps, I-bar clamps weigh more and cost about \$30 apiece for 5' models.

Wooden bar clamps allow you to clamp broad expanses, too, but at considerably less cost than the steel I-bar type. You can buy one set of the fixtures shown *below* from the Hartford Clamp Co. for about \$15 (you have to supply a 1¼ × 2½" wooden bar). We suggest you mill the bars from birch and then wax or oil their surfaces to prevent glue buildup.

Because of their speed and convenience, no clamp gets more use for smaller jobs than **light-duty steel bar clamps**. You can pur-

chase these in lengths from 6" to 36", but we find the 6" and 12" models most useful.

Two of the largest suppliers of these clamps, the Adjustable Clamp Co. (makers of Jorgensen and Pony-brand clamps) and Bessey, offer different versions as shown by the models *below*. Both types have advantages. The Jorgensen clamp has a disc clutch that prevents the adjustable end from slipping. In our experience, these clutches normally work fine, but occasionally stick.

With the Bessey, the movable end grips tiny serrations along the bar, requiring you to apply forward pressure on the screw while you turn it. Though more expensive, the Besseys have larger pads with nonmarring plastic caps.

You'll pay \$9-\$10 for a 12" Jorgensen light-duty steel bar clamp and \$3-\$4 more for a similar Bessey clamp. Remember that you'll eventually need at least 12 of

these, and you can often save money by buying six at once.

C-clamps: affordable, with pressure to spare

You can buy C-clamps with capacities from 1" to 6" and throat depths up to 6¼". Because of their rigidity, these clamps apply tremendous amounts of pressure to your workpiece—a feature that comes in handy for thick laminations and stubborn workpieces.

Handscrews: the classic lives on

These timeless woodworking clamps, such as the one *above*, have wide, wooden jaws that operate independently, allowing you to clamp nonparallel surfaces. You can adjust the nonmarring jaws to spread pressure over the entire surface or concentrate the force on a small spot. They're fairly expensive at about \$18 for an 8"-jaw model.

Continued



Handscrew

C-clamp



◀ ¾" reversible pipe clamp

Bessey ▶ light-duty steel bar clamp

Jorgensen ▶ light-duty steel bar clamp

Wooden ▶ bar clamp



Strap clamp

Handscrew made from plans offered on opposite page.

Spring clamps: instant positioning

These clamps give you an extra "hand" when you need to hold a workpiece in position before securing it with handscrews or other clamps. We keep a variety of spring clamps such as the one shown *below* in our shop, but we make the greatest use of 6"-long models with 2" maximum openings (\$3-\$4 each).

Cam-action clamps: lightweight and quick

For those delicate clamping tasks where the workpiece won't support a lot of weight, and you don't need a great deal of pressure, a cam-action clamp works nicely. As shown *below*, you can buy cam-action clamps with either wooden jaws or plastic jaws that resist glue better. Either type costs \$10-\$15 in lengths ranging from 8" to 24".

Strap clamps: buy the ratcheting type

These clamps, such as the one shown *above*, prove indispensable for jobs that require wrap-around pressure. Chairs, bowls, and other multisided projects benefit from this handy helper. With most strap clamps, you must tighten the strap with a screwdriver or wrench, but some have a rapid-action ratcheting mechanism that greatly simplifies this task. You just grab a built-in lever, flip it back and forth a few times, and there you have it. No fuss. You'll pay about \$10 for a 15'-long clamp.

SOME NICE LUXURIES

Sure, you can get along without the following clamps in your workshop, but we find them real time-savers or just plain handy.

Quick-Grip clamps: for times when you need three hands

True to its name, the Quick-Grip clamp from American Tool Companies works fast, thanks to its triggerlike action. And, you can one-hand these lightweight clamps, freeing your other hand to position the workpiece. We rely on four of the 12" Quick-Grips in the *WOOD* magazine shop, and love using them. However, they're not cheap at \$18-\$25 for the 12-36" models.

Locking clamps: We like the deep-jaw types

As shown *below*, both American Tool Companies (makers of Vise Grips) and Bessey have designed clamps with the locking-pliers mechanism. These cost \$10-\$30, depending on capacity, but work well for repetitive tasks. We often utilize the deep-jawed version because it extends up to 15" over the edge of a work surface.



Bessey locking bar clamp

American Tool Companies deep-jaw locking clamp



Spring clamp ▼

◀ Wooden-jaw cam-action clamp (left). Plastic-jaw (right) ▶

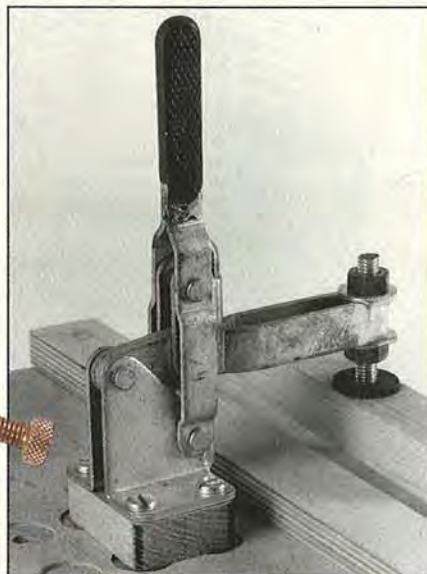
Tru-grips: As versatile as a clamp can get

Griset Industries now makes two variations in its Tru-grip line of clamps: the original **Clamp 'N Tool Guide** shown in top and bottom views *below*, and the newer **Back-To-Back Bench Clamp** to its *right*. Both versions have a cam-action device that exerts light to medium pressure. The 50"-long Clamp 'N Tool guide makes a fantastic straightedge for routers or portable circular saws because of its low height (about 1/2"). The Back-To-Back Bench Clamp has jaws on both its top and bottom, so a pair will hold your workpieces securely in place atop a bench. Expect to pay \$30-\$50 per clamp.



Toggle clamps: instant holding force for all your jigs

If you're into repetitive cutting or shaping that requires jigs, here's a must-have clamp. You can buy many varieties for \$10-\$15 each. With one of the most common types (shown *below* on a mortising jig), you push the handle forward to exert downward pressure on the workpiece. Similar versions have a low-silhouette handle for tight areas. Other models exert pressure horizontally for those times when you want to hold workpieces tight against a fence.



Toggle clamps place secure holding force wherever you need it.

Case clamps: handy for cabinetry projects

Case clamps, such as the model shown *below* from Hafele, work much like pipe clamps except they have long jaws that help you square up a cabinet as you clamp it. Two of these will cost you more than \$100, so we suggest them only if you build cabinets on a regular basis.

Handscrew kit and plans

Plans, article reprint, and hardware kit for an 8" handscrew, \$9.99 from Leichtung Workshops. Call 800/237-5907.

Manufacturers listing:

Adjustable Clamp Company
312/666-0640

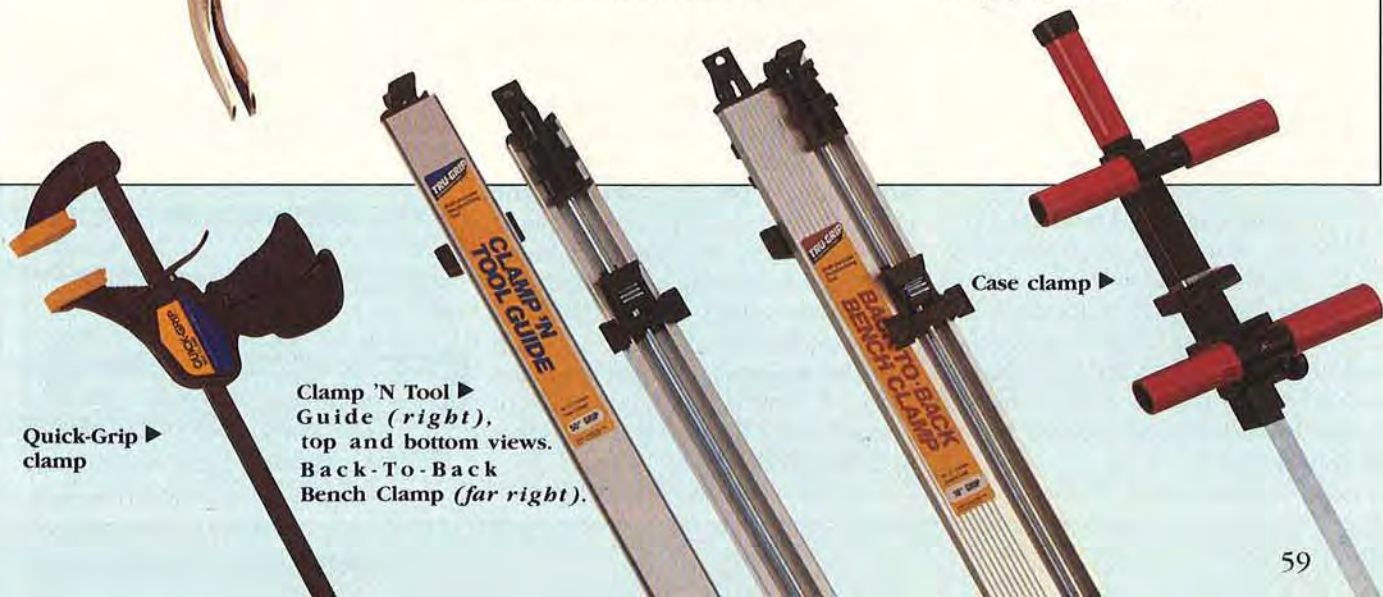
American Clamping Corporation
(importer of Bessey clamps)
800-828-1004
In Canada: 800-265-8678

American Tool Companies
402/683-2315

Hafele America
919/889-2322

The Hartford Clamp Company
203/528-1708

Written by Bill Krier
Technical consultant: George Granseth
Photographs: John Hetherington




Quick-Grip clamp

Clamp 'N Tool Guide (right), top and bottom views. Back-To-Back Bench Clamp (far right).

Case clamp

TIPS FOR GETTING THE MOST FROM YOUR CLAMPS

 Print this article

Before you go out and buy a new set of clamps, keep in mind that you might save some money by getting better performance from your current clamps. To give you a hand, we've rounded up some of the best pearls of clamping wisdom from the *WOOD*® magazine shop.

Note: For eight great pipe-clamp tips, see pages 66 and 67 of the August 1989 issue of WOOD magazine. Many of these tips work equally well with bar clamps, too.



BOE'S FIVE COMMANDMENTS FOR PROPER CLAMPING


Boe knows clamps (Jim Boelling, *WOOD* magazine's project builder, that is), so we asked him to come down from his workshop with five of his best clamping commandments. As always, Boe came through with some dandy tips.

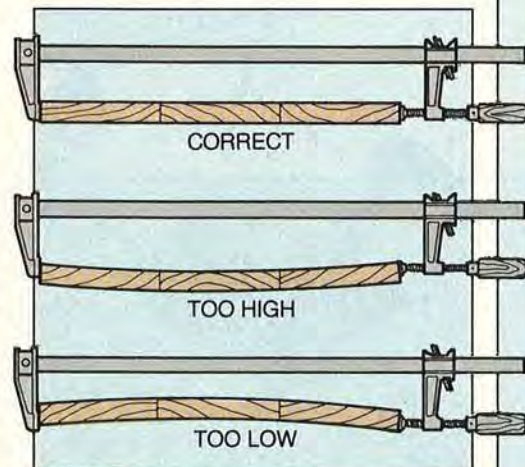
I Thou shalt commit to dry clamping. Before you put a drop of glue to any surface, dry-assemble and clamp your workpiece. This way, you'll know if the pieces fit and whether you have enough clamps to get the job done properly.

III Thou shalt not overclamp. No amount of clamping pressure has ever turned a bad joint into a good joint. So, re-machine ill-fitting parts rather than force them into alignment with clamps. Sooner or later, badly fitted joints will come back to haunt you.

II Thou shalt spread the pressure evenly. Some clamps, such as most bar and C-clamps, exert pressure in small areas. So, place auxiliary blocks of wood between the clamps and workpiece to spread out the pressure evenly.

IV Thou shalt protect the workpiece. If you're not careful, clamps will dent or stain your project's surface. To be on the safe side, place wooden pads over the jaws of the clamp. To prevent glue from reacting with the metal clamp and staining the wood, lay a protective sheet of waxed paper between the metal bars of a clamp and the workpiece. Make sure the jaws of your clamps are free of grease, dirt, clumps of dried glue, or other debris.

V Thou shalt properly position the line of pull. Whenever you clamp edge-joined boards, make sure the clamp screw and opposing jaw line up with the center of the joined boards. If you position the clamp a little high or low as shown *below*, bowing likely will result. 



Illustrations: Kim Downing; Jim Stevenson

FANCIFUL FLOWERS

FROM FOUND WOOD

Don Hart of Pasadena, Texas, enjoys transforming wood that most people consider useless into beautiful turned objects. For this project, he salvaged a downed limb from a

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Attach a wooden auxiliary faceplate to a 3" metal faceplate (see the drawing *below right* for reference). After you find a 4"- to 6"-diameter limb, bandsaw it down the center through the pith. Next, cut a 2"- to 2½"-diameter plug from the limb section where shown. Using cyanoacrylate adhesive (epoxy also works), center and adhere the plug to the auxiliary faceplate.

With your lathe running at 1,500 rpm and using a ¼" spindle gouge, start at the rim and rough-shape the outside of the flower. (See the Full Sized Section View drawing.) Try to leave the bark on the rim of the turning.

Don suggests that you begin hollowing the flower interior with a ¼" bowl gouge. Alternate back and forth, hollowing the inside and then refining the shape of the outside until the wall thickness of the turning measures about ⅛". He also advises putting a fine bead of cyanoacrylate on the rim to keep the bark from separating from the wood.

Slow your lathe to 800 rpm, and sand the flower. Make the final shaping cuts on the base with a ¼" spindle gouge, and then sand that area. With the lathe running, apply a light coat of paste wax to the turning with a cloth, being careful not to let the cloth catch on the rough bark edge.

Part the flower from the faceplate and drill a ⅛" hole ¼" deep into the base bottom. To form the stem, soak a piece of ⅛" dowel stock in hot water for about 10 minutes. This will enable you to bend the dowel and form a more realistic-looking stem. 🌱

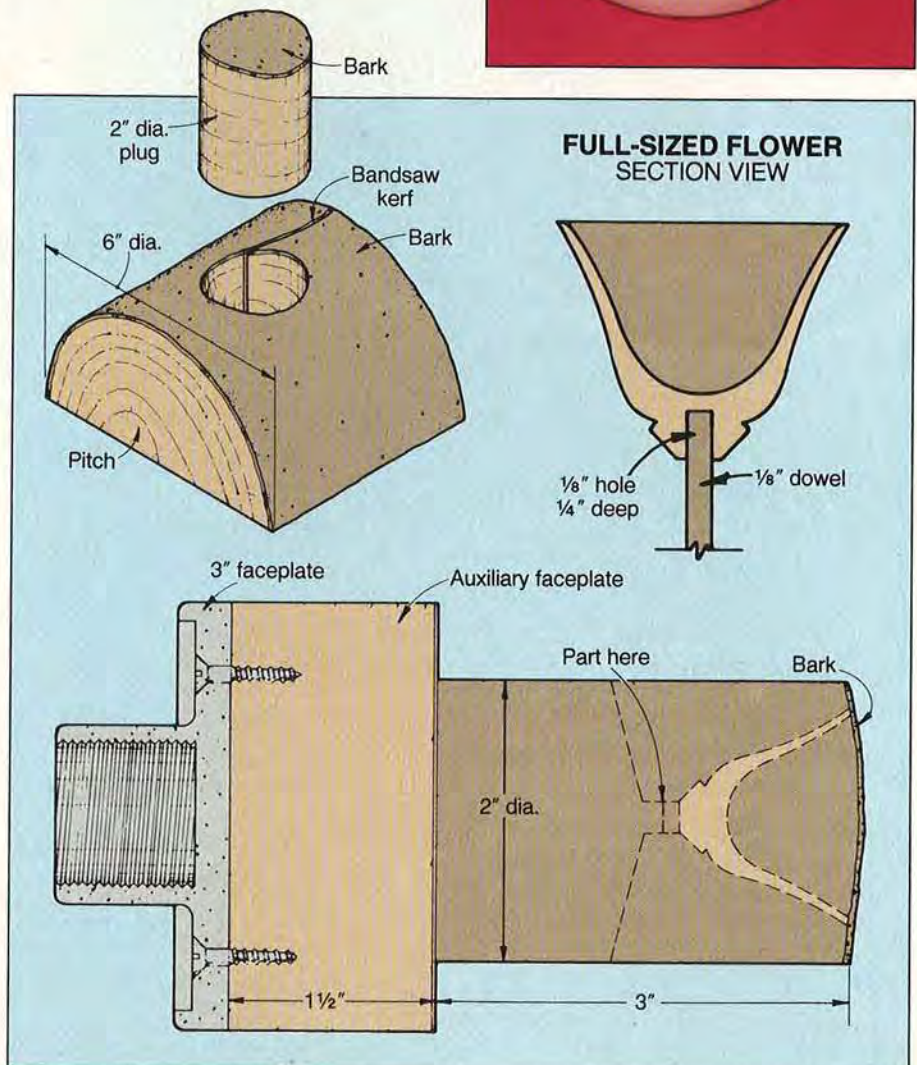
Photographs: Gaye Hart; Bob Calmer
Illustrations: Kim Downing; Bill Zaun

neighbor's pear tree to create a stylish bouquet of flowers.

Another in a collection of designs from the nation's top woodturners



Don Hart




ARIZONA TURN

HOT SHAPES FROM THE SOUTHWEST



Recently, the Arizona Woodturners Association organized a monthlong members' exhibit at Arizona State University in Tempe. Shown here are selected pieces from that show. The Phoenix-based club, a chapter of the American Woodturners Association, consists of 42 beginning, intermediate, and professional woodturners.

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Greg Campbell, Tempe
7½" diameter, 5¼" high, *above left*.

Greg found New Zealand walnut beautiful to turn and sand when he created this masterpiece. He shaped the inside and outside of the base and formed the ⅜"-thick walls with a roundnosed scraper. Greg used Watco Natural Oil for the finish.

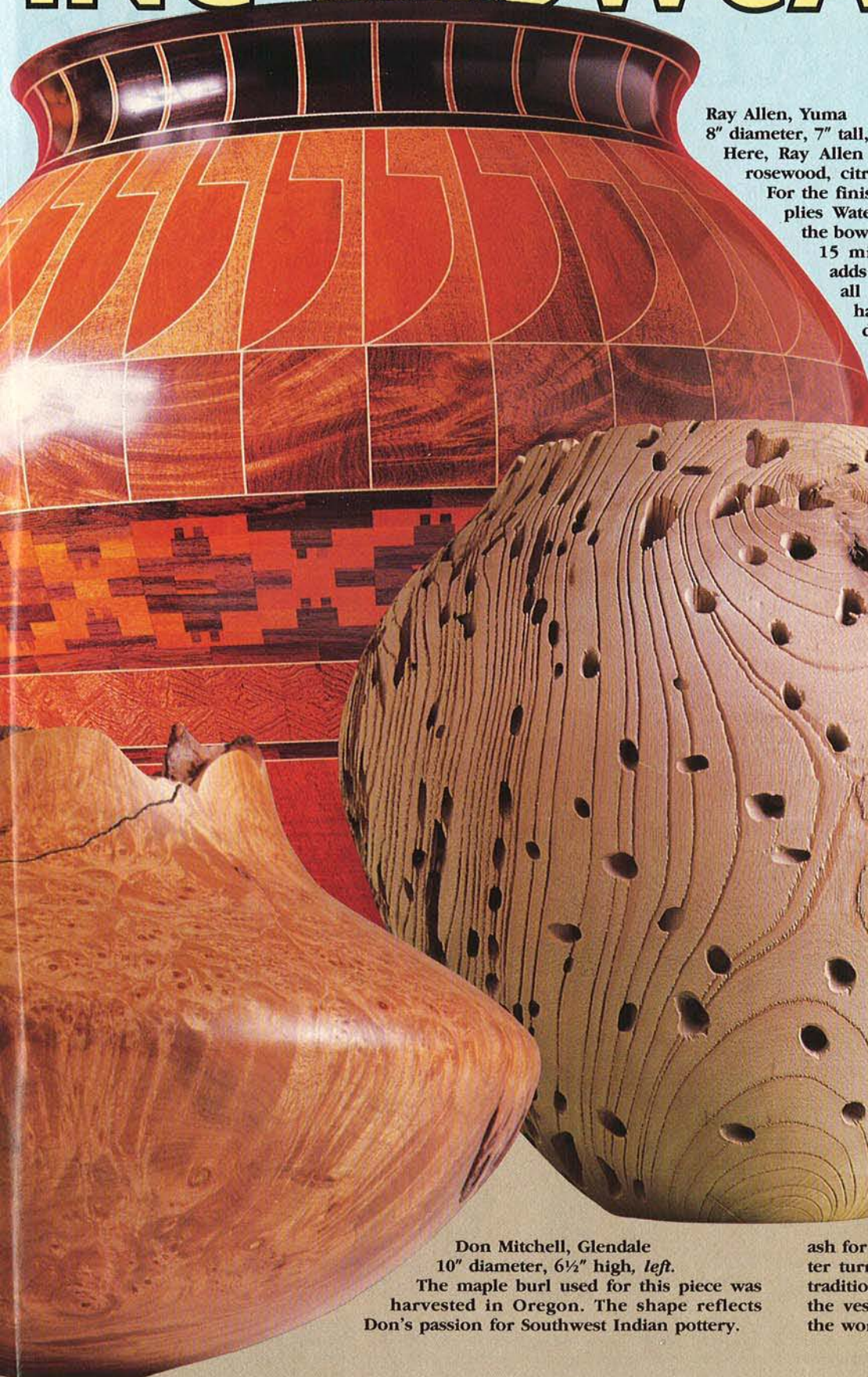
Jim Stephenson, Tempe
5½" diameter, 7" high, *above right*.

Jim used ash veneer and ebony for the base, maple and walnut burl for the midsection, and walnut and ash for the top. Jim's eye for detail carries over from his business—Palo Verde Machine—a manufacturer of precision parts for aircraft and armorments.

Ray Allen, Yuma
15" diameter, 13" high, *above center*.

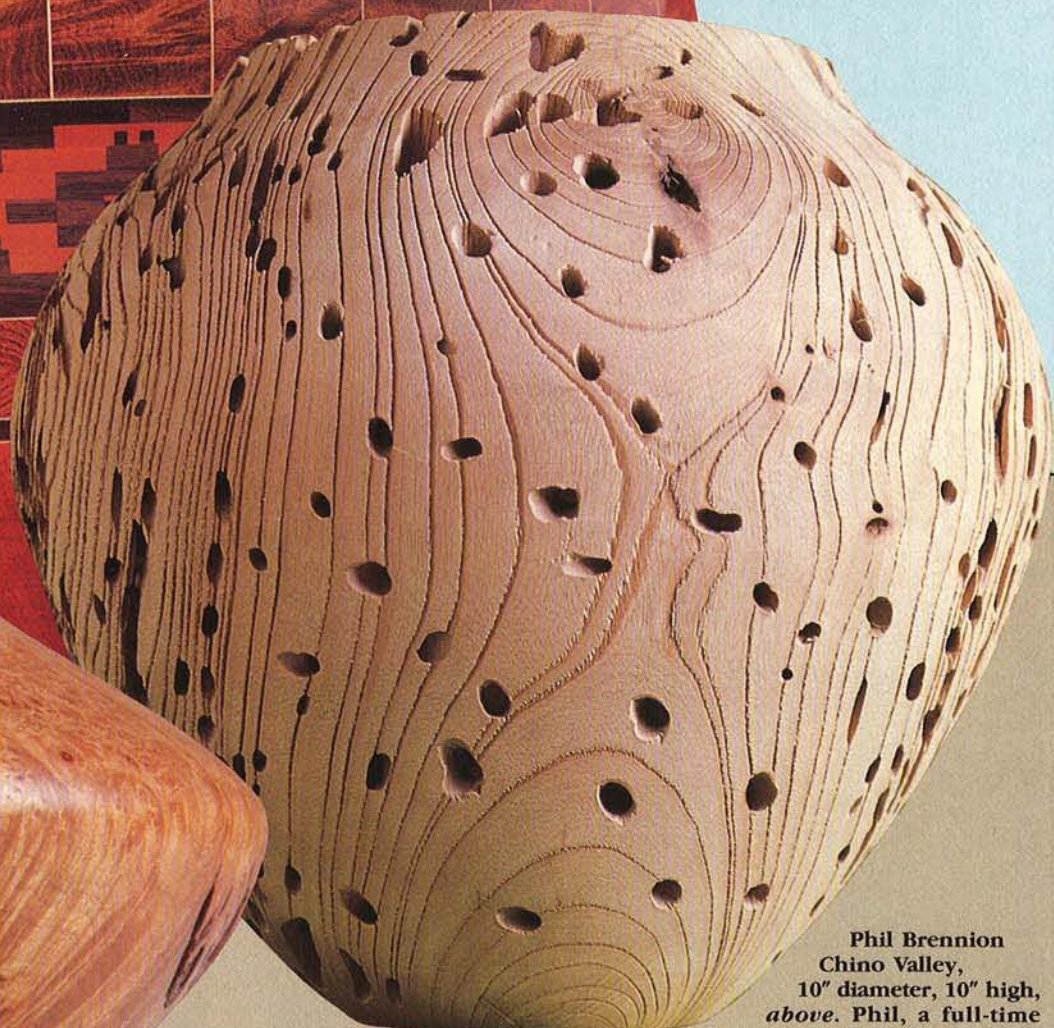
Ray's polychromatic turning consists of 1,241 pieces of mesquite, pernambuco, rosewood, holly, bubinga, and ebony. The feather pattern near the bowl's top reflects a pottery design found at New Mexico's Santa Clara Pueblo. Ray adapted the shape from a photo of a bowl dated 100 B.C. to 200 A.D., and unearthed at the Mica grave at the Hope-Well-Mound site in California.

ING SHOWCASE



Ray Allen, Yuma
8" diameter, 7" tall, *left*.

Here, Ray Allen combined black walnut, maple, rosewood, citrus, eucalyptus, and purpleheart. For the finish, Ray sands to 600-grit, and applies Waterlox, a tung-oil based finish, to the bowl. Next, he lets the bowl set about 15 minutes (until sticky), and then adds a bit more Waterlox to remove all the finish except for that which has soaked into the wood. The next day, he repeats the process. Finally, Ray applies paste wax with 0000 steel wool, and removes the piece from the lathe.



Phil Brennon
Chino Valley,
10" diameter, 10" high,
above. Phil, a full-time
turner, collected the wormy


ash for this piece in central Arizona. After turning it to a shape inspired by a traditional Hopi design, Phil sandblasted the vessel to remove the residue from the worm holes and texture the wood.

Don Mitchell, Glendale
10" diameter, 6½" high, *left*.

The maple burl used for this piece was harvested in Oregon. The shape reflects Don's passion for Southwest Indian pottery.

RIDE THE WIND

An intarsia wall hanging that's a breeze to build

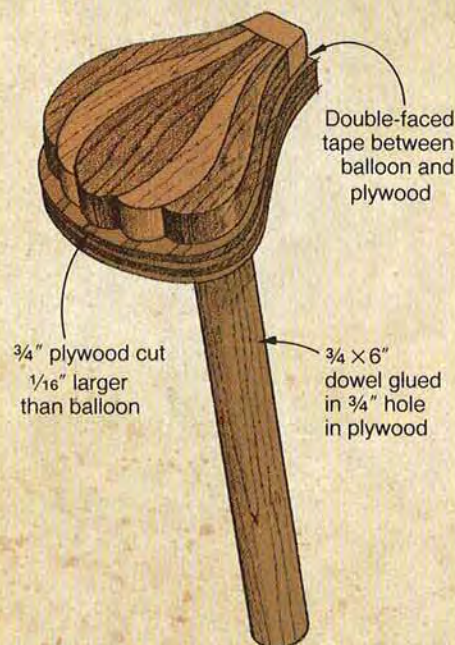
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To make the balloon, plane or re-saw two pieces of stock (we used oak and walnut) to $\frac{3}{8}$ " thick. Cut a piece from each that measures $3\frac{1}{4}$ " wide by $3\frac{3}{4}$ " long. With double-faced tape, join the two pieces face to face. Using carbon paper, transfer the balloon pattern to the top piece. Cut the balloon outline to shape with a bandsaw fitted with a $\frac{1}{8}$ " blade or a scrollsaw.

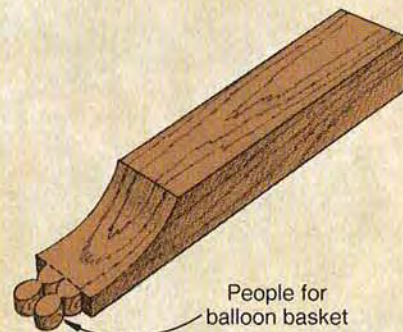
Trace the balloon's outline onto a piece of $\frac{3}{4}$ " plywood. Cut the plywood to shape, and bore a $\frac{3}{4}$ " hole about halfway through it. Glue a 6"-long $\frac{3}{4}$ " dowel into the hole in the plywood.

Cut the balloon pieces to shape. Mix the parts (you'll have enough for two balloons). With hot-melt adhesive, spot-glue the parts together and then to the plywood. Drum- or belt-sand the surface of the balloon to shape (see the Side View for reference).



Remove the balloon pieces from the holder, scrape off the hot-melt adhesive, and sand a slight round-over on the interior edges of each balloon piece.

As shown on the sketch below, transfer the shapes of the people and basket to the end of a piece of $\frac{3}{8}$ " maple and oak respectively. (It's easier to cut and sand the tiny pieces when they're part of a longer piece of stock.)

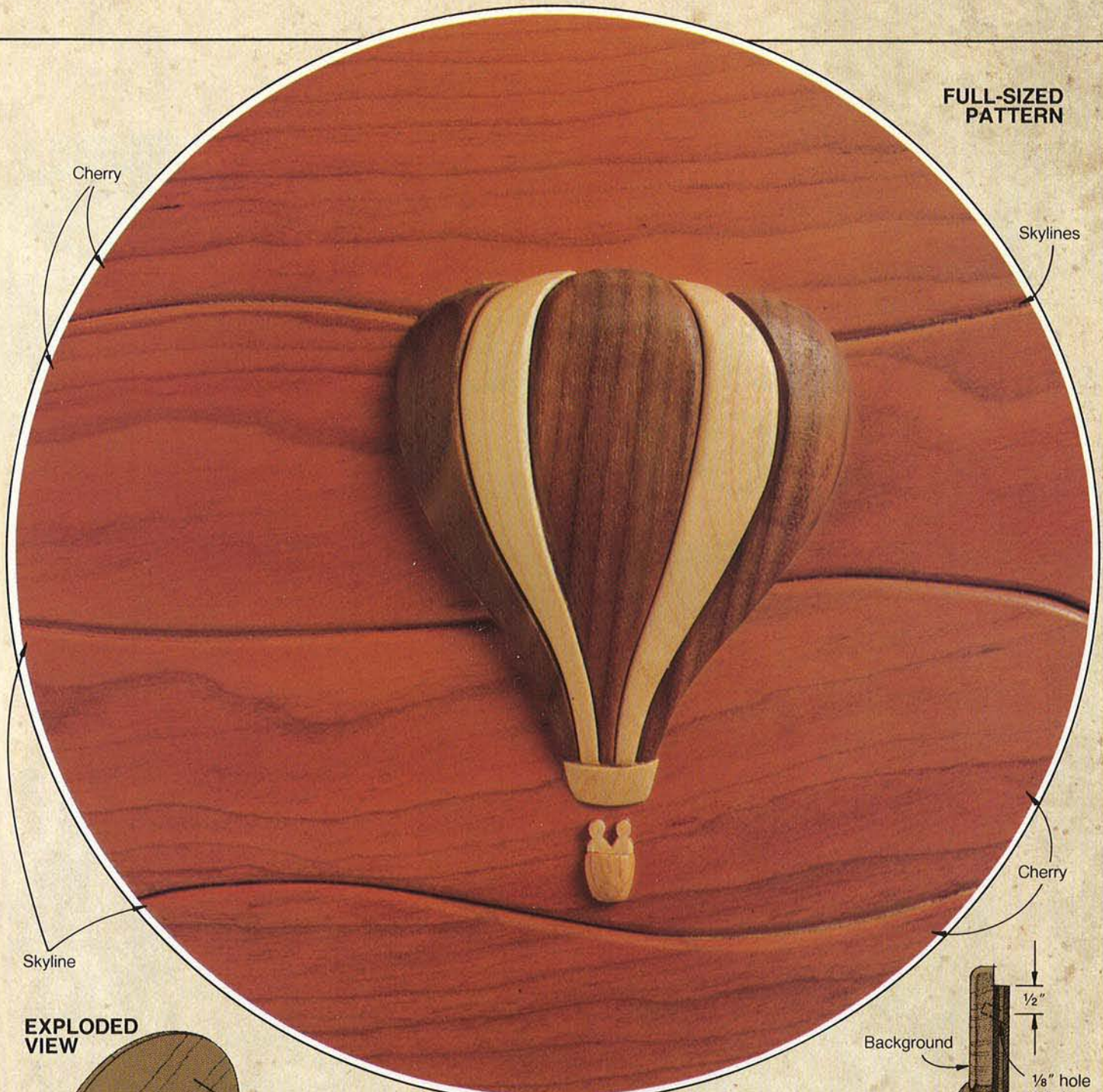


Cut and sand the basket and people to shape, and crosscut them from the end of the strips.

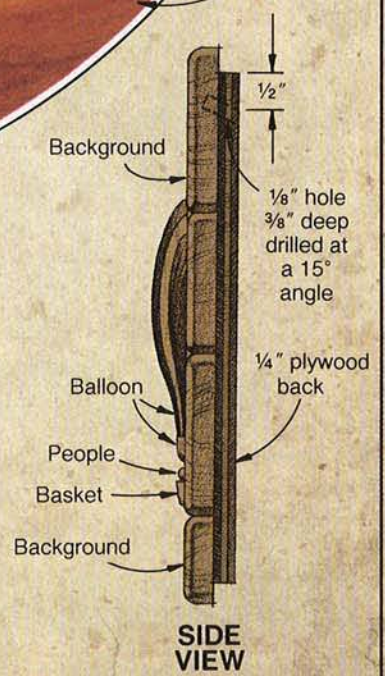
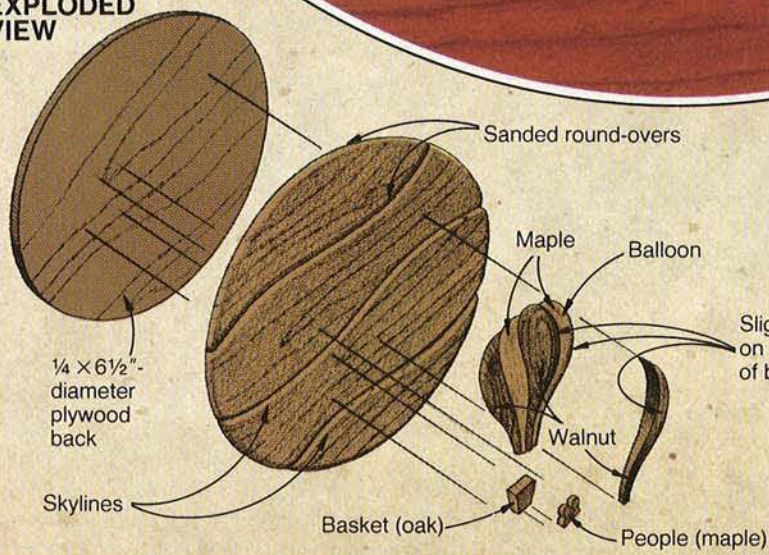
Transfer the sky pattern to a $\frac{1}{2}$ x8x8" piece of cherry. Bandsaw slightly outside the pattern's perimeter. Cut the individual sky pieces to shape. Sand a slight round-over along all edges of each sky piece. Cut a $6\frac{1}{2}$ "-diameter disk from $\frac{1}{4}$ " plywood.

Finish-sand all the parts. Glue the sky pieces to the plywood disk. Now, starting with the center piece, glue the balloon to the sky using the photo as a positioning guide. Then, glue the basket and people to the sky where shown. Add the finish. Drill a $\frac{1}{8}$ " hole $\frac{3}{8}$ " deep where shown on the Side View drawing. ♣

FULL-SIZED PATTERN



EXPLODED VIEW

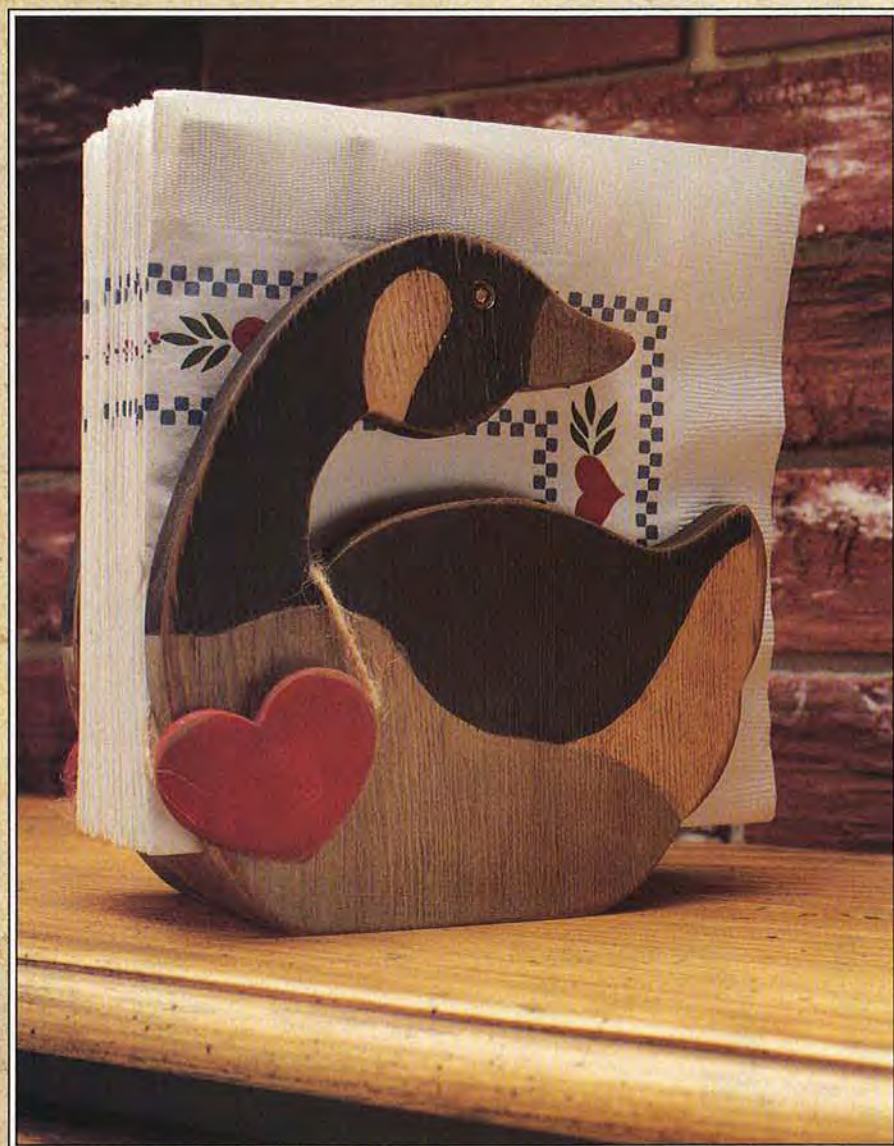


SIDE VIEW



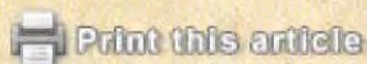
A napkin holder
with lots of
country charm

GRACEFUL GOOSE



Project Design: Woodworks Unlimited, Ghent, N.Y.

Photograph: Hopkins Associates



Take a gander at this accommodating accent for your kitchen table. It combines two well-loved country symbols—a goose and a heart—into a practical accessory.

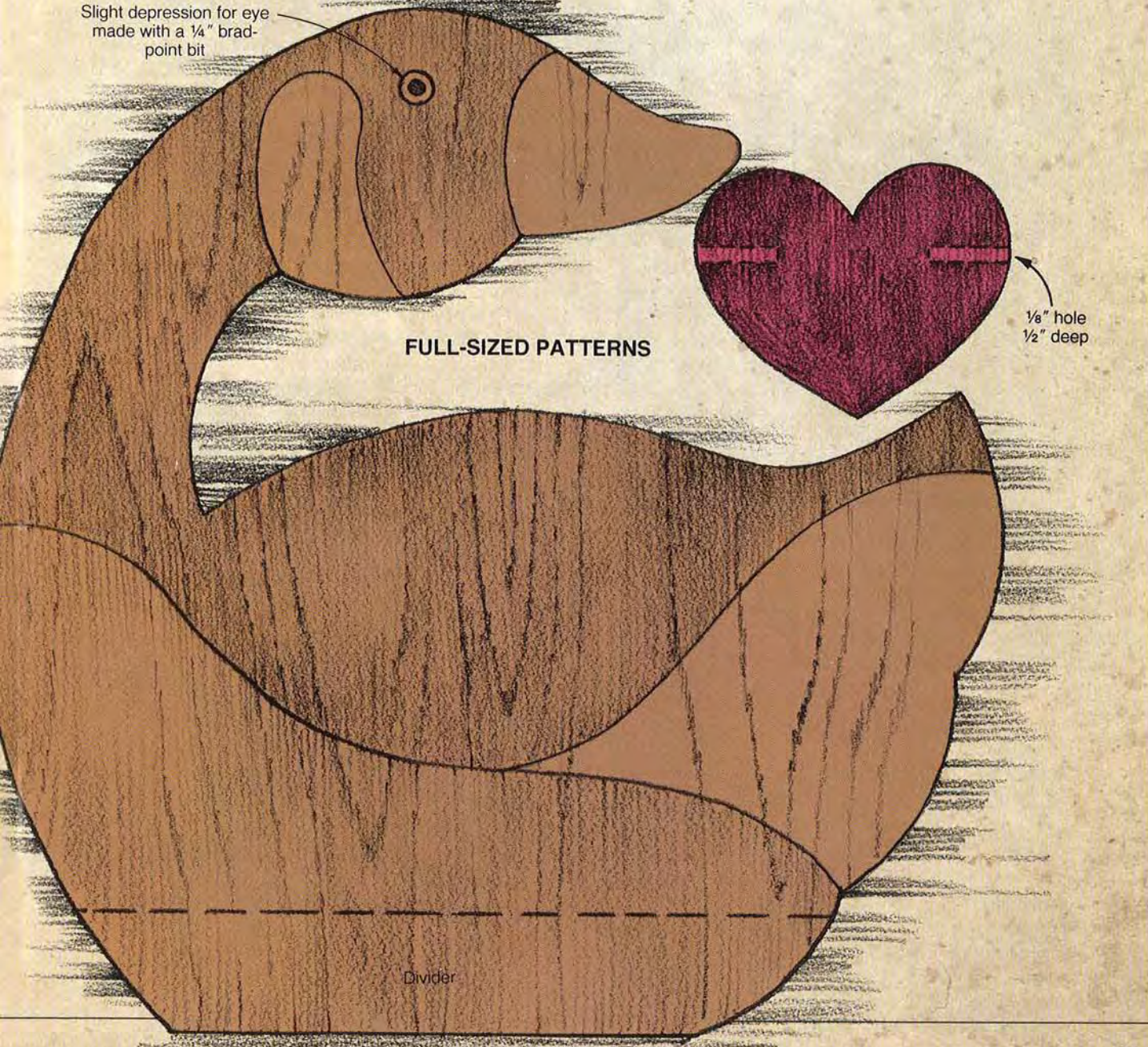
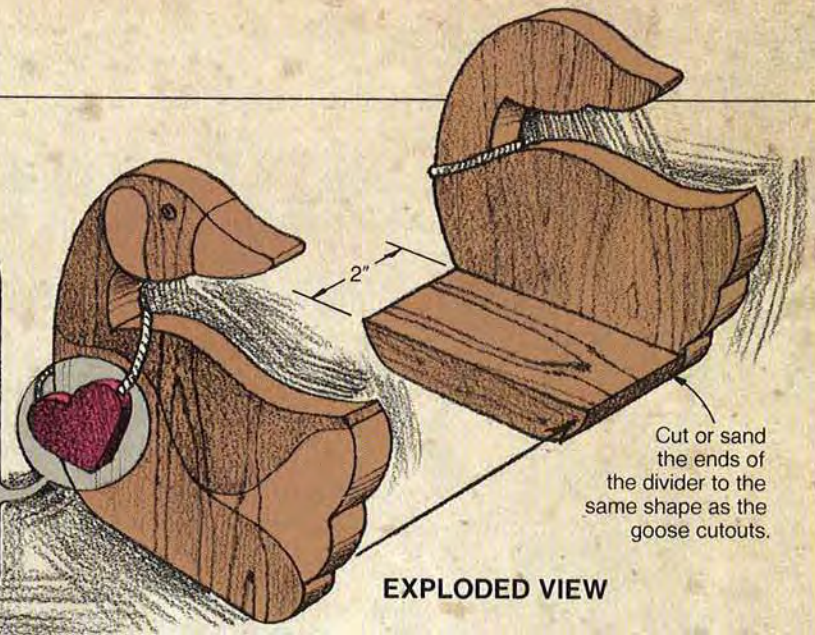
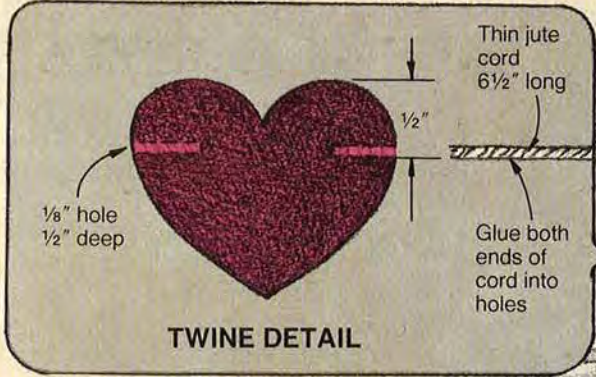
Transfer the full-sized goose pattern on the opposite page onto $\frac{1}{2}$ "-thick stock and the heart pattern onto $\frac{1}{4}$ " stock (we used clear white pine). To keep the neck portion strong, follow the grain direction on the Exploded View drawing when laying out the pieces. With a bandsaw fitted with a $\frac{1}{8}$ " blade or a scrollsaw with a #9 skip-tooth blade, cut out the geese and heart shapes. (Double-faced tape allowed us to stack and cut out the geese and hearts in pairs.) From $\frac{3}{4}$ " stock, cut the bottom of the holder to $2 \times 4\frac{3}{4}$ ". Cut or sand the ends of the divider to the same shape as the goose outline. Then, drill a pair of $\frac{1}{8}$ " holes $\frac{1}{2}$ " deep in each heart where located on the full-sized pattern. Sand the parts.

For the best results, paint the geese before assembly, but mask the areas that will contact the base. (To paint the pieces, we used water-based acrylics and a no. 6 sable brush.) Apply the gray (a mixture of black and white), the black, and finally the white. Paint the hearts red.

To achieve the aged look, lightly sand the edges of each goose and heart after the paint has dried. To further age the project, rub on a brown-colored stain (we used a water-based acrylic) and immediately wipe off most of it. Using a $\frac{1}{4}$ " brad-point bit, form a slight depression for each eye.

Glue the divider between the goose pieces. Cut two pieces of thin jute cord to $6\frac{1}{2}$ " long. Glue the ends of each cord into the holes in the heart. Hang the hearts around each goose neck, and fill the holder with napkins. ♣

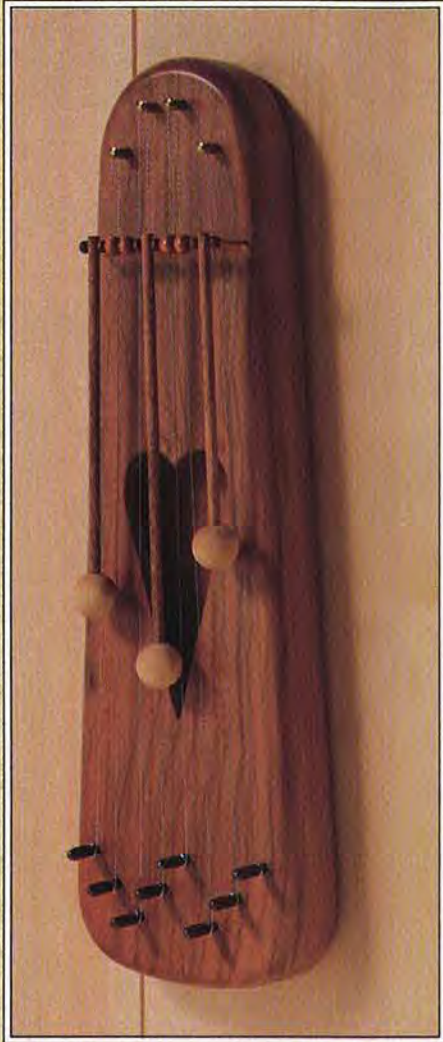
Illustrations: Jamie Downing; Jim Stevenson





CHEERY, CHERRY DOOR

A "Welcome" Addition to Your Home's Entry



We've heard a symphony of door harps over the years, but Robert Kiser's design sounds better than any we've listened to. What's Bob's secret? He hangs the wooden balls on dowels instead of wires or string. See the Buying Guide for our source of pins, music wire, and a clapper assembly.

Plane or resaw cherry to obtain two pieces measuring $\frac{1}{4} \times 5 \times 16''$ for the front and back pieces (A). Using double-faced tape, stick the front and back together face-to-face with the edges and ends flush. Draw a centerline where shown on the Exploded View drawing. With carbon paper, transfer the curved end patterns to the top piece. The finished length of the harp equals $15\frac{3}{8}''$.

Draw a pair of lines between the two end patterns to complete the outline. Refer to the dimensions on the Exploded View drawing and mark the two center-points for the heart opening as well as the point at the bottom of the heart. With a bandsaw, cut the taped-together pieces to


shape, cutting just *outside* the marked line. Separate the pieces and remove the tape. Using a Forstner or a spade bit, bore two 1" holes for the heart-shaped opening. Draw lines from the outside edges of each hole to the heart's point, and finish cutting the heart to shape with a scroll-saw. Sand both pieces smooth.

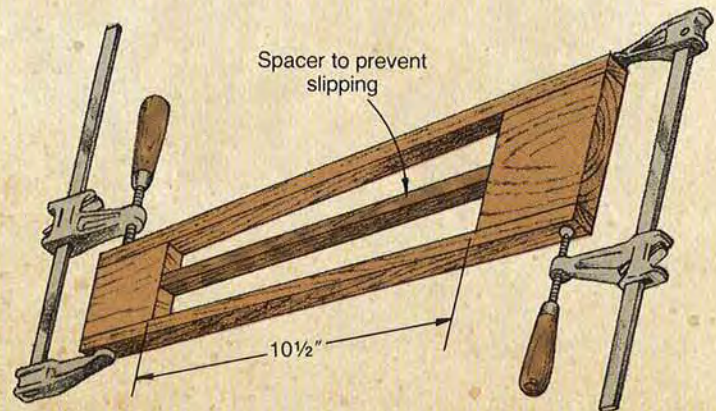
Rip and crosscut the sides (B) to $\frac{1}{2} \times \frac{3}{4} \times 16''$. Using the full-sized patterns as guides, mark and cut the wedge-shaped ends (C, D) to size. With the surfaces flush and a $10\frac{1}{2}''$ -long spacer between the end pieces, glue and clamp the frame pieces (B, C, D) in the configuration shown *below*.

Using the front piece (A) as a template, center it on the frame parts and trace its outline on the frame. Bandsaw the frame to shape, cutting just outside the marked line.

Glue and clamp the front and back pieces to the frame. Later, sand to the marked line for flush edges. Mark the location, and drill the holes for the tuning pins, bridge pins, clapper assembly, and hanging hole.

Rout a $\frac{3}{8}''$ round-over along the top and bottom. Sand and add the finish (we used aerosol lacquer).

 Print this article

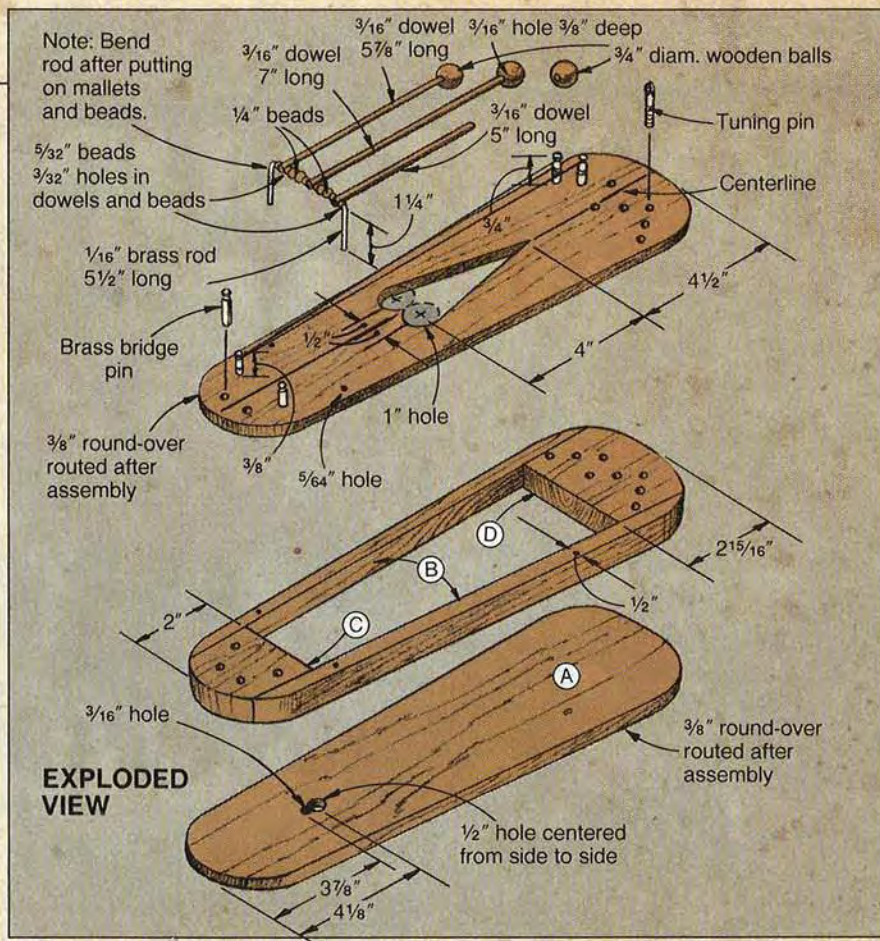


HARP

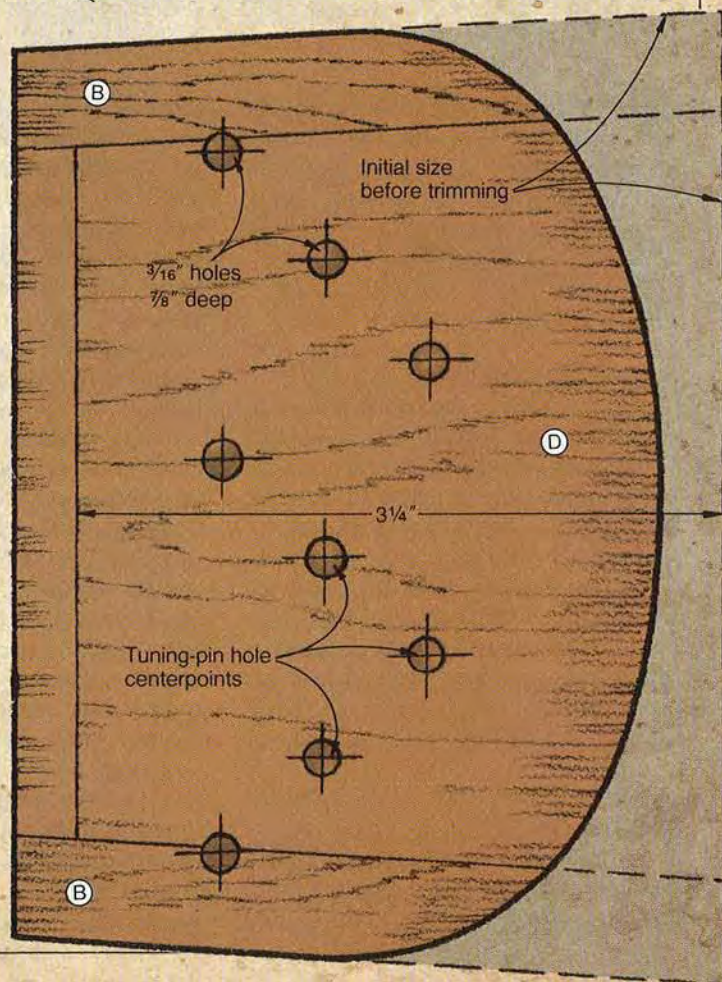
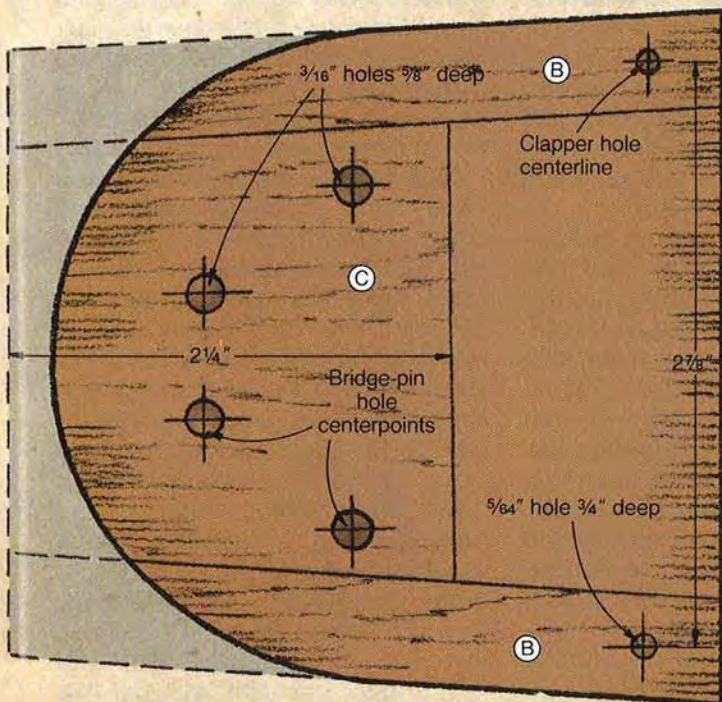
With a mallet, tap the bridge pins into the holes. Tap the tuning pins about $\frac{1}{8}$ " into their mating holes. Use the tuning-pin wrench to thread the pins into the holes. String the wire where shown in the Exploded View drawing. Put two drops of instant glue in each $\frac{5}{64}$ " hole, and adhere the clapper assembly to the harp. Hang the harp on the inside of your door.

Buying Guide

• **Hardware kit.** 15' of #6 music wire, tuning wrench, 4 brass bridge pins, 8 steel tuning pins, 1 clapper assembly, and detailed wiring instructions. \$9.50 ppd. Violet Crown Harpery, 1502 Cullen Ave., Austin, TX 78757



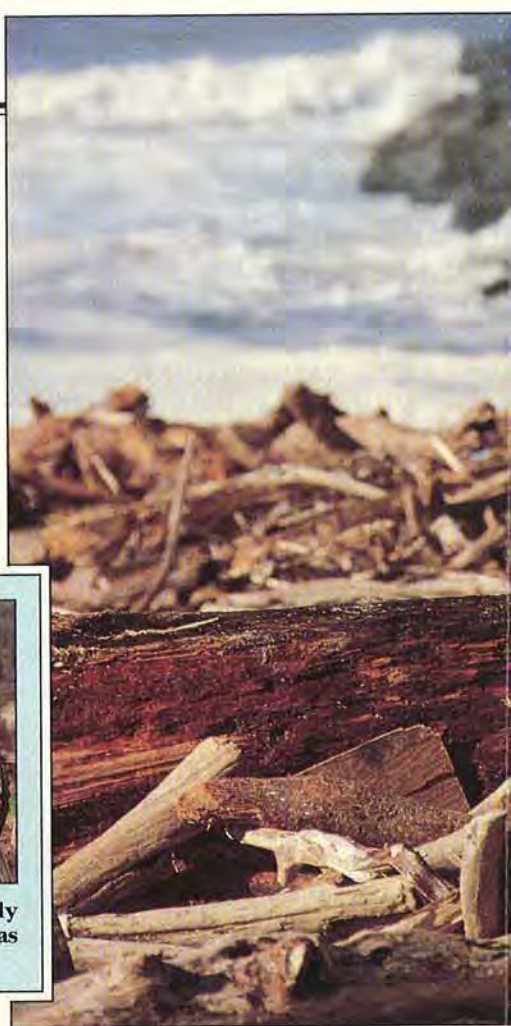
FULL-SIZED END PATTERNS



Project Design: Robert Kiser, Violet Crown Harpery, Austin, Texas.
Photo: Hopkins Associates. Illustrations: Jamie Downing; Jim Stevenson

WASHED-UP WOOD

ALONG THE OREGON COAST, CRAFTSMEN LOOK TO THE OCEAN FOR STOCK



Sam sinks into a cozy, clam-shaped easy chair hued from the trunk of a huge cedar tree. He found the wood on the beach.



A giant myrtle tree furnished the bizarrely bleached and burlled roots that stand out as one of Phil's prized finds.

When most of us need wood, we march down to our hardwood dealer or lumberyard. Enterprising Oregon woodworkers Phil Clausen and son Sam, though, head for the beach instead.

Winter storms roil the Pacific waters off the Oregon coast, building waves that pound more than 300 miles of beach. Inland, torrential rains of the season swell rivers to their banks. Like waters from wide-open faucets, the floods surge to the ocean, sweeping obstacles before them. The inevitable clash with the incoming tide creates a driftwood delicatessen—one that offers specials every day.

EIGHTEEN YEARS BUILDING, NEVER A PENNY FOR STOCK
To Oregon's beachcombing woodworkers, Phil and Sam Clausen, the lull of a storm signals harvesttime.

The father-and-son team knows that Mother Nature's forces have littered the coastline near their shop with wooden casualties—root balls, branches, planks, entire trees. Free for the taking (it's perfectly legal on Oregon public beaches), the washed-up wood will find new life in their workshop.

"Back in 1964, we had a memorable flood that literally lined the beaches with wood," says Phil. "I've been woodworking full-time 18 years since then, and we're still drawing off that reservoir."

Phil, 62, and Sam, 38, own and operate Clausen Studio in tiny Riverton, on the Coquille River, a short drive from the oceanside towns of Bandon and Coos Bay. Together, they craft rustic and unusual free-form tables, chairs, lamps, and other wood accessories.

In addition to drawing from their beach bequeathal, the Clausens commandeer wood wherever they happen to find it. "Besides working the beach, a little wood comes

down the Coquille River every winter, from the interior, that doesn't make it to the ocean," explains Phil. "We also haul from logging areas on public lands, such as the national forests and Bureau of Land Management parcels.

"From the beach, we get logs and even whole trees: redwood, Douglas fir, white fir, pine, cedar, and cypress," Phil continues. "Sometimes, there'll be maple, myrtle, alder, oak, and yew—every kind of tree that you'd find in the forest. In '64, even big redwoods from Northern California washed up—and I mean trees with 20,000 board feet of wood!"

Occasionally, they pluck a real prize. "A few years ago, Sam found a mahogany log on the beach," says Phil. "I suspect it fell off a ship. Anyway, it had been in tropical water for some time, because it was full of holes bored by shellfish. He had it sawed at the mill. Some of it went to a local woodworker for an interesting-looking hutch."



Where Oregon's Coquille River empties into the ocean at Bandon, cedar, fir, pine, and other woods pile up on the beaches.

WOOD IS WHERE YOU FIND IT

No ocean beaches for driftwood near you? Take heart. Rivers, river-fed lakes, and reservoirs all offer some free-for-the-picking stock. And, one of these natural wood depositories shouldn't be far from wherever you happen to live. Best times of year? Look for wood just after the spring snow melt and runoff. In reservoirs, try during late summer when the water level drops.

What will you find? Remnants of trees native to your area that probably died on the stump and were blown into the river or lake bed. If you live near a major waterway, the washed-up wood you'll find might have originated hundreds of miles away.

Sometimes, a surprise comes only after they work the wood in the shop—like the time the woodworkers found a 3"-diameter, solid piece of vine perfect for a lamp base. Then, they discovered that their treasure was poison oak! "We got a good case of it," Sam recalls, chuckling at the thought.

Hardwood trees, stumps, and burls also find their way into the Clausens' shop via tips from friends. In fact, they acquire some extraordinary wood that way. "A dredging crew was digging out the river bottom for a boat ramp when they brought up a sunken tree. We went over to see the log and discovered that it was myrtle, but somehow the wood had acquired a blue cast during its submergence. I slabbed it up to sell as tabletops."

OCEANSIDE LOGGING ISN'T A PICNIC

The tools and equipment Phil and Sam need to reap their harvest of free wood rivals that of a small log-

ging operation. Four-wheel drive pickups sporting oversized tires overcome traction problems on beach sand and provide pulling power. "We mount a winch above the bed," notes Phil, "and raise the log lengths right into the truck."

To handle 7'- and 8'-diameter trees, such as redwood, Phil wields a chainsaw fitted with a super-sized 60" bar. "The only way to get through those big ones!" he says.

But, even with tools matched to the job, the beachfront loggers tackle a tedious task when they harvest driftwood. That's because sand permeates every piece, and it takes a toll. "Trees from the river bottom will have some sand and pebbles in them," Phil says, "but driftwood is the worst. When there's no bark, the wind blows sand right into the grain. You can't wash it all out or blow it out with a compressor. Even when a log has bark, there'll be sand in the end grain. So, when we cut at the beach we constantly sharpen the chain.

And," he adds, "in the shop, the sand dulls saw blades and bits that we have to replace or resharpen."

Phil and Sam consider the inconvenience of sharpening, plus wear and tear to cutting edges, a small price to pay for the wood they bring home. Because, in all ways, it proves exceptional.

"Except for that one blue-colored myrtle tree dragged from the river, neither salt nor fresh water have much effect on a wood's color," Phil notes. "But, and it seems kind of strange, wood that has been immersed in any kind of water seems to dry faster than green wood, and has greater stability."

There's no difference between sanding, staining, or finishing found wood than wood from the lumberyard, say the woodworkers. "All in all, it's satisfying stock," Phil sums up. "And what beats all is that you just never know what you're going to find." 🌲

Written by Peter J. Stephano
Photographs: Mary Schamehorn



The woodworker's survival FORSTNER

FIVE DIFFERENT TYPES OF FLAT-BOTTOM-HOLE BITS TO CHOOSE FROM

Not long ago, Larry Clayton, *WOOD*® magazine's editor, stopped by my office and asked me if I had seen a recent advertisement for low-priced Forstner bits. "Can you believe that price—\$89.99 for 16 bits?" Larry asked. "I wonder if they're any good?"

His questions convinced me that the time was right to shed some light on the subject. So, I made a few calls to the major manufacturers and distributors of Forstner bits, all of whom agreed to send me samples. With more than 100 bits in five styles from no fewer than 11 suppliers in hand, I turned the testing over to Jim Boelling, *WOOD* magazine's project builder. After two weeks of tryouts, Jim let me know, in no uncertain terms, how the various samples performed.

Bill Kier

Products/Techniques Editor

 Print this article

Early on in my research, I realized that even though many manufacturers label their products as Forstner bits, few of these tools resemble the bit Benjamin Forstner invented in 1886 for cutting smooth-walled, flat-bottomed holes. The Salem, Oregon, blacksmith would be amazed that manufacturers from around the world still are fiddling with his design more than 100 years later. I uncovered these five variations:



CONVALCO.

These bits, made exclusively by Connecticut Valley Manufacturing (CONVALCO) in New Britain, Connecticut,

closely resemble Forstner's original bit. Some similarities include an almost-nonexistent centerpoint, two continuous rims without spurs, and hand-sharpened lifting cutters.

Tony Garro of CONVALCO told me that only his company machines Forstner bits from solid bar stock. "We don't forge our bits like the imports do," Tony said. He also explained that his bits have more mass near the rim. Like saw blades or any other cutting tool, extra mass near the scoring edge absorbs and dissipates heat.

You can buy these premium-priced bits through the mail from either Woodcraft Supply or directly from the manufacturer. Only CONVALCO supplies Forstner bits in 1/16" increments.



Imported Forstner.

European and Southeast-Asian manufacturers produce this bit at a relatively low cost

because the notch behind each lifting cutter allows them to machine-grind the cutters. These bits, as well as the following three types, have centerpoints ranging from 1/8" to 1/4" in length, depending on the diameter of the bit.



Multi-spur.

Like the teeth on a sawblade, side-by-side cutting edges along the rim of multi-spur bits aggressively score the walls of the hole. Multiple spurs help keep the rim cool, but also add to the manufacturing cost.

Multiple spurs help keep the rim cool, but also add to the manufacturing cost.



Carbide-tipped.

Because they have cutters, centerpoints, and two scoring spurs made of carbide,

these bits last and last, but cost more than any other type.



Single lifter.

Made by Vermont American and sold under its name as well as under the Sears brand, these

bits have just one rim and lifter. Interestingly, the 1/2"-and-smaller sizes were the only bits in our tests with flutes along their shanks for improved chip evacuation.

guide to buying... BITS

WHAT OUR TESTS REVEALED

Style and looks are one thing, but like you, I wanted to know how the various bits performed. So, Jim Boelling and I decided to judge the bits according to the three criteria listed below. You'll find the complete results in the chart at right.

1. Sharpness from the factory

Right out of the package, the bits varied greatly in the sharpness of their lifting cutters and rims. The carbide-tipped and CONVALCO bits had the finest edges, and the Chinese-made bits had visibly rough lifting cutters. These rough edges cut fairly well, but left minute scratches in hole bottoms.

2. Resistance to burning

As the rim and centerpoint of Forstner bits heat up, two things can happen. First, the rim can turn blue (a sign that it has lost temper). Without temper, the softened cutting edge quickly dulls. Also, as shown in the photo below right, an overheated rim will burn the walls of the hole.

To test for resistance to burning, we started with sharp, cool bits, and cut 1/2"-deep holes in hard maple with 1 1/2" bits running at the recommended speed of 250 rpm. Only the CONVALCO, multi-spur, and carbide-tipped bits allowed us to make multiple holes without waiting for the bit to cool considerably between holes.

3. Smoothness of cuts

If you intend to use your Forstner bits to make holes with exposed

Continued on page 89

PERFORMANCE RATINGS OF SOME WIDELY AVAILABLE FORSTNER BITS

SUPPLIER	TYPE ¹	SHARPNESS ²		RESISTANCE TO BURNING ²		SMOOTHNESS OF CUT ²		COUNTRY OF ORIGIN ³	PRICE OF SINGLE BIT ^{4,5}	SET PRICES ⁵
		LIFTING CUTTERS	RIM	CENTERPOINT	RIM	HOLE WALL	HOLE BOTTOM			
Amana	IF	E	E	G	G	E	F	I	N/A	\$59 A
Constantine's	IF	E	E	E	G	E	E	A	\$12.95	75.25 B
Delta	IF	G	G	G	G	G	F	WG	13	N/A
Dollar Trading Corp.	IF*	F	G	G	G	G	F	C	6.99	97.50 #C, 33 #B
Freud	IF	E	E	G	G	E	E	A	9	160 C
	CT	E	E	E	E***	E	E	I	45 B	N/A
Garrett Wade	IF	E	E	G	G	E	E	A	11.85	99.90
	MS	E	E	E	E	E	E	A	16.20	N/A
Irwin	IF	E	E	E	E	E	E	A	16.89	77.95 G
	MS	E	E	E	E	E	E	A	16.89	77.95 G
Leichtung	IF	G	E	F	G	E	F	T	8.99	99.99 B
	MS	E	E	E	E	E	E	T	29.99 A	199.99 D
Vermont-American	SL	G	E	G	F	G	E	US	17	54 G
Woodcraft	CO	E	E	E	E	E	E	US	21.90 #	54.95 #E
	IF	F	F	F	F	F	F	WG	13.35 #	69.95 #B
	MS	E	E	E	E	E	E	A	18.50 #B 33.25 #A	N/A
Woodworker's Supply of New Mexico	IF**	E	E	G	G	E	E	T	9.75	59.95 B, 199 C
	MS**	E	E	E	E	E	E	T	29.75 A	299 D
	CT	E	E	E	E***	G	G	A	26	435.50 F

N/A Not available.

*Similar bits available from AMT.

Dollar Trading Corp. provides

multi-spur bits in sizes 1 1/2"-2 1/8".

**Similar bits available from

Grizzly. ***In place of rim, these

bits have two scoring spurs.

1. (CT) Carbide tipped; (CO)

CONVALCO; (MS) Multi-spur; (SL)

Single lifter; (IF) Imported

Forstner.

2. (E) Excellent; (G) Good;

(F) Fair.

3. (A) Austria; (C) China; (I) Italy;

(T) Taiwan; (US) United States;

(WG) West Germany.

4. Price for 3/4" bit unless noted

otherwise. (A) 2 1/8" bit; (B) 1" bit.

5. # Postage-paid price

6. (A) 6 sizes from 3/8" to 1"; (B) 7

sizes from 1/4" to 1"; (C) 16 sizes

from 1/4" to 2 1/8"; (D) 8 sizes from

2 1/8" to 3"; (E) 3 sizes (1/4", 3/8",

1/2"); (F) 13 sizes from 3/4" to 3 1/8";

(G) 4 sizes from 5/8" to 1".



We came across the good, the bad, and the ugly of burned walls in our tests. Holes resulted from left: CONVALCO, Chinese-made, and West German-made Forstner bits.

CABINET, CABINET

Clean and simple with a Shaker air about it, our cherry wall cabinet makes a nice addition to most any wall in need of dressing up. You can build it in two evenings and enjoy it for a lifetime.

Note: You'll need some thin stock for this project. You can either resaw or plane thicker stock to size.

Start with the basic case

1 From $\frac{3}{4}$ "-thick cherry, cut the sides (A), fixed shelf (B), and top and bottom (C) to the sizes listed in the Bill of Materials.

2 Mark the locations and cut a $\frac{3}{4}$ " dado $\frac{1}{4}$ " deep on the inside face of each cabinet side. Then, cut or rout a $\frac{3}{8}$ " rabbet $\frac{1}{4}$ " deep along the back inside edge of each cabinet side.

3 Mark the shelf-hole centerpoints and drill $\frac{1}{4}$ " holes $\frac{1}{2}$ " deep on the inside face of the side pieces (40 holes total).

4 After viewing the Chamfer detail for reference, rout a chamfer along the front and side edges of the top and bottom pieces (C).


5 Sand the cabinet pieces. Now, dry-clamp the cabinet with the back edges flush; check for square. Mark the dowel-hole centerpoints on the top and bottom pieces, and drill $\frac{3}{8}$ " holes through the top and bottom and 1" into the ends of the side pieces. Remove the clamps.

6 Cut eight $\frac{3}{8}$ "-diameter dowels $1\frac{3}{4}$ " long (we used cherry dowel stock; see the Buying Guide for our source). Next, glue, dowel, and clamp the cabinet assembly (A, B, C), checking for square. Wipe off excess glue with a damp cloth. Trim and sand the protruding end of each dowel flush with the cabinet surface.

7 Mark the location and fasten the hinges to the cabinet side. (See the Buying Guide for our source of hardware.)

Continued



 Print this article

CABINET

It's time to add the back

1 Cut three pieces of $\frac{1}{4}$ "-thick cherry to $4\frac{1}{16}$ " wide by $22\frac{3}{4}$ " long for the back panel (D). Sand a slight round-over on the front edges of each piece. (The drawing at *right* shows the method we use to resaw thicker stock to size.)

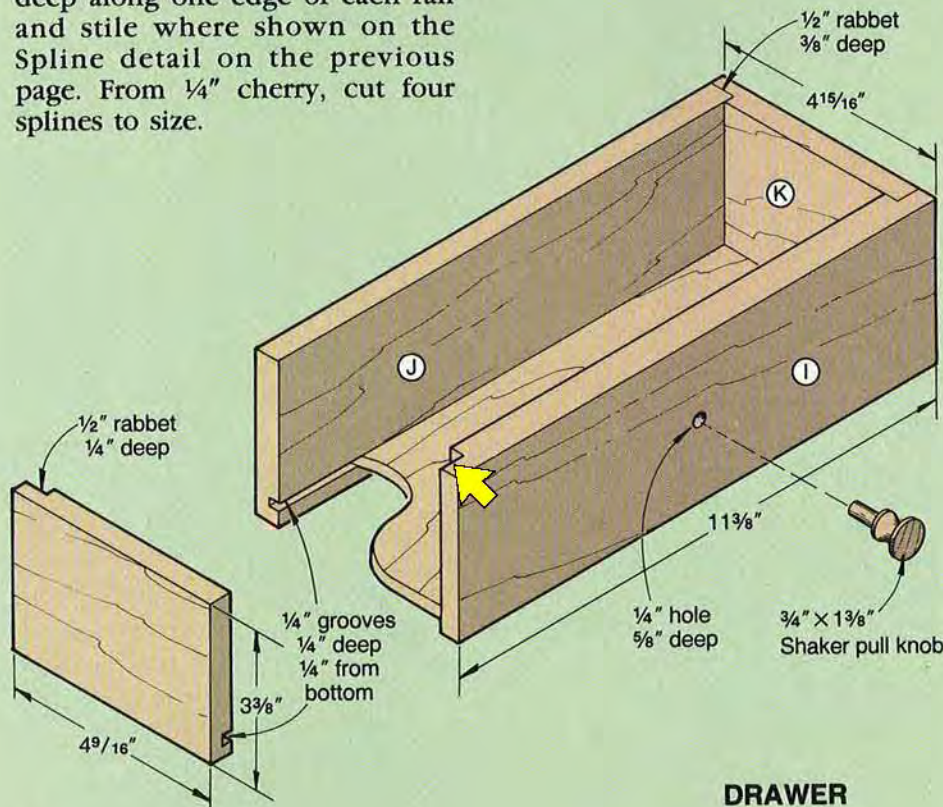
2 Rout a $\frac{3}{8}$ " rabbet $\frac{1}{4}$ " deep along the inside edge of the top and bottom pieces (C) to match the rabbet previously cut in the side pieces. Use a sharp chisel to square the corners where the rabbets meet.

3 Lay the cabinet facedown. Position the three back pieces (D) in the rabbeted opening. Drill and countersink holes in the back-panel pieces to the sizes shown on the Exploded View drawing.

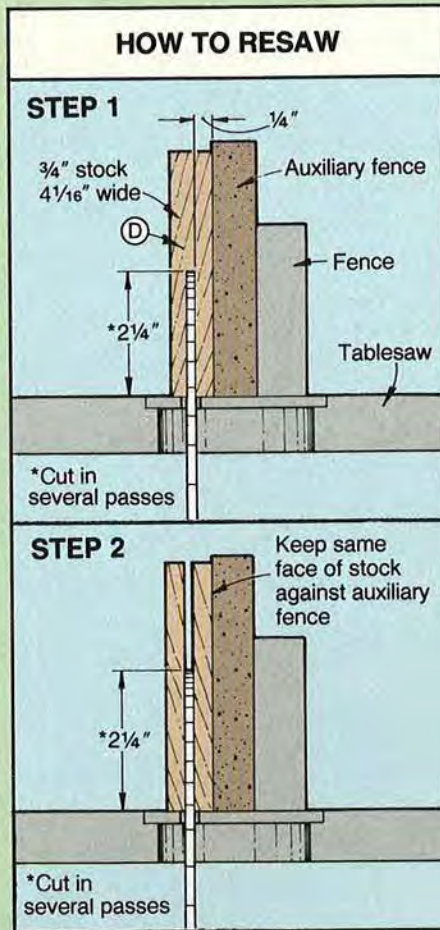
The door comes next

1 Cut the door stiles (E) and rails (F) to size. Then, cut two pieces of cherry to $4\frac{1}{2} \times 15$ ". Plane or resaw the pieces to $\frac{1}{4}$ " thick for the door panel (G). Glue and clamp the pieces edge to edge with surfaces and ends flush.

2 Cut or rout a $\frac{1}{4}$ " groove $\frac{1}{2}$ " deep along one edge of each rail and stile where shown on the Spline detail on the previous page. From $\frac{1}{4}$ " cherry, cut four splines to size.



DRAWER



3 Test-fit the door pieces; the panel should be slightly undersized about $\frac{1}{16}$ " in each direction to allow it to expand without splitting the assembled door. Then, glue and clamp the door. Allow the panel to float inside the frame *without glue*.

4 Mark the centerpoint, and drill a hole for the Shaker pull knob.

5 Cut the adjustable shelves (H) to size.

Add the drawer and then the finish

1 Cut the drawer front (I), back (J), sides (K), and bottom (L) to sizes listed in the Bill of Materials.

2 Cut a $\frac{1}{4}$ " groove $\frac{1}{4}$ " deep $\frac{1}{4}$ " from the bottom edge of the front, back, and side pieces where shown in the drawing at *left*.

3 Cut $\frac{1}{2}$ " rabbets on both ends of the front piece and the back end of each side piece (see the Drawer drawing for particulars).

4 Draw diagonal lines from corner to corner to find the center of the drawer front, then drill the mounting hole for the Shaker knob in the drawer front.

5 Dry-clamp the pieces and check the fit of the drawer in the opening. Then, glue and clamp the drawer parts.

6 Drill a pair of mounting holes through the cabinet back.

7 Sand the cabinet, back, door, and drawer. Apply the finish to the cabinet and knobs (we left the cherry natural and brushed on several coats of polyurethane). Add the knobs. Finally, add the magnetic catch and strike plate.

Buying Guide

• **Hardware.** One $\frac{3}{4}$ "-diam. and one 1"-diam. Shaker pull knob, one pair of $1\frac{1}{2}$ "-long no-mortise hinges, magnetic catch, two 8" pieces of $\frac{3}{8}$ " cherry dowel. Cabinet kit no. 101WD, \$9.95 (U.S.) ppd. Cherry Tree Toys, P.O. Box 369, Belmont, OH 43718. 🌲

Produced by Marlen Kemmet

Project Design: Dean Young,

Des Moines, Iowa

Photographs: Hopkins Associates

Illustrations: Jamie Downing; Bill Zaun

WOOD® Magazine announces:

1991 BUILD-A-TOY™

**Our Third Annual Juried Contest
to benefit deserving kids through Toys-for-Tots**



ENTRY DEADLINE: FEBRUARY 1, 1991

Great prizes for every skill level! New Judging Categories!

Prizes for Original Designs and Built from Plans!

Holiday exhibition at the Museum of American Folk Art!

Enter by November 1, 1990 to be eligible for Museum exhibit.

We're proud to invite woodworkers of every age and skill level to participate in the Third Annual WOOD Magazine BUILD-A-TOY Juried Contest.

This year, we've expanded the competition into new areas. Special citations will be awarded to woodworkers who build toys from plans as well as original design entries. There are also several new judging categories.

We've added more valuable prizes contributed by leading WOOD advertisers. Some winning toys will be chosen for editorial features in future issues of WOOD.

There's even an exhibition of winners scheduled for the 1990 holiday season at the Museum of American Folk Art in New York City. (Toys received by November 1, 1990 will be eligible for display in the Museum's Christmas Tree exhibition.)

BUILD-A-TOY is the best way we know of for woodworkers to get the

COMPETITION PRIZES AND CATEGORIES			
	STUDENT (K-12):	HOME HOBBYIST:	PROFESSIONAL:
DESIGN: These 15 categories are open to original design entries only.			
Grand Prize	KITY: K-5 Machine (\$2,000 value)	Delta: \$2,500 in merchandise	Freud: \$2,000 in merchandise
First Prize	Black & Decker: \$1,500 in merchandise	Shopsmith: Mark V (\$1,600 value)	AEG: \$1,000 in merchandise
Second Prize	Jet: 14" Band Saw (\$579 value)	Grizzly: \$500 in merchandise	Skil: \$500 in merchandise
Third Prize	American Tool Cos.: \$500 in merchandise	Lobo: \$500 in merchandise	Wilke: BW1-P Planer (\$400 value)
Fourth Prize	Industrial Abrasives: \$250 in merchandise	Leichtung: \$250 in merchandise	Milwaukee Electric: 4" Belt Sander with Bag (\$348 value)
SPECIAL CITATIONS: These 39 categories are open to both original and existing designs.			
Best use of Router	AmMax: Scroll saw	Porter Cable: \$1,000 in merchandise	Ryobi: \$1,000 in merchandise
Best use of Wood	Adams Wood Products: Turning Squares Constantine's: \$100 in merchandise	RBI: 14" Scroll Saw	Makita: \$500 in merchandise
Best Carved Toy	Dremel: \$500 in merchandise	Dremel: \$500 in merchandise	Dremel: \$500 in merchandise
Best Finish	Deft: \$1,000 in merchandise	Minwax/Watco: \$1,000 in merchandise	Performax: ST Sander
Best Truck	How-To Book Club: \$100 Membership Toys and Joys: Antique Car Plans	Meisel: \$500 in merchandise Dollar Trading: Carving Set	Craftsman Wood Service: Turning Squares Brandmark: Branding Iron
Best Car	Constantine's: \$100 in merchandise	Berea: Assortment of Hardwoods	Furniture Designs: Plans
Best Pull Toy	DML: 10" Carbide-Tipped Blade	Formby's: Gift Set	Timbers Woodworking: Gift Certificate
Best Train	Rodale: Woodworking Books	Seven Corners: \$250 in Power Tools	How-To Book Club: \$100 Membership
Best Bank	Formby's: Gift Set	Fisher Hill: Rip Straight	DML: 10" Carbide-Tipped Blade
Best Airplane	Nova Tool: Branding Iron	Accents in Pine: Set/Blueprints	Constantine's: \$100 in merchandise
Most Number of Toy Entries	Accuset Tool: ParaGauge Econ Abrasives: \$100/Sandpaper	Woodcraft Supply Corp.: \$100 Gift Certificate	Diamond Machining Technology: 8" Fine Whetstone
Best Boat	Tarheel Filing: Router Insert	Fisher Hill: Rip Straight	Penn State: Variable Speed Scroll Saw
Best Puzzle	St. Croix Kits: Thumb Piano	MLCS: Master Set	Hardwoods of Illinois: 20 sq. feet of Walnut

WOOD® Magazine's 1991 BUILD-A-TOY Contest

There is no limit to the number of entries. Please provide the following information for each toy submitted.

My entry is: Original Design* Built from plans

My skill level is: Student Home Hobbyist Professional

Name _____

Address _____

City _____ State _____ ZIP _____

Daytime Phone (_____) _____

*For Original Design entries: I certify that I have designed and built this toy myself. Should my entry win, I agree to cooperate with WOOD Magazine to supply builder's notes and a bill of materials for publication.

Signature _____ Date _____

Send toys to: 1991 BUILD-A-TOY, WOOD Magazine,
1912 Grand Avenue, Des Moines IA 50309

recognition they deserve for great craftsmanship. We'd like as many entries as we can get.

That's because WOOD Magazine's BUILD-A-TOY Competition is also the contest with the biggest heart. The toys you submit will be contributed to the TOYS-FOR-TOTS program of the U.S. Marine Corps Reserve.

Help make some deserving kids happy this Christmas.

**1991 BUILD-A-TOY
ENTRY DEADLINE:
FEBRUARY 1, 1991.**

TEST YOUR WOODWORKING

I.Q.



Taking tests back in high-school shop class sure wasn't much fun. Now, though, only your enjoyment is at stake. Challenge your know-how, and then check your answers against those at the bottom of the page.

 [Print this article](#)

HOW DID YOU DO?

16-18 Shop wizard

11-15 A cut above

7-10 Run of the mill

less than 7 Hill of sawdust

FROM TREE TO BOARD

1. What size is a board foot?
A. 1×6×18" B. 1×12×12"
C. 2×6×12" D. 12×12×12"
2. What's the greatest difference between red and white oak?
A. Red oak is a different color
B. White oak makes a durable outdoor project
C. White oak costs less
3. If you followed the old adage about how long it takes to air-dry green wood, how long would it take to dry a piece 3½" thick?
A. 4 years B. 6 months
C. 2½ years
4. After seasoning, will a board be narrower or shorter than when it was green?
A. Shorter B. Neither
C. Both D. Narrower

WORK THAT WOOD

5. Which of the following can be done on a bandsaw?
A. Ripping B. Cutting circles
C. Resawing D. Mitering
6. When ripping on the table-saw, how much blade should extend above the wood?
A. 1½" B. The teeth C. ¾"
D. Double wood thickness
7. What is the shortest board you can safely run through a jointer?
A. One half the bed width
B. 24" C. 10" D. 12"
8. Hardwood should be drilled at a faster speed than softwood.
A. True B. False

PUTTING PROJECTS TOGETHER

9. What is the strongest woodworking joint?
A. Butt B. Shouldered butt
C. Tongue-and-groove
D. Mortise-and-tenon
10. Veneering became popular in the Machine Age of the 1800s.
A. True B. False
11. When is a dado a groove?
A. When it runs with the grain
B. Only across grain
C. At the end of a board
D. On the edge of a board
12. When someone mentions aliphatic-resin glue, what are they talking about?
A. Glue warmed in a pot
B. Yellow glue
C. Contact cement
13. What can slow-cure epoxy do that 5-minute epoxy can't?
A. Be sanded B. Resist water
C. Fall out D. Accept paint

THE FINAL TOUCH

14. What hand tool did the finish sander replace?
A. Sanding block B. Plane
C. Cabinet scraper
15. Which of the following finishing materials comes from a tree?
A. Linseed oil B. Tung oil
C. Aniline dye D. Lacquer
16. For outdoor use, a clear finish should contain what?
A. Tint color B. Varnish
C. Pigment D. UV inhibitors
17. What is "fish eye"?
A. Smelly varnish B. A blemish
C. Wood figure D. Router bit
18. When sanding, how do you know when to switch to the next finer grit?
A. It no longer removes wood
B. You run out
C. When it feels smooth
D. After five minutes

10. (B) Veneering was popular in ancient Egypt to conserve precious wood.
11. (A) A dado goes across the grain, grooves with it.
12. (B) The old reliable—creamy yellow woodworker's glue.
13. (B) It holds up better to moisture than any other glue.
14. (C) Cabinet scrapers were used to finely smooth wood.
15. (B) Seeds of the tung tree, from China, yield oil.
16. (D) Ultraviolet light (UV) penetrates the wood and discolors it.
17. (B) Craters occur in lacquer when there are traces of silicone on the wood.
18. (A) No kidding!

1. (A,B,C) Usually 1×12×12", but other combinations work.
2. (B) Try putting red oak outside for a few years.
3. (C) Dry green wood two years for the first 1" of thickness, then one year for each added 1".
4. (D) Wood shrinks only in width and thickness.
5. (A,B,C,D) A versatile tool.
6. (B) To remove sawdust, the teeth need only to clear the wood.
7. (D) For safety's sake, regard 12" as minimum.
8. (B) Slower speeds avoid burning.
9. (D) Mainly because of the amount of gluing surface.

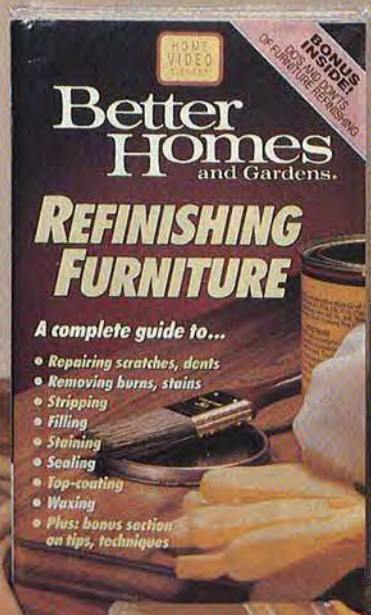
Answers

Illustration: Jim Stevenson

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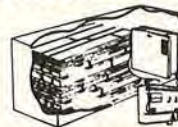
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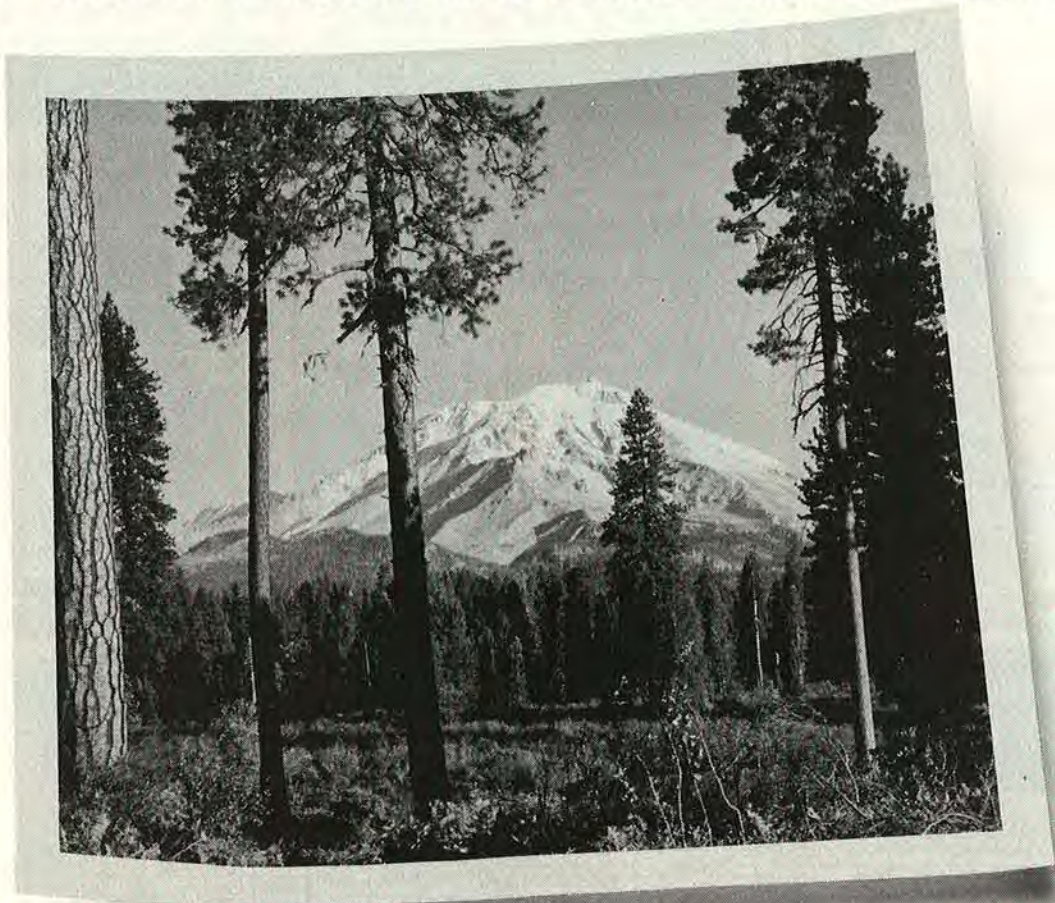
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Tool No.	Diagram	Radius/Angle	Cutting		Shank		Price	Tool No.	Diagram	Radius/Angle	Cutting		Shank		Price
			Dia.	Len.	Dia.	Len.					Dia.	Len.			
T100B	Corner Rounding	1/8	3/4	5/16	1/4	1-1/4	10.00	T301B	Roman Ogee	5/32	1-1/8	15/32	1/4	1-1/4	15.00
T101B		3/16	7/8	3/8	1/4	1-1/4	10.00	T302B		1/4	1-1/2	21/32	1/4	1-1/4	16.00
T102B	Beading	1/4	1	7/16	1/4	1-1/4	11.00	T303B	Slot Cutter	5/32	1-1/8	15/32	1/2	1-1/2	15.00
T103B		5/16	1-1/8	1/2	1/4	1-1/4	12.00	T304B		1/4	1-1/2	21/32	1/2	1-1/2	16.00
T104B	Cove	3/8	1-1/4	5/8	1/4	1-1/4	14.00	T1501B	Core Box	1-1/4	1/8	1/4	1-1/2	9.00	
T105B		1/2	1-1/2	3/4	1/4	1-1/4	16.00	T1503B		1-1/4	1/4	1/4	1-1/2	10.00	
T110B	Chamfer	1/2	1-1/2	3/4	1/2	1-1/2	16.00	T1506B	Carbide Tipped Dovetail	1-1/4	1/2	1/4	1-1/2	11.00	
T111B		5/8	1-3/4	7/8	1/2	1-1/2	19.00	T1512B		1-1/4	1/2	1/2	1-1/2	11.00	
T112B	Straight Bit w/ Beaving	3/4	2	1	1/2	1-1/2	20.00	T601	V Groove	1/4	1/4	1/4	1	9.00	
T113B		1	2-1/2	1-1/4	1/2	1-1/2	32.00	T602		3/8	3/8	1/4	1	10.00	
T200B	Mortising	1/8	3/4	5/16	1/4	1-1/4	10.00	T603	Classical	1/2	3/8	1/4	1	12.00	
T201B		3/16	7/8	3/8	1/4	1-1/4	10.00	T604		5/8	5/8	1/4	1-1/8	13.00	
T202B	Mortising	1/4	1	7/16	1/4	1-1/4	11.00	T605	Classical	3/4	5/8	1/2	1-1/2	14.00	
T203B		5/16	1-1/8	1/2	1/4	1-1/4	12.00	T1602		1/2	1/2	1/4	1-1/4	5.00	
T204B	Mortising	3/8	1-1/4	5/8	1/4	1-1/4	14.00	T1604	1/4" Straight Bit Single Double flute	3/4	3/4	1/2	1-1/2	6.50	
T205B		1/2	1-1/2	3/4	1/4	1-1/4	16.00	T1606		1	7/8	1/2	1-1/2	7.50	
T210B	Mortising	1/2	1-1/2	3/4	1/2	1-1/2	16.00	T1607	1/4" Straight Bit Single Double flute	1/2	1/2	1/2	1-1/2	5.00	
T212B		3/4	2	1	1/2	1-1/2	20.00	T2201s		1/8	1/2	1/4	1-3/16	5.00	
T901B	Mortising	1/4	1	3/8	1/4	1-1/4	11.00	T2202s	1/4" Straight Bit Single Double flute	3/16	1/2	1/4	1-3/16	5.00	
T902B		3/8	1-1/4	1/2	1/4	1-1/4	12.00	T2205d		1/4	3/4	1/4	1-3/16	5.50	
T903B	Mortising	1/2	1-1/2	5/8	1/4	1-1/4	13.00	T2207d	1/4" Straight Bit Single Double flute	3/8	1	1/4	1-3/16	5.50	
T904B		1/4	1	3/8	1/2	1-1/2	11.00	T2209d		1/2	1	1/4	1-3/16	5.50	
T905B	Mortising	3/8	1-1/4	1/2	1/2	1-1/2	12.00	T2211d	1/4" Straight Bit Single Double flute	5/8	3/4	1/4	1-3/16	6.50	
T906B		1/2	1-1/2	5/8	1/2	1-1/2	13.00	T2212d		3/4	3/4	1/4	1-3/16	7.50	

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T1204			1-1/4	3/4	3/8	1-3/4	18.00
T1205	Half Round	1-3/8	3/4	3/8	1-3/4	20.00	
T1206			1-1/2	3/4	3/8	1-3/4	22.00
T801	Cove Beading	15/16	1/4	1/4	1-1/4	13.00	
T802			1-1/16	3/8	1/4	1-1/4	14.00
T803	Chamfer	1-3/16	1/2	1/4	1-1/4	15.00	
T805			1-7/16	3/4	1/4	1-1/4	17.00
T805L	Straight Bit w/ Beaving	1-7/16	3/4	1/2	1-3/4	19.00	
T807			1-11/16	1	1/2	1-3/4	21.00
T2501B	Mortising	3/16	1	1/2	1-1/4	12.00	
T2502B			1/4	1-1/8	9/16	1/4	1-1/4
T2503B	Mortising	5/16	1-1/4	5/8	1-1/4	14.00	
T401B			Chamfer	45°	1	3/8	1/4
T403B	Mortising	45°			1-3/8	5/8	1/4
T403B			Mortising	45°	1-3/8	5/8	1/2
T2004B	Straight Bit w/ Beaving	1/2			1	1/4	1-1/4
T2008B			V Groove	1/2	1	1/2	1-1/4
T701	Mortising	3/8			1/2	1/4	1
T702			Mortising	1/2	1/2	1/4	1
T2101	Mortising	1/2			13/32	1/4	1
T2102			Mortising	5/8	9/16	1/4	1-1/4
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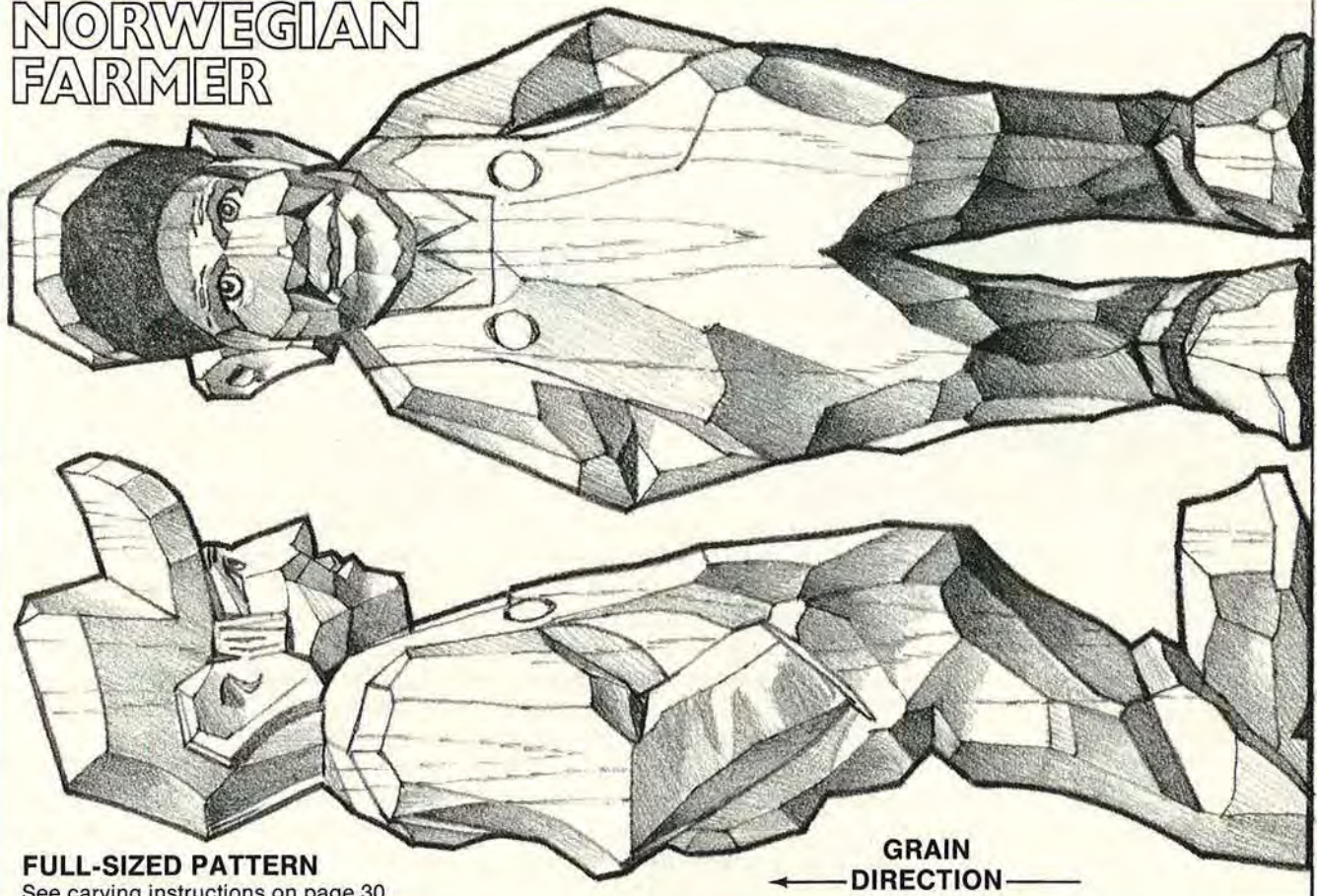
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ASK WOOD

Whether your woodworker's license reads "Beginner," "Intermediate," or "Advanced," you're bound to have a few questions about your favorite hobby. We can help by consulting our staff and outside experts. Send questions to:

Ask WOOD
Better Homes and Gardens®
WOOD® Magazine
P.O. Box 11454
Des Moines, IA 50336-1454



What's a woodworker to do?

Although I want to make many of the toys and other items you publish in your interesting magazine, I am dissuaded from doing so because my shop tools are limited.

I have a handsaw, circular saw, and sabersaw. I have a hand plane, a belt sander, and an orbital sander. I have a 3/8" electric drill and a cordless screwdriver. But I don't own a lathe, drill press, bandsaw or scrollsaw, so the making of toy wheels and such is left to my sabersaw and ingenuity.

Is there any way you could show more projects that don't require such expensive shop equipment?

—Phil Gabler, Deerfield Beach, Fla.

Phil, every woodworker in our reading audience either has walked in your shoes or is walking in them right now. And for this very reason, in this issue of

WOOD, we have introduced the new, six-page Craftshop section (see pages 64-69). Now, woodworkers with little time and/or a limited number tools can come away with three great, easy-to-do projects.

We work to include buying guides in many of our project write-ups that tell readers where to buy thin stock, toy wheels, and other items that require special machining. Just look through past issues for some of our sources, and then write to these mail-order houses for their catalogs. You'll be amazed at how much machining you can avoid by going this route.

Finally, as you continue to grow in your hobby, you'll want to invest in a few more tools to expand your woodworking horizons. Surveys tell us most of our readers own routers, and/or tablesaws.

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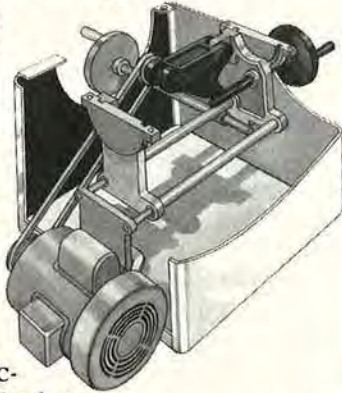
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Do all tablesaws have tilting arbors?

We've had a running joke among a group of amateur woodworkers at work. We've all seen advertisements for tilting-arbor tablesaws. What we want to know is aren't most saws tilting arbor, but only some advertised that way? We've looked through industrial-product manuals and dictionaries, but can't find a good definition of what constitutes "tilting arbor."

—Michael Miller, West Allis, Wis.



It's a rare tablesaw sold today for the home woodworker's market that doesn't have a tilting arbor, Mike. In practice, the motor—and therefore the sawblade arbor—tilts when you turn the crank. This has become so common that many tablesaw ads no longer mention this feature.

A truckful of American ebony



I live in the north Georgia mountains where the white pine trees have become infested with pine beetles. To curb this situation, the Forest Service is cutting roads into the wilderness to allow timber men to cut the infested trees. A persimmon tree stood in the way of one of these roads and had to be cut down. Because of its size, the Forest Service estimated it to be 450 years old. I acquired about 120 board feet of lumber from this tree, with some pieces 10" wide. What might I use it for?

—Tom Jervis
Blue Ridge, Ga.

You now own some mighty nice hardwood, Tom. As we told WOOD readers in an August 1986 "Wood Anecdote," persimmon is North America's only ebony. Because it's dense, hard, and shock resistant, most persimmon becomes the heads of golf clubs. But, you can work the wood into anything that must take abuse—tabletops come to mind.

Continued on page 86

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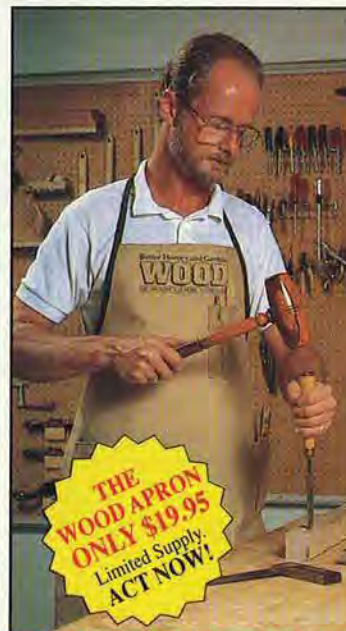
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ASK WOOD

Continued from page 85

Original sin

I'm confused. I've been browsing through magazines other than the best two—WOOD® and Weekend Woodworking Projects®—and have seen projects that are dead ringers for some of yours, save for a few modifications....I understand that two different people might have the same idea at the same time, but I thought that whoever was first owned the idea. Could you explain the legal aspects of this?

—Sam Johnson, Barnwell, SC

Sam, in addition to the project designs we develop from scratch at WOOD, you'll find many designs in the magazine attributed to outside designers. When working with these folks, we have them sign a non-exclusive, unlimited copyright license (your basic legal agreement) that cites them as licensor of the project design. They

give us permission "to print, publish, display, perform, reproduce, and use in all forms, works and derivative works" the purchased project design.

Our agreement says that the licensor "warrants [that the project design] is original" and "previously unpublished."

We also verbally ask project designers if they indeed originated the design. When they tell us "yes," then, unless we have conflicting information, we take them at their word. That's not to say that we haven't been duped a time or two.

If, on the other hand, a design leaves us suspicious, then we immediately drop the project. And even when we buy an original design, we often improve on the construction, safety, and design of the project — in effect, adding our own personal thumbprint.

Working thin

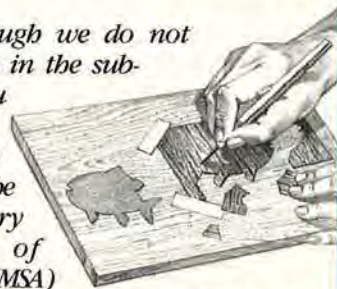
I would like to see drawings for inlays in marquetry, parquetry, and veneering in future issues of WOOD magazine. Could you consider designs for seashells, horns of plenty, and geometric shapes?

—Earl Glass, Cabool, MO.

Earl, though we do not specialize in the subjects you mention, we have covered the Marquetry Society of America (MSA)

in issue 7, page 34, and featured a handsome marquetry project in issue 17, pages 74-77.

Incidentally, to contact the MSA, write: Marquetry Society of America, Inc., Dept. W, P.O. Box 224, Lindenvurst, NY 11757.



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#30 Shaker chair, doll cradle, rod rack, strip sander, carved whale, portable belt sander, cabinet clean-up, treated wood.

#31 Woody car, rip fence, waddling duck, woven basket, candle holder, tabletop frame, jointers, working small, world's woods.

#32 Tambour desk, oak mirror, bookends, tabletop easel, recipe-card holder, biplane, carved angel, table-saws, toxic woods.

#33 Router table, dry sink, desert landscape, FAT CAT trucks, turned bracelets, router tests and tricks, microwaved bowls.

#34 Psaltery, dollhouse, tablesaw base, framed hummingbird, carved bluegill, sandblasting, planers, thin-kerf blades.

#35 Oak settee, monster truck, spoon rack, hand screw clamps, toy wheels, tabletop finish, Shopsmith vs. Total Shop.

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#4 Salt-and-pepper set, bird feeder, honeybee, dresser mirror, crayon caddy, towel ring, house sign.

#5 Adirondack chair, footstool, bandsawed basket, plant stand, oak casserole server, acorn box.

#6 Scandinavian candle holder, door harp, snack tray, Ferris wheel, bandsawed box, music box.

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#8 Armored-car bank, coaster set, whale stamp box, turned biscuit cutter, serving tray, table lamp.

#9 Redwood bench, marble game, toy dining set, barn birdhouse, carousel, night-light clown.

#10 Child's rocker, hourglass, antique clothes rack, wall plaque, planter basket, butter churn.

#11 Country wood quilt, plate rack, dragster, pineapple bookends, heron wall clock, eggs and bowl.

#12 Holiday blocks, turned teleidoscope, tree candle holder, shadow box, clown toy, wood jewelry.

#13 Mortar and pestle, wall mirror, fish cutting board, grasshopper toy, dovetail shelving, lamp.

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Blade-changing features set apart this inexpensive scrollsaw during tests in the **WOOD®** magazine shop.

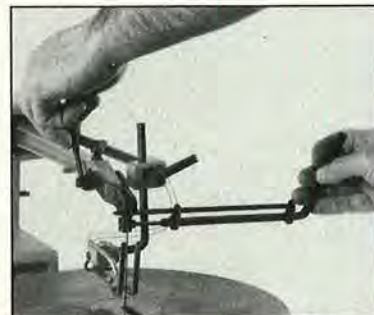
DELTA'S NEW SUB-\$200 MODEL 40-560

We've always liked the hassle-free blade changes on Delta's best 18" scrollsaw—the electronic variable speed model 40-601. So, when we heard that Delta had built the same blade-changing system into a scrollsaw selling for under \$200, we just had to try it out. As you'll see, we weren't disappointed.

What sets this scrollsaw apart

At first glance, Delta's new model 40-560 scrollsaw looks a lot like other inexpensive scrollsaws also made in Taiwan. The 16"-capacity machine has constant-tension parallel arms, a heavy cast-iron base and 11¾"-diameter table, and a two-speed, ½-hp motor that runs at 850 or 1,790 cutting strokes per minute. However, a closer look reveals several exclusive features.

The 40-560 doesn't require you to remove the blade clamps when changing blades. With Delta's Quickset blade-changing system, you simply flip forward a tension-release lever located near the front of the top arm and insert a special wrench into the clamp assembly as shown at right. With one turn of the wrench, you release the blade from either the top



or bottom clamps. To replace the blade, just slip it into the top or bottom clamp and secure it with the wrench. To reset the blade tension, you only have to flip backward the tension lever.

This scrollsaw also has a smartly designed blade guard/hold-down. The sturdy assembly pivots and adjusts up, down, and sideways.

What we discovered in our tests

The Quickset blade-changing system made the 40-560 scrollsaw a joy to use. Blade tensioning was a snap, and the blower cleared debris well. The level of vibration was acceptable with the machine securely mounted to a work surface. ♣

Photographs: John Hetherington

FORSTNER BITS

Continued from page 73

walls and bottoms, then only the bits with *excellent* ratings in this area will do. With the others, you'll wind up doing a lot of difficult sanding.

The CONVALCO bits cut the smoothest and flattest bottoms of any of the Forstner bits largely because of their finely ground cutters and miniscule centerpoints. However, without a centerpoint to serve as a pilot, the CONVALCO bits had a tendency to wander across the surface of any workpiece not securely clamped in place on a drill-press table.

Ready to buy?

With the testing completed, I asked Jim to select his favorite bits in three price ranges. The following picks include a few of Jim's comments:

Low price: "For the money, the Chinese-made Forstners performed well, and I recommend them for the woodworker who has only occasional need for a Forstner bit. If you use Forstner bits all the time, however, it will be worth your money to invest in a higher-quality set. For smaller holes, especially pocket holes, Vermont American's 1/2"-and-smaller bits really impressed me."

Medium price: "The Austrian-made Forstners seemed to be of consistent quality from importer to importer. As long as I didn't push them too hard, their rims resisted burning fairly well. Of the various brands, the Irwin bits performed best. I just wish they were available in more than four sizes."

High price: "If you make heavy use of a Forstner bit, buy the multi-spurs. If you need flat-as-can-be holes, put your money into CONVALCO bits." 🌲

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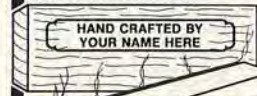
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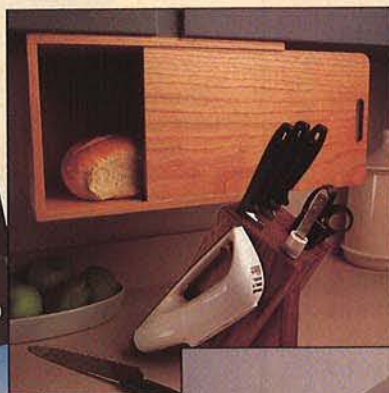
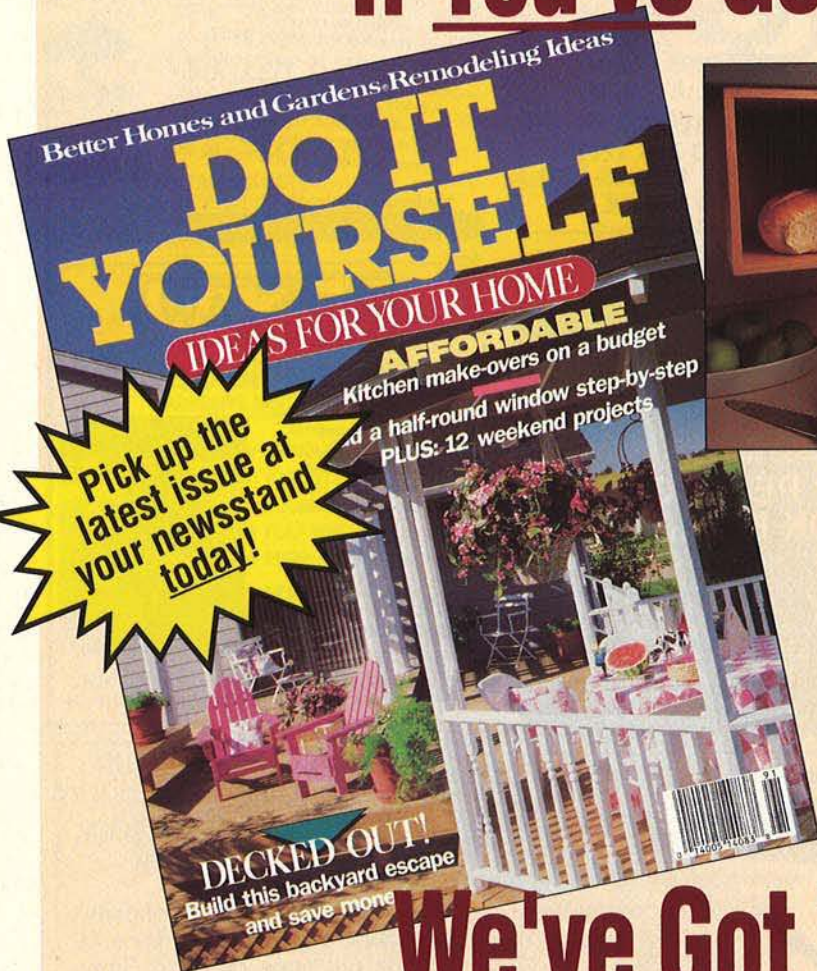
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it-yourself on how to make picture frames using standard mouldings. Tells what tools to use and how to build and finish picture frames. WOOD MOULDING & MILLWORK PRODUCERS ASSN. 75c. Circle No. 2085.

COMPUTER SOFTWARE—Woodworking Magazine Index for Wood, Fine Woodworking, Woodwork, Woodsmith, Today's Woodworker, and 1987-1990 issue of Woodworker's Journal and Workbench. Now you can find the article you remembered, and know the magazine, issue and page without searching through many printed indexes. Yearly updates can be added to the original index. Send for brochure; price refundable with order of Woodfind. WOODFIND. \$1.00. Circle No. 2089.

WOODWORKING ASSOCIATION OF NORTH AMERICA—First international association for woodworkers. Benefits include our monthly bonus packets, Project-Of-The-Month, Group Purchase Opportunity, free woodworking problem solving through full time consultant, 50% discount on regional show admission and more. Send for sample magazine and application. WOODWORKING ASSOC. OF NORTH AMERICA. \$3.00. Circle No. 2092.

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WOODCARVING CATALOG—64-page catalog packed with over 2500 items specializing in woodcarving and decoy carving. Included are carving woods, large selection of hand carving chisels, gouges, knives. Power carving tools and the largest selection of bits, cutters, burrs and abrasives, woodburners, extensive painting supplies and brushes, books and videos. CRAFTWOODS. Free. Circle No. 2110.

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WOODCARVING TOOLS—Whittlers and carvers—Warren Tool Co. offers a complete catalog of whittling and carving, hand/power tools, sharpening stones, wood cut-outs and related wood carving supplies. WARREN TOOL CO., INC. \$1.00. Circle No. 2185.

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

NEW TOOLS BY DELTA			
40-560 1/2" speed scroll saw	266	195	
23-580 5" Bench grinder 1/5 HP	60	54	
11-990 12" Bench Drill Press	266	195	
11-090 32" Radial bench drill press	399	279	
22-540 12" Portable planer	595	399	
22-450 1/2" Bench router/shaper	399	279	

DELTA STATIONARY			
34-761 10" universal 1-1/2 HP	1715	1399	
33-980 10" radial arm saw	727	565	
33-280 6" motorized jointer	440	375	
50-178 3/4 HP 2 stg. dust coll.	435	339	
50-180 1 HP dust collector	535	415	
50-182 2 HP dust collector	760	599	
22-667 13" planer w/2 HP motor			
newland & ext. wings	1750	1099	
33-050 NEW 8-1/4" Sawbuck	742	545	
33-055 Above saw comp w/legs	865	655	
34-330 NEW 8-1/4" Tbl Saw 13A	321	195	
34-985 1/6 HP stock leader	698	459	
32-100 NEW station plate jointer	645	289	
36-040 NEW 8-1/4" compd mitre saw	216	159	
34-897 50" Delta uniface	500	338	
36-755 NEW 10" Tbl Arbor Saw	1203	875	

MILWAUKEE TOOLS			
6527 NEW SawZall vispd 8 amp			
w/ice & Quick Loc Cord	299	165	
0399-1 NEW 1/2" cdss var/spd drill			
w/batt. charger & case	290	155	
0395-1 9.6V cdss. drill w/ice	270	148	
0219-1 9.6V cdss. drill w/ice	295	165	
0224-1 3/8" drill 4.5A magnum	189	112	
0234-1 1/2" drill 4.5A magnum	209	112	
0244-1 1/2" drill 4.5A magnum	209	112	
0222-1 3/8" drill 3.5A-1000 rpm	179	102	
0228-1 3/8" drill 3.5A-1000 rpm	169	99	
0375-1 3/8" close quarter drill	208	125	
0379-1 1/2" close quarter drill	243	154	
6539-1 Cdss. scrvn. 190 rpm	119	69	
6540-1 Cdss. scrvn. w/bits & cse	159	108	
6546-1 Cdss. scrvn. 200 & 400 rpm	126	75	
3102-1 Pimbrs rt angle drill kit	330	185	
3002-1 Electricians rt angle drill	330	182	
5399 1/2" D-hole ham drill kit	312	179	
1676-1 H.D. Hole Ham w/ice	429	229	
6511 2 sp SawZall w/ice	224	129	
6750-1 Drywall gun 4-0000 4.5A	154	89	
6507 TSC SawZall w/ice	239	129	
6170 1/4" chop saw	430	259	
6014 Orbital sander 1/2 sheet	209	118	
8977 Var. temp heat gun	114	75	
5397-1 3.8" visp ham. drill kit	232	137	
5371-1 1/2" visp ham. drill kit	335	185	
3107-1 1/2" visp rt angle drill	340	189	
6754-1 Drywall gun 4-0000 4.5A	179	119	
3300-1 1/2" visp mag rt angle drill	309	179	
5660 Router 1-1/2 HP - 10amp	325	195	
5660 Router 2 HP - 12 Amp	355	219	
5455 7/8" polisher 1750 rpm	219	127	
6215 1/8" chain saw	280	169	
6365 7-1/4" circular saw	204	119	
6366 7-1/4" circ. saw w/ice & bid.	214	125	
6368 7-1/4" circ. saw w/ice			
blade & case	239	135	
0235-1 1/2" drill kylls. chuck mag	215	125	
6016 1/4 sheet pad sander	84	49	
6145 4.5" grinder 10,000 rpm	159	95	
6142 6145 w/ice & access	197	125	
6749-1 Drywall gun 0-2500 4.5A	189	125	
6377 7-1/4" worm drive saw	295	169	

FREUD SAW BLADES			
5/8" Bore - Industrial Grade			
CARBIDE TIPPED SAW BLADES			
Item	Description	Teeth	List Sale
L072M010	Gen Pur. - A.T.B. 10' 40"	58	38
L082M010	Cut-off 10"	60	77
L04M011	Comb 10"	50	65
L085M010	Super Cut-off 10"	80	96
LM72M10	Ripping 10"	24	57
L073M010	Cut-off 10"	60	70
L087M010	Thin kerf 10"	24	60
L088M010	Thin kerf 10"	60	74
L098M010	Ultimate 10"	80	107
SD306	8" Dado - Carbide	184	105
SD309	8" Dado - Carbide	186	109
F0	1-3/4" x 5/8" Bisc. 1000 Qty.	32	27
F10	2-1/8" x 3/4" Bisc. 1000 Qty.	32	27
F20	2-3/4" x 1" Bisc. 1000 Qty.	34	29
FA	Assor. Biscuits 1000 Qty.	34	29
WC106	6 pc. chisel set w/ice 1/4"-1"	73	52
FB100	16 piece forstner bit set	294	158
94-100	5 pc. router bit dossier	288	155
JS100	Biscuit Jointer w/ice	300	159
CE82	Planer w/ice & carb blds	216	135
FT2000	3-1/4 HP plunge router	299	179

THE NEW "TK" BLADE SERIES

Item	Description	Teeth	List Sale
TK203	1-1/4" Framing	24	29
TK206	10" Framing	24	33
TK303	1-1/4" Finishing	40	36
TK306	10" Finishing	40	39
TK903	1-1/4" Combo	30	31
TK906	10" Combo	45	26

MAKITA CORDLESS			
Model	List	Sale	
60700W 3/8" vispd rev. drill, 7.2v	130	78	
60710DW 3/8" vispd rev. drill	199	115	
w/removable batt., 7.2v	199	115	
50900W 3-3/8" saw kit, 9.6v	256	139	
60100DW 3/8" cds drill kit, 7.2v	164	95	
60105DW 3/8" cds. drill kit, 7.2v	251	149	
DA30000W 3/8" angle drill, 7.2v	251	149	
84000W Hammer drill kit, 9.6v	272	149	
43900W 9.6 cds recip saw kit	230	128	
6012HDW 2 speed, driver drill			
w/ulutch & case 9.6	236	122	
60920W V/isp drill, kit complete	250	125	
60930W V/isp drill w/clutch-complete	261	127	
632007-4 9.6 volt battery	48	30	
632002-4 7.2 volt battery	40	28	
5007NBA 7-1/4" saw w/elec. brake	233	124	
5008NBA 8-1/4" saw w/elec. brake	284	158	
BD4510 1/4 sheet pad sander	85	54	
9900B 3" x 21" belt sander w/bag	288	144	
9045DB 3x 24" belt sander w/bag	282	145	
4200N 1/2" slit fin. sand. w/bag	231	129	
4301VB Orb. visp jig saw 3.5A	289	155	
JR3000V Vs. recip saw w/ice	227	124	
LS1020 10" mitre saw 3.5A	463	289	
9820-2 Blade sharpener	373	195	
1900BW 3-3/4" planer w/ice	209	114	
1911B 4-3/8" circ. saw 7.5A	240	139	
1100 3-1/4" planer w/ice	401	205	
9027SPC 7" sander/polisher	276	149	
3601B 1-3/8 HP router	255	139	
9045Z 4" grinder, 3.5 amp	126	69	
90180 6" round sander	101	64	
BD4050 1/4 sht pad sander w/bag	86	58	
DA3000W 3/8" angle drill	270	148	
HP2010N 3/4" visp hmr. drill w/ice	300	165	
2708W 8-1/4" table saw	504	249	
2711 10" table saw w/brake	841	479	
2030N 12" planer/jointer	3120	1665	
2040 15-5/8" planer	2595	1459	
1895B 6-1/8" planer kit w/ice	679	359	
5095BA 5-1/2" circular saw	223	135	
6494 3/8" drill rev. 0-2100 rpm 2A, 10A	140	65	
6510LV 3/8" drill rev. 0-1050 rpm	145	79	
6013BL 1/2" drill rev. 6 Amp	241	135	
5402A 16" circular saw 12 amp	636	325	
3612BR 3 HP plunge router	377	189	
9401 4" x 24" belt sander w/bag	318	165	
4302C V spd. orb. jig saw	302	159	
5077B 14" Hydrolid saw	252	138	
LS1440 14" Mitre saw	721	435	
LS1030 NEW 10" Mitre saw	414	225	
5007NB 7-1/4" circ saw 13A	209	112	
3612B 3 HP plunge router sq/base	377	189	

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SENCO AIR NAILERS			
Model	List	Sale	
SFN1 Finishing nailer 1" - 2"	377	285	
SFN2 Fin. nailer 1.5" - 2.5"	571	405	
SN325 Nailer 1-7/8" - 3-1/4"	685	445	
SN4 Gen'l purpose 2" - 3-1/2"	685	479	
LS2 Pinner 5/8" - 1"	351	255	
SKS Stapler 5/8" - 1-1/2"	351	255	
LS5 Pinner 1" - 1-1/2"	399	295	

BOSTICH AIR NAILERS			
Model	List	Sale	
N80C-1 Utility coil nailer	795	399	
N80S-1 Stick nailer	795	399	
T36-50 Sheath & decking stapler	595	334	
N112B-1 Coil roofing nailer	795	399	
N60FM-2 Finishing nailer	625	335	
T31 1/2" Brad nailer	245	149	
CWC100 1 HP Pancake Compressor	445	299	

SKIL SIZLERS			
6590-02 NEW 12" EMH hammer			
drill w/ice 4 amp	255	129	
3810 10" Mitre saw	263	209	
3810S 3810 w/60 tooth carb blade	235		
77 7-1/4" worm drive saw	230	144	
2735-04 12v vispd cordless drill			
complete w/ice, & 2 batt.	210	125	
1605 NEW Biscuit Jointer w/ice	200	118	

LEIGH DOVETAIL JIGS

Model	List	Sale
D1258R-12 List 329.00 Sale 235.00		
D1258R-24 List 399.00 Sale 279.00		

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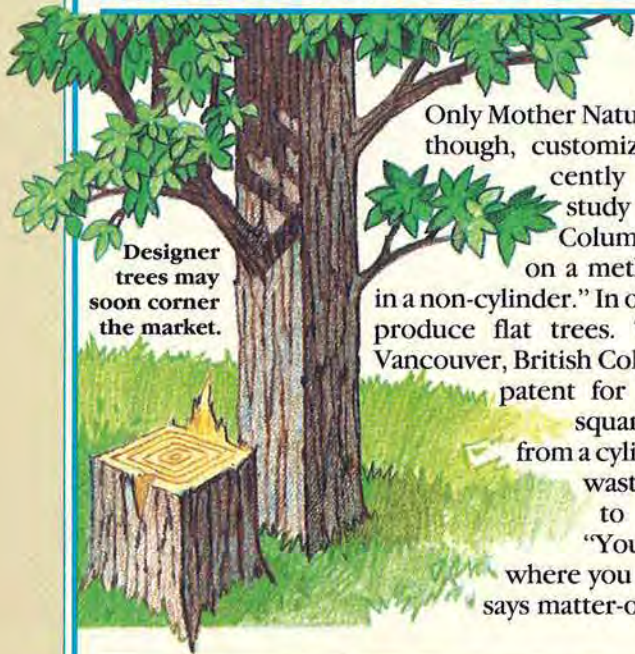
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MMT 12" multiple mort. & tenon attachment for D1258-12	269	219
MMT 24" multiple mort. & tenon attachment for D1258-24	299	135

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37-154 DJ15 6" Jointer			
w/3/4 H.P. motor	999.00		
28-283 14" Band Saw			
w/closed stand			
3/4 H.P. motor	675.00		
70-200 NEW 20" Drill Press			
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Designer trees may soon corner the market.

DESIGNER TREES

Only Mother Nature makes trees. Robert Falls, though, customizes them. Robert, who recently completed his doctorate study at the University of British Columbia, holds a Canadian patent on a method of "culturing cambium in a non-cylinder." In other words, he thinks he can produce flat trees. The 38-year-old native of Vancouver, British Columbia, has also applied for a patent for his technique of growing square trees. Flat boards sawed from a cylindrical trunk result in lots of waste, so Falls researched ways to change the trunk's shape. "You accelerate wood formation where you want the corners to be," he says matter-of-factly.

FIRST SAW WAS A SERPENT



Greek legend has it that Talus invented the first saw in 1,200 B.C., according to author Ronald S. Barlow. In his book, *The Antique Tool Collector's Guide to Value* (\$12.95, Windmill Publishing Co., El Cajon, Calif., 1985), Barlow says the ancient Greek discovered the principle of set saw teeth while severing a tree limb with the jawbone of a large serpent. He later reproduced the snake's teeth on a sheet of hammered iron. And the rest, as they say, is history.

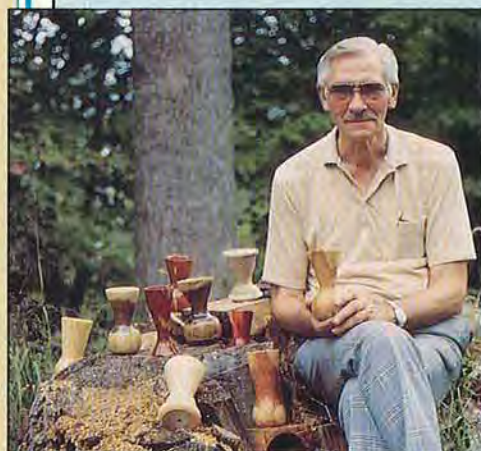
PARTS FOR YESTERDAY'S TOOLS

When readers write to ask where they can buy parts for obsolete woodworking machines, we often can't provide much help. But we just met a guy who can, especially if you own an old DeWalt saw.

Chuck Wolfe owns and operates Wolfe Machinery in Johnston, Iowa, a business that sells new and used machinery. He carries a host of brand-name machines for both metal- and woodworking, but specializes in DeWalt radial-arm saws. "I've got parts for many old-model

DeWalts, and if I don't have a part, I can probably make it," Chuck says. For inquiries, write: *Wolfe Machinery, 6107 Merle Hay Rd., Johnston, IA 50131*. Call 800-345-6659 or 515/270-2766.

Other possible sources for old machines and parts are members of the Antique Woodworking Power Tool Association (AWPTA). To receive the bimonthly journal covering companies and equipment, send \$14 (U.S.) to AWPTA, P.O. Box 1027, *Connellsville, PA 15425*.



From his seat atop the stump of a storm-felled yellow poplar, Flay Terres points out some of the vessels he's turned from Hurricane Hugo's leftovers.

READER REAPS HUGO'S HARVEST

Flay Terres, of Gastonia, North Carolina, has only been working wood since his retirement in 1987 (he was a machinist for 40 years). Nevertheless, he earned a special citation in *WOOD* magazine's 1989 Design-A-Toy contest with his train engine. Now, he writes, he's taken up turning, and thanks to Hurricane Hugo, has a tremendous supply of wood.

"Because of your article on drying green bowls in the microwave [February 1990 issue, p. 46], I am now able to fulfill a lifetime dream. I can go into the woods, cut a chunk of green wood, and

turn it into a finished piece within a few days," Flay says in his letter. Since September 1989, when Hugo unleashed its devastation on the Carolinas, the late-blooming woodworker has tried to make a dent in the downed trees. We found out during a telephone call that he has over 40 vases turned from green wood. "I've turned poplar, apple, dogwood, sassafras, cedar, and even sumac," he notes. "People call me to pick up trees." Last September, on the first anniversary of the storm, Gastonia's public library displayed Flay's collection. 🌲

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