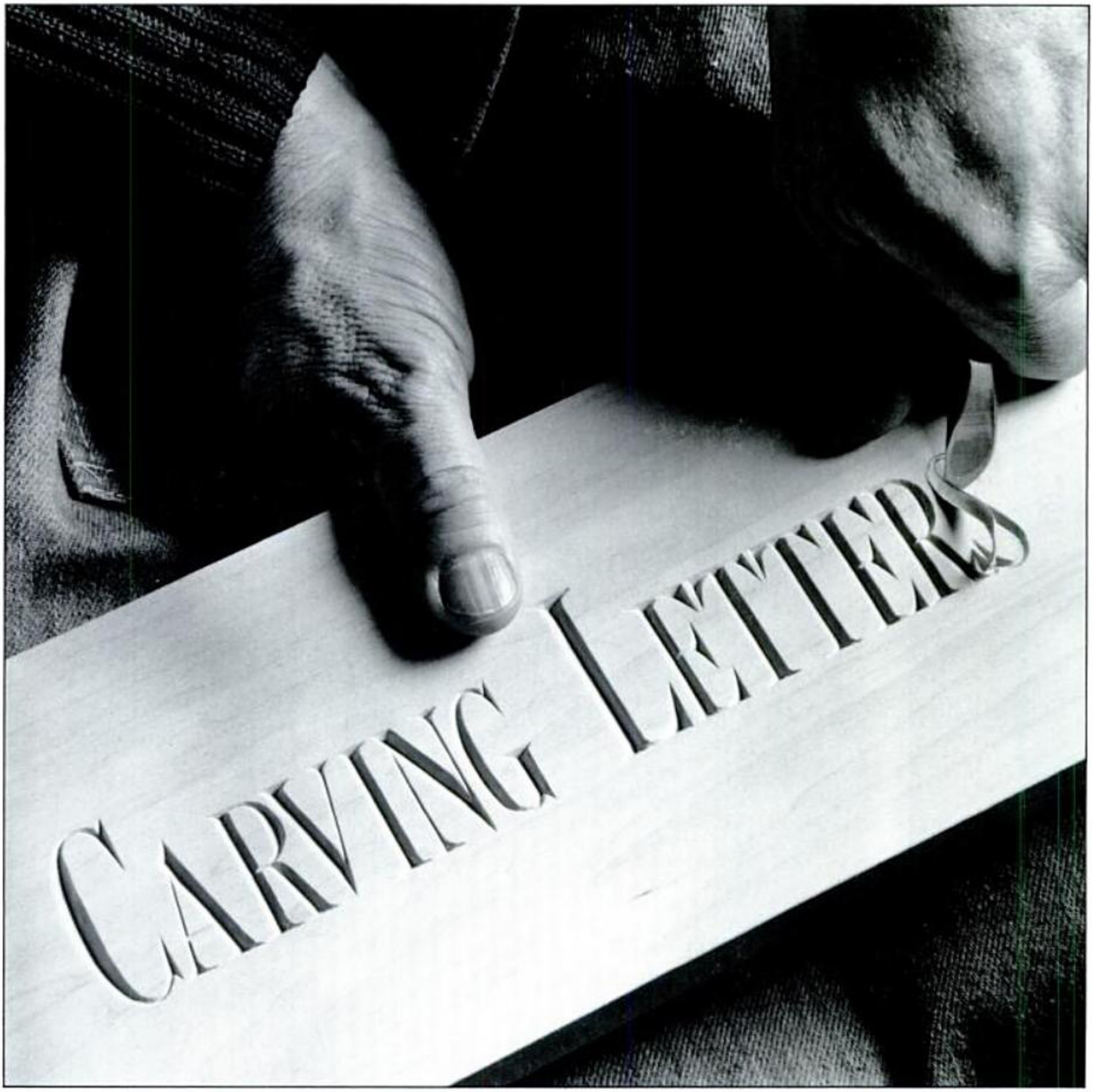
AMERICAN WOODWORKER

August 1990, Issue No. 15



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AMERICAN WOODWORKER (ISSN 8750-9318) is published six times a year in January, March, May, July, September and November by Rodale Press Inc., 33 E. Minor St., Emmaus, PA 18098, (215) 967-5171.

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SUBSCRIPTION RATES: U.S. one-year $27, two-year $54. Single-copy $4.50. Canada one-year $35, two-year $70 (Canadian funds). Foreign, one-year $35, two-year $70 (U.S. funds). U.S newsstand distribution by Eastern News Distributors, Inc., 1130 Cleveland Rd., Sandusky, OH 44870. **SECOND-CLASS POSTAGE:** paid at Emmaus, PA and additional mailing offices. **POSTMASTER:** Send address changes to AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. **CONTRIBUTOR GUIDELINES:** available upon request. We will treat unsolicited material with care, but cannot assume responsibility for loss or damage. Send a stamped, self-addressed envelope for return of material.

A WORD FROM THE EDITOR

SAFETY: WHO'S RESPONSIBLE?

Vintage woodworking machinery fascinates me. Towering bandsaws with spiraling spokes, jointers as wide as a carrier deck, tablesaws powered by pedals and treadles and cranks. America was in love with machines in those days, and it showed in the way they were made. The curve of a casting where straight would have done, the pinstripes that jazzed up a plain coat of paint—little touches that made these machines as graceful as any sculpture.

The stark simplicity of these old machines is striking. One can't help but notice the absence of safety guards. No blade guards on tablesaws, bandsaws or shapers. No covers on bandsaw wheels, pulleys or belts. Many of these machines are downright dangerous. With so much attention lavished on details, why this apparent lack of concern for safety? Irresponsible designers? *Kamikaze* woodworkers? Hardly.

Attitudes and expectations were different back then. People took responsibility for their own safety. Machinery was dangerous, and you had to be careful. If you weren't, you got hurt. You took that for granted.

Today, things are different. Americans prefer to hold others responsible for their safety. Injure yourself, and the reflex is to blame someone else and sue. This shift in opinion about who's responsible for safety has had a drastic affect on the way our society functions.

On the plus side, products—woodworking machines included—are safer today than they ever were, now that the public holds manufacturers accountable for the safety of their products. On the minus side, product liability lawsuits have forced hundreds of firms that make inherently dangerous products to close their doors. Those still in business pay through the nose for liability insurance. This drives up prices for everybody.

The American woodworking-machine industry has been particularly hard hit. Lower labor costs may not be the only reason so many machines are made in Taiwan.

Machine makers aren't the only victims of this blitzkrieg of litigation. Liability lawsuits have nearly wiped out high school wood shop as most of us knew it. A sad state of affairs.

Let's face it, woodworking machines are inherently dangerous. Safety equipment such as guards and hold-downs greatly reduces the risk of injury, but even the best guard can't make a machine idiot-proof. You need to do your part as well by using common sense and caution when you work with machines. If a procedure seems dangerous, *don't try it*, no matter how many other folks work that way. Figure out an alternative that feels safe. Don't put the burden on the other guy. Your safety is *your* responsibility.

DAVID SLOAN
Editor

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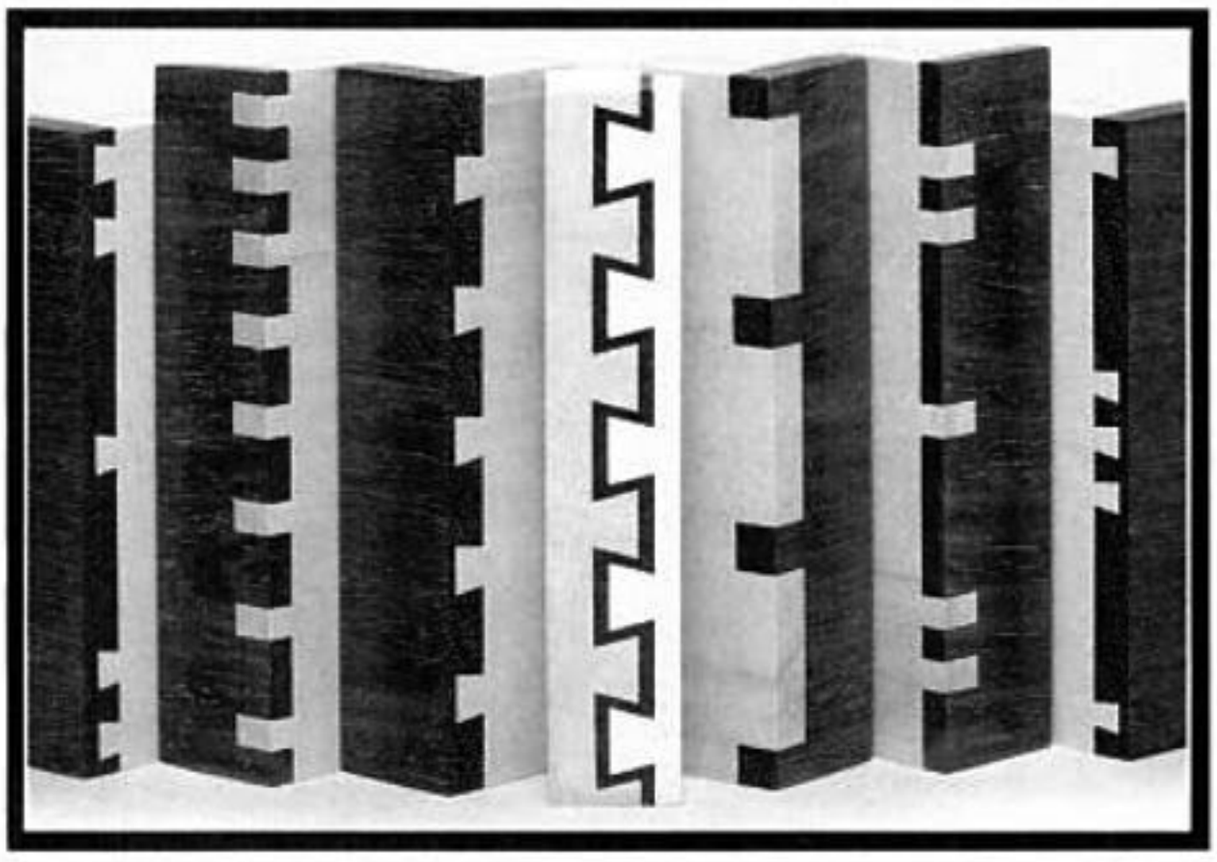

These joints were made using the new ***Incra Templates****, with* ***Incra Jig*** *on the router table.*

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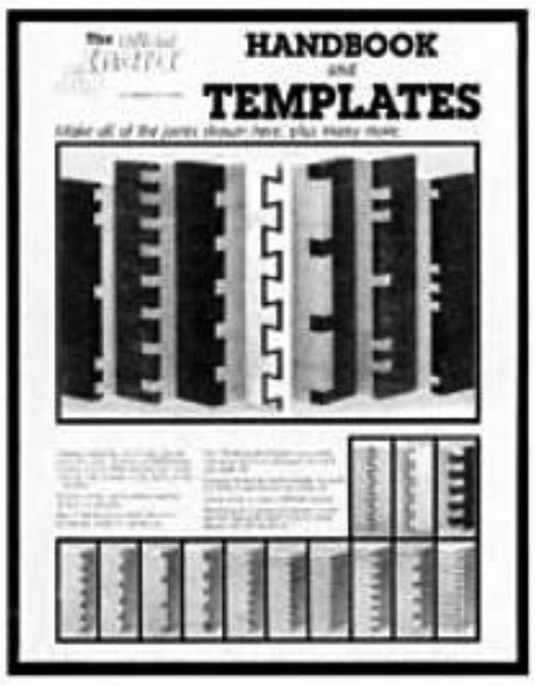

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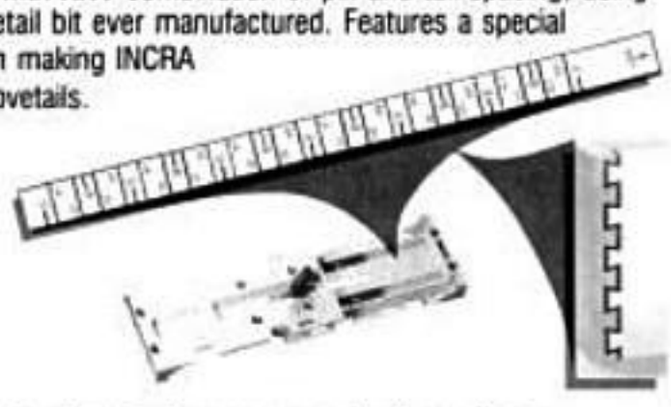

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LETTERS

Cutoff Box Comments

The tablesaw cutoff box described in the June, 1990 issue was interesting but far too big to handle and expensive to make. Essentially, the same results can be obtained at much less expense with the panel cutters Norm Abram uses on "The New Yankee Workshop" on PBS. I've built four panel cutters of various sizes for various functions. Cuts made with these jigs are absolutely square.

The panels are constructed by dadoing a piece of plywood or hard composition board, gluing a hardwood runner that is the width of the saw's miter-gauge slot into the dado, and cutting the edge of the panel flush with the blade by running it through the saw with the runner in the miter slot. After this is done, a front rail is added and squared to the flush-cut edge. The overall size of the panel and the height of the front rail should vary with the application. I routinely crosscut 6-ft. stock on a large panel cutter with little or no wobble. A stop block can be clamped to the rail for repetitive cuts. Tenon shoulder and cheek cuts are easily and accurately made, as are miters. The approximate cost of one of these panels is a couple of bucks, depending on how fancy you want to be, but most of the materials can probably be found in the average scrap pile.

NEIL BUCKLEY
San Francisco, CA

Relatively Speaking

As a new subscriber to *AW* and having been born close to High Wycombe, England, I was naturally interested in the article in the June, 1990 *AW* concerning the Bodgers Shaving Horse. You can well imagine my surprise in seeing a photograph of my Uncle Owen included in the article.

I remember as a boy, visiting the woods around Great Hampden with my father and watching Uncle Owen and other bodgers performing skills, with what today would be considered antiquated equipment that had to be seen to be believed.

Finding the bodgers was always a problem as they conveyed their workshop and tools to whichever section of the woods they happened to be working, but it was always a worthwhile search.

Uncle Owen's speciality was the pole lathe. It was interesting to note he rarely used a rule, most things being done by eye, but the consistencies of size and patterns was uncanny.

I remember trying to use the pole lathe and the shaving horse, but I usually ended up scraping more than the bodgers could afford, and so I usually ended up being the bottom man in the saw pit, covered in saw dust.

As modernization took over, the bodgers could no longer financially compete. Some exhibited their skills at the local county fairs, but gradually the bodger became a craftsman of the past.

Uncle Owen and his fellow bodgers are no longer with us, but it is comforting to know that craftsmen like Don Weber are maintaining the proud heritage of the English furniture makers.

C. ROBIN DEAN
Clemmons, NC

Mangled Mags

I don't know if this is a major problem for your subscribers, but it's happened to me twice.

It seems that every time it either rains or snows my new issue of *AW* appears with either the cover torn off or so wet that I can't read it for a couple of days. Yesterday was one of those days. My June, 1990 issue arrived with the last ten pages wrinkled and wet.

Would it be too much trouble to package your magazine in plastic? Other woodworking magazines I subscribe to have gone to this method. Some have even packaged them in bio-degradable plastic. I'm sure I'm not the only person who keeps the magazines for future reference.

JOHN FLORES
Mason City, IA

Until recently, we mailed most issues of AW *in a protective "biodegradable" plastic wrap to ensure that the magazine arrived in good condition. We stopped using the plastic wrap when we learned that "biodegradable" plastics may not be as biodegradable as we hoped. This type of plastic was designed to break down with exposure to sunlight. Sounds good, but unfortunately, the discarded plastic usually ends up buried in a landfill where the sunlight never touches it. We're currently exploring the practicality and the environmental consequences of alternative wrapping materials.*

Dust Collector Hang-Ups

In the June, 1990 *AW* I found the article on the "Shop-Built Dust Collector" a good one. I made a similar model with two exceptions which you may wish to share with readers.

First, I wired the dust collector with a switch built into the back end of the box and also wired it so it could be plugged into an outlet. Second, I suspended the dust collector from the ceiling with chains. This stopped any motor vibrations from being transmitted to the ceiling joists. Hooks were used to suspend the chains from the dust collector to the ceiling.

Mounting the dust collector in this manner allows it to be easily removed from the ceiling for cleaning. It also enables me to use the dust collector in other rooms.

WAYNE DRAGISH
Linwood, PA

Tech Tip Troubles

I was surprised that you included Michael Carey's push-stick holder in Tech Tips (April, 1990 *AW*). While his push-stick holder might provide some convenience, it would preclude the use of the fence on the other side of the blade, as well as any jigs which fit over and ride on the fence. It would also make the fence more cumbersome to handle and store when it had to be removed for an operation. If he got 25 bucks, he made out like a bandit.

PETER M. COOPE
North Stonington, CT

Send your comments, compliments, complaints and corrections to: Editor, AMERICAN WOODWORKER, *33 E. Minor St., Emmaus, PA 18098.*

Q&A

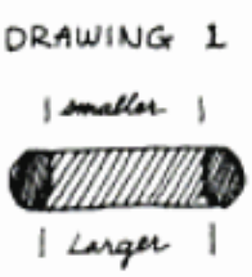
Loose Hoops on Chisels

Q. *I bought a set of Japanese chisels a few years ago. They're fine in the summer, but every winter when I turn on the heat, the hoops on the handles fall off. What can I do to secure these hoops so they don't come off?*

STEPHEN ARNHEIM
Columbus, OH

A. These metal hoops, called *sagariwa*, are left loose by the manufacturer so the craftsmen using them can seat them the way they like. The hoop's inside diameter is larger at one end and smaller on the other. The larger diameter goes on first so it can conform to the slight taper of the handle which is thicker in the middle.

The hoop should slide onto the end of the handle easily and fit tight.

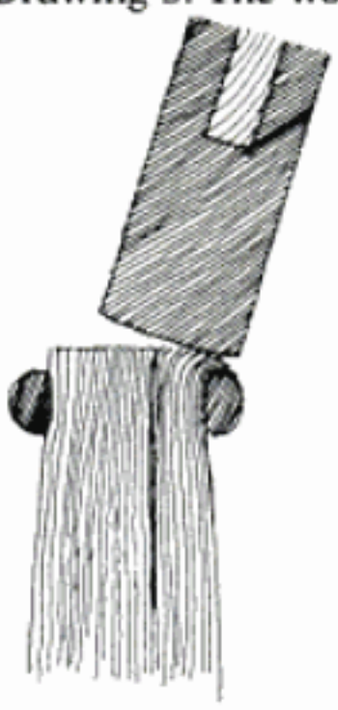


DRAWING 1

If your hoop doesn't fit well, check the inside of the hoop which sometimes has sharp edges. If this is the case, file the edges so the inside of the hoop looks like the top figure in Drawing 1. If the hoop is too tight, you can use several methods to reshape the end of the handle: shave off a bit of wood at the end of the handle with a knife, a file, or some medium-grit sandpaper. You could also lay the end of the handle on a block of wood or an anvil and tap it firmly with a hammer all around, as shown in Drawing 2.

DRAWING 2

When you get the hoop to fit well, tap it down until it fits tightly, about 1/32 in. to 1/16 in. below the top of the handle. With the hoop in place, dip the end of the handle in water for a few minutes. Next, hold the handle in one hand and smash the outer rim of the handle down around the top of the hoop with the corner of a hammer. Then use the flat of the hammer to smooth the end of the handle into a "mushroom" shape, as shown in Drawing 3. The wood fibers must be saturated with water for this mushrooming to work, otherwise the edge of the handle will crumble.


DRAWING 3

The mushroom will keep the hoop from flying off when the chisel is struck with a hammer. If the mushroom is not formed properly, you can strike the hoop directly, which causes an "overhang," as shown in the bottom figure in Drawing 1. If this happens, file the inside of the hoop again, reseat the hoop, and form the mushroom again.

TOSHIO ODATE
Sculptor, shoji maker and author
Woodbury, CT

DRAWINGS BY TOSHIO ODATE

Source for Thin Cedar

Q. *I build small cedar boxes out of 7/16-in. to 9/16-in. thick material. I buy 1 3/4-in. stock and go to great expense to have it milled to size and thickness. I want to know if there is a source for the stock I use at a lot less cost per board foot than I'm now paying.*

FRED HUSTON
Bethel, OH

A. Lumber mills rarely cut material of this dimension, so there's a large void between 4/4 lumber and thin-sliced veneer. When it is produced in intermediate sizes—1/8, 1/4, 1/2, etc.—the wood is resawn and then surfaced on both sides with a planer or wide-belt sander. This material is called "sawn veneer" and is sold by the surface foot. The work involved in resawing and surfacing ensures that the price will be high. One nice benefit of resawing is that successive bookmatched pieces are produced.

One source for sawn veneer is Woodworker's Dream, the outlet store of a sawmill operated by the Martin Guitar Co. It offers more than 20 species of domestic and imported sawn veneers in different thicknesses. The store is at 10 W. North St., Nazareth, PA 18064, 215-759-2064.

For more economy, I'd recommend that you keep your eyes open for a batch of 5/4 or 8/4 cedar lumber—ideally 1000 board feet or more to get a good price. Then have your lumber shipped directly to a mill. This 5/4 lumber will yield two pieces of 1/2-in., and 8/4 will yield three pieces. When resawing is done in this quantity, it reduces the price substantially. The sawn veneer can be reshipped to your shop where it can acclimate to local conditions.

DICK BOAK
Wood Products Manager
Martin Guitar Co.
Nazareth, PA

Get the Snipe Out

Q. *How can I eliminate the "snipe" at the end of a board when I run it through a thickness planer?*

JOHN MITCHELL
Dubuque, Iowa

A. First, reduce the bed-roller height all the way to zero, and wax the bed to keep the stock moving. If you still get snipe it's probably from deflection of the bed itself as the stock passes under the feed rollers. This can be minimized by reducing the downward pressure of the feed rollers. If your machine doesn't allow this adjustment, an alternative is to keep the pressure uniform by butting a piece of scrap before and after the stock you are surfacing. The idea here is to have *both* rollers exerting pressure during the *entire* passage of the important piece.

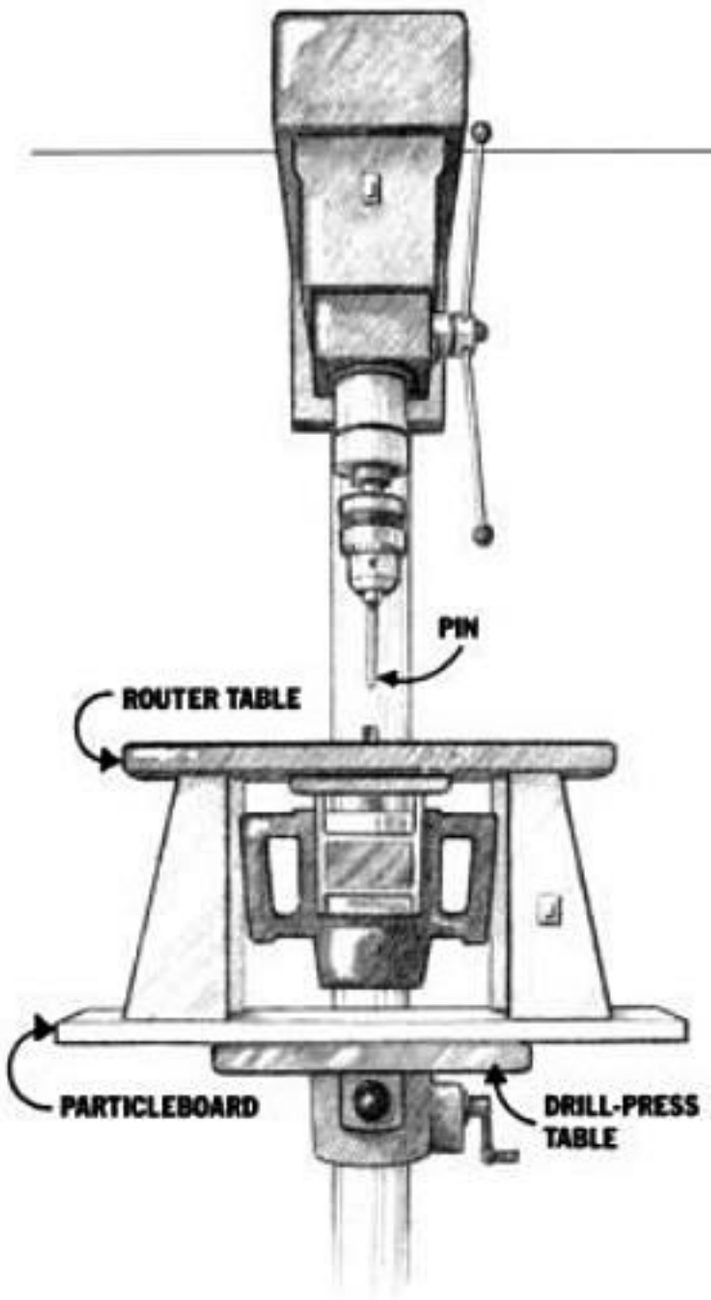
BOB MORAN
Assistant Editor

Where To Find It

Unplated steel nuts, bolts and screws of all types for historic restoration are available from Warren Fasteners, 201 Morgan Ave., Brooklyn, NY 11237, 718-417-4010.

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

TECH TIPS



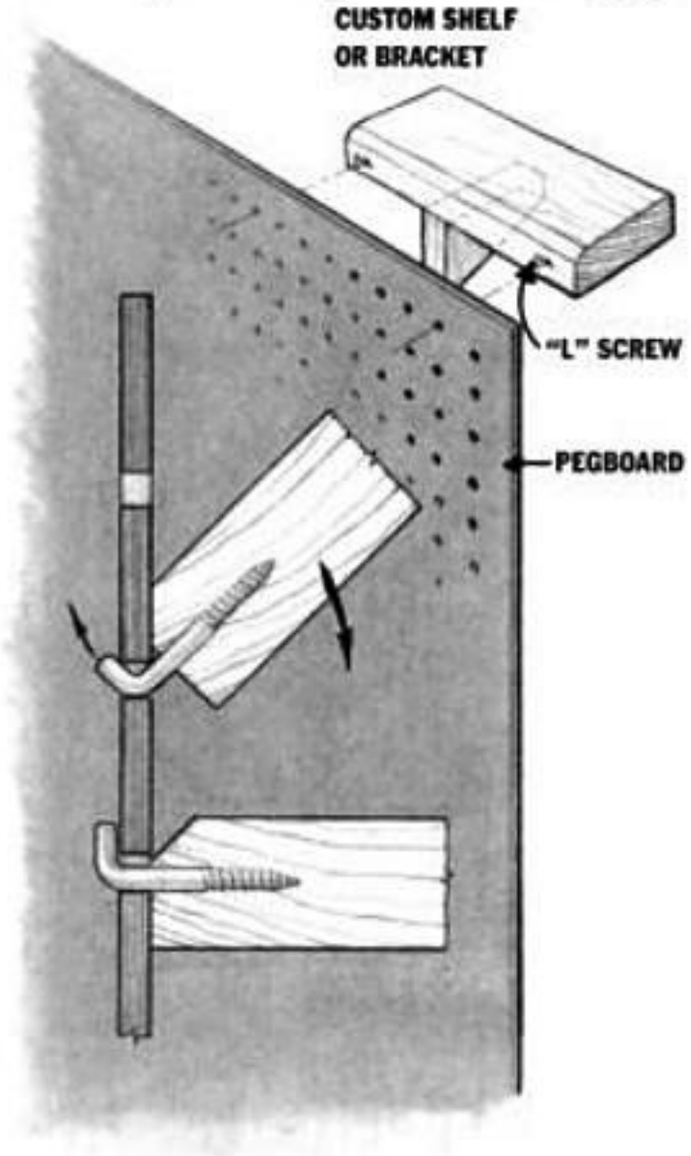
Pin Router in a Hurry

Clamp a router table to a drill-press table and you've built a pin router! Be sure the axes of the two machines line up. A steel rod or upside-down bit in the drill serves as the pin and raises or lowers with the quill.

DAVID JEFFREY
McKinleyville, CA

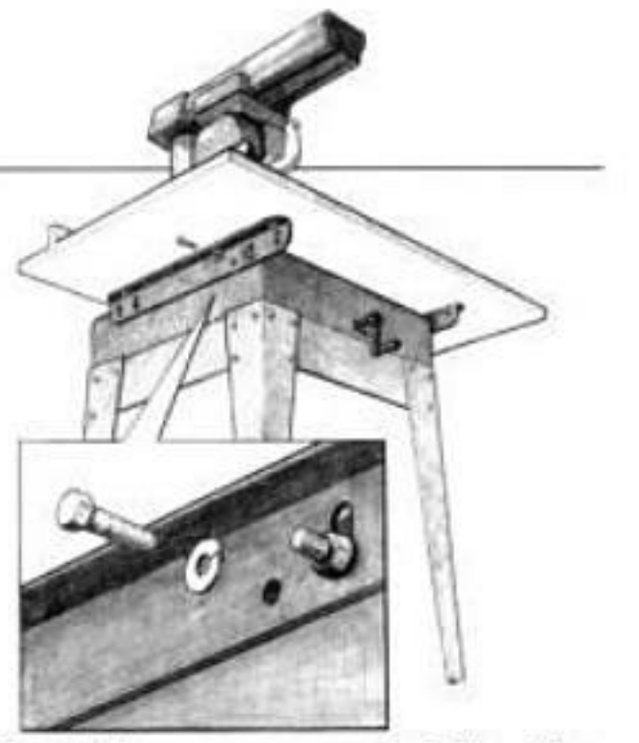
Hang It Up

Do you have a drawer full of unused pegboard hooks and a workbench full of stuff that won't hang on the hooks? You can make your own shelves or custom-fitted hangers out of wood, and hang them on the peg-



board using store-bought "L" screws on the back edge. Three things to watch: 1) "L" screw fits the pegboard; 2) horizontal spacing of the screws is exactly the same as the spacing of the holes; 3) top half of the back edge of your hang-up is chamfered.

MYRON S. LEVY
Gold Hill, OR



1. Adjust table precisely, and tighten original bolt.

2. Drill and tap second hole, and insert machine screw and lock washer.

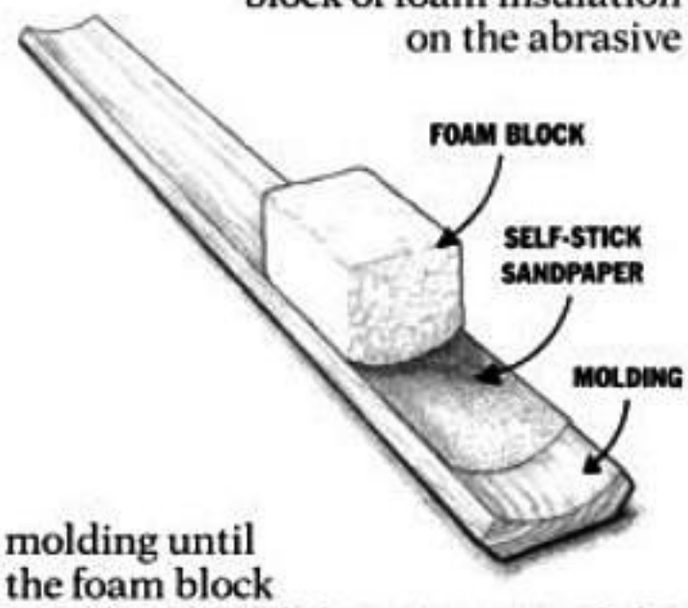
To Lock an Adjustment

Some adjustments never seem to stay adjusted. If they rely on the clamping power of a bolt in a slot, as is often the case with radial arm saw tables, they can be locked securely by drilling and tapping a second hole and inserting a machine screw with a lock washer. Just be sure you've got it where you want it, because the second screw allows no adjustment.

JAMES E. BUTTERFIELD
Clarksville, TN

Custom-Contoured Sanding Blocks

If a lot of molding needs to be sanded, apply 80-grit self-stick sandpaper neatly and carefully to several inches of the molding. Then rub a block of foam insulation on the abrasive



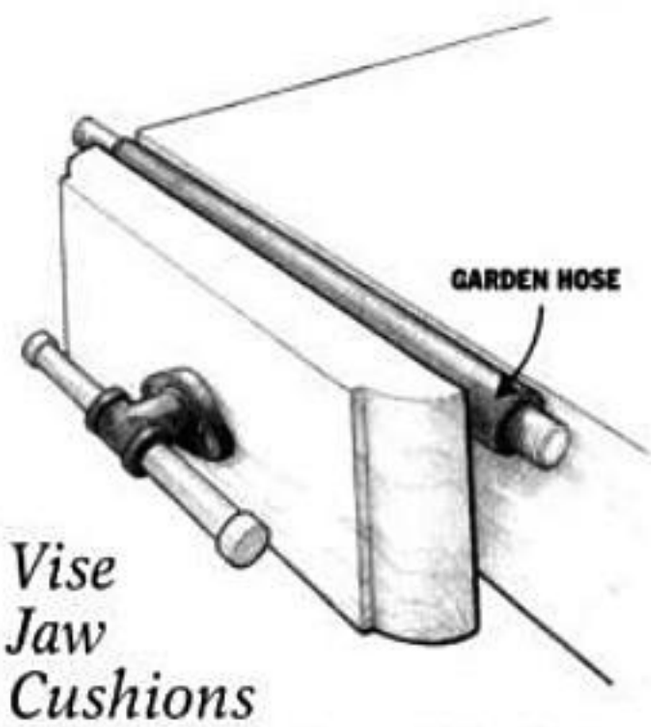
molding until the foam block matches all of the contours of the molding. Finally, remove the self-stick paper from the molding, apply an appropriate grit to the foam block, and sand the molding.

TREBOR NAROM
Onaled, MN

Masking-Tape Shims

When cutting tenons on the tablesaw, you often need to move the fence just a hair to adjust the thickness of the tenon. Instead of trying to adjust the fence in such tiny increments, I apply layers of tape to the side of my tenoning jig where it bears against the fence. Masking tape works well for a fairly thick shim, and mylar packing tape works as a very thin shim.

BEN ERICKSON
Eutaw, AL



Vise Jaw Cushions

I protect dowels and threaded rod from vise jaws by slipping them into a piece of discarded garden hose before clamping them in the vise. Rubber automotive heater hose works for larger diameters.

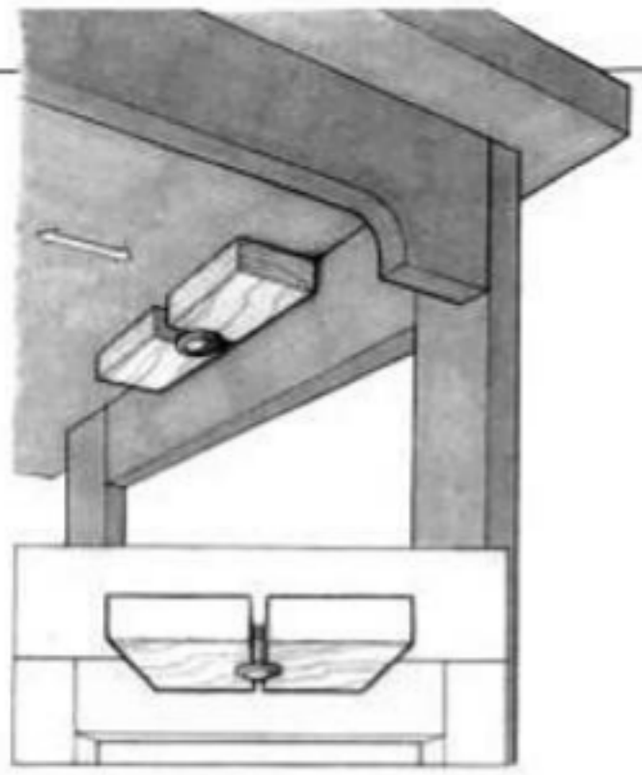
W. J. MORRISON
Northport, NY

Styrofoam Clamp Pads

When laminating curved surfaces, I use 1-in. or 2-in. thick styrofoam as clamp pads. The pads form to the radius of the curved surface, resulting in even clamp pressure.

BRIAN J. O'CONNOR
Wolverine, MI

TECH TIPS



No-Rout Screw Slots

Here's an easy way to attach tabletops or cabinet tops. Like the screw-in-slotted-hole method, it allows the top to move but doesn't require any routing to produce the slot. The screw slot is formed by the gap between two 3/4-in. × 1 1/2- × 2-in. wooden blocks glued to the understructure of the top. Use the intended screw as a spacer to separate the blocks. When the screw is installed, it can slide between the blocks as the top expands and contracts.

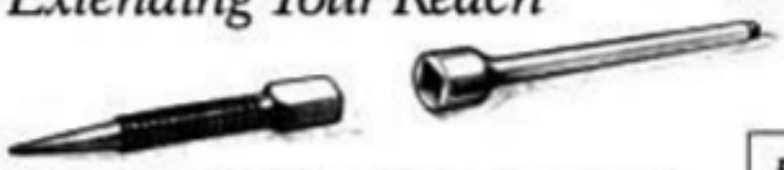
PAT WARNER
Escondido, CA

Handy Layout Fluid

A felt-tip permanent marker works as well as machinist's layout fluid for laying out marks on machines or tools. Rub the felt-tip marker over the whole area where you need to scribe a mark, let dry for about 30 seconds, and scribe into the ink from the marker. The ink can be removed with steel wool or alcohol when you're finished.

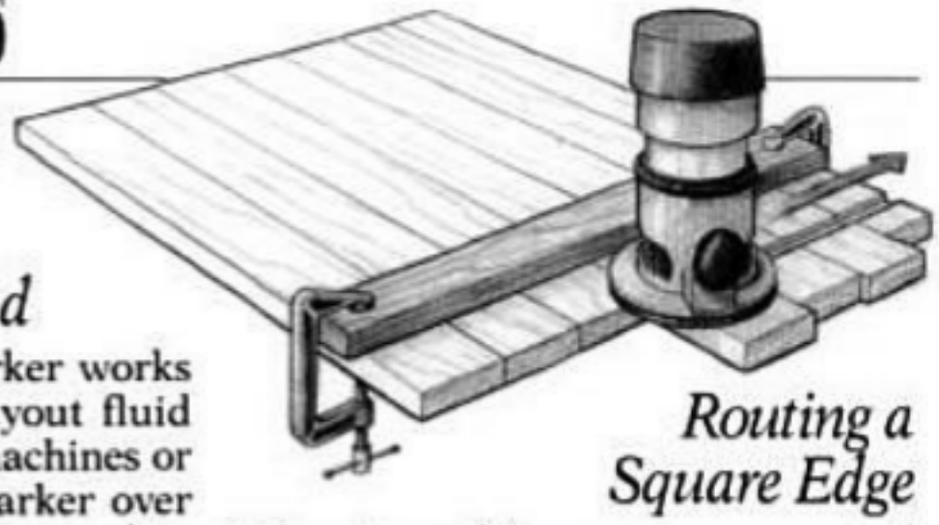
ROBERT PAULEY
Decatur, GA

Extending Your Reach



For setting finish nails in those hard-to-reach places, I use a 3/8-in. ratchet drive extension over the nail set. It fits perfectly over the nail set, and light hammering does no damage to the extension.

ROBERT WELBURN
Lake Worth, FL



Routing a Square Edge

When I need to square up a panel that's too large for my tablesaw, I simply clamp a fence across the piece and trim off the excess with a 3/8-in. or 1/2-in. straight bit in my router. It takes four or five passes at increasing depths-of-cut, but the edge is unsplintered and square. This technique also works well with veneered plywood, which tends to chip out when cut with a circular saw.

BILL KEARNEY
Douglas, WV

Know a better way of doing something? Designed a clever jig? Send your woodworking tips, along with a sketch or a snapshot to: Tech Tips, AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. We'll pay you $25 if we publish your tip.

DRAWINGS BY HEATHER BRINE LAMBERT

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for one gallon o
■ *Truly Persnip AWT, 607 N. Hor 92052, 619-433-*
CIRCLE NO. 50 O

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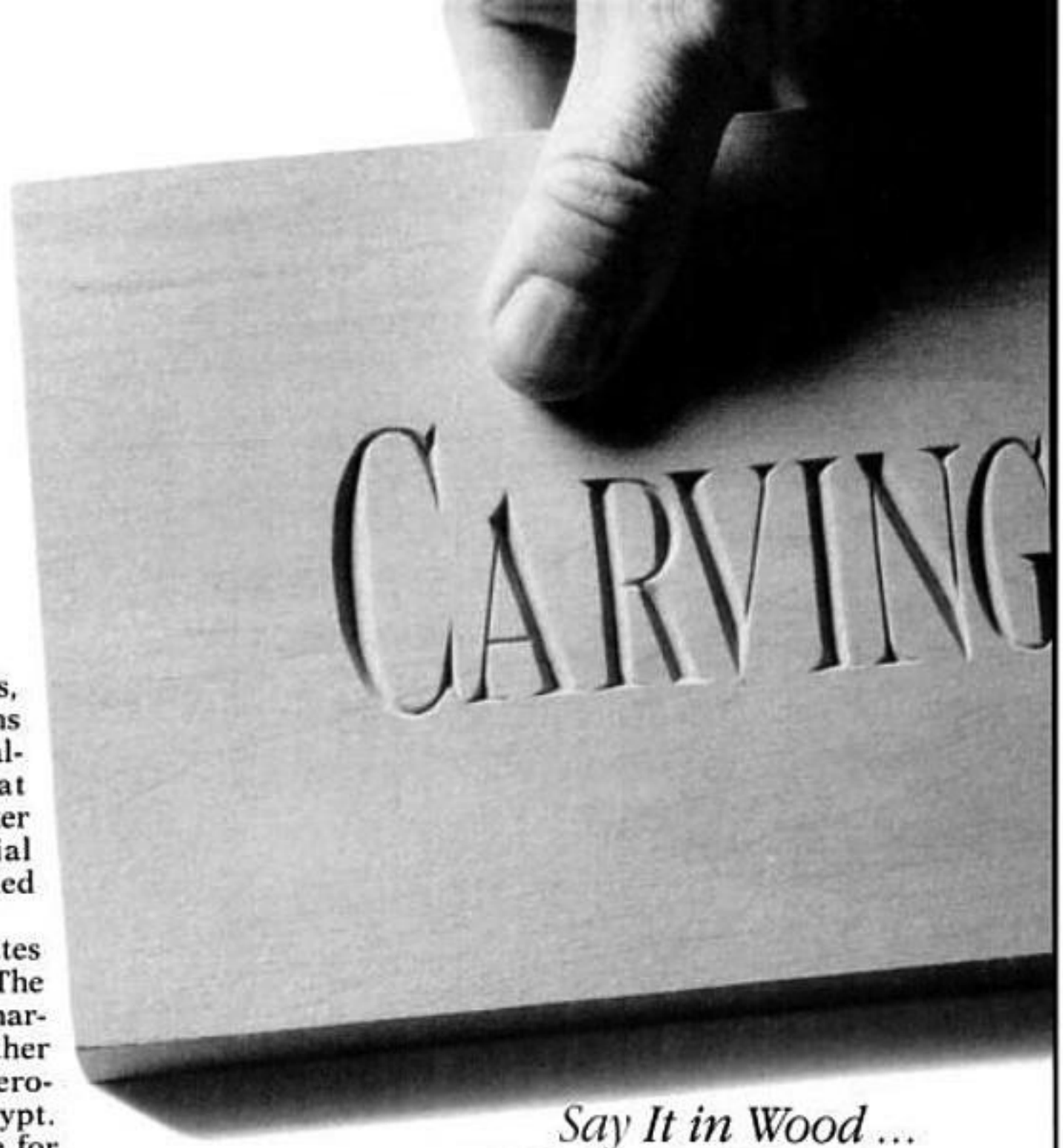


Say It in Wood ... A Knife Is All It Takes

BY WAYNE BARTON

Carving names, dates, initials or inscriptions on a project personalizes it in a way that satisfies the vanity of both recipient and maker alike. There's no better way to turn a special piece into an heirloom that's proudly handed down from generation to generation.

The tradition of carving letters in wood dates back at least as far as the ancient Egyptians. The archeologists that opened the tombs of the Pharoahs discovered stools, chairs, chests and other wooden artifacts decorated with carved hieroglyphics—the picture writing of ancient Egypt. Letter carving has been common in Europe for centuries, where names, initials and dates are carved on everything from bread boards to furniture; from ceiling beams to the outside of houses; from milk pails to jewelry boxes.

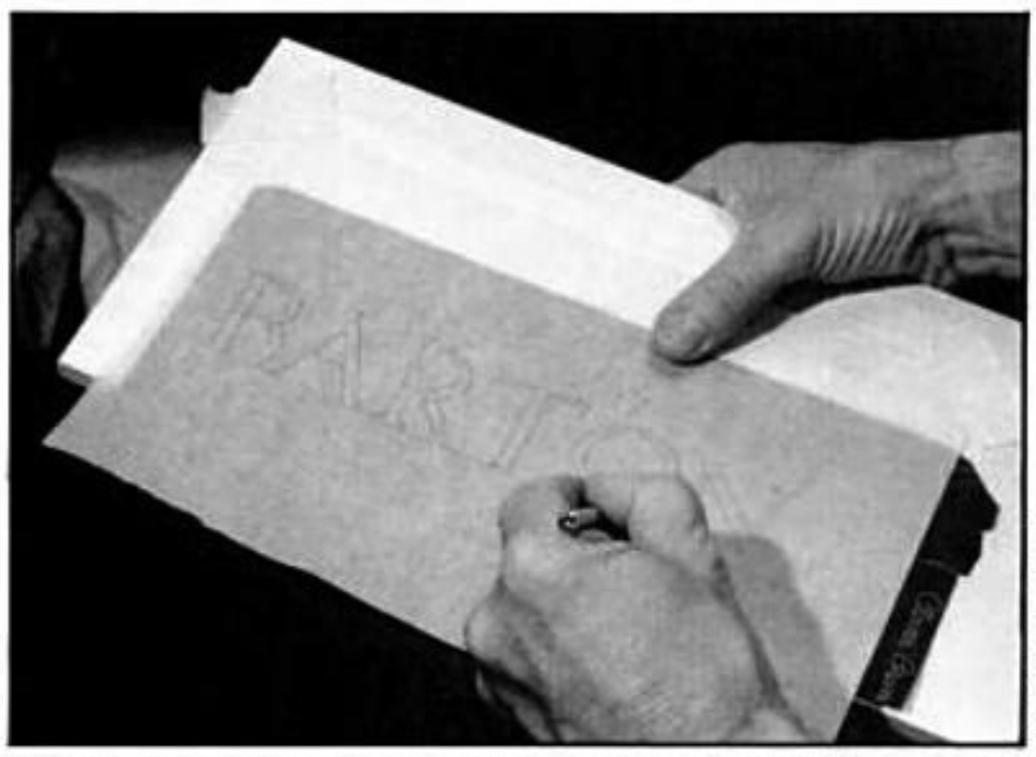
There are several ways to carve letters. The fastest and easiest is the incised method that's used in chip carving—the method I'll explain in this article. I practice the Swiss style of chip carving, and I do all my carving—letters included—with just two knives. The cutting knife (see photo) does most of the work. The stab knife has a thicker bevel angle and is used to create wedge-shaped indentations with a stab-like thrust. It's rarely used in letter carving. The knives I use are the Klotzli brand, made in Switzerland specifically for this type of carving. I think they're the best knives available today. (See Sources.)

The reason the chip-carving method is easy is because the knife is held in a constant locked position, which establishes the angle of cut. The cutting knife is always drawn toward you, which makes it easy to control the cut, especially around curves. I'll explain later in this article how to hold the knife and use it. First, and just as important for good-looking letters, you need to know something about letter styles and layout.

Choosing a Letter Style

There are hundreds of letter styles—known as typefaces, or *fonts*—to choose from for carving. The best

Carved letters start as type on a page or as letters sketched on paper. Trace the letters onto tracing paper, adjusting the spacing between letters and words for best appearance.



PHOTOS BY DAVID SLOAN

Transfer the letters to the wood with graphite paper (it's like erasable carbon paper) and a ball-tipped stylus, and you're ready to carve.

MITCH MANDEL

Crisp, hand-carved letters can personalize your work with names, initials, dates or inscriptions. A single knife is all it took to carve these elegant Roman capitals.

places to look for designs are type books, which you can order by mail if you can't find them at a local library, book store or art-supply store. (See Sources.) Art-supply stores sell sheets of rub-on transfer letters, which you can copy for carving.

Some letter styles are much easier to carve than others. For instance, plain Roman capitals (the letters I'm carving in the photos) are easy to read and to carve, which is why they're so frequently used on plaques and inscriptions. The real criteria for selecting a typeface, however, should be how well the style of the letters fits the style of the project and how well the typeface fits with the rest of the carving on the object.

Readability is another point to consider when selecting a style. Ornate typefaces are often hard to read. If the letters must be read from a distance at a glance, choose plain, readable letters such as Roman "caps."

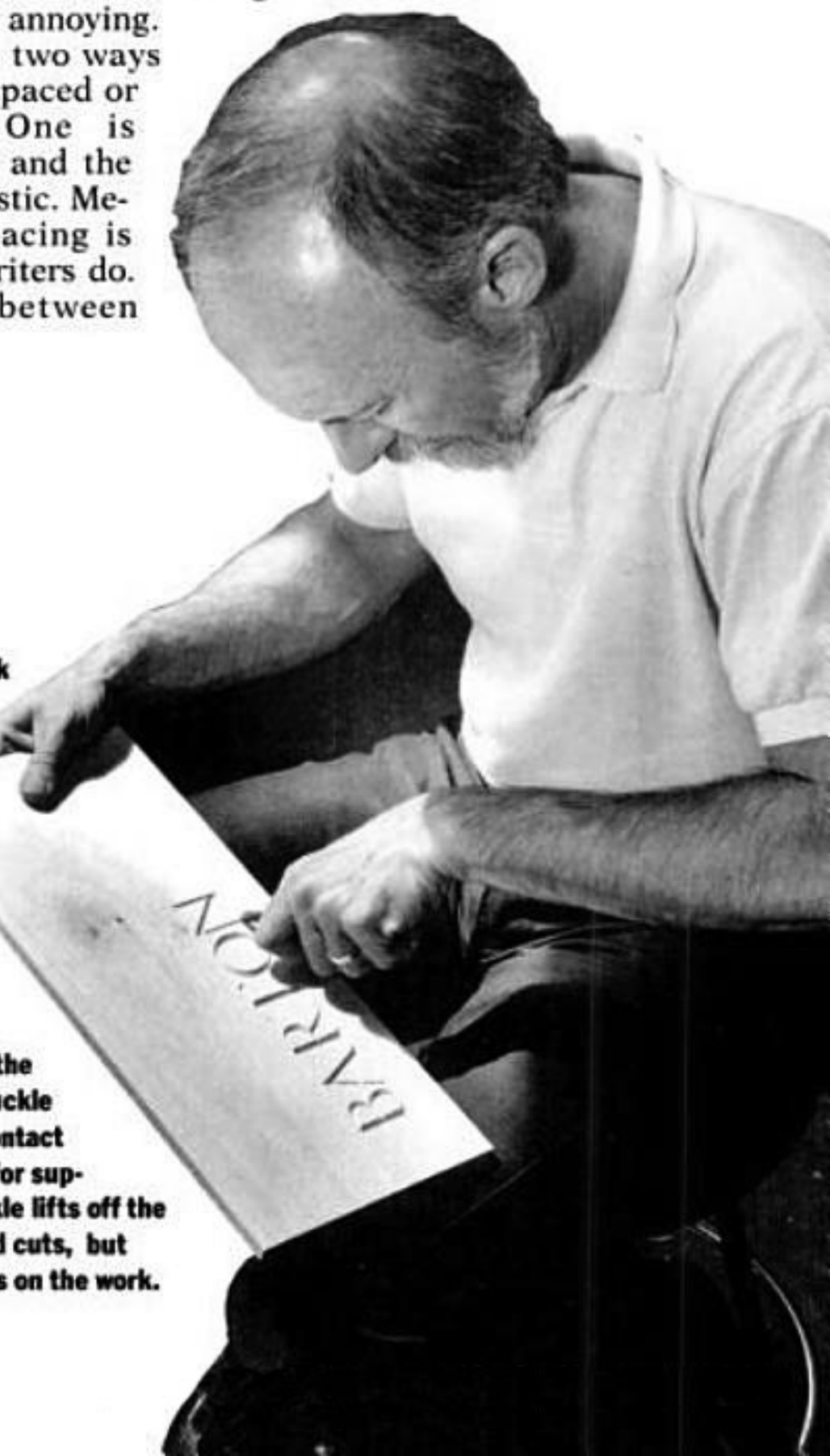
The typefaces that look best when carved are those that have both wide and narrow elements in each letter. Normally, the horizontal part or parts of each letter are narrow and the vertical parts are wide. This makes the letter look supported and interesting. Typefaces that have all parts the same width may look good on paper, but in most cases, they're visually uninteresting when carved.

If you choose one of the more ornate styles of lettering—such as an Old English style—be sure to use both upper- and lower-case letters to compose names or words. Some people make the mistake of using all capital letters in order to capture more of the flair of these styles. Doing so, however, makes the words difficult, if not impossible, to read.

Layout: The Secret to Good-Looking Letters

The secret to letter carving really is in the layout. The most important aspect of laying out letters is spacing. The most common error is to space the letters too far apart. On paper, it may not look bad, but these wide spaces become more apparent when the letters are enlarged and carved because of the shadows and depth of carved letters. Unless there is some artistic reason for spacing out the letters in words or names, don't. Take a look at the printing on this page. The letters of each word are so close together that you see and read them as units (words), not as individual letters. Spreading the letters out forces the eye to jump back and forth. This makes reading difficult and annoying.

There are two ways letters are spaced or adjusted. One is mechanical, and the other is artistic. Mechanical spacing is what typewriters do. The space between



Holding the work in your lap lets you turn the work so you can always draw the knife toward you. Note that the thumb and the index-finger knuckle are always in contact with the wood for support. The knuckle lifts off the wood for curved cuts, but the thumb stays on the work.

FIG. 1: LAYING OUT LETTERS

letters is always the same. Artistic spacing allows those letters that do not inherently fit well together to be moved to one side or the other, so they are visually compatible with all the other letters in a word. (Typographers refer to the manipulation of space between letters as *kerning*).

For example, the letters A and V in Roman caps leave a notable gap when mechanically spaced. (Try it on a typewriter.) The two letters are far more pleasing when the leg of the V is slid over the leg of the A. (See Fig. 1.)

Though there are always exceptions, the box on page 17 contains some guidelines to assist you with letter spacing. These are not rules chiseled in stone (or wood) and will vary with typeface and conditions, but they will help you get started.

There are several ways to test for proper spacing. After laying out my letters on a piece of paper, I usually squint at all the lettering as a whole, in order to blur the letters beyond recognition. This immediately shows if any letters are spaced too close or too far apart. Another method is to turn your paper around, and hold it up to a light to view your lettering from the back side. Because we don't normally read in reverse, the eye sees only shapes. You will be able to tell immediately whether or not the letters are spaced correctly.

Besides spacing, be aware of the size of your letters in relation to the rest of the carving. You'll want the letter size compatible to the overall size of the piece, whether it's a plaque, statue or jewelry box.

Woods for Carving

Before we consider carving, let's discuss wood. Any wood can be carved, but not all woods are great for carving. Some are folly to consider. Generally, woods with a close, straight grain that are not extremely hard carve well. Good softwoods to carve are ponderosa pine, Western pine and Eastern white pine. Hardwoods that can be carved include butternut, walnut, jelutong, some cherry and mahogany. My favorite carving wood—and the one I use for most of my work—is basswood, also known as linden. (See Sources.) It has all the features a carver seeks. Its grain is tight, even, straight and plain so its figure doesn't compete with the carving. It's medium-hard, so it carves easily and still holds design well. These are the marks of a

good carving wood. Basswood has been used for centuries by master European carvers.

A quick mention of moisture content. Most woods carve best with a moisture content of at least 8 percent. If your wood is cracking or splitting too easily as you carve, you'll need to store it in a humid environment, where it can absorb more moisture. If you do, be sure to stack the wood on sticks, so the air can pass around the board. You want the wood to absorb moisture equally on all sides.

Now that you understand the importance of layout, and know which woods to carve, I'll tell you how to lay out your letters on the wood. Larger letters are easier to carve than small ones, so I suggest that you start with Roman capital letters that are 1½ in. high.

Laying Out the Letters

The layout tools you'll need are simple: paper (graph paper is handy if you're designing your own letters), tracing paper, pencil, ruler, graphite paper (like carbon paper but is erasable), a stylus for tracing the letters onto the wood (available at leather shops), and in some cases, a compass. A ball-point pen that's out of ink will also work fine as a stylus.

Start by laying out your letters on tracing paper—it will be easier to make any adjustments to the spacing. You can trace typeset letters from a book or a preprinted sheet, or trace your own letters which you've previously drawn on graph paper. (Don't worry about spacing when you draw your own letters—you can adjust the spacing when you trace them.) Next, place a sheet of tracing paper over the letters, and trace the letters onto the tracing paper. As you trace, adjust the spacing between letters and words the way you want it to look on the wood. Once you've completed the layout, use graphite paper to transfer the letters from the tracing paper to the wood. (Carbon paper is greasy and difficult to clean off the wood after carving.) Use the stylus to transfer the letters. The rounded point of the stylus won't mark up the pattern the way a pencil will. You may want to use that design again one day.

LETTER SPACING GUIDELINES

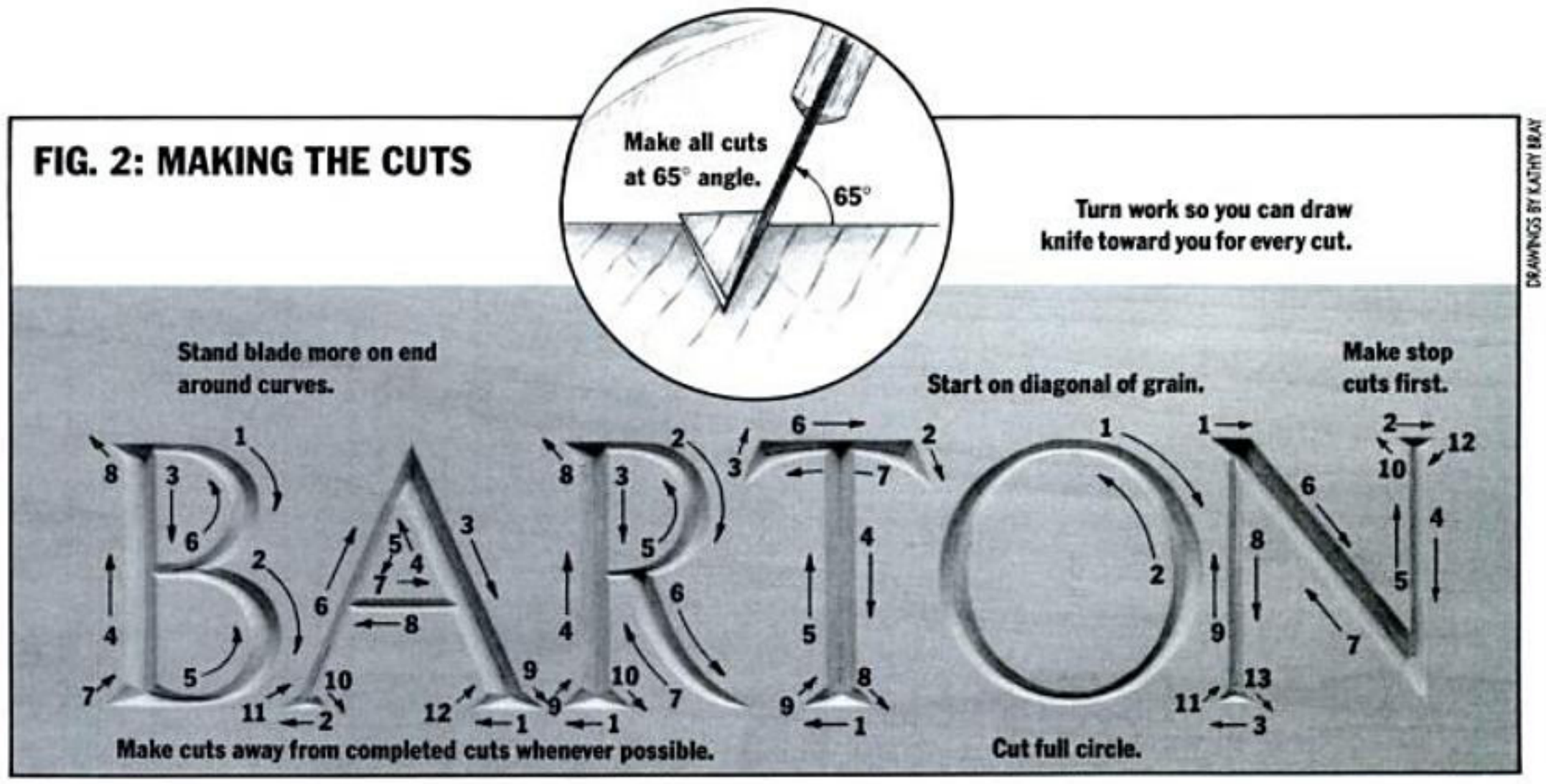
- The space between letters should be one-half the width of the widest part of the letter, which is usually the vertical leg. For example, if the vertical leg in a Roman H is ¼-in. wide, the letters of this particular word would be spaced ⅛ in. apart.
- The space between words should be half the height of the capital letter.
- The space between words at the end of a sentence is the full height of the capital.
- The space between lines of words should be half the height of the capital. For example, if the capital is 1½ in. tall, the top of the capitals on the next line will be ¾ in. below the bottom of the first line.

Carving the Letters

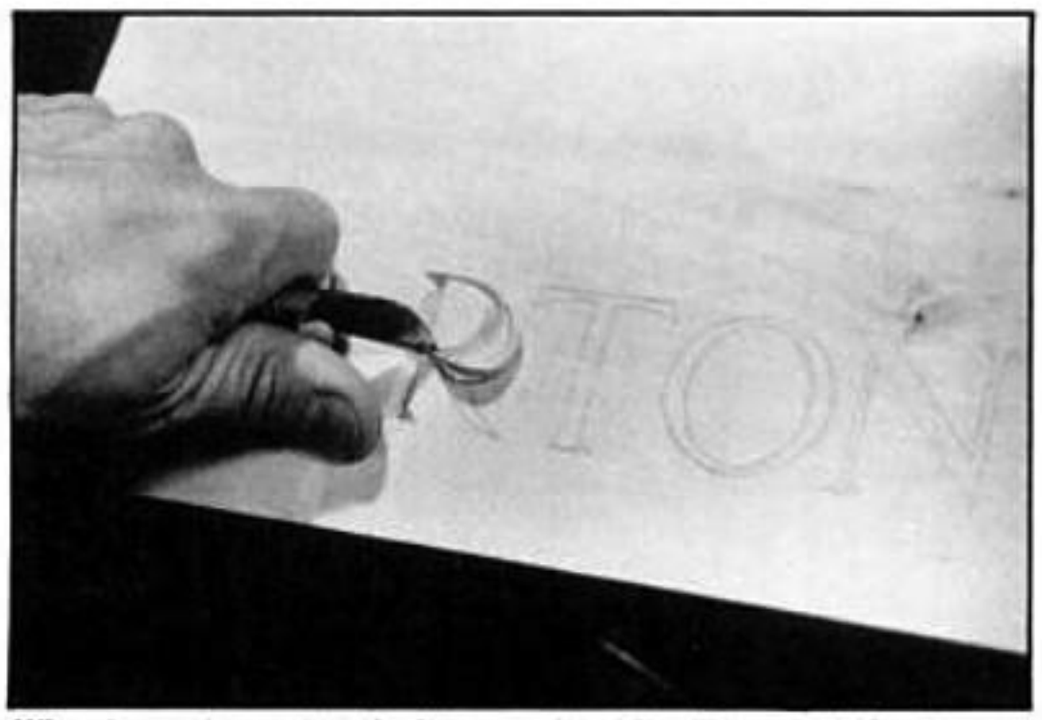
You'll find it best to sit with the work in your lap. In this way you can turn the work so that you can always draw the knife toward you as you carve.

To hold the cutting knife, place the first knuckle of your thumb at the blade end of the handle, and wrap your fingers around the handle. Let your thumb and the knuckle of your index finger ride on the wood to support the knife as you make a cut, as shown in the photos. This assures that you'll have complete control of the knife. By keeping your thumb against the handle, you lock the angle of the blade at 65° to the surface of the wood. It feels awkward at first, but you'll get used to it. The main things to remember are that the blade should always cut at a 65° angle to the surface of

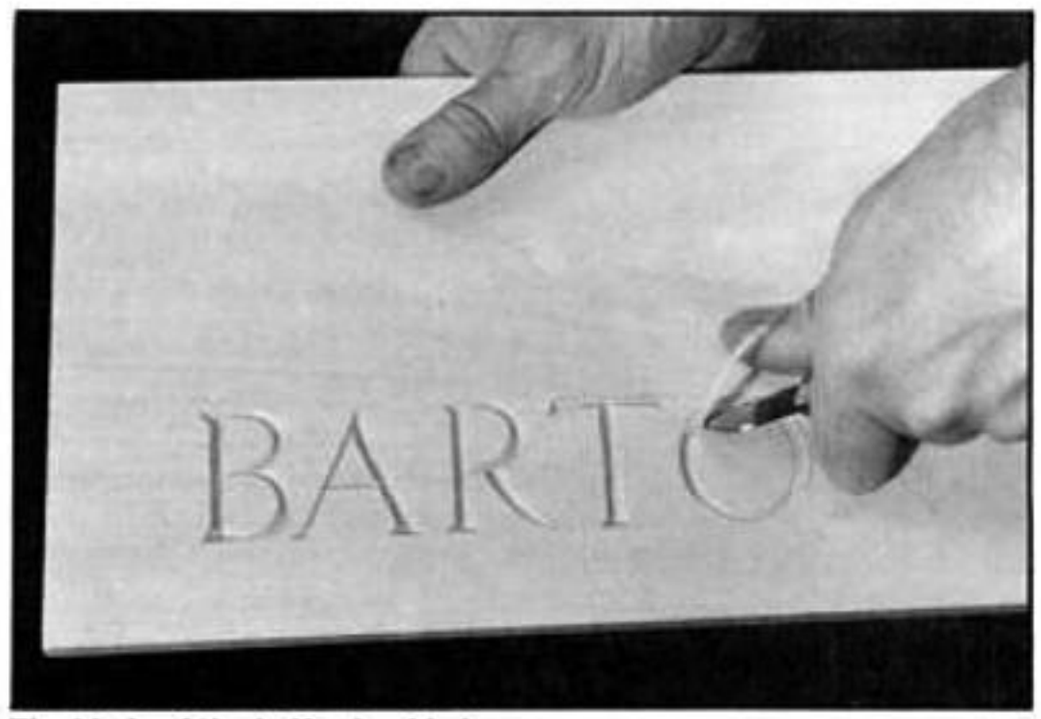
FIG. 2: MAKING THE CUTS



DRAWINGS BY KATHY BRAY



When two cuts meet at the bottom, the chip will pop out. If not, you aren't cutting deep enough.



The blade of the knife should always cut at a 65° angle.

the wood, as shown in the drawing, and that you should move your hand and the knife as one. By turning your carving after each cut, you'll be able to continue to make all the cuts properly by drawing the blade toward you.

When carving, cut on the lines you've drawn, and go for the whole chip at once. Don't try to shave or whittle your way into the design. A single, clean cut is best. When two cuts meet at the bottom, the chip will pop out. If it doesn't, you're not cutting deep enough. But don't go too deep. Insert the blade only as deep as necesssary to remove the chips. Cutting deeper means you're working harder than you have to and may also result in breakouts and splitting. Because the knife always cuts at a 65° angle, wider parts of the letter will be deeper than narrower parts.

The order and direction of cuts is important. To avoid breaking out bits of wood, try to make each new cut away from the chips that you've already removed. This will help to prevent breakouts and splitting. When carving a straight-legged letter such as an A, H, or K; or a curved letter with serifs such as a C, G, or S, make the end cuts, or stop cuts, first. (See drawing.) After making the stop cuts (or if you're carving a letter that doesn't require any stop cuts), remove the larger sections or chips. The drawings show the sequence and direction of cuts for the letters I'm carving in the photos—B A R T O N. If you're left handed, as I am, the order of cuts will be a mirror image of those shown in the drawing. In other words, if you're left handed, cut the left leg of the "A" first, instead of the right leg, as shown in the drawing.

When making a curved cut, hold the blade more upright relative to the direction of cut—that is, perpendicular to the wood—while maintaining the 65° cutting angle to the side. The tighter the curve, the more upright the blade should be. This prevents the blade from chattering while going around curves or corners and produces a clean, smooth cut. For making curved cuts, I find it helpful to start the cut with my elbow away from my body, sweeping it in against my body as I make the cut.

With a little bit of practice you'll find letter carving quite simple and a lot of fun. Adding this form of carving to your repertoire will not only extend your carving capabilities but will surely provide a new vista from which to view all your carving. I wish you the best of luck. ▲

SOURCES

Klotzli chip-carving knives:
ALPINE SCHOOL OF WOODCARVING, 225 Vine Ave., Park Ridge, IL 60068, 708-692-2822.

CONSTANTINE'S, 2057 Eastchester Rd., Bronx, NY 10461, 212-792-1600.

GARRETT WADE, 161 Ave. of the Americas, New York City, NY 10013, 800-221-2942.

WOODCRAFT, Dept. AW, Wood County Park #210, P.O. Box 1686, Parkersburg, WV 26101, 800-225-1153

Type books:
For a free catalog of books on type and other graphic arts subjects write to: Dover Publications, Inc., 180 Varick St., New York City, NY 10014.

Basswood:
SWISS CABINETRY, N2571 Coplien Rd., Monroe, WI 53566, 608-325-6681. (4/4, 5/4, 8/4 in stock—will resaw thinner boards to order.

Chip-carving books:
Chip Carving Patterns, by Wayne Barton (1990, Sterling Publishing Co. Inc., 387 Park Ave. South, New York City, NY 10016).

Chip Carving, Techniques & Patterns, by Wayne Barton (1984, Sterling Publishing Co., Inc.), available from Garrett Wade.

Chip-carving video:
Chip Carving with Wayne Barton (1988, Taunton Press, Box 355, Newtown, CT 06470, 800-888-8286).

Wayne Barton is a professional woodcarver who trained in Brienz, Switzerland. He teaches chip carving at the Alpine School of Woodcarving in Park Ridge, Illinois. He wrote about chip carving in the May/June, 1988 AW, *and is author of two books on chip carving. (See Sources.)*

DISPLAY CABINET

A Showcase Designed With a Router in Mind

MITCH MANDEL BIRDS COURTESY OF WILLIAM R. WALLACE

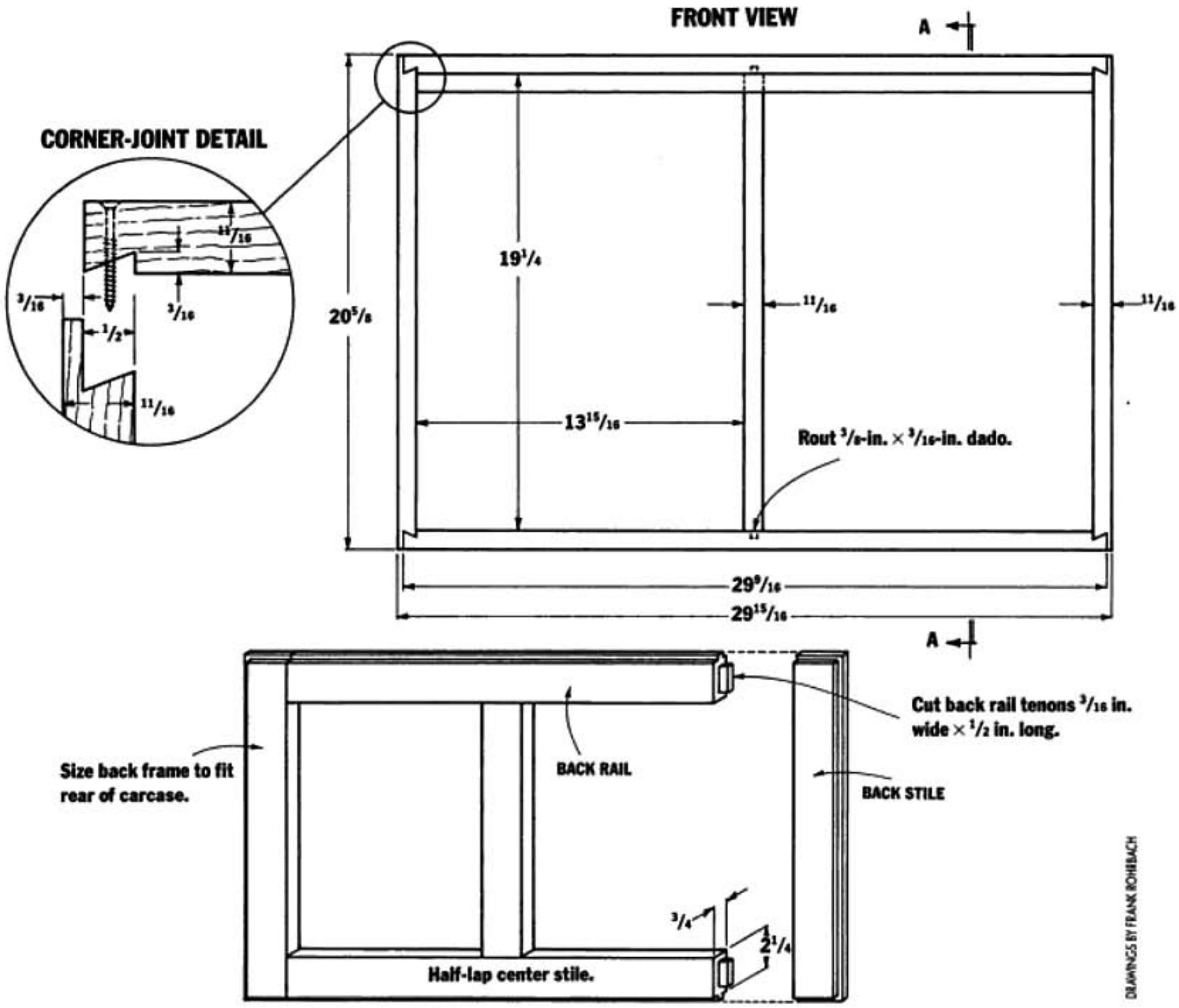
Give your collectibles a distinctive home behind the glass-paneled, sliding doors of this cabinet. The soft white wood and precision joinery add a touch of class.

BY PAT WARNER

It seems to be a part of human nature to put things on display. This sliding-door wall cabinet makes a perfect showcase for collectibles—be it fine china, art objects, or some well-preserved antique tools. The lines of the cabinet are clean and simple, and the full-width shelves are adjustable for position. The cabinet shown in the photos is made of soft, white ash left unfinished, because I like the brilliant "in-the-white" look of this wood.

The construction is designed for strength. The corners of the carcase are joined with a half-dovetail rab-

FIG. 1: WALL-CABINET CARCASE



BACK-FRAME DETAIL

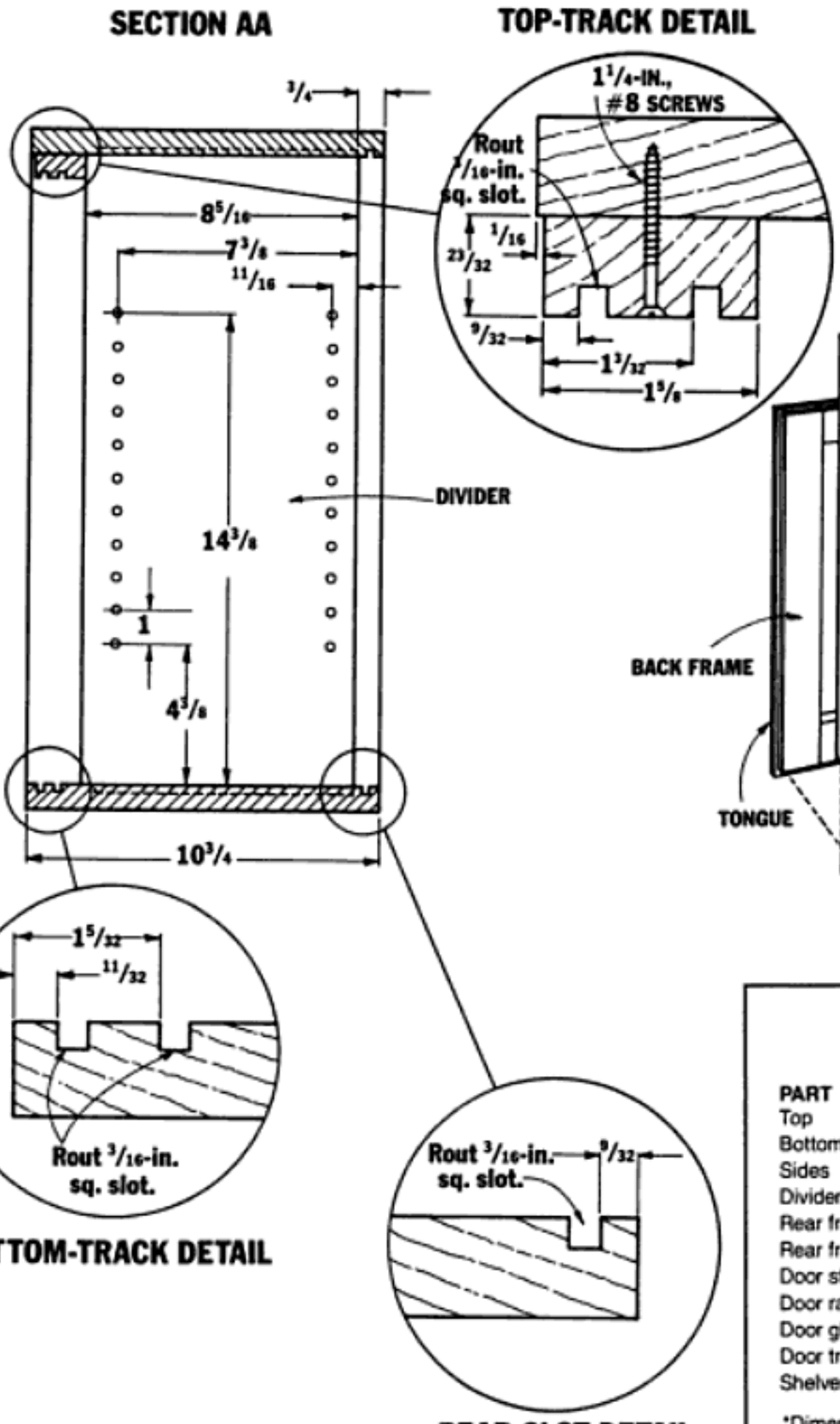
bet joint that I developed especially for casework. Whether screwed or glued together, this joint has proven to be strong. I cut the joint with a router, with the help of some shop-built fixtures. (See sidebar, page 23.) The cabinet has a back frame but no back panels. (See Fig. 1.) I think the view through the glass doors to a flat, off-white wall in back lends an air of lightness. If you don't agree, it's an easy matter to add panels in the back frame.

The real design highlight is the sliding-glass doors. In most cabinet doors the glass is held in place by a tacked-on wooden molding. I've designed these doors so the glass is captured in grooves routed in the stiles and rails. (See Fig. 2.) The top rail of each door is removable, so it's easy to replace the glass. The doors slide in tracks, top and bottom. The bottom track is routed in the bottom of the cabinet, but the top track is a separate piece, as shown in Fig. 1. This top track makes for a tight-fitting door and eliminates the up and down play common to most sliding-door cabinets.

The cabinet shown here is screwed together, not glued, so it can easily be knocked down for moving. You can just as easily glue the joints permanently if you don't like the look of plugged screw holes.

Building the Cabinet

I prefer to do almost all my joinery with a hand-held router. I like the way a router lets me work to fine tolerances, which gives me the accuracy I want in my work. I make use of several shop-made jigs and templates in building this cabinet. I also use a number of different router-bit and pilot-bearing combinations that you won't find in a router-bit catalog. For example, you won't find a dovetail bit with a pilot bearing in any catalog. There's no great mystery here. I buy the bearings and bits separately and simply press the bearing on the bit's shaft above the cutters to meet my needs. But if you don't want to duplicate my router setups to build just one cabinet, you can do most of the operations with methods other than the router tech-



BILL OF MATERIALS

PART	QUANTITY	DIMENSION
Top	1	11/16" × 10 3/4" × 29 9/16"
Bottom	1	11/16" × 10 3/4" × 29 9/16"
Sides	2	11/16" × 10 3/4" × 20 5/8"
Divider	1	11/16" × 8 5/16" × 19 5/8"* †
Rear frame stiles	3	3/4" × 2 1/4" × 19 5/8"* †
Rear frame rails	2	3/4" × 2 1/4" × 25 7/16"* †
Door stiles	4	3/4" × 2 1/16" × 18 1/2"
Door rails	4	11/16" × 2 5/16" × 11 3/16"*
Door glass	2	11" × 14 7/8" (double strength)
Door track	1	23/32" × 1 5/8" × 28 9/16" †
Shelves	4	5/8" × 8 7/16" × 13 7/8" †

*Dimensions include length of tongues and tenons.
†Nominal dimensions given; measure inside of case to size parts for your cabinet.

niques I'll describe.

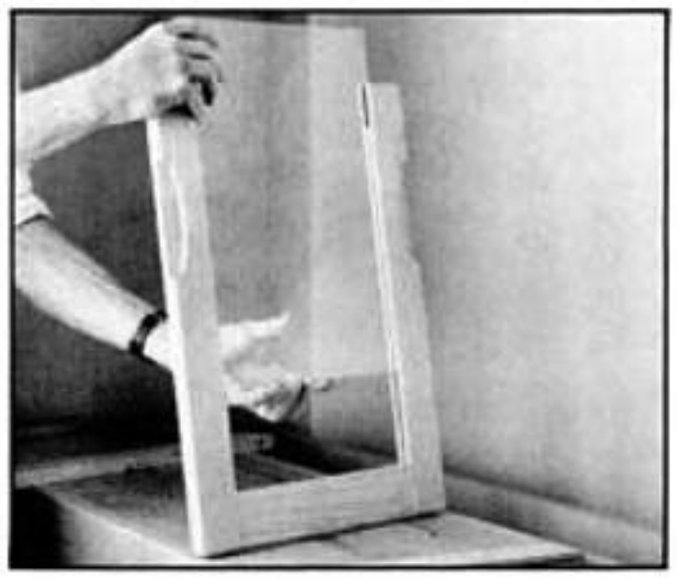
Make the carcase first. Glue up stock for the top, bottom and sides. (See Fig. 1 and Bill of Materials.) Leave the center divider a bit long, but rip it to 8 5/16 in. wide. I edge glued my stock with a 3/16-in. square tongue-and-groove joint, though butt joints will work.

Next, cut the joints for the corners of the case. The half-dovetail rabbet joint I designed for the corners is a nice-looking joint. I developed some handy router accessories and a special jig for making the joint, which are explained in the sidebar on page 23. You could substitute dowels, dovetails or a screwed rabbet joint if you want.

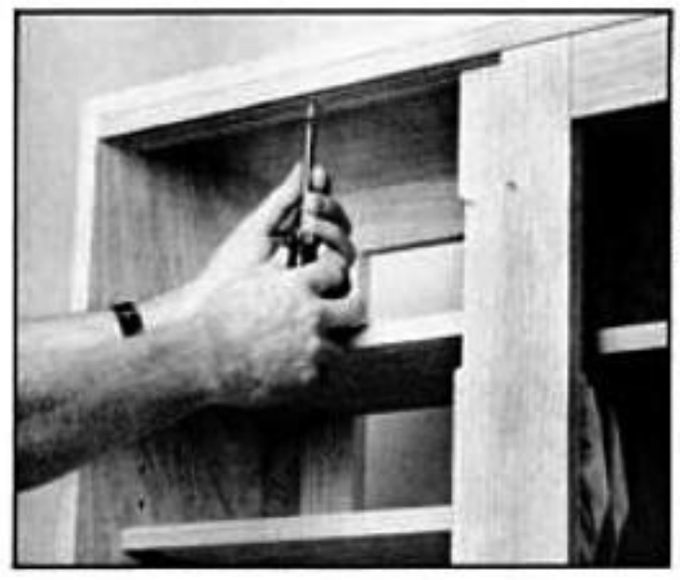
Once you've completed the corner joinery, rout a slot on the rear, inside faces of the sides, top and bottom to receive the tongue of the back frame. (See Fig. 1.) I use a 3/16 in. slotting cutter that cuts a 3/16-in. deep slot (Paso Robles Carbide #TA 293K3, see Sources), and my right-angle jig (see sidebar) to rout this slot with a hand-held router. You could also use a 3/16-in. straight bit and an edge guide, though I think the slotting cutter and jig do a superior job. Also, rout the 3/16-in. square slots on the inside face of the cabinet bottom for the bottom door tracks. (See Fig. 1.)

Next, rout the 3/8-in. wide × 3/16-in. deep stopped dadoes in the center of the top and bottom for the divider. Cut the dadoes 8 1/8 in. long, measured from the back slot toward the front. I clamp a straight fence across the pieces, and rout the dadoes with a 3/8-in. straight bit.

Now, dry clamp the carcase together, and measure the length and height of the inside to determine the correct dimensions for the divider and back frame. These measurements are critical for a good fit. The drawings show the dimensions of my carcase, but slight variations in the geometry of the dovetailed rabbet joints at the corners may vary the inside dimensions for your carcase. When you have these dimensions, add 3/8 in. to the length and height to give the overall dimensions for the back frame (including



No need for keeper strips or glazing putty. The top rail on the door frame is removable, so the glass can slide into grooves routed in the stiles and rails.



PHOTOS BY MITCH MANDEL

The removable door track at the top of the cabinet simplifies the sliding-door installation.

the $^3/_{16}$-in. tongue) and divider. (See Fig. 1.)

Cut the divider to length, and machine the tongues to fit the dadoes. Lay out and drill the shelf-hanger holes on 1-in. centers on the divider and sides (See Section View, Fig. 1.) I prefer "L"-shaped brass hangers with $^3/_8$-in. long, $^1/_4$-in. diameter studs. It's a good idea to stack the top, bottom and sides of the cabinet on stickers to avoid warping while you make the back and doors.

As I mentioned, I like to make the back an open frame, though you could easily let in solid panels if you prefer. Size the stiles and rails according to the inside case dimensions taken before, making sure to allow material for the rail tenons and the tongue around the perimeter of the frame.

The center stile of the back frame joins the top and bottom rails with half laps. I cut the laps in the two rails at the same time by clamping them together edge to edge and removing the wood with a fence-guided router. I use a $^1/_2$-in. flush-trim bit with a $^1/_2$-in. long cutter and $^1/_2$-in. dia. pilot bearing mounted above the cutter (Paso Robles Carbide #TA 170, see Sources). That way I can place the fence right on the layout lines for the laps—the bearing rides the fence, while the cutter removes a section of wood right up to the lines. You can also cut the lap joints with a dado blade on the tablesaw.

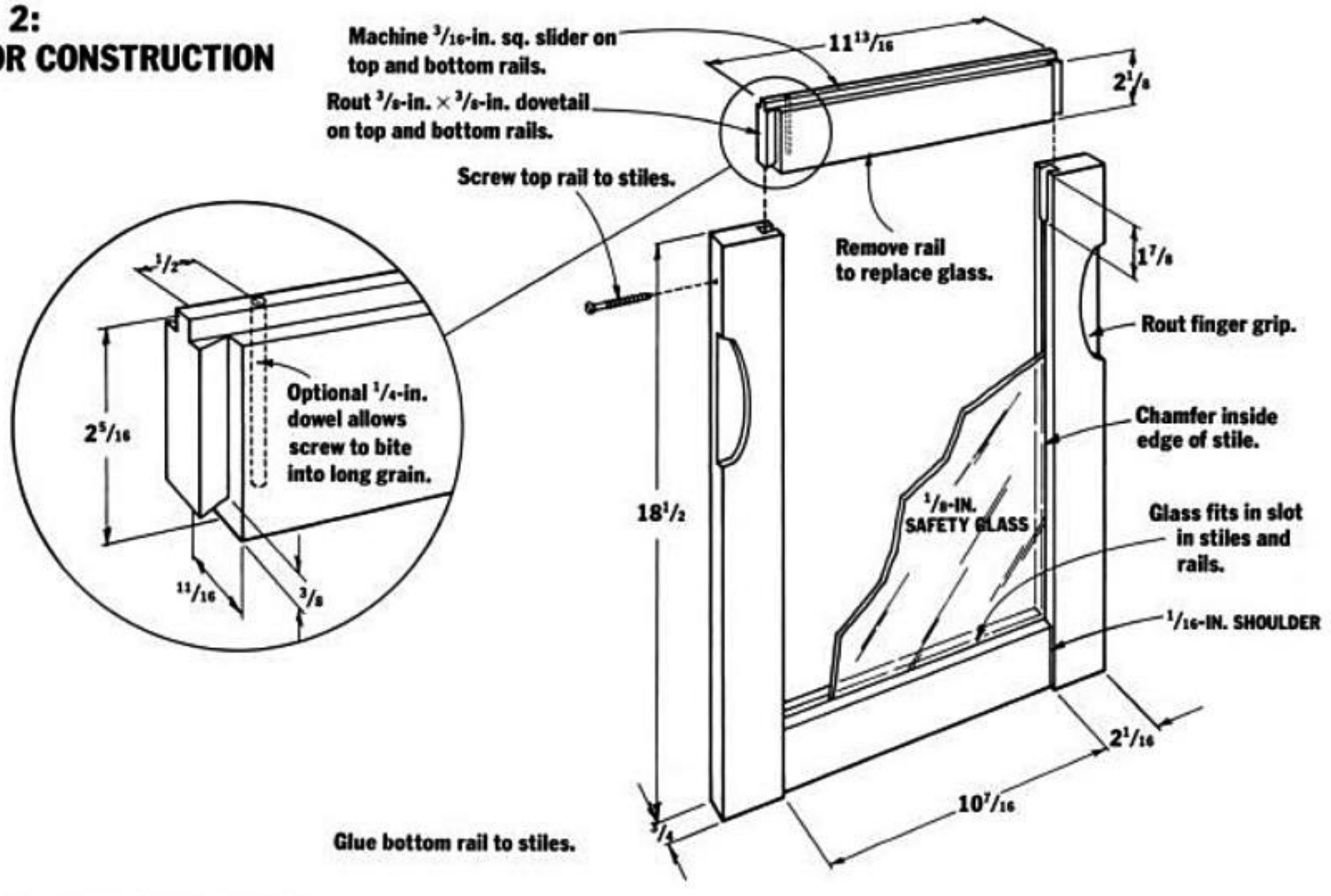
Rout laps on both ends of the center stile, using the same method you used before. Glue up the back frame, and when it's dry, rout a centered $^3/_{16}$-in. square tongue around the perimeter of the frame.

Making the Doors

The door construction is the most interesting element in the whole cabinet. The door frames are joined with $^3/_8$-in. sliding dovetails, which allows the top rail to be easily removed for replacing the glass, as shown in the photo and Fig. 2. This joint detail also makes the doors strong, and it looks nice as well.

Cut the door stiles and rails to the dimensions given in the Bill of Materials, which includes an allowance for dovetails and sliders on the rails. The dimensions given allow the doors to overlap about $^1/_2$ in. when they're closed. Cut a $^1/_8$-in. slot centered along the

FIG. 2: DOOR CONSTRUCTION



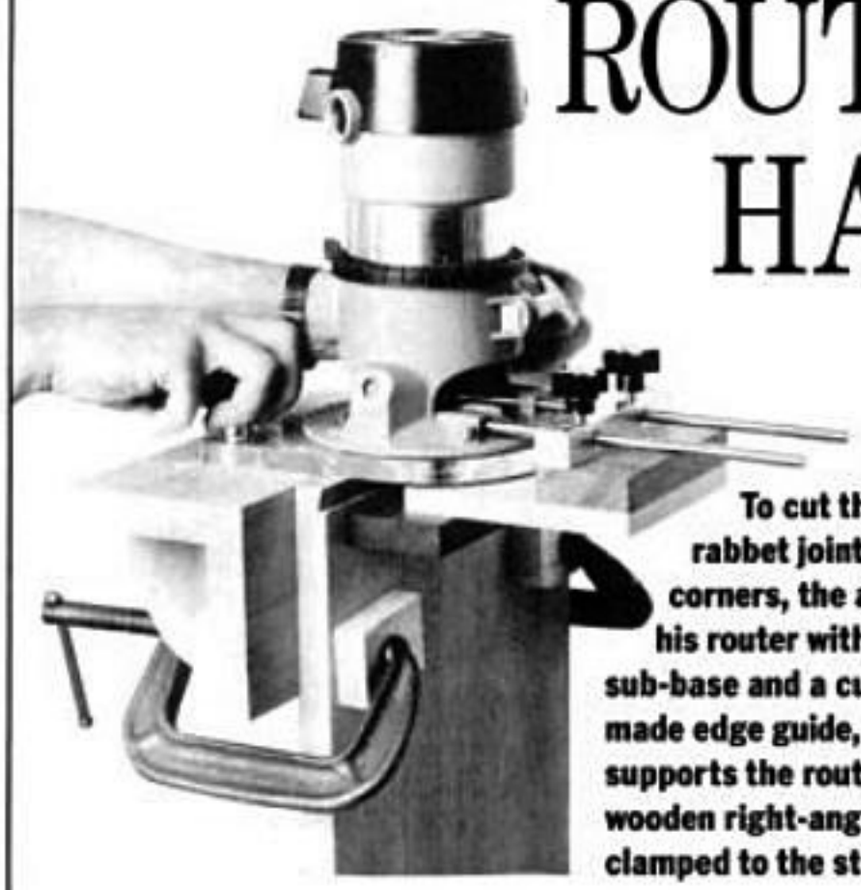
inside edge of each piece to accept the glass. I used a 1/8-in. three-wing slotting cutter on the router table, making the slots 5/16 in. deep. Glass thickness may vary slightly from sheet to sheet, so adjust accordingly. Note that the stiles and rails are different thicknesses to provide a visual accent, so reset the cutter height as required to keep the slot centered. Cut a slight chamfer on the inside edges of the stiles with a sharp block plane. Also, cut 3/16-in. square tongues centered on the outside edges of the rails to act as sliders for the door tracks. (See Fig. 2.)

To cut the dovetail joint, I used a 3/8-in. dia., 9° dovetail bit and made the cuts on a router table. The ends of the stiles should fit flush with the rails, leaving only the slider tongues protruding when the door frame is assembled. (See drawing.)

Next, rout finger grips into the stiles. I used a 1/2-in. dia., 14° dovetail bit and pressed a 5/8-in. O.D. pilot bearing on the shank. With this setup, I used a template shaped like the grip profile and made the 3/8-in. deep cut in one pass. The slight undercut looks nice and provides a better grip for the fingers than a straight-sided recess. The location of the grips is arbitrary, but on mine they're centered 5 7/8 in. from the top of the stiles.

Glue the bottom rail into the stiles with the top rail in place but unglued. The top rail is held in place with screws. I used 3-in., twin threaded, #8 drywall screws.

ROUTING A HALF-DOVETAIL RABBET JOINT



To cut the dovetail rabbet joint at the corners, the author fits his router with an offset sub-base and a custom-made edge guide, and he supports the router on a wooden right-angle jig clamped to the stock.

I developed this router-cut corner joint as an alternative to more familiar carcase corner joints such as rabbets, tongue-and-rabbet joints and lock miters. It's a fairly simple joint to make with a router. The joint comes together neatly and squarely and is more resistant to racking than a conventional rabbet.

The tools you need to cut the joint are a 1-in. dia., 14° router bit (see Sources), a router fence, a router edge guide and a right-angle jig, as shown in the drawing.

I make the half-dovetail cut on the side pieces first. I fit a 1 1/8-in. O.D. pilot bearing on the shaft of the dovetail bit above the cutter. The bearing rides against a fence clamped to the work.

Before cutting the actual cabinet pieces, make trial cuts to get the bits and fences set up properly. The idea is to cut the side so the mating horizontal piece will fit perfectly with a 3/16-in. shoulder. When you get the trial cuts to fit right, go ahead and cut the sides.

Next, cut the dovetail rabbet on the top and bottom horizontal pieces. This can be done in a router table, but I've developed a simple right-angle platform jig that clamps to the work. Clamp the top/bottom, as shown in the drawing, and set the edge guide to make a cut with a 3/16-in. shoulder. The router's depth-of-cut should be the same as before.

I've developed a couple of router accessories to make these operations easier and safer. One is an offset router sub-base made of 1/2-in. clear acrylic plastic. A large grip knob on the offset allows you to pull the router against the fence, while pressing the router down on the inboard side of the work. This eliminates tipping and improves control for most portable routing operations. The other accessory is a custom edge guide for use with the offset sub-base. (See Sources.) —*P.W.*

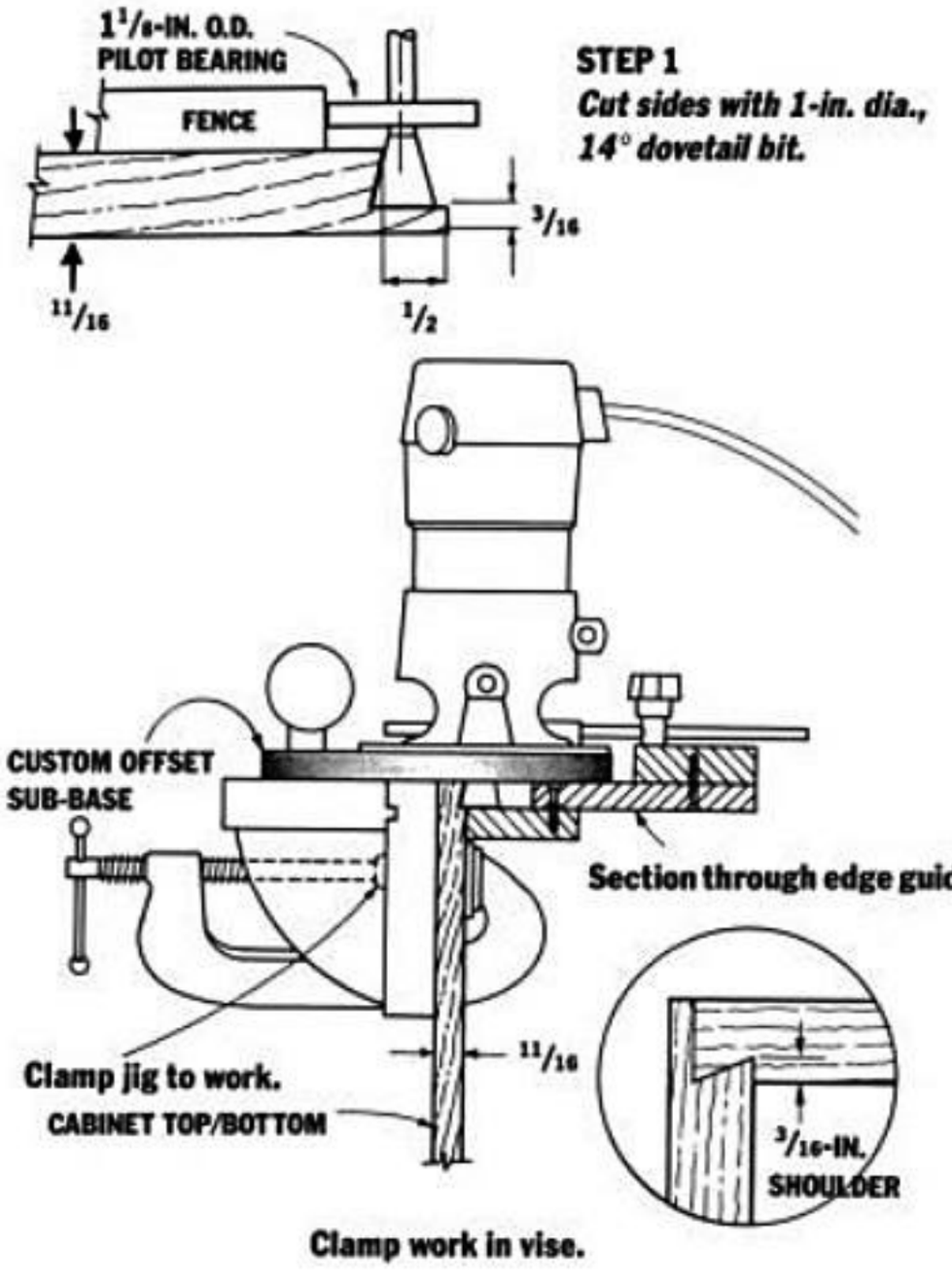
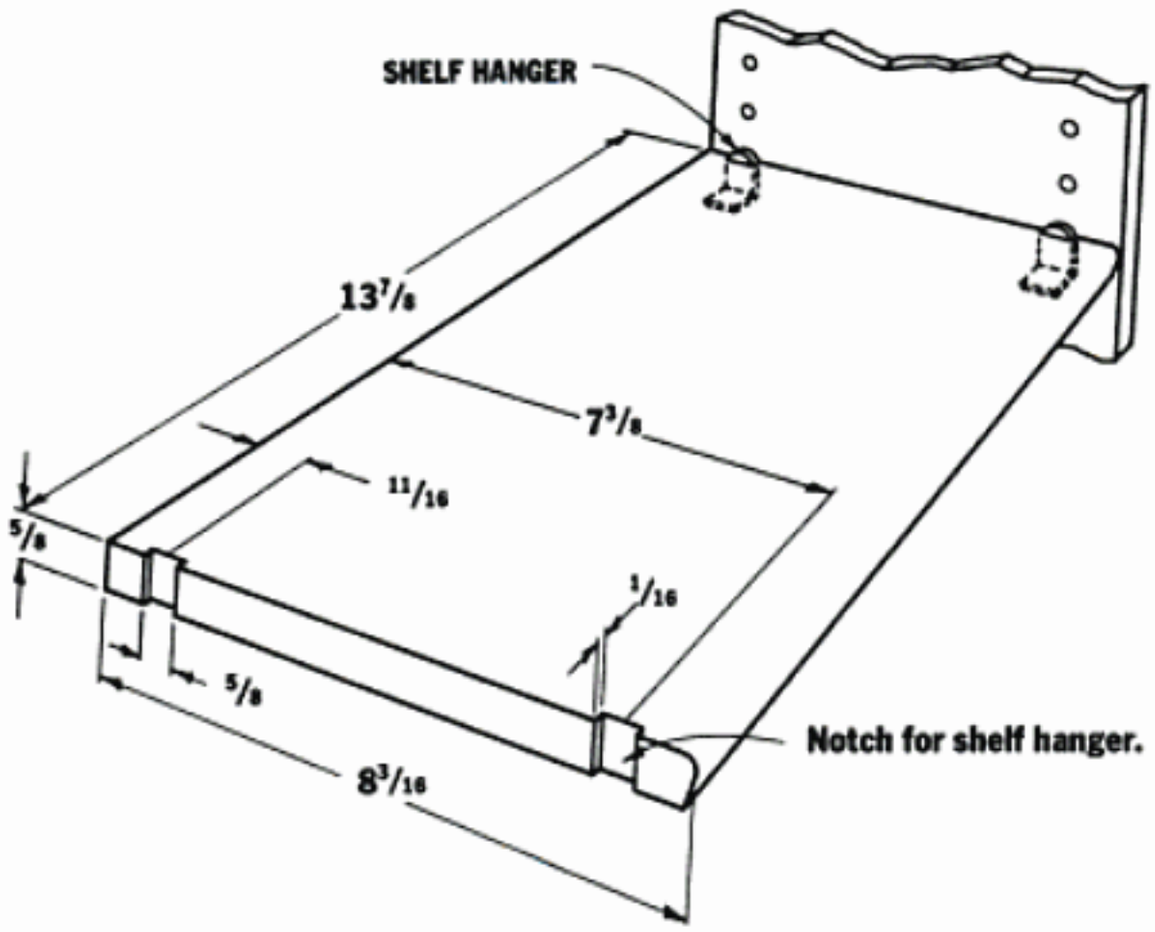


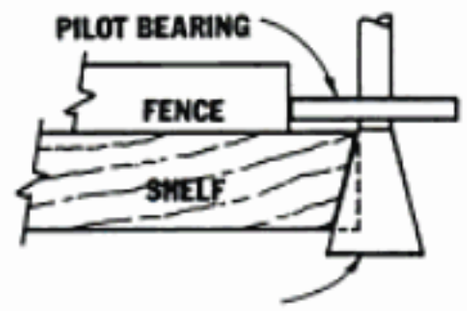
FIG. 3: SHELF CONSTRUCTION



SHAPING THE EDGE

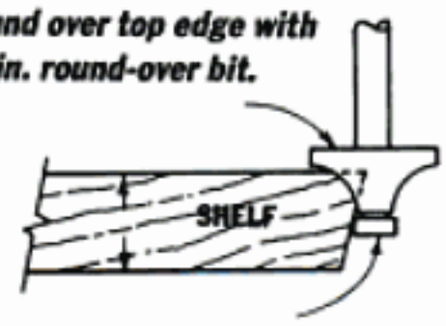
STEP 1

Rout bevel on edge of shelf with 1-in. dia. dovetail bit.



STEP 2

Round over top edge with 3/8-in. round-over bit.



If you don't have double-thread screws, which hold well in end grain, I recommend putting a 1/4-in. cross dowel in the rails, so the screw can bite into long grain. (See Fig. 2.)

Cut the pieces of glass to size by adding 9/16 in. to the length and width of the inside door dimensions. Sand all the members, and polish the slides with 400-grit sandpaper. Remove the top rails, and slide in the glass. Replace the top rails, and screw them in place.

A removable track at the top of the cabinet simplifies the sliding door installation. And since the tongue slider is centered, the door conceals the slot.

Cut the top door track to size, and machine slots according to the detail in Fig. 1. Locate the track 1/16 in. inside the top front, and fasten it with countersunk 1 1/4-in., #8 flat head screws centered between the slots. To install the doors, seat them in the bottom slots, tip them out just enough to put the top track on, tip them back in, and screw the track in place.

The four shelves are notched to conceal the brass hangers and prevent the shelves from sliding out, as shown in Fig. 3. This means the shelves are cut full length, avoiding the usual unsightly gaps where the shelves meet the cabinet sides. Cut the notches wide enough and deep enough to match your shelf hangers.

I routed the smoothed beveled edge on the front of the shelves in two steps, as shown in the drawing. First, I made a bevel using a 1-in. dia., 14° dovetail bit (Wisconsin Knife Works #69420, see Sources) fitted with a 1 1/8-in. O.D. pilot bearing, as described in the sidebar. Then I use a 1/4-in. round-over bit to smooth the top edge.

Assembling the Cabinet

Sand all the parts before assembly. The cabinet can be screwed completely together (as this one is) for knockdown capability, or glued. I used 50 mm (about 2 in.), #8 funnel-head screws for all assembly. (See Sources). These screws have twin sets of threads—one low and one high—that give tremendous gripping power in a 1/8-in. hole whether it's in face or end grain. The head is also designed to make its own counterbore as it's turned in.

First, locate the back frame in the bottom slot. Place the sides on next. Fit the divider into its dadoes, and put on the top. Screw and/or glue the top and bottom to the divider, and screw and/or glue the top, bottom and sides to the back frame. The divider can also be screwed through the center back stile if you want. Two or three screws per edge is sufficient, unless there's some pesky warp that needs to be pulled flat. I covered the screw heads with colored plastic caps specially designed to fit into the cross slots of Phillips-head screws. (See Sources.) You could also counterbore and cover the screw heads with wood plugs. ▲

SOURCES

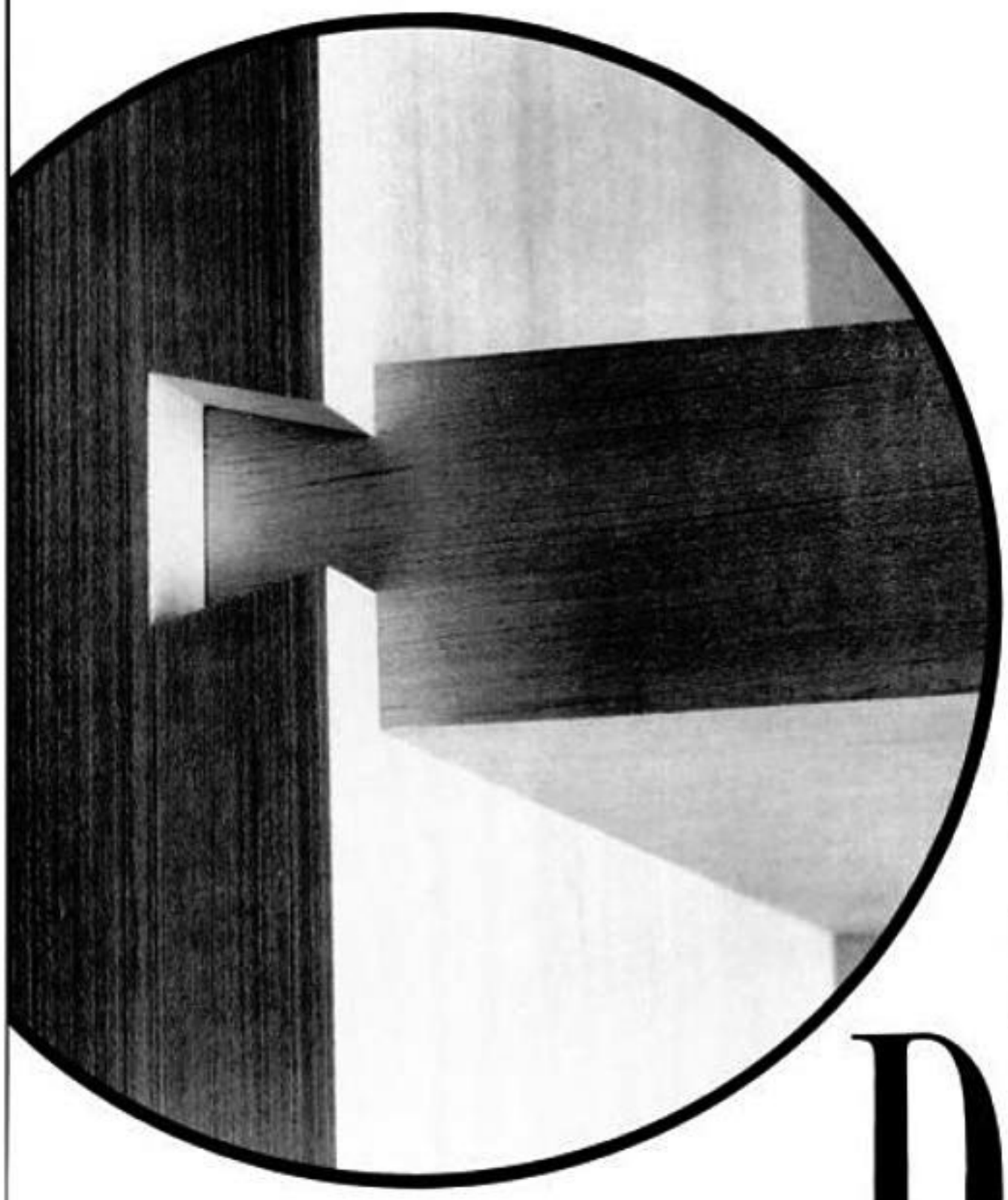
1-in. dia., 14° dovetail bit (#69420):
WISCONSIN KNIFE WORKS, 2710 Prairie Ave., Beloit, WI 53511, 800-225-5959.

3/16-in. slotting cutter (Paso Robles Carbide #TA 293K3) and 1/2-in. dia. flush-trim bit with 1/2-in. long cutter and top-mounted bearing (Paso Robles Carbide #TA-170):
THE WOODWORKS, 14007 Midland Rd., Poway, CA 92064, 619-748-4363.

50 mm, #8 funnel-head screws (#6077), and colored plastic screw caps (#1020-C):
CABINET MAKER SUPPLIES, 12700 NE 124th St., Kirkland, WA 98034, 206-822-8242 ($25.00 minimum order).

Offset sub base ($19.95), and custom edge guide ($30.00) router accessories:
PAT WARNER, 1427 Kenora St., Escondido, CA 92027, 619- 747-2623.

Pat Warner designs and builds furniture, writes about woodworking, and teaches courses in router techniques at Palomar College in San Marcos, California.



Tapered Sliding Dovetails

This Router-Cut Joint Makes Assembly a Breeze

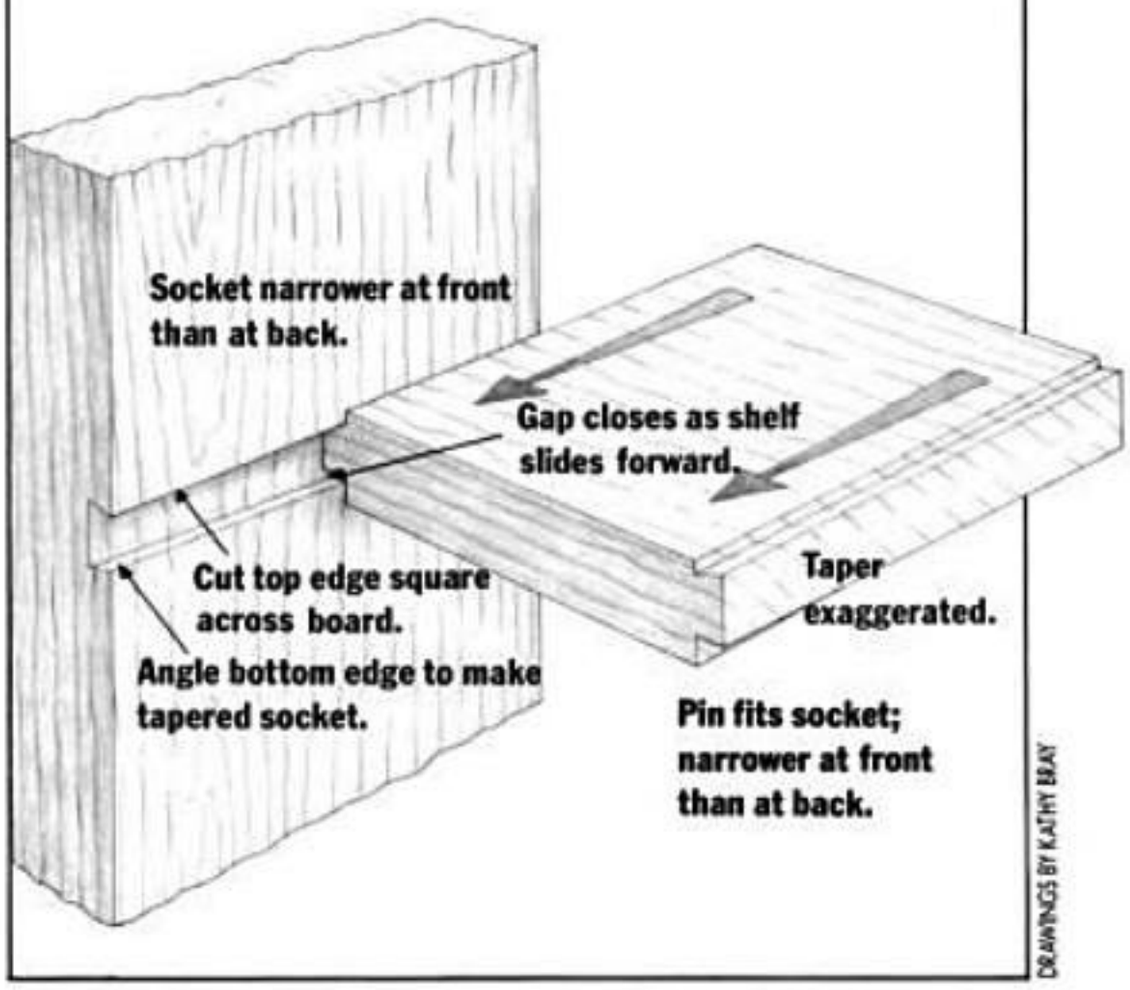
BY W. CURTIS JOHNSON

The sliding dovetail is a marvelous method of joining a board across the grain of another in a "T" configuration. Since the parts interlock and don't really need to be glued, the wood is free to move in situations where long grain is joined to cross grain, such as joining drawer frames to carcase sides. When the joint is across the grain of both boards, as when fastening a shelf in a carcase, the interlock of the sliding dovetail compensates for the weakness of an end-grain glue joint.

But sliding dovetails present problems. A slightly undersized pin can be quite loose in the socket, making a very weak joint. A slightly oversized pin, even one that goes together when dry, may stick before it is completely assembled with glue, and that's the stuff of a woodworker's nightmare. By tapering one side of a sliding dovetail, as shown in Fig. 1, we can get a tight

PHOTO BY MITCH MANDEL

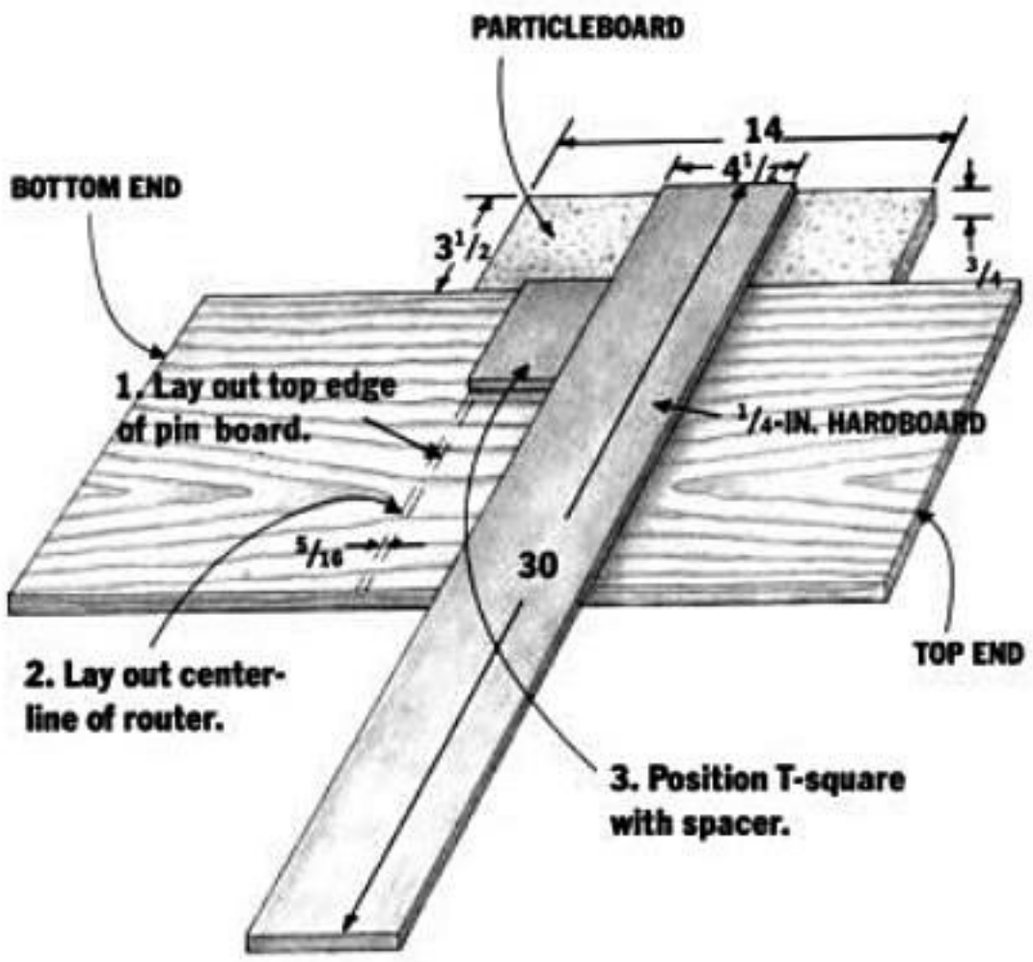
FIG. 1: TAPERED SLIDING DOVETAILS



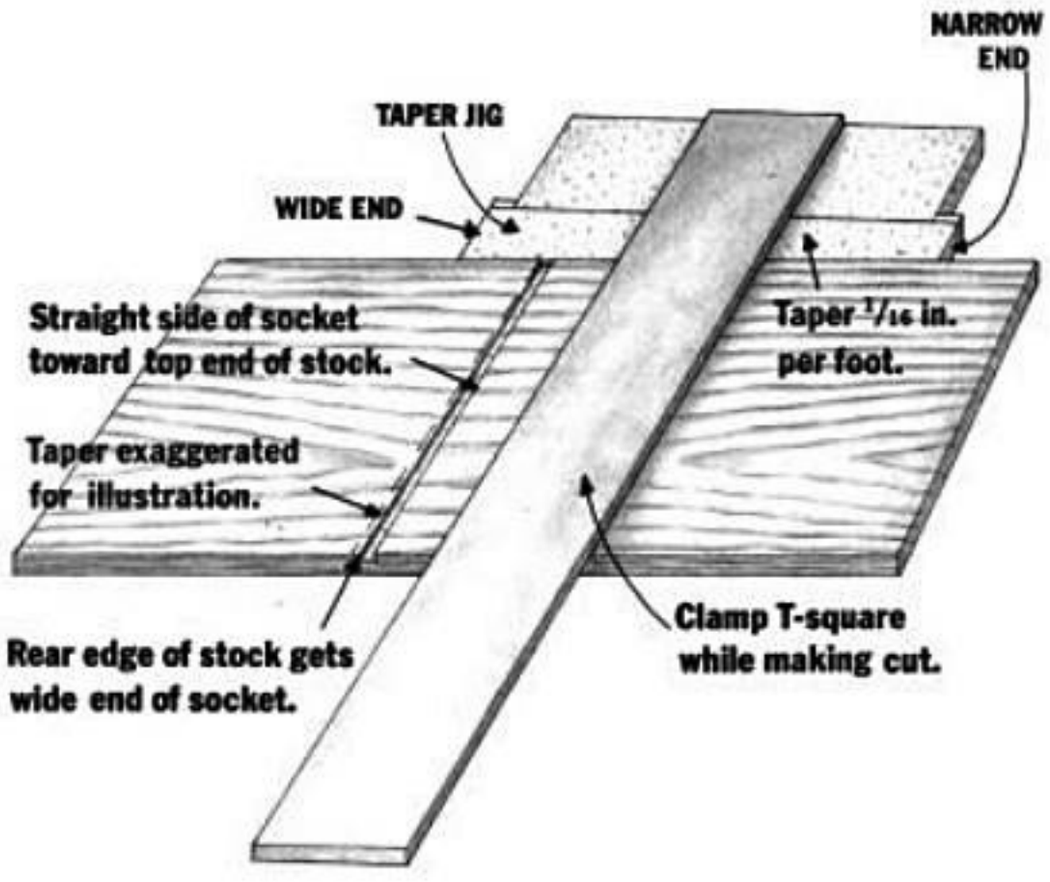
DRAWINGS BY KATHY EBAY

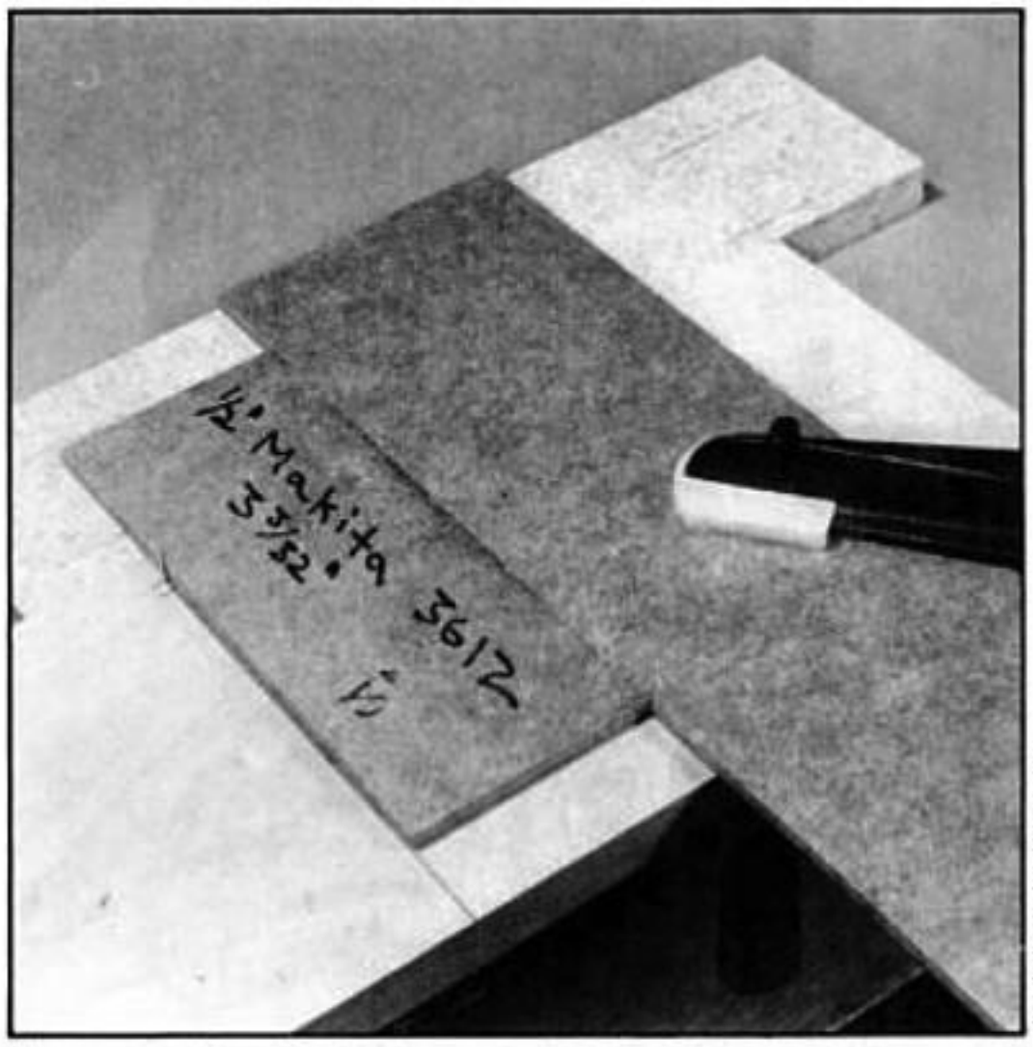
FIG. 2: LAYING OUT THE SOCKET

SETUP FOR SQUARE CUT



SETUP FOR TAPERED CUT





PHOTOS BY W. CURTIS JOHNSON

A spacer half the width of the router base is a slick, repeatable way to position the T-square. The small brad on the centerline of the socket makes relocation a snap.

joint but avoid sticking, because the joint will only be tight when fully assembled. The secret to success is to get the joint to come tightly together just when the two pieces are in the correct position. This article will explain how to get that "just right" fit when cutting a tapered sliding dovetail with a router.

The usual arrangement is to make the top side of the dovetail straight and to taper the bottom side, as shown in Fig. 1. The socket is cut with a hand-held router guided by a shop-made T-square. The T-square is angled slightly to cut the tapered side of the socket, as shown in Fig. 2. The pins are cut on a router table with a jig to hold the boards upright, as shown in Fig. 3. A fine adjustment screw allows the final cut to be made with a succession of passes, each removing a few thousandths-of-an-inch, until the fit is perfect.

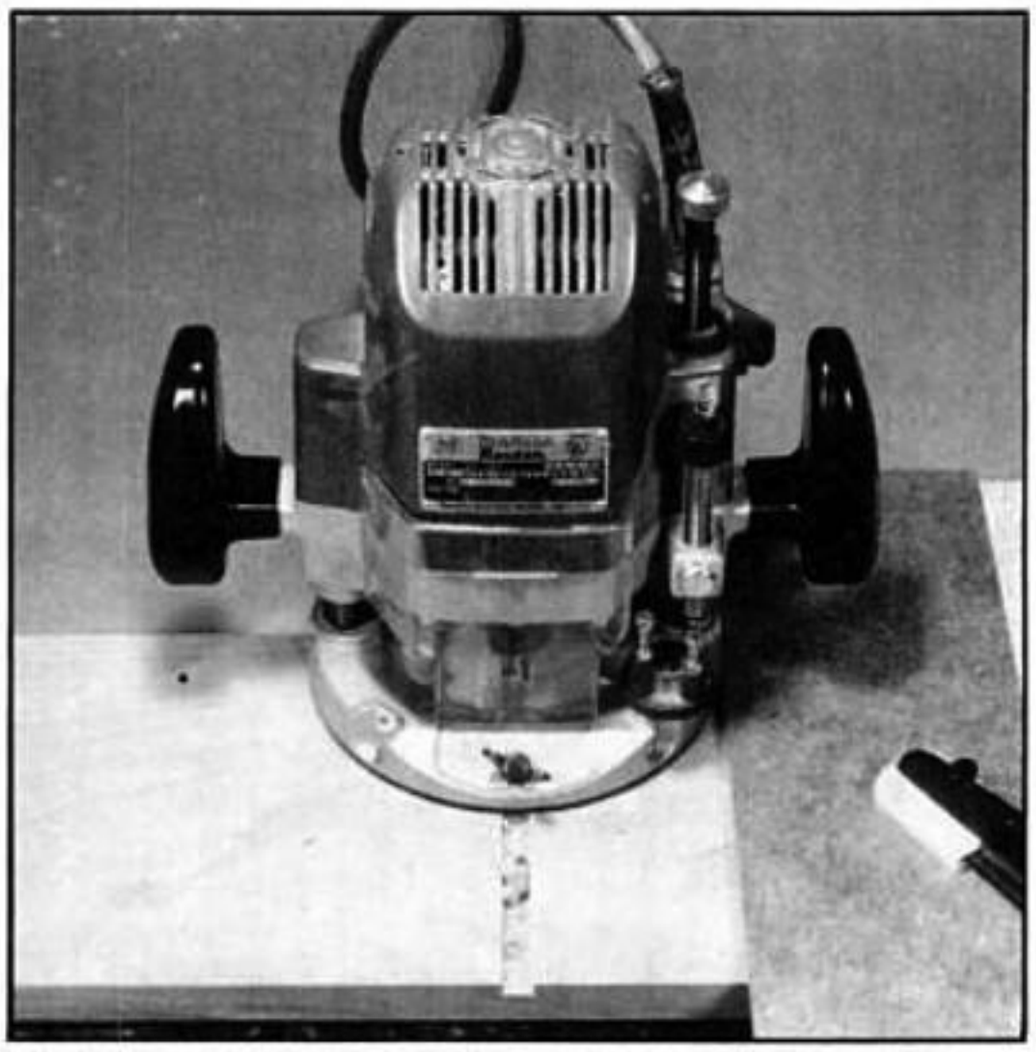
Sliding dovetails are usually used in mirror-image pairs, a left side and a right side, and this system will make both right-hand and left-hand dovetails simply by turning over one of the jigs.

Making the Jigs

The T-square guides the router for cutting the sockets, as shown in Fig. 2. I constructed my square from a piece of 1/4-in. tempered hardboard and a piece of 3/4-in. high-density particleboard. The long sides of the hardboard must be accurately parallel so that both sides of the square can be used. After sizing the piece on a tablesaw, I hand planed the edges and checked for constant width with a dial or vernier caliper. The guiding edge of the particleboard should also be flat. Glue the two pieces together precisely at right angles.

The hardboard spacer shown in Fig. 2 measures exactly half the diameter of the router base. It simplifies positioning the T-square and helps ensure uniformity. Like the T-square, you'll use it often, not just for making sliding tapered dovetails. Make it out of 1/4-in. hardboard, and either mark the width or make it square to avoid using it the wrong way.

The pin jig shown in Fig. 3 holds the board upright



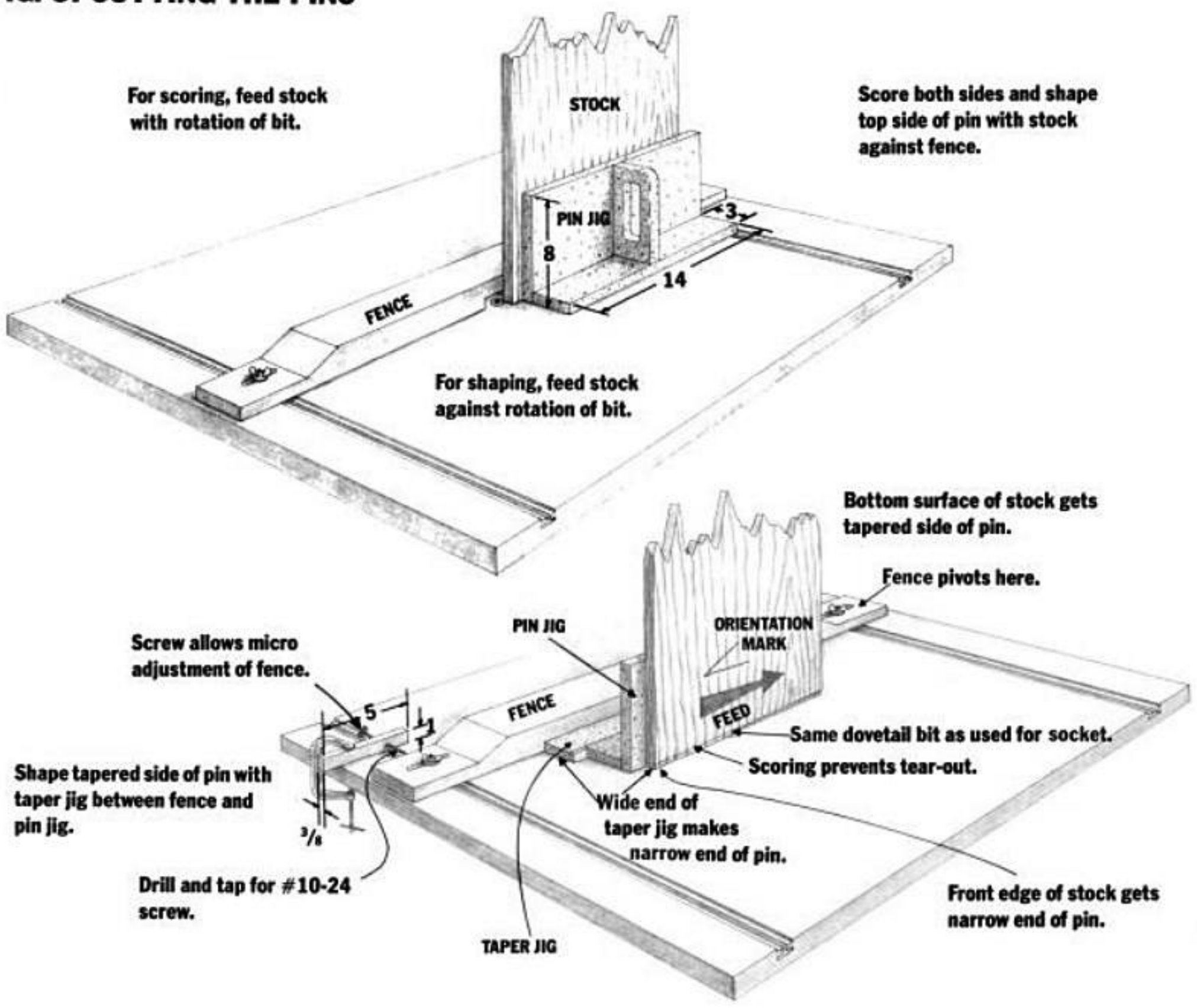
Cutting the straight side of the socket is straightforward routing across a board.

while the pin is cut on the router table. I made it from three pieces of 3/4-in. particleboard. The two long sides of the 3-in. piece must be accurately parallel, so check for constant width with a caliper, as you did for the square. Glue the edge of the 3-in. piece to the 8-in. piece, then immediately glue in the handle while it can still be used to ensure that the two pieces join at exactly 90°. Finally, drill a 1/4-in. hole near either end, and insert a 1/4-in. dowel as a stop.

The taper jig is used with both the T-square and the pin jig to make the taper on the pins match the taper on the sockets perfectly. I made mine out of 3/4-in. particleboard. You can cut the taper on your tablesaw with a taper-cutting jig, or you can lay it out and carefully plane it by hand. Make the jig about 1 1/2 in. wide and a couple of inches longer than the pin jig. I use a taper of 1/16 in. per foot.

Two 1-in. × 3/4-in. × 1/4-in. hardboard stops on the ends of the jig key it to the pin jig for cutting the pins, as shown in Fig. 3, and less importantly, to the T-square, as shown in Fig. 2. Use the base of the pin jig as a spacer when you glue the stops to the taper jig. If that makes it too tight for the T-square, shave the ends of the T- square head. Make sure there are no beads or smears of glue on the edges of the taper jig.

FIG. 3: CUTTING THE PINS



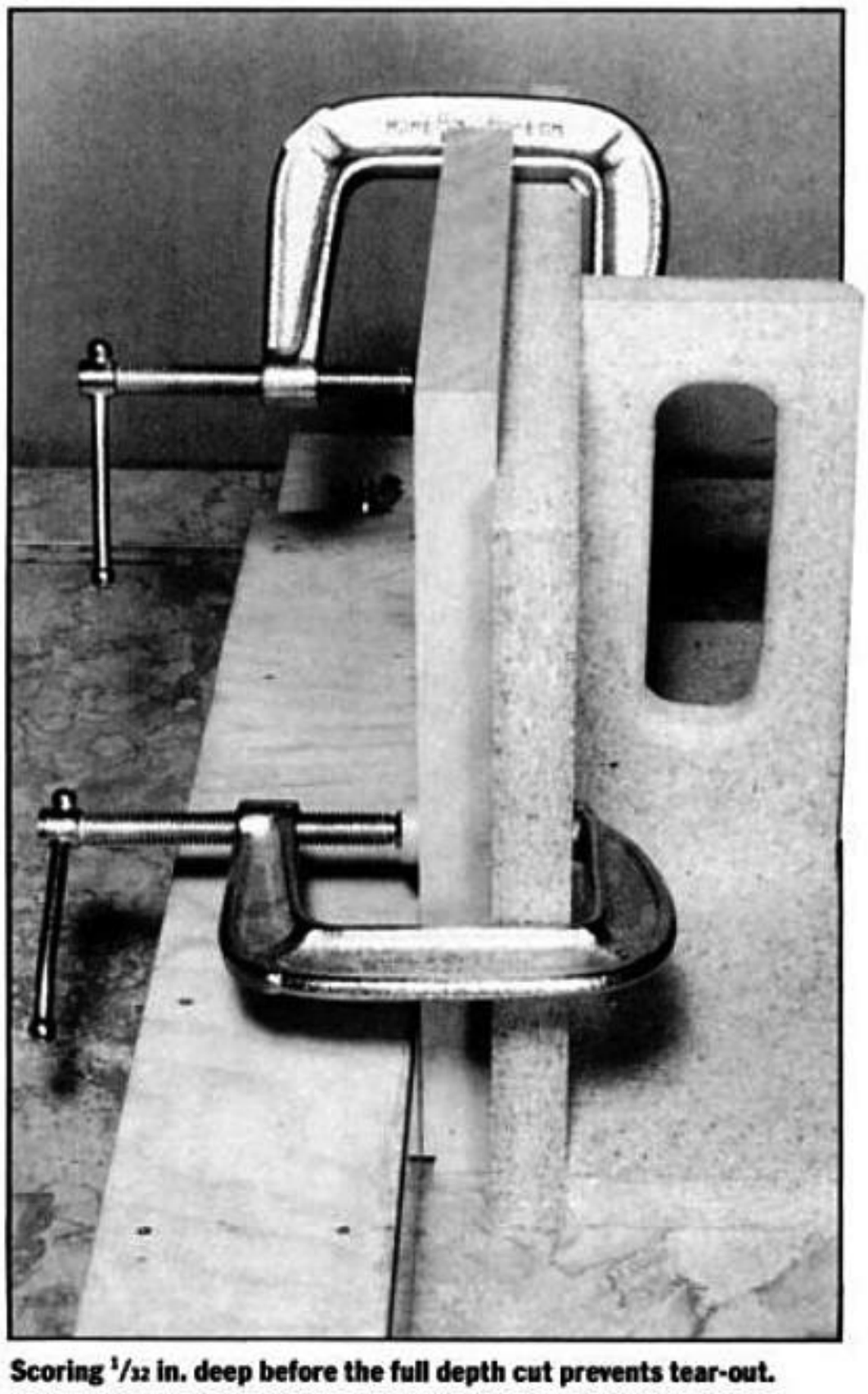
The micro-adjustment screw shown in Fig. 3 moves the fence over in very fine increments (handy for a lot of operations). To make it, I simply drilled and tapped a 1-in. × 5-in. piece of 3/8-in. aluminum at one end for a #10-24 screw. If you round over the end of the screw with a file, it won't scratch or gouge the fence. I screwed a wing nut on tight to act as a handle for adjustments. If the screw tends to turn on its own when the router is running, add a lock nut. At 24 threads per inch, a quarter turn moves the screw about 0.010 in. Since the bit is half-way between the pivoting end of the fence and the moving end, a quarter turn of the screw moves the fence only .005 in closer to the bit.

Cutting the Joint

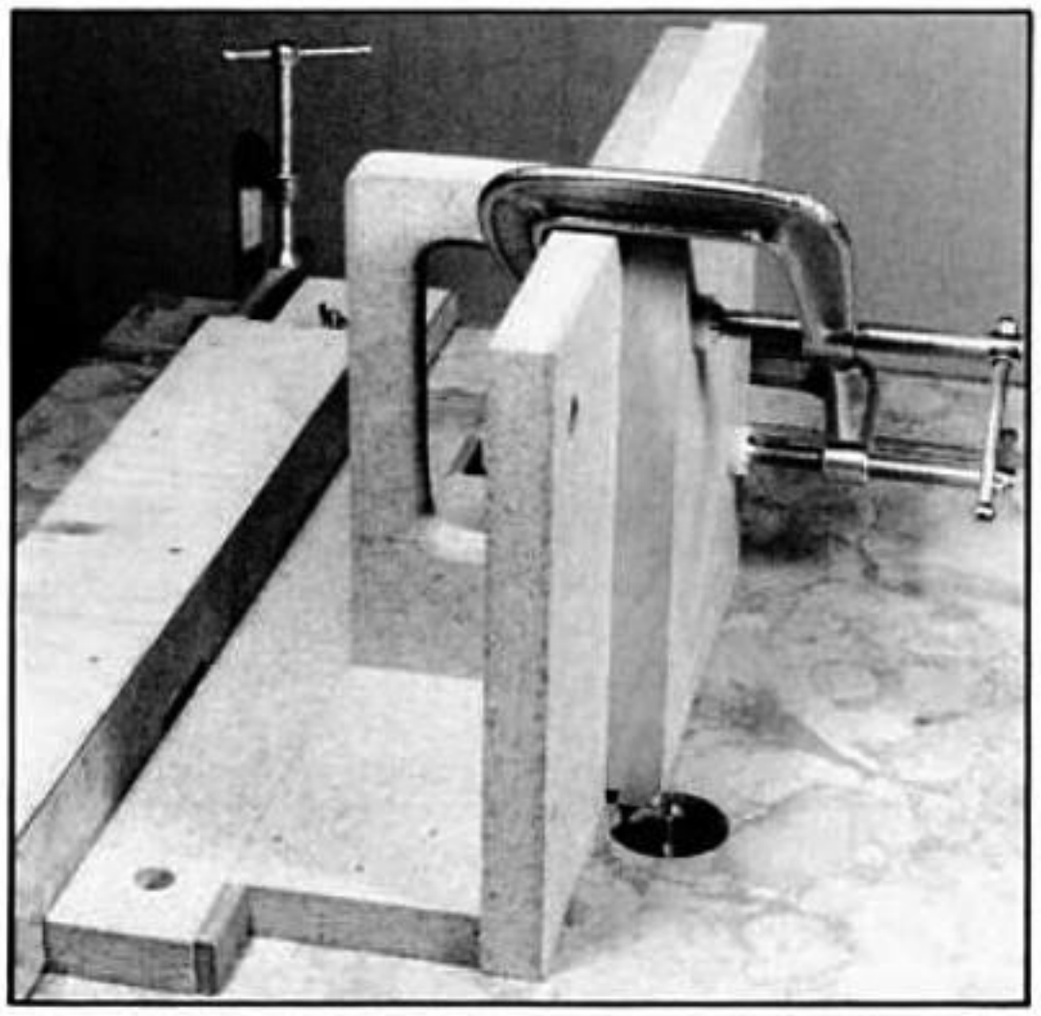
With the jigs made, you're ready to cut joints. I use a 1/2-in. dovetail bit with a 14° angle. The 1 in 4 pitch of 14° simplifies working out the dimensions of the joint. You can use a different bit, but study the relationships between dimensions shown in Fig. 4 to help with the other changes you'll need to make. (With the 1/2-in. × 14° bit, you won't have to change anything.) With the taper of 1/16 in. per foot of my taper jig, I can use the same jigs for 3/4-in. boards, forming a joint up to 24 in. long. I make the joints 3/16 in. deep.

To rout the socket, first mark the position of the top

The micro-adjustment screw provides fine adjustment of the router fence.



Scoring 1/32 in. deep before the full depth cut prevents tear-out.

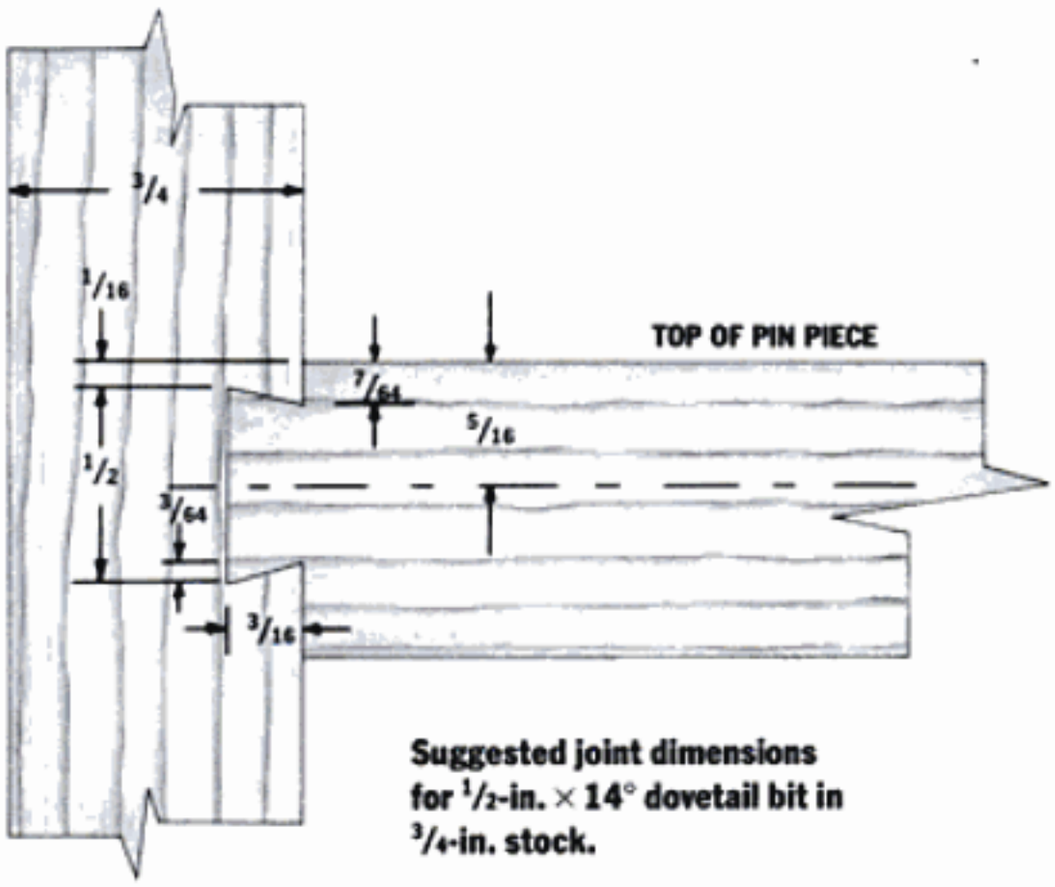


To cut the tapered side of the pin piece, place the taper jig between the router-table fence and the pin jig.

edge of the pin board, as shown in Fig. 2. For 3/4-in. stock, the centerline for the router should be 5/16 in. below this point. Lay out the centerline on the stock, and if the dovetail is to be through (not stopped) square the centerline around the front edge, so you'll still have a mark after the first cut. Use the spacer to position and clamp the square half the width of the router base from the centerline. If you want to stop the socket for a blind dovetail, mark a stop line on the guide piece of the square. With the router base against the square, rout the straight portion of the socket.

With the straight side of the socket cut, put the taper jig between the square and the front edge of the board. Be sure that it causes the square to angle in

FIG. 4: JOINT DIMENSIONS



Suggested joint dimensions for 1/2-in. × 14° dovetail bit in 3/4-in. stock.

the correct direction; normally the taper will be on the bottom edge of the socket. Use the spacer to position the square from the centerline at the front edge, and clamp the square in place. Now rout the tapered (bottom) edge of the socket.

To cut the pins, mount the same dovetail bit in your router table, and adjust its height using the socket as a guide. Cutting slightly shallower is better than slightly deeper, so I use a .005-in. feeler gauge to position the bit slightly lower than the depth of the socket.

To prevent tear-out when routing the pins, I begin by scoring the stock. I do it by exposing the dovetail bit about 1/32 in. beyond the fence and taking a climb-cutting pass on both sides. (Climb cutting is when you feed the stock in the same direction as the cutter rotation. It is not normally done, because the cutter can grab the stock away from you. But just scoring the surface fibers to a depth of 1/32 in. is quite safe.) Clamp the boards to the pin jig to keep them vertical. All the rest of the cuts can now be made against the rotation of the bit without tear-out problems.

Naturally the pins have to match the sockets, so they need a top (straight) side, a bottom (tapered) side, a front (narrow) end and a back (wide) end. Mark the sides of the pin boards that are to be tapered (usually the bottom sides) with an orientation mark as shown in Fig. 3 with the pointed end of the mark at the narrow end of the pin (usually the front edge of the stock). Be careful, it is easy to cut the pins incorrectly.

Now adjust the fence to expose the bit 7/64 in., as shown in Fig. 4. Rout the straight side of the pin with the top face of the board against the router-table fence and the orientation mark against the pin jig.

Cutting the tapered side of the pins is last. For this, the taper jig goes between the router-table fence and the pin jig and moves with the pin jig during the cut, as shown in Fig. 3. The hardboard stops key the two together.

To cut the tapered side of the pin, clamp the top face of the pin board against the pin jig with one edge against the 1/4-in. dowel. Now with the taper jig against the fence and the pin jig nestled between the stops, the dovetail bit can cut the tapered edge of the pin on the outside of this sandwich.

Notice that both sides of the pin are cut with the top side of the board toward the fence. A board that is not uniformly thick will still receive an accurately cut pin.

For a perfect fit, we need to creep up on the proper width of the pin a shaving at a time. First cut the tapered side of the pin so the pin is clearly too wide to fit the socket. Here is where the last jig, the micro-adjustment screw, comes in. First test the fit. Each inch that the pin won't slide home corresponds to about .005 in. in the width of the pin. Use the screw to adjust the fence, but creep up on a perfect fit by trial and error. At least until you get a feel for it, don't move the fence over more than a quarter turn of the screw without testing the fit in the socket.

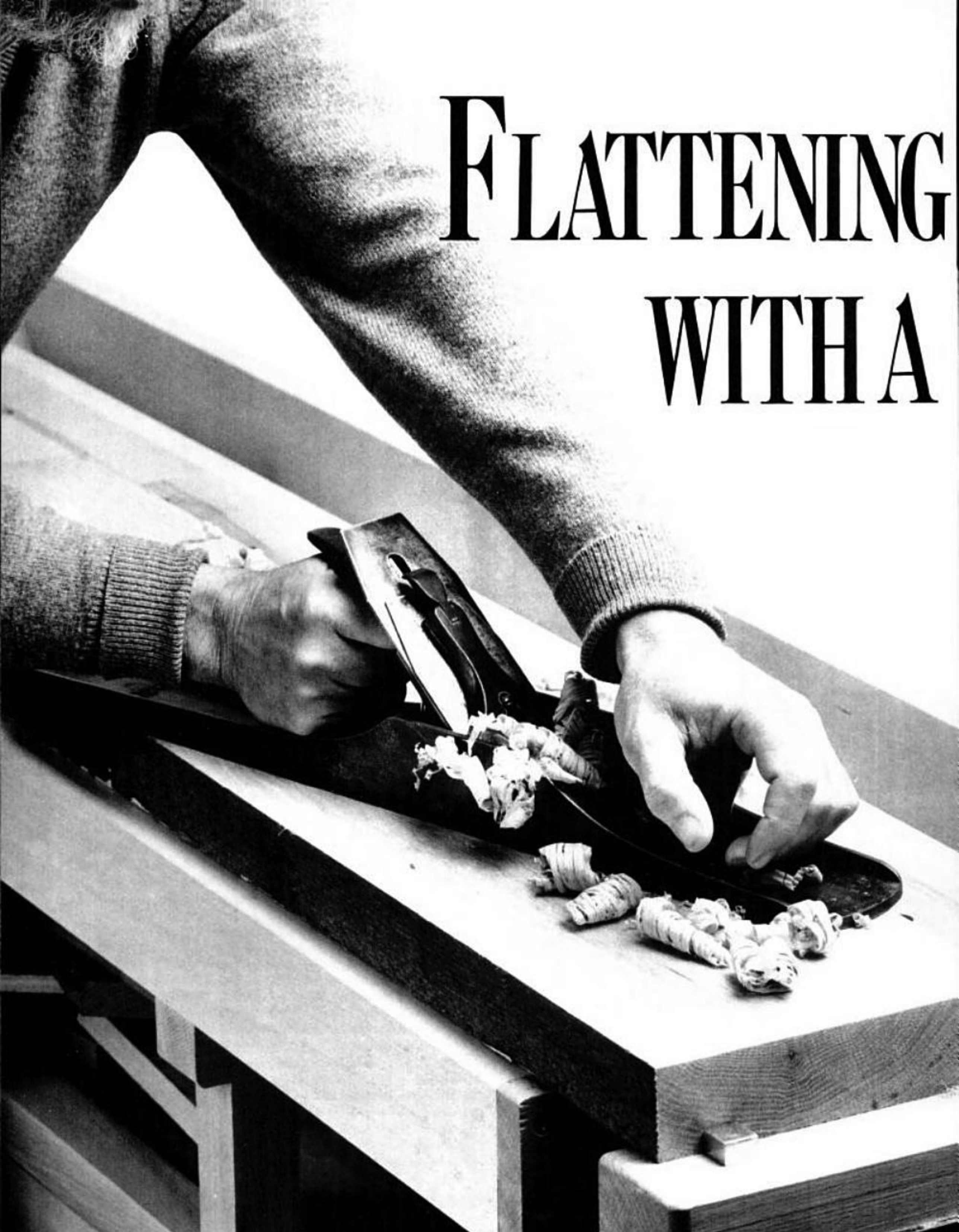
There is some leeway in the fit. You can use a mallet to tap the joint together about another inch, although when glue is added you will probably only gain 1/2 in. If the pin is just slightly undersize, putting glue on both sides of the entire joint will tighten it up. Also, you can hedge your bets by using an extra-wide board and trimming either the front or rear as necessary after the joint is completed. However, if you use the micro-adjustment screw judicially other measures will not be needed.

When there are a lot of sliding dovetails to cut, it would be nice if all of the sockets were exactly the same. With wood, they never will be. When doing blind (stopped) dovetails I create a stop for positioning the T-square by putting a small brad on the centerline for the router and exactly 1/4 in. from the front edge. The small hole will be covered by the pin board. The brad is removed for any routing but ensures that the taper cut will be positioned in the same way as the straight cut. This system is very precise by woodworking standards, plus or minus a few thousandths, but it won't eliminate trial fitting of the pins.

To make cutting the taper on a lot of pin boards easier, I first separate the right-hand joints from the left-hand joints, and treat them as two batches. I work on just one pin in one of the batches until it almost fits in the largest socket. I then cut all the tapers in the batch with that setup and check their fit. For the next trial fitting, I turn my adjustment screw an eighth of a turn and take another shaving off all of the tapers. Some pins will fit, but others will still be too large. Another eighth of a turn on the screw reduces the oversize pins again. A third reduction in size may be needed for a few tapers. I then start over for the other batch. Right-hand and left-hand joints can't be done in the same batch.

One final word of caution: Try to arrange your work so that the joints will be assembled very soon after they are cut. A change in humidity could present a real headache. Satisfaction comes from making a rugged joint that industry is pretty unlikely to replicate. ▲

W. Curtis Johnson is a biophysicist in the Department of Biochemistry/Biophysics at Oregon State University. He is also a part-time professional woodworker and contributing editor for AW.



FLATTENING WITH A

BOARDS BENCH PLANE

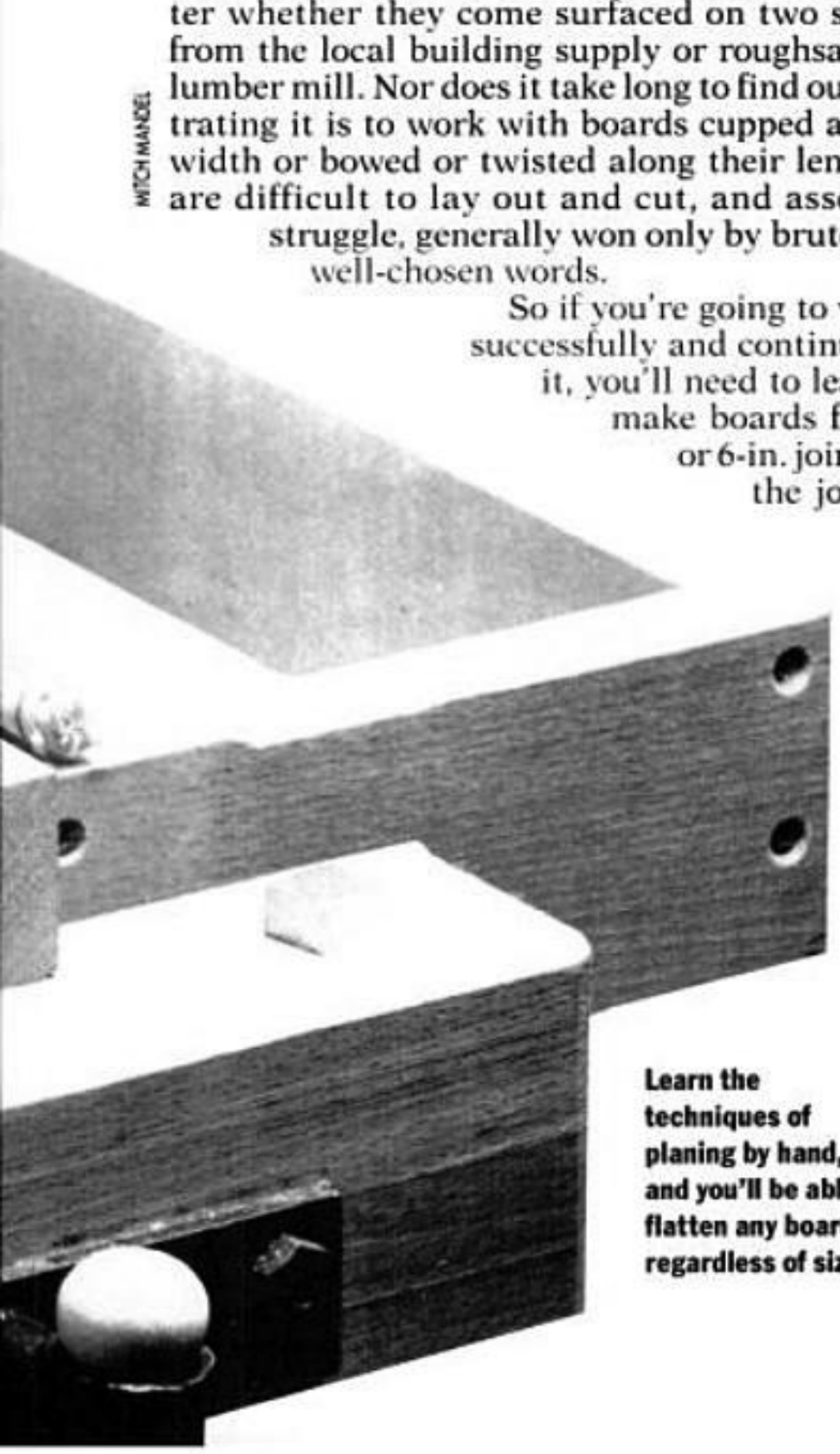
Discover the Pleasures of Doing It by Hand

BY ROGER HOLMES

You don't have to work with wood very long to discover that few of the boards you buy are flat. It doesn't matter whether they come surfaced on two sides (S2S) from the local building supply or roughsawn from a lumber mill. Nor does it take long to find out how frustrating it is to work with boards cupped across their width or bowed or twisted along their length. Joints are difficult to lay out and cut, and assembly is a struggle, generally won only by brute force and well-chosen words.

So if you're going to work wood successfully and continue to enjoy it, you'll need to learn how to make boards flat. A 4-in. or 6-in. jointer will do the job if you're willing to rip everything into narrow strips and reglue. (You can reduce boards to uniform thickness with a planer alone, but it won't make them flat.) Flattening, thicknessing, edge joining and gluing enough strips for a 36-in. tabletop is no picnic. And there are times when you just don't want to cut a nice, wide board into strips.

A hand plane allows you to flatten any board, regardless of the board's width, length or thickness. Flattening piles of boards with a hand plane can be strenuous and tedious work. (It was deemed an ideal character-building task for generations of apprentices.) But if you don't have access to a wide jointer, you have no choice. Even if you do, it's useful to know how to flatten boards by hand. If you understand the hand technique, you'll use your machines more skillfully. And when you get a special, wide board, you'll be able to work with it intact.



MITCH MANDEL

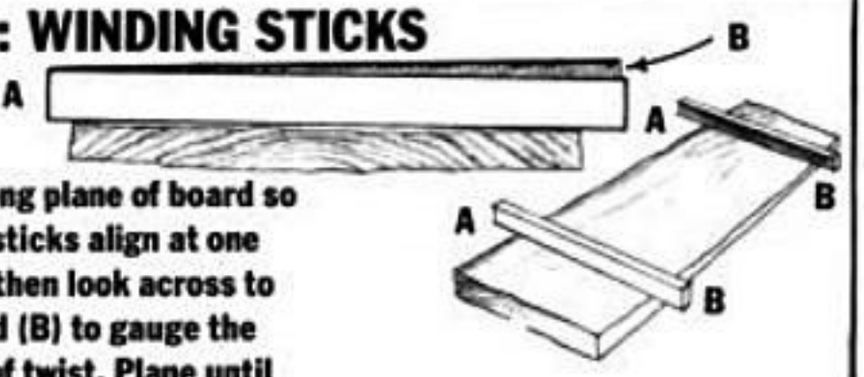
Learn the techniques of planing by hand, and you'll be able to flatten any board, regardless of size.

Tools

You don't have to spend a lot of money for machine tools to flatten and thickness boards. All you need are a sharp hand plane and a workbench, a pair of winding sticks—two straight sticks that gauge the twist of a board—and a marking gauge.

I do all my hand planing with an old Stanley 07 jointer plane. Its 22-in. long sole bridges high spots on a board, instead of riding up and down on them as a shorter plane would. It's heavy, so I don't have to bear down to get the job done. The only drawback is its narrow throat. Because I use this one plane for everything, I've set the throat for finer work, so when I use it for rough planing, the thicker shavings have a tendency to clog the throat. This just means I have to stop and clean out the shavings a little more often. If you plan to do a lot of rough planing, you could do what the old-timers did, and use a scrub plane with a wide throat and a blade that's slightly rounded across its width. A scrub plane is capable of removing a lot of

FIG. 1: WINDING STICKS



Sight along plane of board so winding sticks align at one end (A), then look across to other end (B) to gauge the amount of twist. Plane until sticks align at both ends.

DRAWINGS BY KARL SHUMAKER

PHOTOS BY SCOTT LANDIS

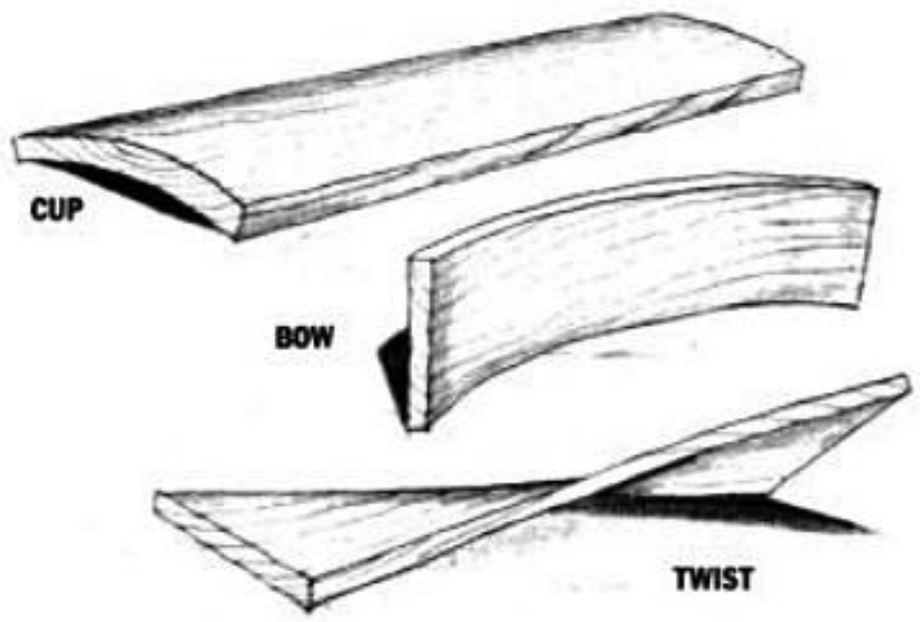
Sight across the top edges of a pair of winding sticks to see if a board is twisted along its length.

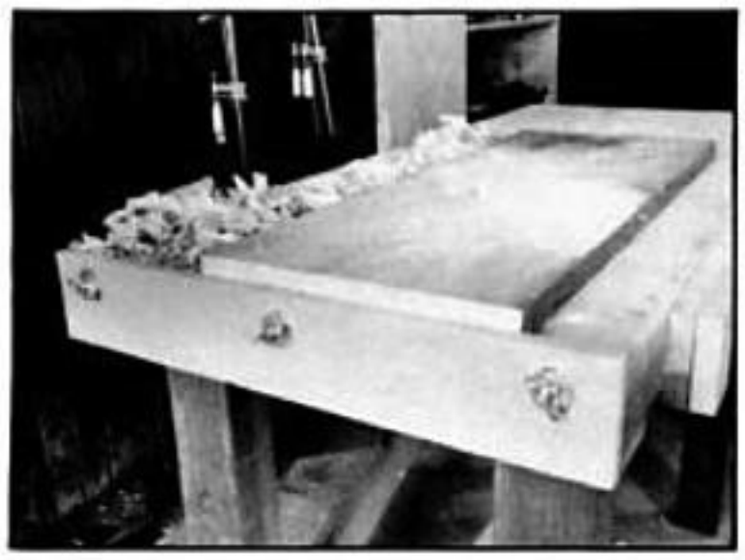
wood quickly. Whatever plane you use, don't worry about the size of the plane you use. Any bench plane (smooth, jack, fore or jointer) will do. It's more important that you feel comfortable with the plane, and keep it sharp.

A workbench fitted with a tail vise and bench dogs is ideal for face planing all but the longest boards. Unfortunately, I don't have one in my current shop, so I've rigged up an adjustable stop on the end of my simple, slab benchtop, as shown in the photo on page 32. I've found that planing into this stop works for most boards, even when planing diagonally across them. A bench dog or two in the holes along the back of the bench helps to hold boards that would otherwise slip around.

It's important that the top of your workbench be flat. A flat benchtop serves as a gauge for determining

FIG. 2: COMMON BOARD AILMENTS



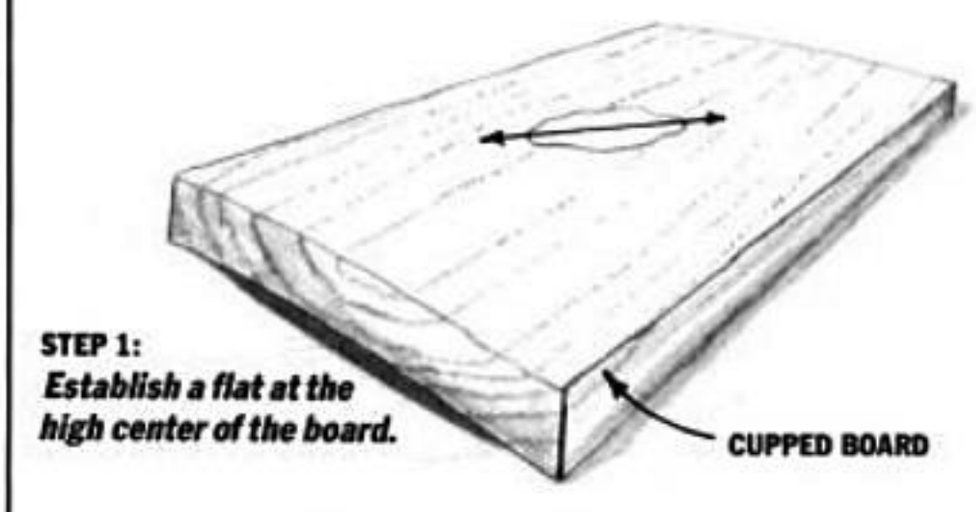


Planing against a simple stop across the end of the bench keeps the board from sliding.

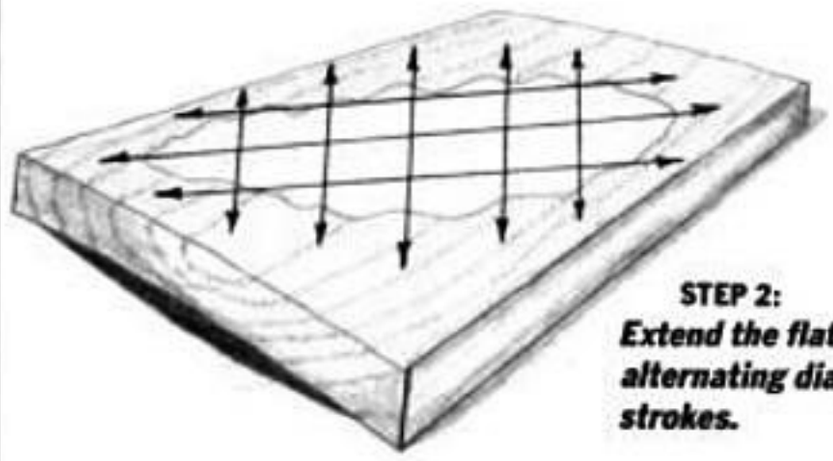
a board's deformities. It's difficult to plane a board flat, particularly a thin one, when it's supported by an undulating surface. Planing your wooden benchtop is an ideal way to practice flattening a surface—it's thick enough so you can keep at it until you get it right.

Winding sticks help you gauge how much a board is twisted along its length. (A twisted board is said to be "in winding" or "wound," hence winding sticks.) They're simply two long, narrow pieces of wood of exactly the same width, as shown in the photo and Fig. 1. They're easier to use if the top edges are two contrasting colors. A handsome mahogany pair I've seen had inlays of ebony on the top edge of one stick and holly on the other. At the other end of the spectrum is the simple pair I recently made. I was in a hurry, so I

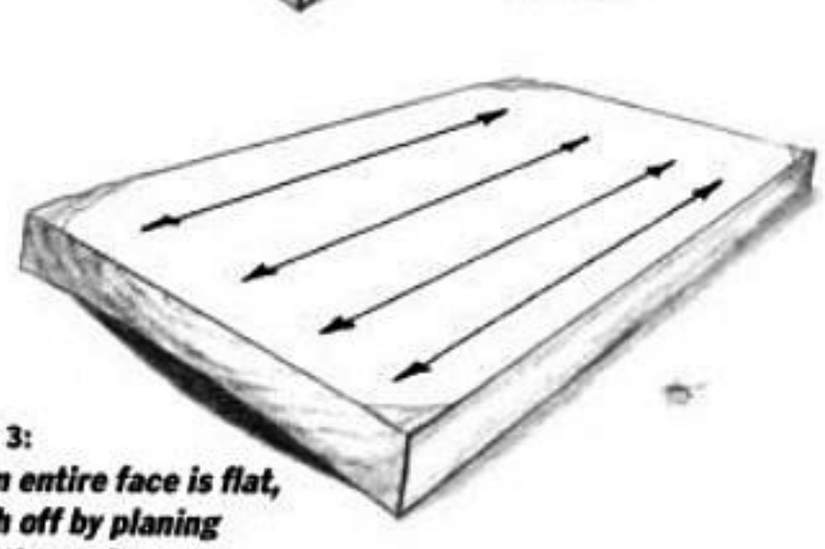
FIG. 3: FLATTENING THE CONVEX FACE



STEP 1:
Establish a flat at the high center of the board.



STEP 2:
Extend the flat with alternating diagonal strokes.



STEP 3:
When entire face is flat, finish off by planing with the grain.

THE PLANE TRUTH

BY KARL SHUMAKER

One day I found myself in the shop facing one of the biggest, prettiest planks of bubinga I'd ever seen. True, it wasn't the most politically correct wood to make into a coffee table, but it was bought before I'd heard of the ozone layer, deforestation, and all the other connections between this board lying on my bench, and the survival of our planet. It had stood for a long time in the stack labled "Someday when I get time." Now I had the time and the idea. But this great expanse of board (1 in. × 20 in. × 66 in.) that was absolutely flat when I had put it away, had taken on annoying curves.

A friend suggested that the only way out was to take it to the machine room and spank it back into shape. I was to rip it into 8-in. widths, run it over the jointer, through the planer, and then edge glue the flat pieces. But how could I disturb that beautiful plane of unbroken grain? That plank *wanted* to stay together. Who was I to get in the way of so noble a desire?

Despite warnings of the hardships of working bubinga, I set expediency aside, rolled up my sleeves and reached for my roughing plane. This board was special. It had waited too long for me to let this experience slip into the dust collector.

I'll grant you, it was work, but sometimes work feels good. I smelled the fragrance of the wood as the shavings formed in heaps around my ankles. The whole process left me intimately acquainted with every square inch of the board. What could have been done in four or five hours with the help of the power company, took ten hours by hand.

In the end, my body had the satisfying feeling that it had been used for a good purpose. My skills were honed just a little bit sharper. But most important, my spirit had been exercised as well. There was a mark on that piece of furniture, wherever it found a home. It still belongs to me as a craftsman—and not to the machines.

ripped two pieces of plywood to the same width and ran a strip of black electrician's tape down the top edge of one. They worked just fine.

You need the marking gauge to scribe the desired thickness on the edges and ends of the board after you've flattened one face. I prefer to use a steel-pointed gauge. The line is always the same width, and I can get very accurate thicknesses by planing to the center of the incised line.

Diagnosing a Board

If a board isn't flat, it will be cupped across the grain, bowed with the grain, or twisted along its length. Frequently, it's all three at once. (See Fig. 2.)

Cupping and bowing are easy to see. Just sight along the end or edge, or check against a straightedge. (The sole of your plane, held on edge, makes a handy straightedge.) Twists are sometimes not so apparent. Even if both ends are flat and both edges straight, a board can still be twisted. The simplest way to check for twist is to place the piece on a flat surface (your benchtop or tablesaw) and push gently on diagonal corners. If it rocks, it's twisted. Mark the diagonal pair of high corners so you can plane them off.

Winding sticks come in handy when you need to check a large board that won't fit on your flat benchtop. Place a stick across the grain at each end of the board, then kneel, and sight across the upper edges of the winding sticks, as shown in the photo. If they're out of line, the board is twisted. The misalignment is often very slight (Fig. 2 shows an extreme case), so you'll need to do some careful squinting.

Remedies

You'll save yourself a lot of elbow grease and no small amount of wood if you lay out and cut the stock roughly to the length and width you need *before* you plane. Why flatten a cupped 12-in. wide board if what you need is two 6-in. wide pieces?

FIG. 4: FLATTENING THE CONCAVE FACE

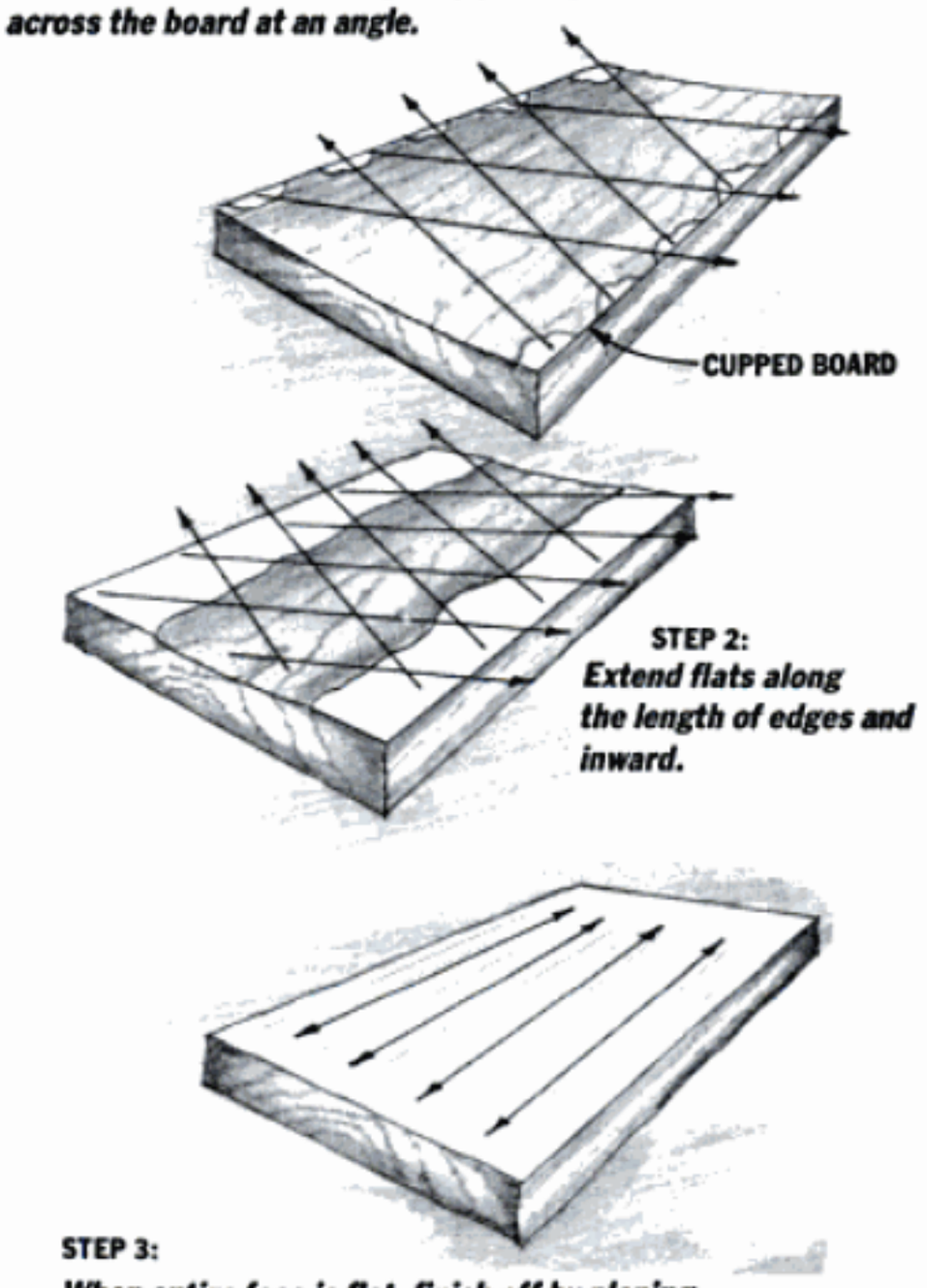
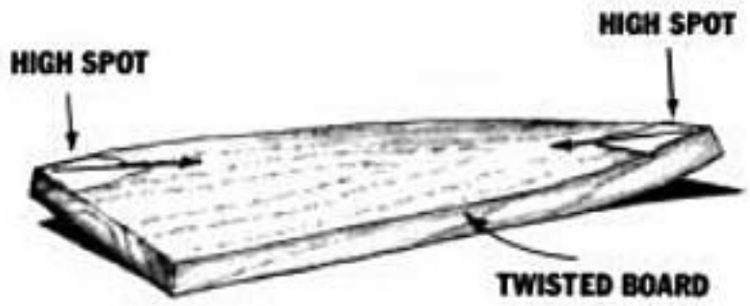
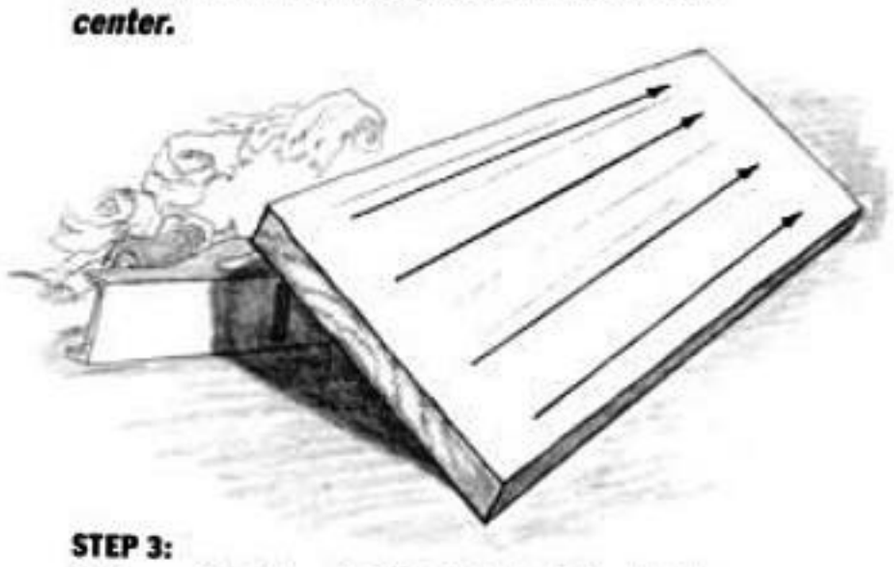


FIG. 5: FLATTENING A TWISTED FACE



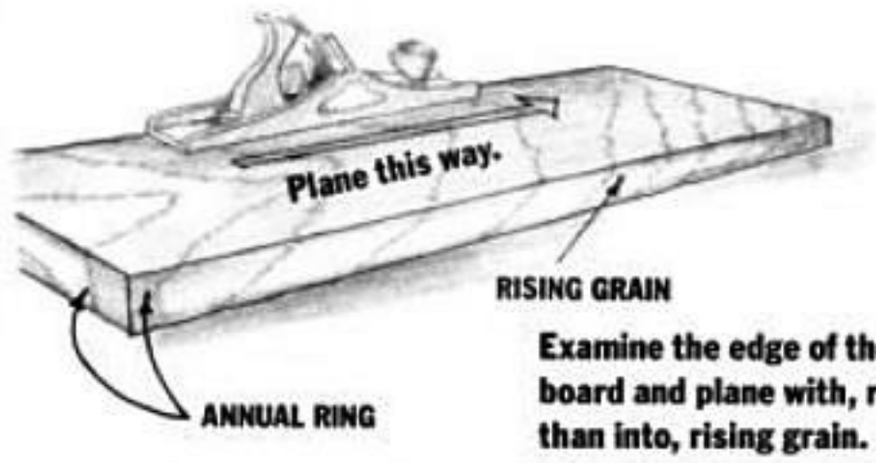
STEP 1:
Establish flats on two high corners of board.

STEP 2:
Extend flats in from opposite corners toward center.



STEP 3:
When entire face is flat, finish off by planing with the grain.

FIG. 6: PLANING WITH THE GRAIN



Examine the edge of the board and plane with, rather than into, rising grain.

I prefer to start by planing the concave face of a cupped or bowed board. It can be difficult to keep the plane from following a convex curvature. (However, if a badly cupped or bowed board rocks too much while I'm planing its concave face, I'll plane the opposite, convex face first.) With twisted boards the same logic applies—span high spots rather than rock on ridges. However, it's often a tossup as to which face will be easier to plane.

Correcting cupped, bowed or twisted boards is a matter of planing off the high spots. Unfortunately, this is easier to say than to do. The trick, if there is one, is to try to plane off the least amount of wood. If you're planing the convex face, establish a flat surface, and extend it equally in all directions until you reach the low spots. For concave faces this means removing equal amounts of wood from opposing high spots. (See Fig. 4.) A good example of this is boards with just one defect—such as being cupped. Twisted boards are a little more complicated than cupped or bowed boards, but the remedy is the same—remove equal amounts from diagonally opposed high spots, as shown in Fig. 5. Most boards are cupped *and* bowed *and* twisted, so you'll most often need to feel your way along, checking your progress frequently with a straightedge or by eye and adjusting your tactics accordingly. Because you cover much of the surface of a board when correcting for a twist, you can usually take care of the cup or bow as you plane out the twist.

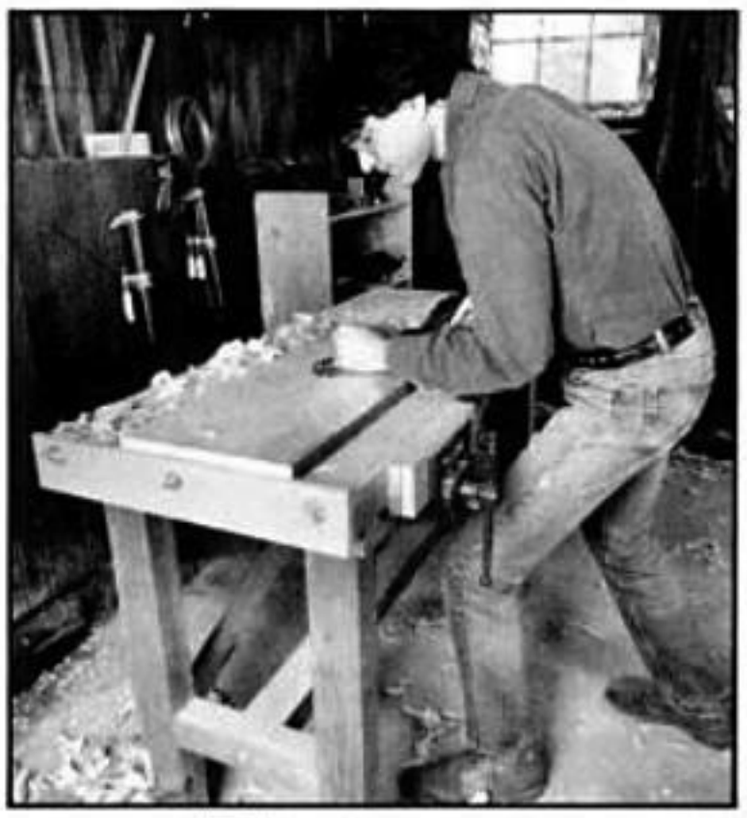
Whatever the defect I'm correcting, I make most of the strokes diagonally across the board, in from both edges. I concentrate on the high spots at first. As the face gets flatter, I cover more of it. The final strokes are along the length of the board, covering its entire surface. Even when I'm using diagonal strokes, I make an effort to plane with the grain wherever possible. The quickest way to determine the direction of the grain is by planing—if you're going against the grain, you'll usually feel, hear and see it. A less nerve-wracking method of determining grain direction is to examine the annual rings along the edge of the board, as shown in Fig. 6.

Though you often want to remove a lot of wood quickly when face planing, thicker shavings mean harder work. The position of the chip breaker on the

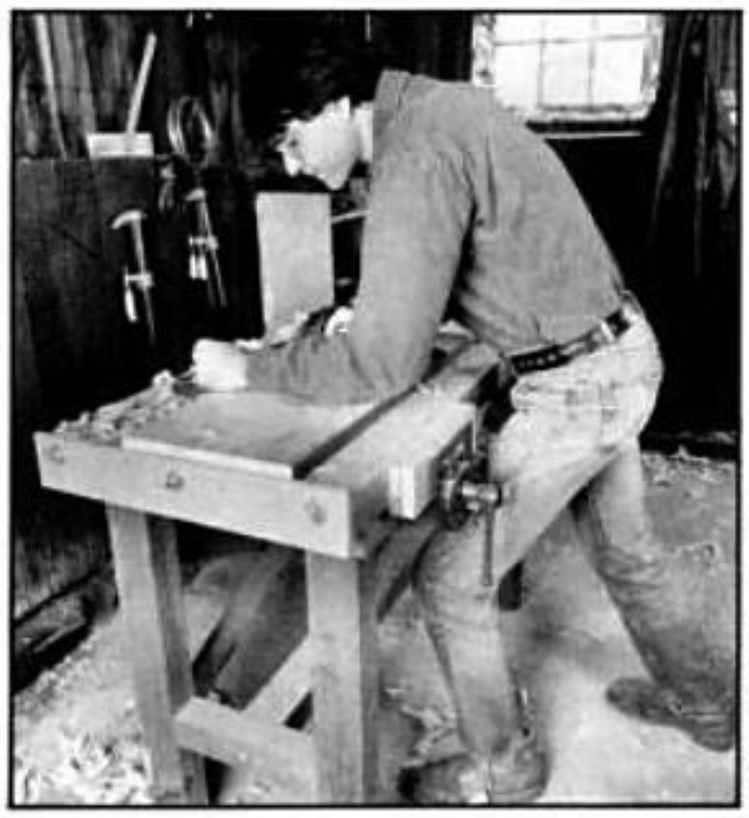
Rough plane diagonally across the board. Plane in from the edge where possible rather than off the edge to minimize tear-out.

To reduce a board's thickness, scribe the desired thickness around the edge with a marking gauge, working from the face you've already flattened. Then plane to the line.

HOW TO PUSH A PLANE



Use your entire body when you plane, not just your arms. Control the plane with your hands and wrists.



Shift your weight as the stroke progresses, bringing your legs and back into play.

There's no getting around it. Hand planing a stack of boards (even a short stack) is hard work. But it needn't be back-breaking work. You can plane comfortably for a long time if your bench is the right height and you plane rhythmically, using your whole body to push the plane.

If your bench is too low, you'll get a sore back from bending over it. If it's too high, you'll get sore arms, because they'll have to do all the work. The best rule of thumb I've heard for establishing bench height comes from Frank Klausz, an accomplished cabinetmaker in New Jersey. Frank, who does a lot of hand work at the bench, says that when you stand next to your bench with your arms at your sides and your palms parallel to the floor, the benchtop should just touch your palms. My bench is about 1 in. higher than this, which makes cutting joints in the vise easier, but it's just a little too high for sustained planing.

Like many other strenuous activities, planing is a lot easier when you get into a rhythm. When I'm in the swing of it, I rock back and forth on my heels and toes as my weight shifts from the beginning to the end of the stroke and back again. My hands and wrists hold and guide the plane; my legs, back and arms provide the force.

At the beginning of each stroke, overcome the tendency to let the unsupported rear end of the sole drop by applying pressure with your leading hand on the front of the plane. Likewise, don't let the front of the plane drop at the end of the stroke. As you work your way down a long board, move your body, too, rather than extend your arms farther and farther.

Finally, keep your plane in good working order. A little candle wax rubbed on the sole cuts friction noticeably. And take the time to sharpen the plane iron when it begins to lose its edge, not after the edge is long gone. It's amazing how much less work it is to plane with a sharp tool than with a dull one.—*R.H.*

plane iron is one limit to the depth-of-cut. When rough planing, I set the chip breaker back from the cutting edge between $^1/_{32}$ in. and $^1/_{16}$ in., depending on the hardness of the wood. (A scrub plane with a heavy, curved cutting iron takes thicker shavings and needs greater clearance.) I set the iron for a shallow cut and adjust it during the first few strokes to take a comfortable shaving—thick enough to make the job go as quickly as possible, thin enough to make it as easy as possible.

Thicknessing

When you've got one face of a board planed flat, you can use that face as a reference surface to plane the board to the desired thickness and to get the second face flat as well. Planing a board to correct thickness is a much simpler task than flattening its first face, though it may be more strenuous work if there's lots of wood to remove. All you do is scribe the desired thickness on the edges and ends of the board with a marking gauge, and plane to the center of that line. If the first face is flat, the scribe mark will guide you to make the second face flat, too. Even so, a quick check on the second side with a straightedge or flat surface won't hurt.

If I'm working up a lot of boards, I'll flatten and thickness each one in turn, then sharpen the plane and take a few very fine shavings off all the faces to finish the job. With two planes, you can finish plane as you go.

Flattening boards can be frustrating work at first. You'll plane away and then wonder why the blasted thing still rocks when you check it. But as you gain experience, you'll develop a sense of just where to plane, and the boards, rather than your spirits, will get flattened quickly. ▲

Roger Holmes works wood and writes in Woodbury, Connecticut.

HEWING A BEAM FROM A LOG

Axwork Techniques of Master Barn Builder Richard Babcock

BY DAVID SLOAN

Richard Babcock makes his living with an ax. For more than 30 years, Babcock has been restoring, moving, and studying the oldest barns in the country. When an ancient sill crumbles with rot or a rafter gives way after 300 winters of snow, Babcock hews a replacement using the same types of tools and methods as the original builders.

I met Richard Babcock by chance. On my way to work one frosty Connecticut morning, a roadside flurry of arms and axes caught my attention. At the center of the storm was Babcock, a middle-age barrel of a man, standing atop a red oak log, swinging an ax with the speed and power of a locomotive, cleaving huge chips from the side of the log beneath his feet. This was scoring, he said, the first step in hewing a rafter for the 17th-century barn he'd been commissioned to repair.

For a scoring ax, Babcock uses a single bit ax with a curved handle anywhere from 27 in. to 30 in. long. The ax pattern isn't important, but the shape of the edge is. Babcock grinds the edge to a thin, knife-like profile on an old sandstone waterwheel. A thicker edge, he says, requires more power to sink into the wood.

Babcock chooses the straightest logs he can find, with the least amount of taper, and hews them green. Unlike some other hewers, Babcock doesn't remove the bark before hewing. Red oak is his favorite wood, because it's easy to hew and structurally strong. Fir, poplar, and Western pines are also easy woods to hew but lack the structural strength of oak.

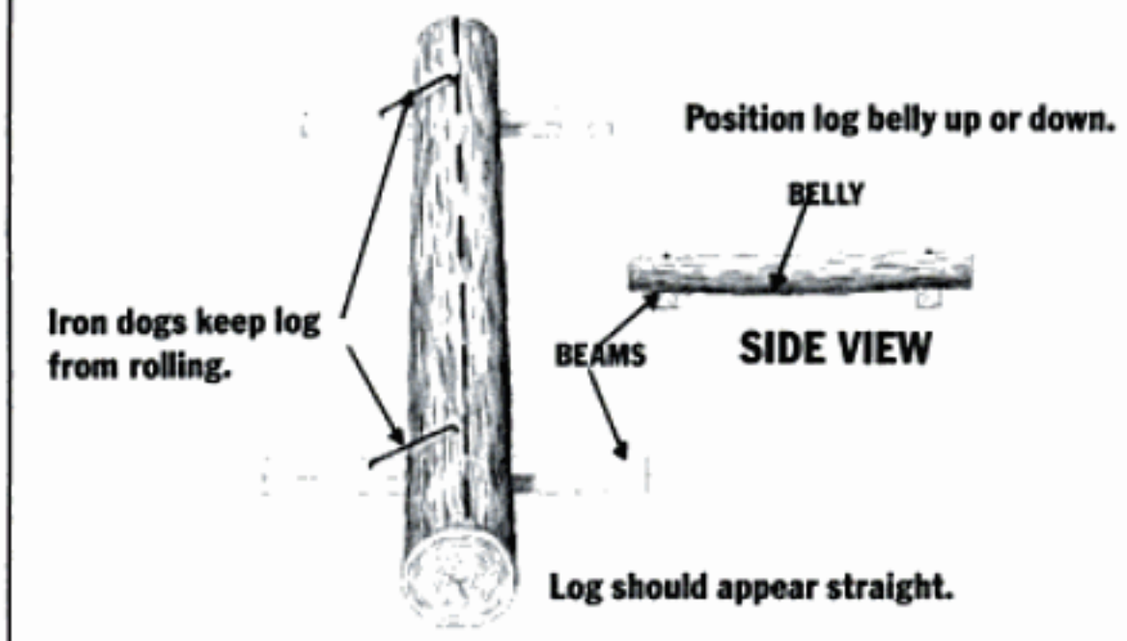
Babcock works on level ground. He positions the log on two cross beams and drives in two iron "dogs" to keep it from rolling. Then with his scoring ax, he chops a flat spot on the top of the log at each end, removes the dogs, and rolls the log 180°, so the flat spots

PHOTOS BY DAVID SLOAN

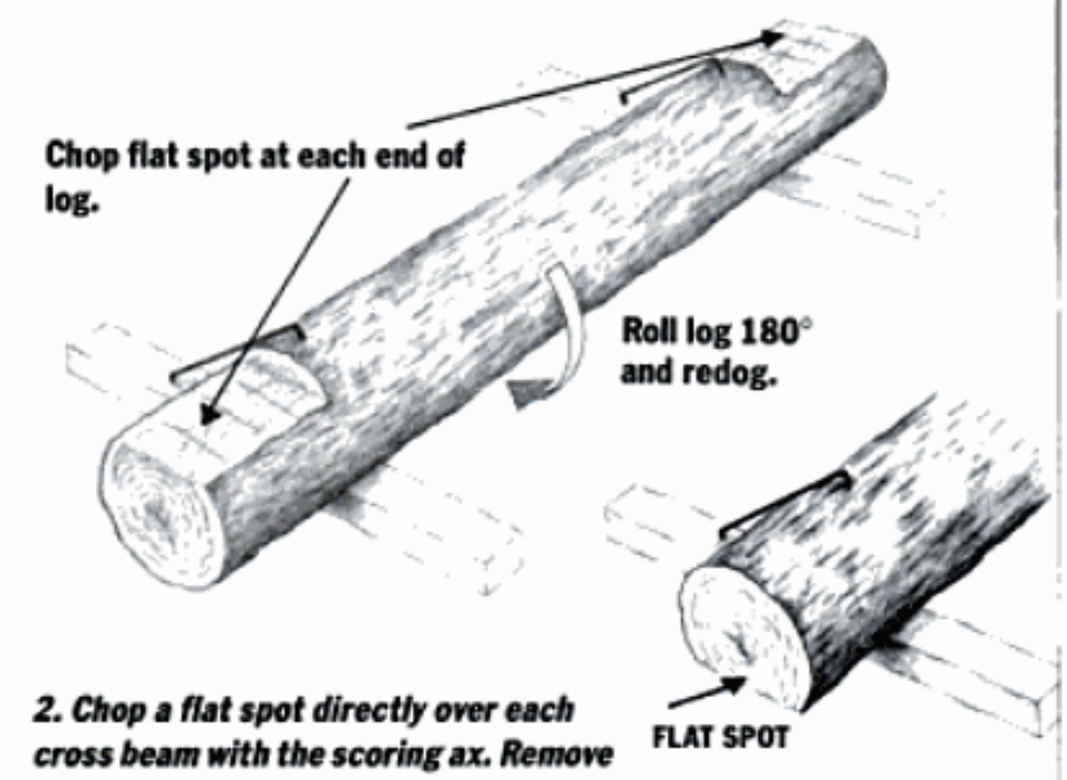
Barn restorer Richard Babcock scores the face of a 20-in. dia. red oak log that will replace the rotted sill of a 17th-century barn in Woodbury, Connecticut.

With a large pair of dividers, mark a circle at each end of the log to determine the width of the beam. Snap a chalk line tangent to each side of the circles to mark a boundary line.

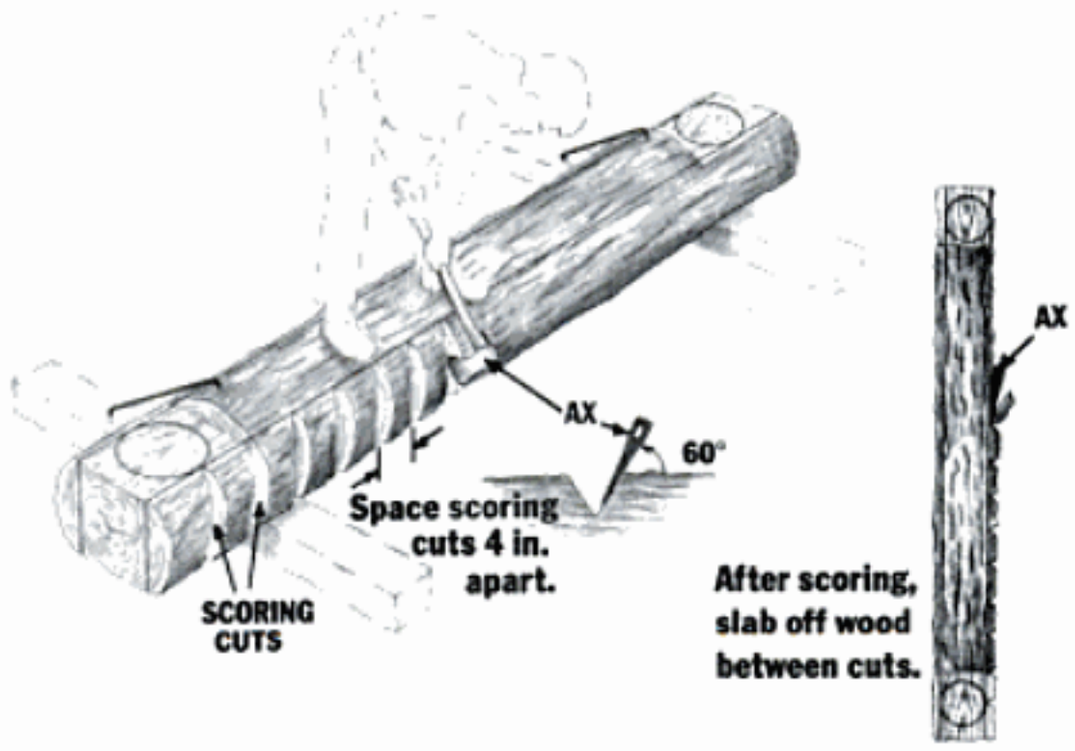
HEWING A BEAM FROM A LOG



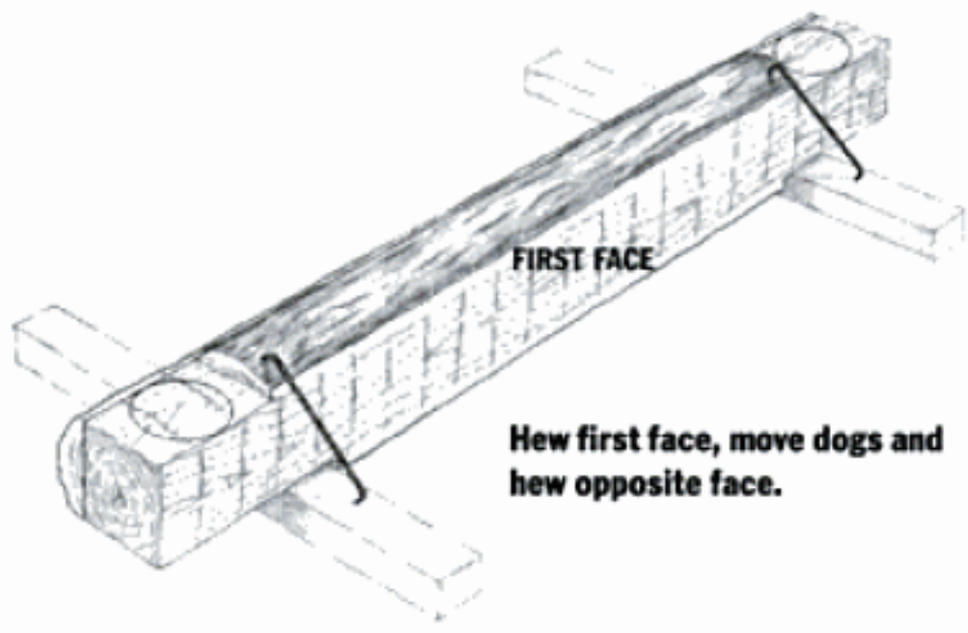
1. Place a 6 ft. beam under each end of the log, and roll the log belly up or down, so that the log looks straight as you sight along the length of the log. Drive in the dogs to hold the log.



2. Chop a flat spot directly over each cross beam with the scoring ax. Remove the dogs, and roll the log 180°, so the log rests on the flat spots. Dog the log on one side only, leaving the other side clear for hewing.



4. Score the first face, cutting vertical notches spaced 4 in. apart. Slab off the wood between cuts with the scoring ax to within 1/8 in. of the chalk line.



5. Hew the face with the broadax, then move the dogs to the other side of the log. Score and hew the second face.

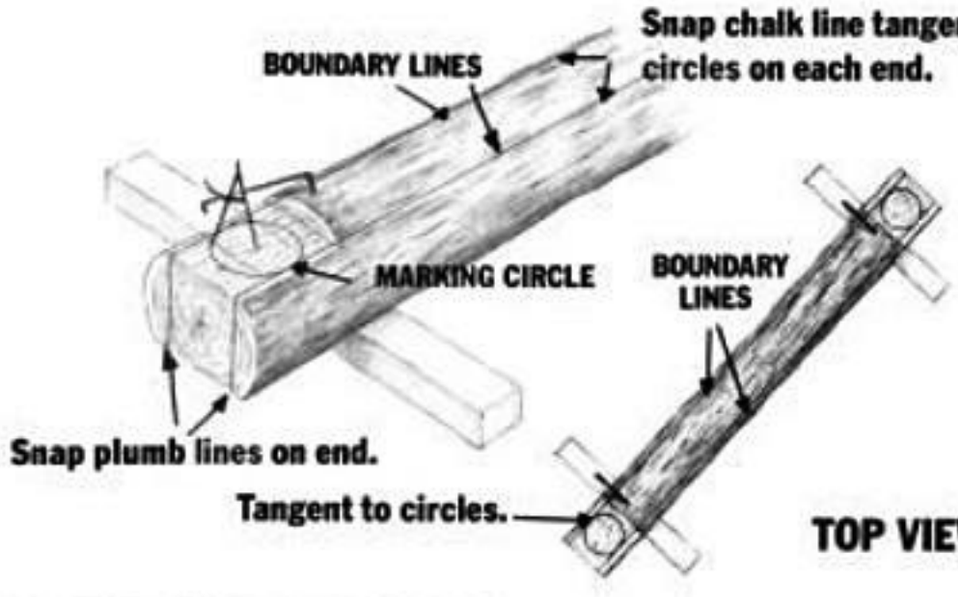
are now on the bottom resting on the cross beams. He drives in the dogs again and chops two more flat spots on the top face of the log with his scoring ax. Next, with a large pair of dividers, he marks out a circle on each flat spot, as shown in the drawing. With a chalk line, he snaps two boundary lines tangent to the circles, as shown in the drawing, and snaps two plumb lines on each end of the log. Now he's ready to hew the first two faces. The axwork is the same for all four faces of the beam.

Scoring the Log

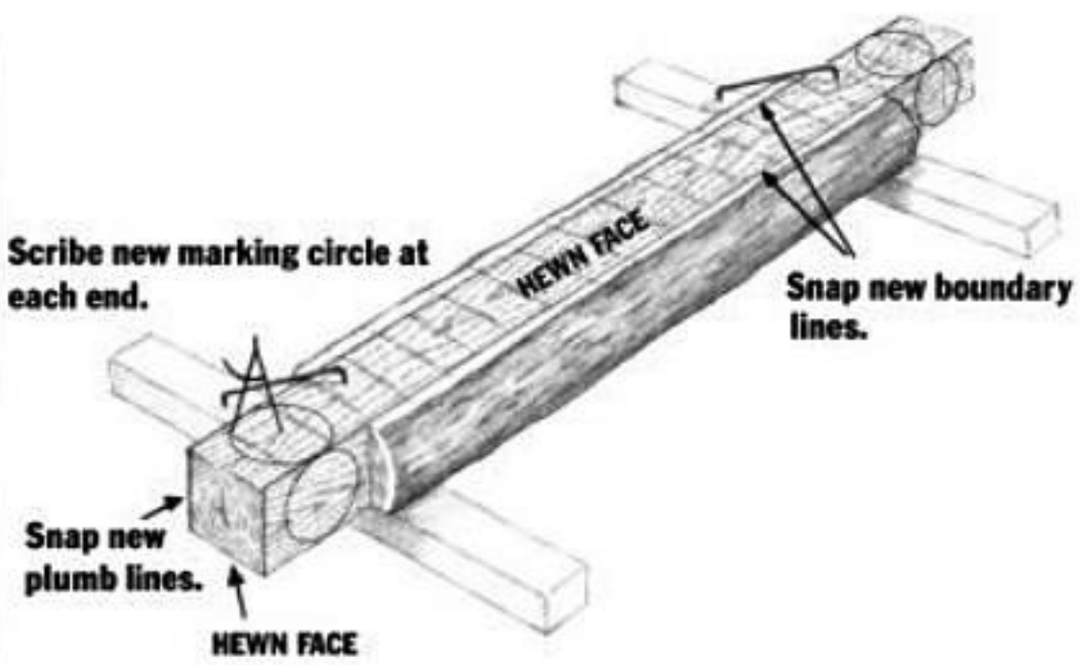
Standing on one end of the log, facing off to one side, Babcock chops out a vertical V-shaped notch in the side of the log, driving the scoring ax within 1/8 in. of the chalk boundary line. The ax enters the wood at a 60° angle to the length of the log. He starts the cut at the top of the log and works down toward the ground. A twist of the handle pops out a chip. After completing the first notch, he moves down the length of the log, spacing these scoring cuts a foot or more apart. Beginners, Babcock recommends, should space their scoring cuts closer—about 4 in. apart.

It's important that the scoring cuts are plumb. An experienced hewer can tell this by eye, but a beginner should check for plumb by dropping a plumb line down the V of the cut to make sure.

Once the log is scored along its entire length, Babcock uses the scoring ax to split off the wood between the scoring cuts to within 1/8 in. of the chalk boundary lines. On a large-diameter log, he'll drive wood or metal wedges into the log an inch from the boundary



3. Chop flat spots at either end of the log. With a compass, scribe a circle at either end of the log to mark the width of the beam. Snap a chalk line tangent to the circles to mark the hewn face of the beam. Drop a plumb line down each end of the log, and snap vertical lines.



6. Roll the log 90° onto one of the hewn faces. Mark new circles at each end of the log, and repeat steps 3, 4 and 5 above.

DRAWINGS BY KATHY BRAY

Score along the log to within 1/8 in. of the boundary line snapped along the top of the log. The ax should enter the wood at a 60° angle to the length of the log.

After scoring the log, split off the wood between the scoring cuts.

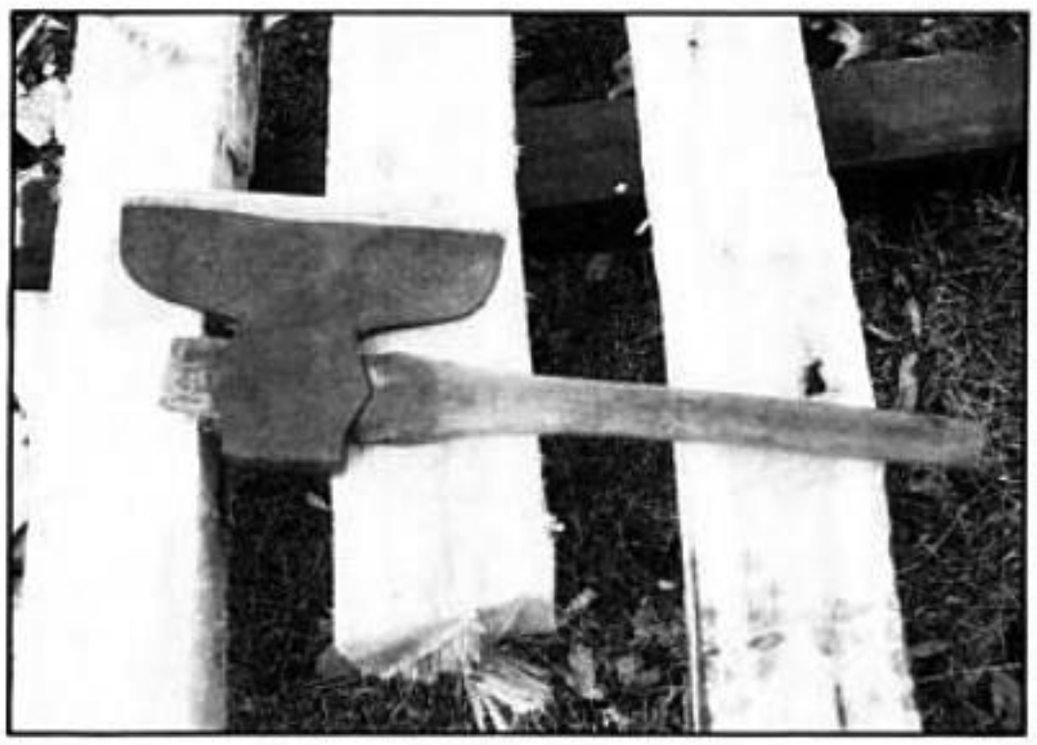
On a large-diameter log, Babcock drives in wedges to slab off the wood between scoring cuts.

line to slab off the wood between scoring cuts.

Hewing With the Broadax

The broadax cleans up the rough face left by the scoring ax. Babcock's axes are old, with short handles 18 in. to 24 in. long. Broadaxes are beveled on one side only, like a chisel, and the other side is flat. In fact, a broadax is used much like a chisel to pare off the wood that the scoring ax missed. Not far from the head, the handle takes a sharp bend away from the flat side of the blade to allow clearance between the log and the hewer's hand.

Facing one end, Babcock straddles the log, his right leg splayed wide, so he can swing the ax between the log and his leg. On a large-diameter log he'll stand on



The broadax is beveled only on one side, like a chisel. The handle can range from 18 in. to 24 in. long, and is offset toward the bevel to allow clearance between the hewer's hand and the log.

When hewing small logs, Babcock straddles the log, with his right leg splayed wide.

The hewing stroke is a down and back stroke, with the weight of the ax doing the work. Babcock never lifts the broadax higher than parallel to the ground.

one side, with the log on his left and his right leg splayed out. Before cutting wood, he takes a slow practice stroke with the broadax to make sure his leg is clear.

Bending over the log, Babcock lifts the broadax no higher than parallel to the ground and lets it drop. The stroke is a paring cut, down and towards him at the same time, taking a light cut. The weight of the broadax does the work. Hewing to the boundary line, he moves backward in a crouch, until he's hewn the entire face of the log.

It's important to keep the hewn face plumb. "A tobacco chewer makes a good hewer," says Babcock. "You can tell whether the hewn face is plumb or not by the way a stream of juice runs down the face."

"What about adzes," I asked? "If you do a good hewing job, you don't need to adze," he replied. But Babcock says he's seen old beams that were adzed after scoring instead of hewn with a broadax. Why? "Hewing is hard on your back. You don't need to bend over to use an adze." Some things never change.

When the first face is finished, Babcock moves the dogs to the opposite side of the log and scores and hews the opposite face. When he's hewn both faces, he rolls the log 90°, scribes two new marking circles on the top of the log and repeats the scoring and hewing process on the third and fourth faces.

Hewn posts or sills can be square in section (8 in. × 8 in., 10 in. × 10 in.) but a beam that has to span a distance should be twice as high in cross section as it is wide (i.e., 6 in. × 12 in., 8 in. × 16 in., and so on). According to Babcock, these proportions provide the optimum combination of strength vs. weight. ▲

Richard Babcock moves and restores early-period barns and has built a barn museum in Hancock, Massachusettes where he lives. His business address is P.O. Box 484, Williamstown, MA 01267. David Sloan is editor of AMERICAN WOODWORKER.

SOURCES

Log dogs, peaveys, cant hooks, wedges, single and double bit axes and other log-handling equipment:

LEE VALLEY TOOLS LTD., 1080 Morrison Dr., Ottawa, Ontario K2H 8K7 Canada, 613-596-0350.

SNOW & NEALLY CO., P.O. Box 876, Main Rd., Hampden, ME 04444, 207-947-6642.

BAILEY'S, P.O. Box 550 Hwy. 101, Laytonville, CA 95454, 800-322-4539.

New broadaxes:
HIGHLAND HARDWARE, 1045 N. Highland Ave. NE, Atlanta, GA 30306, 800-241-6748.

PHOTOS BY KAREN CALLAHAN

Sweeping curves and slender spindles put this quilt rack in the American Windsor tradition.

Air an Heirloom on This Windsor-Style Stand

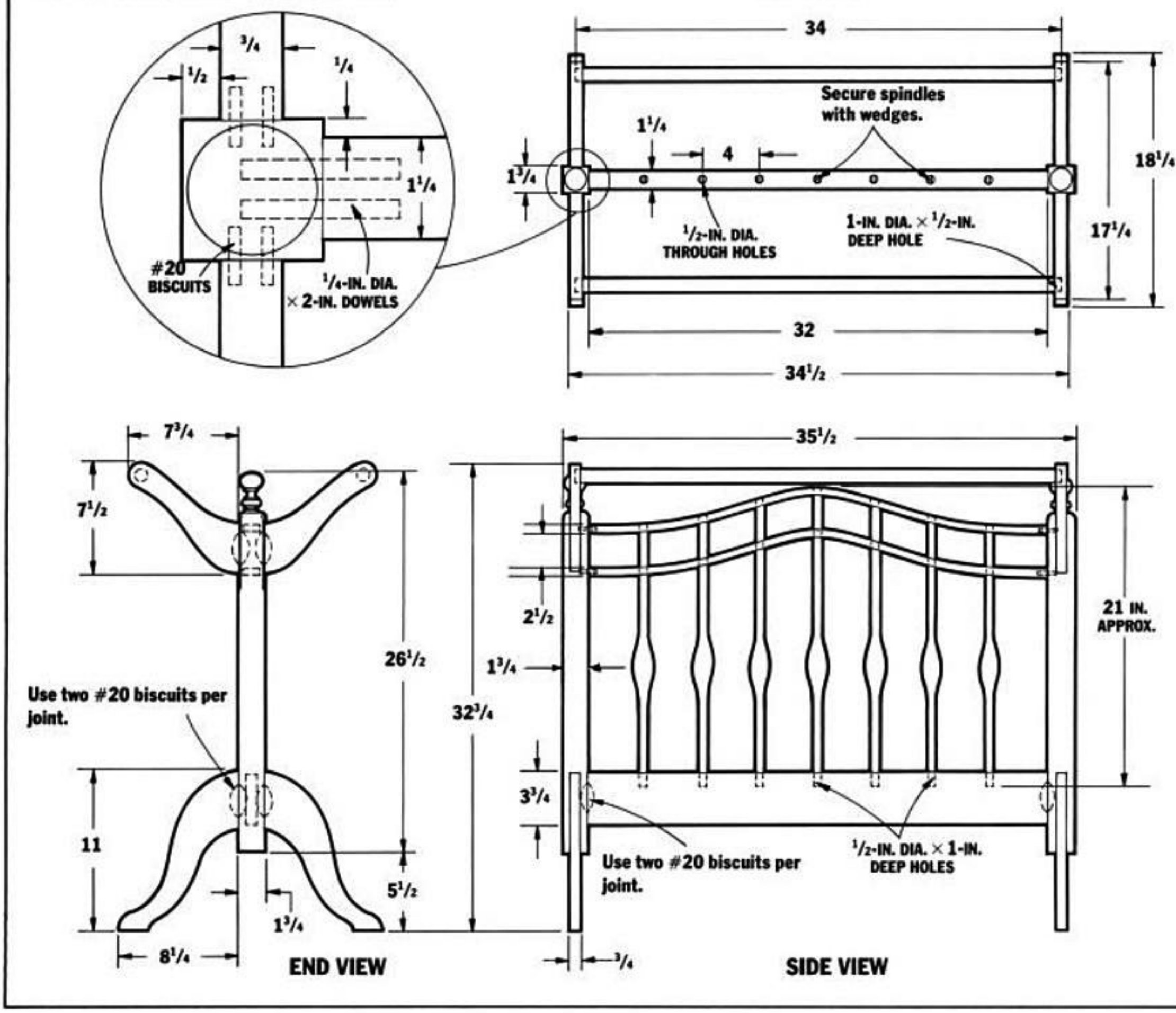
QUILT RACK

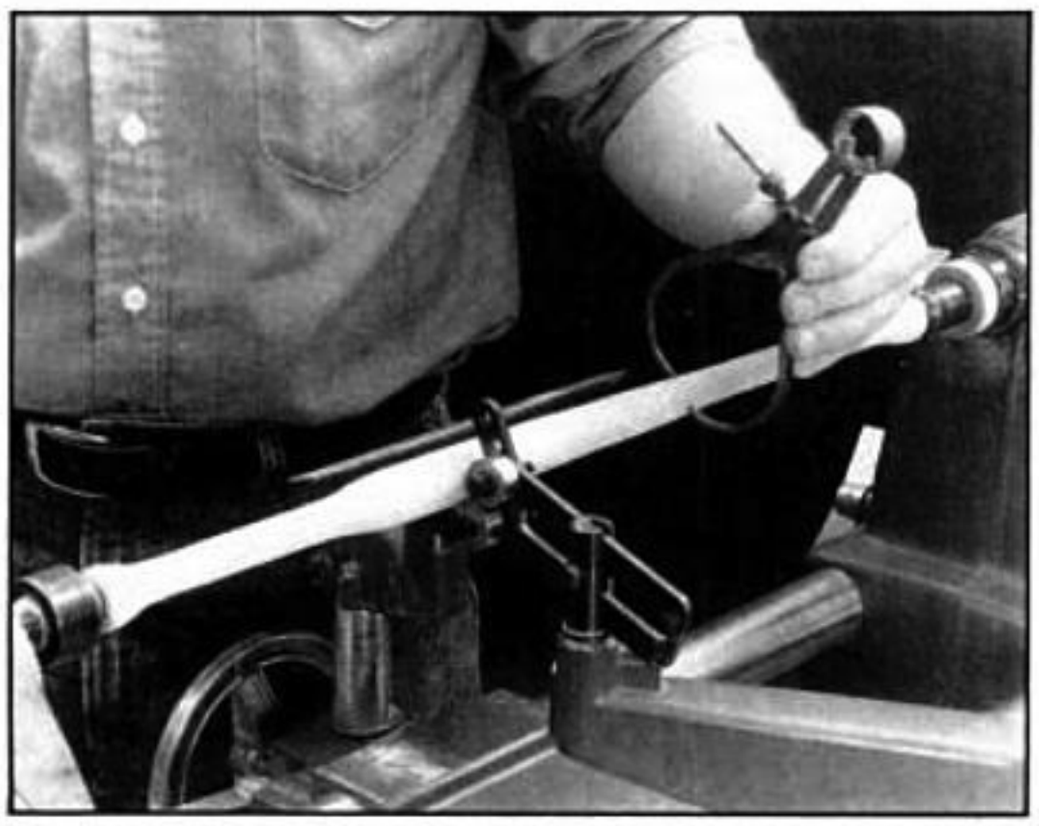
BY NICK ENGLER

Purists will argue that we shouldn't have called this a "Windsor" quilt rack. Traditionally, the term was used to describe a type of English country chair—a scooped plank or "saddle" seat with spindle-turned legs and rungs, probably descended from the four-legged stool. However, the Windsor style became so popular in America that it was often adapted to other furniture forms. This quilt rack, designed and built by Jim McCann, is an example.

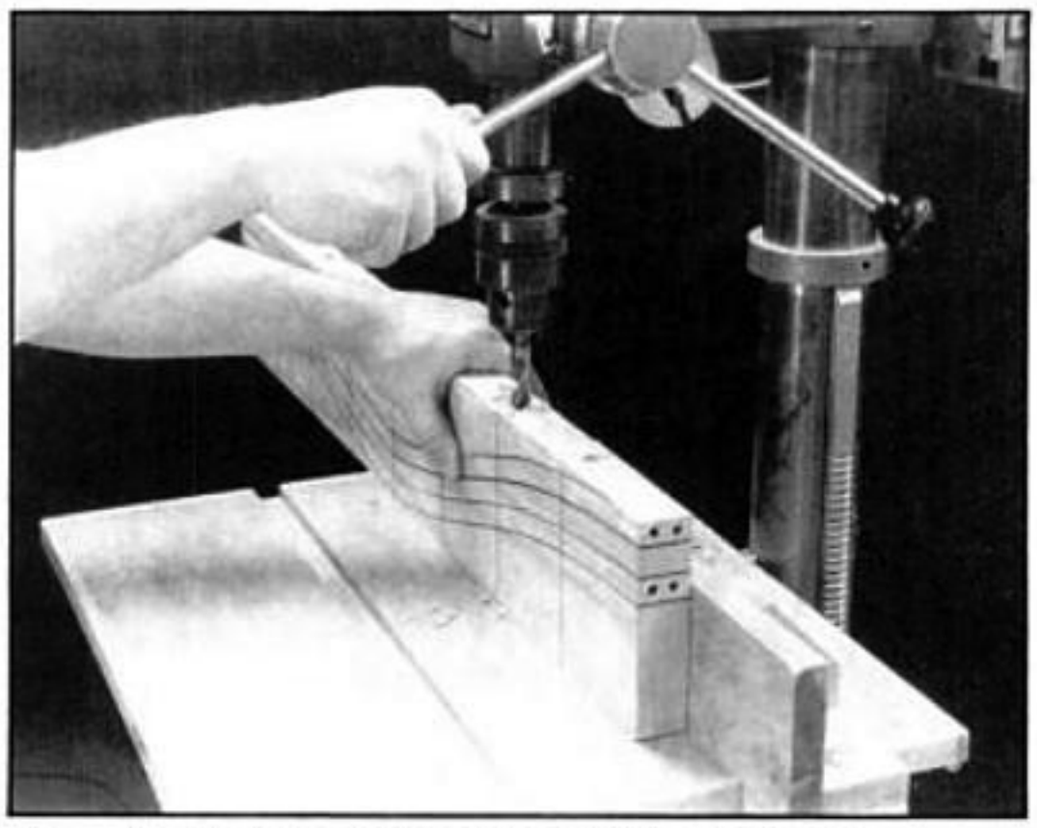
Some will point out that Windsor is a misnomer no matter what kind of furniture it describes. Historically, the style has little to do with the English city. There is an interesting (though unfounded) folktale about the association. The story goes that one day the Duke of Windsor was out riding in his woods. He came upon an itinerant bodger who had set up his portable pole lathe near a grove of young trees. The Duke inspected the bodger's work and found it much more delicate and well-made than the ordinary country chair. He was also astonished to find that a chair so

FIG. 1: WINDSOR QUILT RACK





Use a steadyrest to prevent the spindles from whipping and bowing. Don't clamp them too tightly between the centers, and cut with a very light pressure.



It's much easier to bore holes for the spindles and dowels *before* you saw out the arches.

light could also be so sturdy. He ordered a set of chairs from the bodger and proudly displayed the chairs at the next ducal dinner. His guests admired the bodger's work, and soon they were ordering their own "Windsor" chairs.

Whatever the origin of the term, American country craftsmen embraced the Windsor style in the early 18th century and made it their own, making several distinct changes in the traditional English design. They made the seats thicker and deeper, raked the legs at a more pronounced angle, and most importantly, began to make the backs from slender spindles. These graceful, spindly chair backs were the most striking feature of American Windsor design. So when a craftsman incorporated slender spindles in other pieces of furniture, folks naturally dubbed these "Windsor," too.

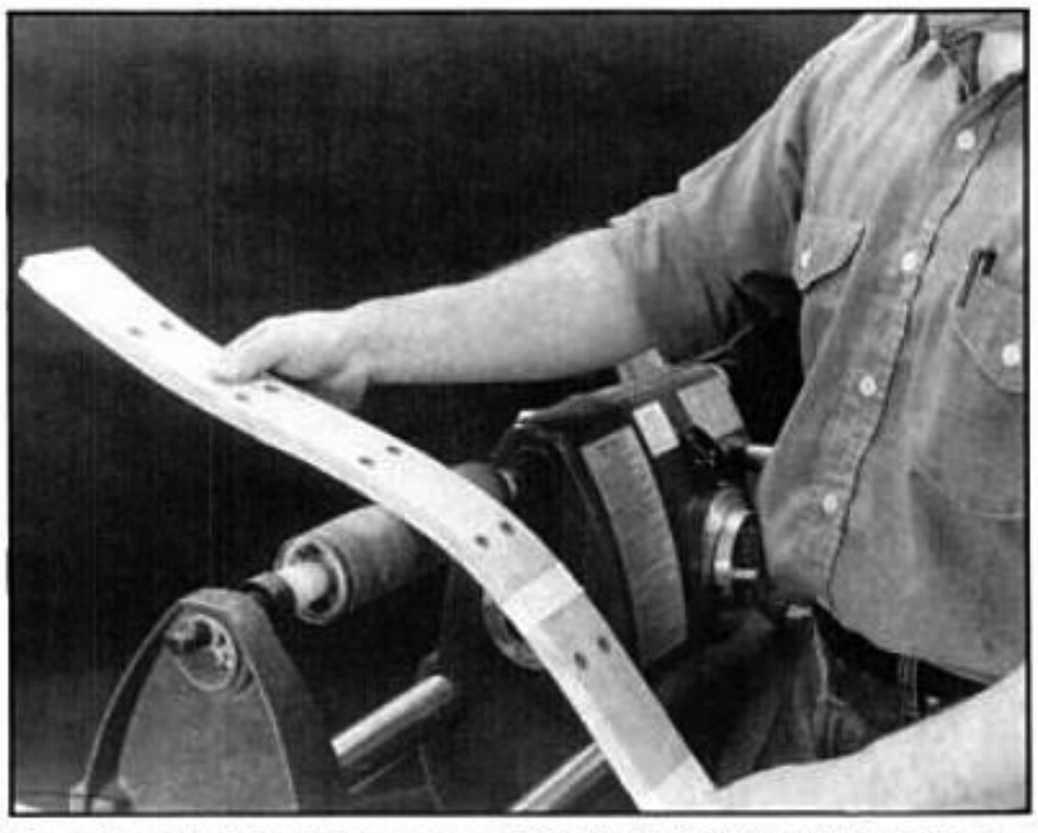
Construction Techniques

The assembly of the quilt rack is straightforward: Turn the spindles, posts and rails; saw out the arches, arms and legs; then join the parts. The rack shown is joined with biscuits, dowels, and wedges. Dowels can also be used where biscuits are shown. Here are a few tips to help your work progress smoothly.

Selecting the stock. Traditionally, craftsmen combined several types of wood in a Windsor piece. They used soft, easily carved woods (pine or poplar) for shaped parts; hardwoods (cherry, maple, or birch) for turned parts; and limber, flexible woods (hickory, chestnut, oak, or ash) for bent parts. For this reason, folks usually painted their Windsor chairs to hide the variations in wood tone and grain.

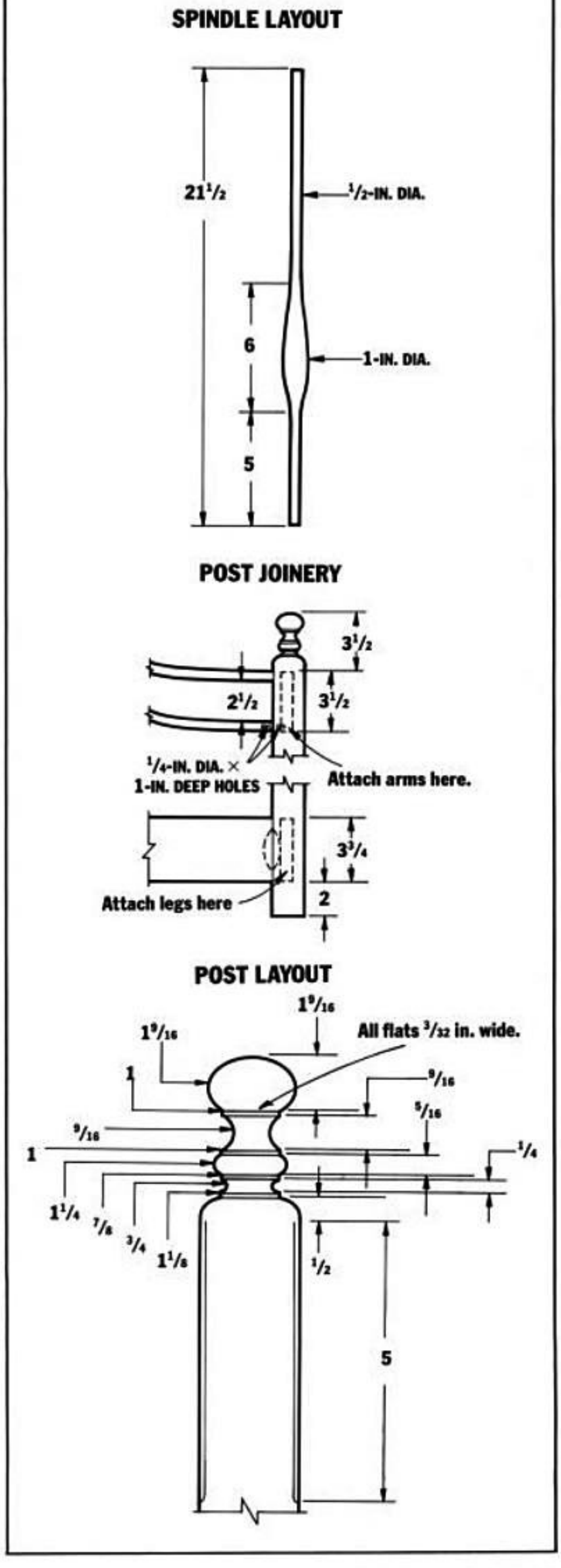
To build this quilt rack, however, you really only need to use one wood, preferably a hard one so the spindles will be easier to turn. There is no seat to carve and the arches are sawn to a curved shape, not bent. The rack shown is made from curly cherry.

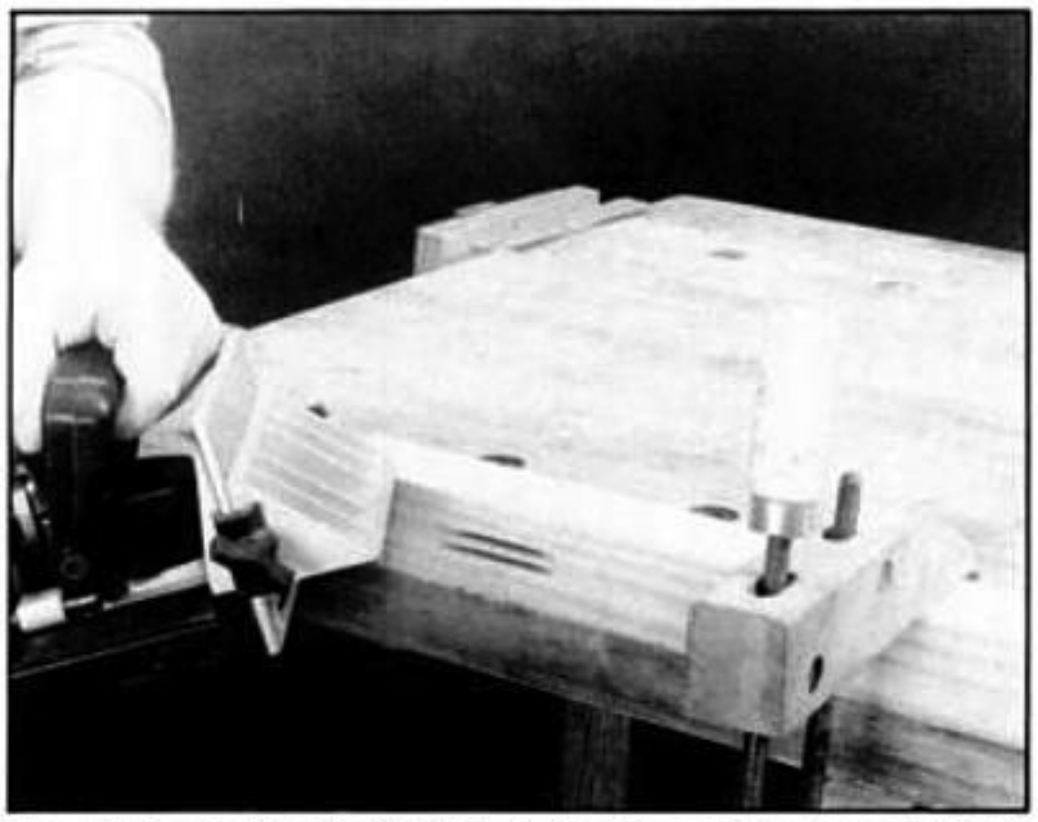
Turning the spindles. Turn each of the spindles precisely the same, making them all slightly longer than needed (22 in. to 23 in.). To prevent these slender turnings from whipping on the lathe, use a steadyrest to brace them. As you turn, make sure the upper portion of each spindle is a constant 1/2 in. in diameter from the top of the swelling or "bulb" shape to the tip. Don't cut



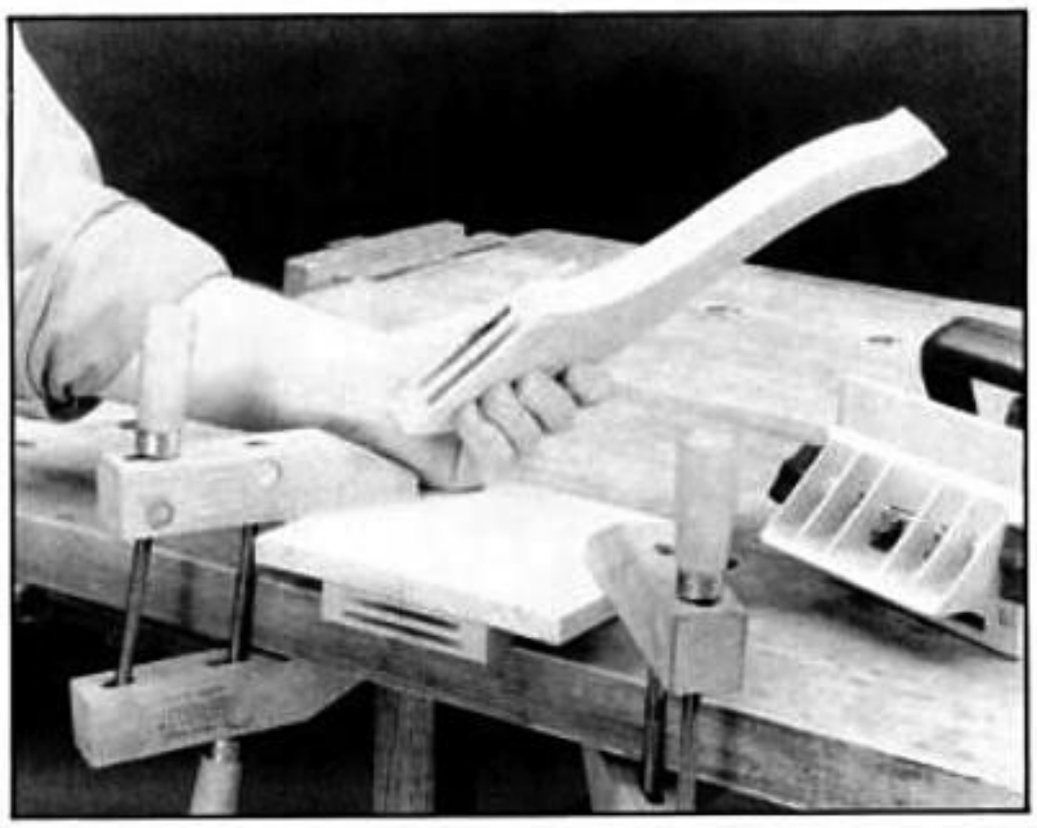
To make certain that the arches match, tape them together edge to edge when you sand them.

FIG. 2:





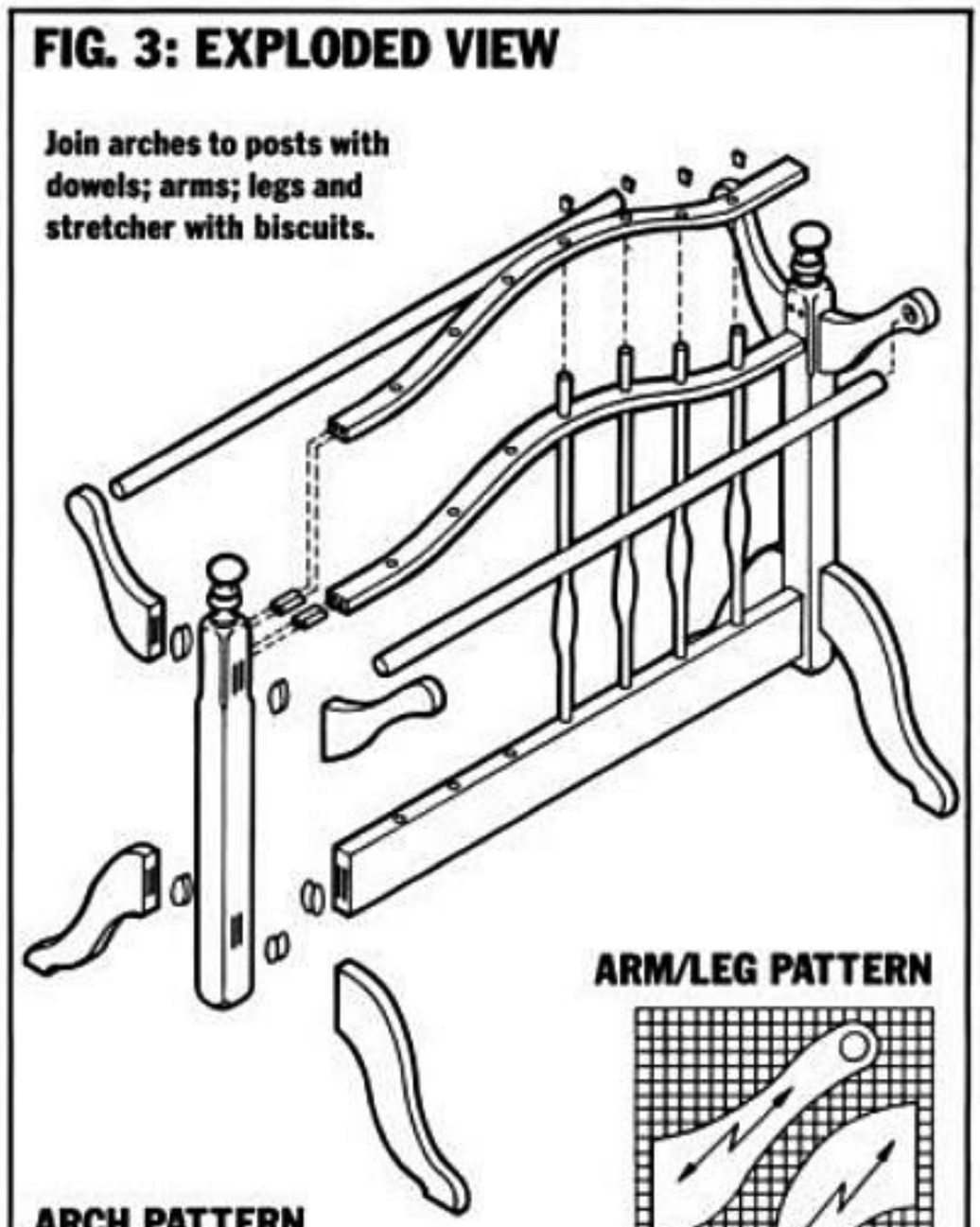
To make the double-biscuit joints, first cut the slots in the post. Adjust the fence on the plate joiner so that it's about 3/4 in. from the blade. Cut the two slots from opposite faces of the post. They should be about 1/4 in. apart.



Clamp the part to be joined to the post—arm, leg, or stretcher—to the workbench, and place a 1/2-in. thick scrap on top of it. This scrap serves as a spacer while you cut the second set of slots. Again, cut the slots from opposite faces. The slots should be exactly the same distance apart as they are on the post.

Use handscrews, as shown, to assemble the legs and arms to the posts. You'll need four to clamp a single pair of arms or legs.

FIG. 3: EXPLODED VIEW



the finished spindles to length until after you dry assemble the quilt rack. At that time you can label the position of each, cut it flush with the upper arch, and saw a small slot in the tip for a wedge.

Making the arches. Saw both arches from the same 1 1/4-in. thick board. Before cutting the shape of the arches, bore the holes that will hold the spindles and dowels. For the spindles, drill 1/2-in. dia. holes spaced 4 in. apart through the edge of the board. Mark the arches on one face and *both* ends. Then drill two 1/4-in. dia. × 1-in. deep holes in each end of the arches for the dowels. After drilling all the holes, cut the arches, and sand them on a drum sander. To make sure they match precisely, tape them together edge to edge while you sand them. Be careful to maintain a flowing or "fair" curve (one without dips or bumps), as you sand.

Making the joints. If you have a plate-joiner machine (see May/June, 1988 *AW*), join the arms, legs, and bottom stretcher to the posts with wood plates or "biscuits." Use two biscuits for each joint to double the strength of the joinery. If you don't have a plate joiner, use a dowel joint. Dowel holes in the posts can be made to match the holes in the arches by using dowel centers available from most mail-order tool suppliers. ▲

Nick Engler is a contributing editor of AMERICAN WOODWORKER. *He has written more than 20 woodworking books, and teaches cabinetmaking at the University of Cincinnati in Cincinnati, Ohio.*

PUTTING A LID ON IT

Hand-Tool Techniques for Installing Butt Hinges

BY ROGER HOLMES

Sometimes it seems there are as many types of hinges as there are things that open and close. Still, with all this variety, I prefer to use old-fashioned, brass butt hinges for most things I build. They're simple to install and add a nice, subtle touch to a box or cabinet door.

I buy extruded brass butt hinges. They're quite a bit more expensive ($4.00 a pair and up), but they're worth it. Die formed and crisply

PHOTOS BY SCOTT LANDIS

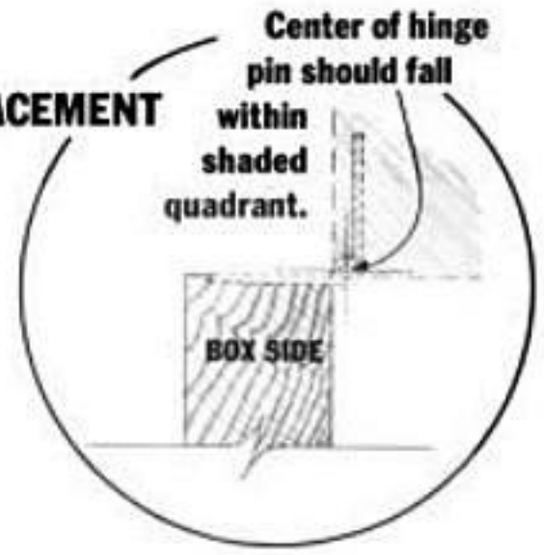
LAYING OUT THE MORTISE

1 Set one marking gauge to width of mortise, just shy of hinge-pin centerline.

2 Set another marking gauge to depth of mortise, just shy of hinge-pin centerline.

3 Mark hinge position with pencil, then scribe mortise width and depth.

HINGE PLACEMENT



4 Scribe against ends of hinge with knife.

machined, these hinges have a pleasing heft (even when tiny) and don't rattle around like stamped or pressed butt hinges, which are made by wrapping sheet brass around a pin. Like a lot of old-fashioned things, extruded brass hinges can be hard to find. Most hardware stores carry only stamped or pressed brass butt hinges. You can get them by mail order from any of the sources mentioned. (See Sources.)

How many hinges? For most boxes, chests and cabinet doors, two hinges are enough. However, a third hinge in the middle can pull a slightly bowed lid or door into position or give added support to an especially heavy lid. I place hinges at least their own length from the ends of a lid or door, but appearance determines placement as much as anything does. The techniques I mention in this article apply to boxes, doors, and chests, but from now on, I will only refer to boxes.

What size? Hinges come in a variety of combinations of length and width. Most catalogs specify by length and open width, in that order. I like to house the hinge in a stopped mortise and to have the knuckle protrude outside the box as little as possible, while still permitting the lid to open fully. To accomplish this, the open width should be equal to or slightly less than twice the thickness of the box side. For a given hinge width, there are often several different lengths available. Longer hinges provide more support, but I frequently select a shorter hinge because it looks better.

Installing butt hinges is fairly simple. I use a marking gauge (or two), a couple of sharp chisels, a mallet, an awl, a hand drill, and a screw driver. The photos tell the story.

Plane the lid and box so there are no gaps between them. Set a marking gauge for the width of the mortise and one for its depth. (Two gauges allow you to do the whole job without resetting.) I set both gauges just shy of the pin's centerline. Wider than this, and the lid won't open completely; narrower, and the protruding knuckle will look bad. Deeper, the lid won't shut; shallower, the gap will be unsightly. The centerline of the hinge pin should fall within the shaded quadrant shown in the drawing above. If it falls below, the lid won't shut. If it falls to the left, the lid won't open completely.

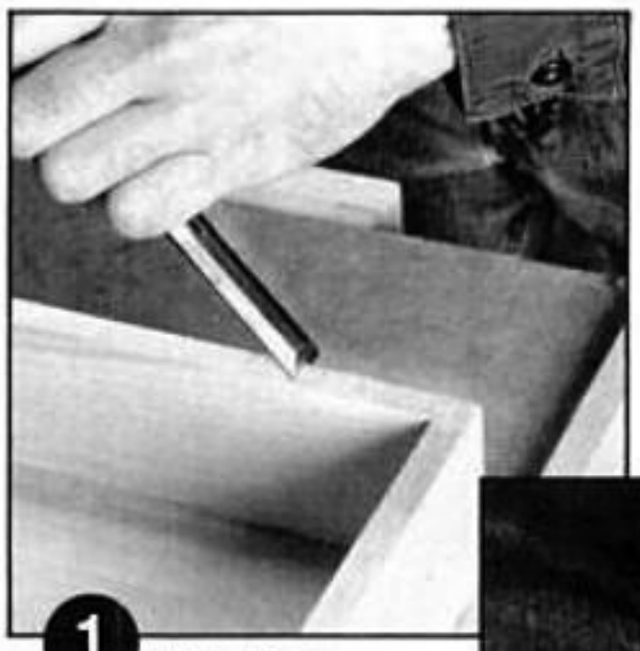
You can start with either the lid or the box. Make light pencil marks indicating the hinge positions, then scribe the mortise width and depth between them with the marking gauge. Align the edge of the hinge with the width mark, and scribe against the ends of the leaf with a thin, sharp knife. (I use a chip-carving knife.) The ends of hinges are seldom milled perfectly square to their edges, so I mark the leaves and mortises with numbers to keep them matched correctly.

Deepen the scribe marks with a sharp chisel, then score the waste to the approximate depth of the mortise. The mortise tapers from the knuckle to the edge of the leaf, as shown in Fig. 1, so I angle the chisel accordingly. Chopping both across, then with the grain makes the waste easier to remove. I stay about $^{1}/_{32}$ in. away from the scribe marks at this stage.

Pare the waste away with a wide, sharp chisel. Start the final cuts by nestling the chisel's edge in the scribe mark for the depth. Trim to the knife and scribe lines, then check the fit with the appropriate hinge leaf. Make the final cuts along the inside edge carefully to avoid splitting off the remaining thin piece.

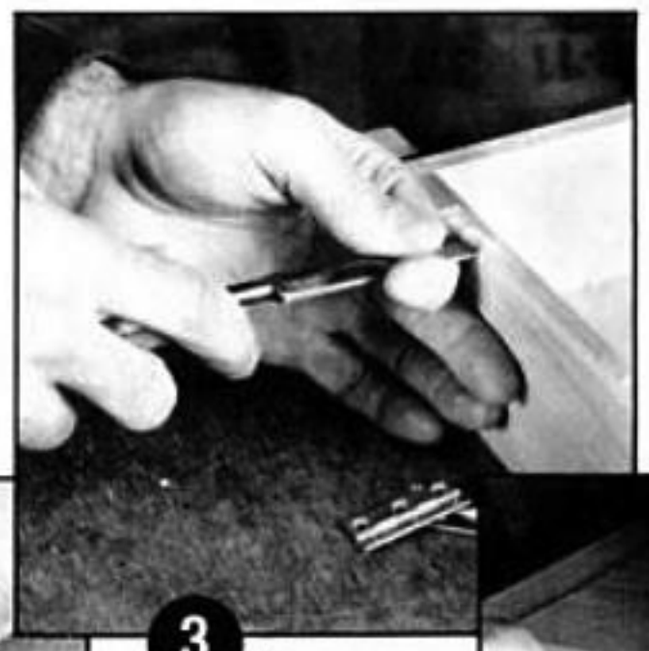
With the hinge in place, use an awl to mark the screw holes. Take some care positioning the holes, particularly in open-grain wood, such as oak. I fudge slightly toward the inside of the box, so the screw will pull the hinge tight to the leaf edge of the mortise. (See Fig. 1.) Bore the pilot holes, then screw the hinge down.(Attach three-hole hinges with only the center screw—the hinge will be on and off several times be-

CUTTING THE MORTISE



1 With chisel, score waste across grain.

2 Score with grain for easier removal.



3 Pare away waste with a wide chisel.

4 With knife, mark hinge position on other half of box.

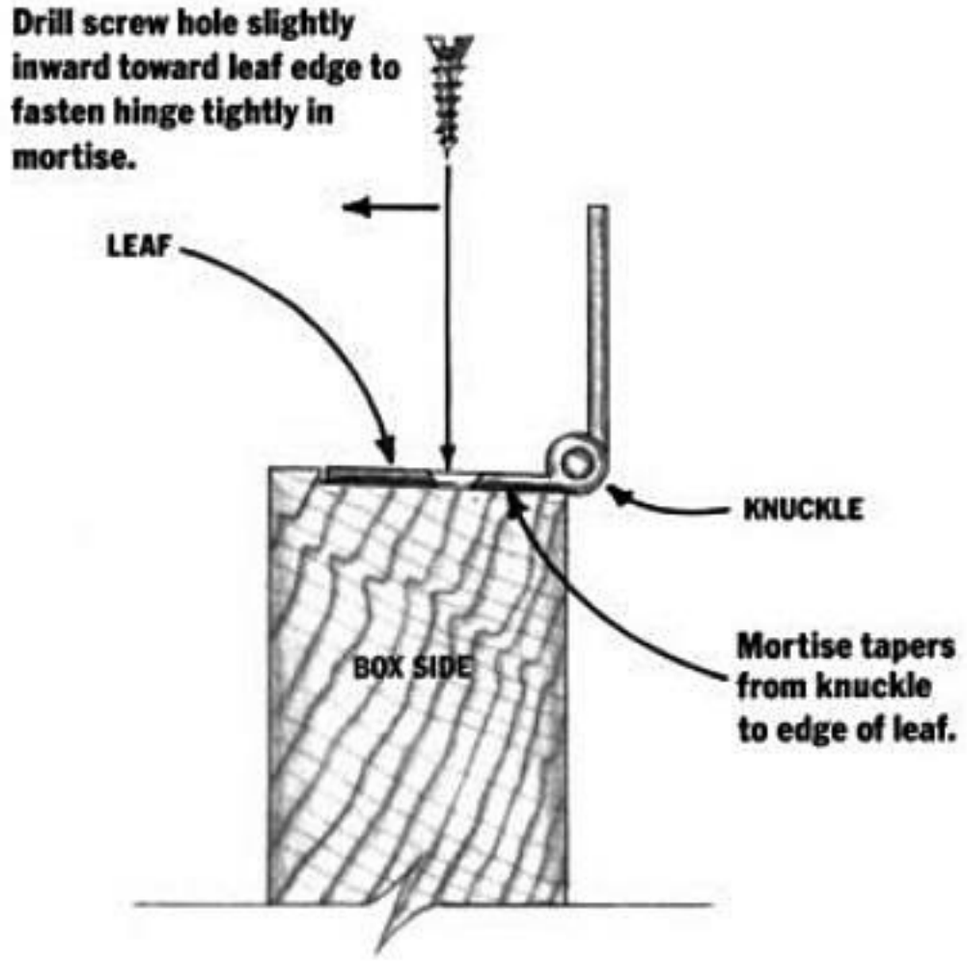
fore you're through.) In hardwoods, to avoid shearing a brass screw, I substitute a steel screw for the brass screw until the final installation.

Install the hinges, and position the lid on the box. With the knife, mark the hinge positions on the box or lid (whichever one remains to be mortised) with the knife. Remove the hinges, and repeat the hinging process. Be sure to use the correct leaf of the correct hinge.

Troubleshooting—If the lid won't close completely, it may be because the inside edge of one or more of the hinge leaves is proud of the box or lid. If so, deepen the mortise on the inside. Another possibility is that the knuckle may be set too deep, causing the lid and box to bind. If so, shim the mortise with paper or veneer. You can also shim to adjust the width of the gap between box and lid.

When everything fits just right, polish the hinges and screw heads with steel wool. And, if you're as compulsive as I am, line up the slots in the screw heads when you put them in. ▲

FIG. 1: INSTALLING THE HINGE



DRAWINGS BY KARL SHUMAKER

SOURCES

Hinges and marking gauges:
GARRETT WADE
161 Ave. of the Americas
New York City, NY 10013
800-221-2942

WOODCRAFT SUPPLY
210 Wood County Industrial Park
P.O. Box 1686
Parkersburg, WV 26102
800-225-1153

LEE VALLEY TOOLS
1080 Morrison Dr.
Ottawa, Ontario K2H 8K7
613-596-0350

Roger Holmes putters in his shop in Woodbury, Connecticut.

This First Cousin to French Polish Is Great for Restoring Old Finishes

WORKING WITH

BY BOB FLEXNER

Padding lacquer, or French finish as it's sometimes called, is a modern form of French polish. It'll give you a finish that's almost identical to French polish, but it's much easier to apply. Like French polish, padding lacquer is made from shellac, with alcohol as a solvent. But despite its name, there's little or no lacquer in it. It can be used as an original finish on a new piece, but I believe its best use is to renew an old finish. With relatively little work and a minimum of skill, padding lacquer can make an old, dull, even cracked finish look brand new.

To understand the value of padding lacquer, it's helpful to know something about French polishing. French polishing was developed in the early 19th century as a technique for applying shellac to high-quality furniture. Since then, it has been used to produce both a first-rate shellac finish and as a technique for renewing old finishes.

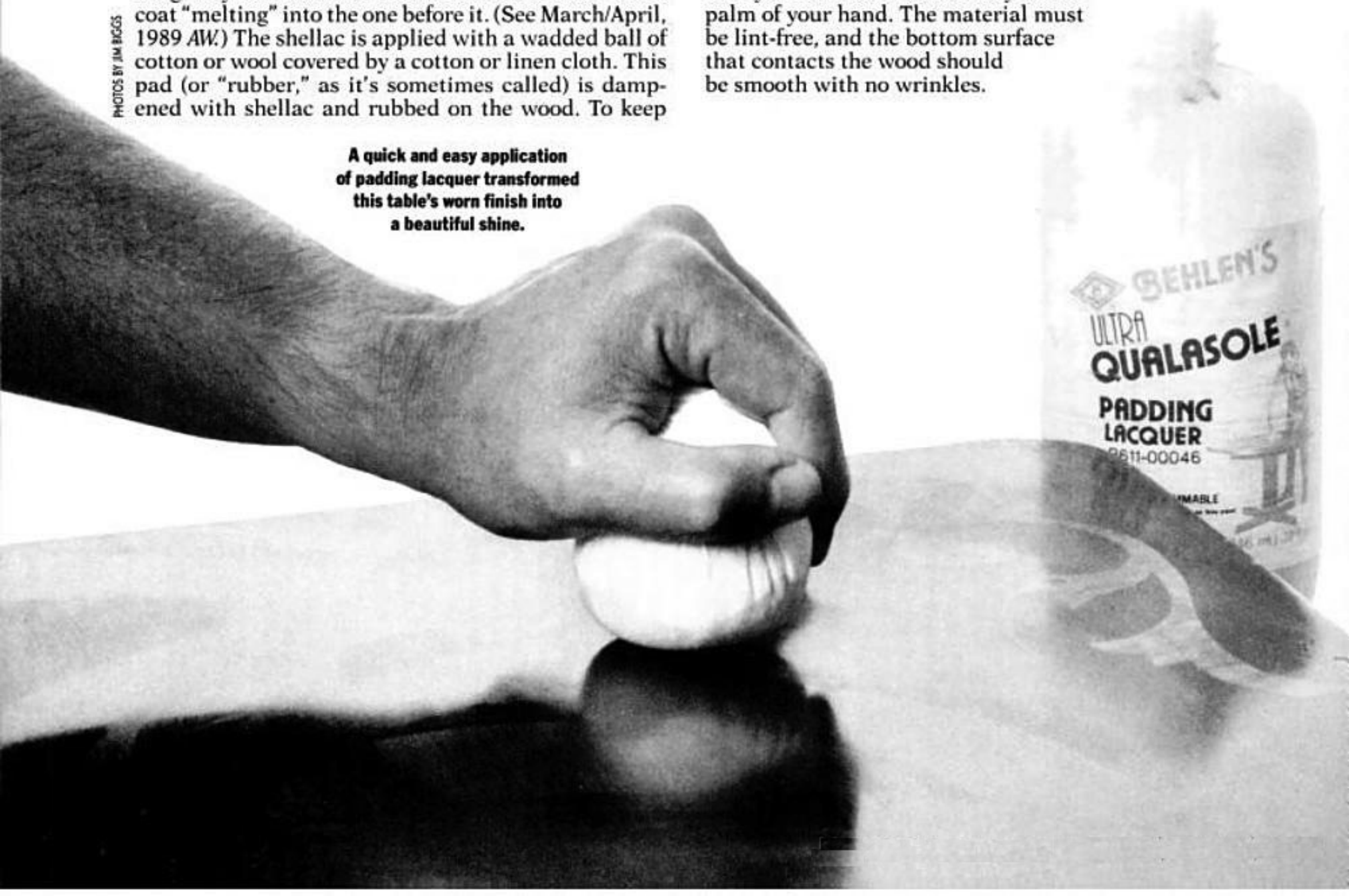
The technique for French polishing involves depositing very thin coats of shellac on the surface—each coat "melting" into the one before it. (See March/April, 1989 *AW.*) The shellac is applied with a wadded ball of cotton or wool covered by a cotton or linen cloth. This pad (or "rubber," as it's sometimes called) is dampened with shellac and rubbed on the wood. To keep the pad from biting into the surface and dragging as the pad is moved around, a drop or two of linseed oil is added to the pad as a lubricant. This oil makes the cured finish appear cloudy, so the last step is to use an alcohol-dampened pad to remove or "spirit off" the oil. Knowing how much oil to add, and removing it without damaging the finish, requires a good deal of skill.

Padding lacquer is French polish (shellac and alcohol) with the lubricant already added. The lubricant is refined turpentine or mineral oil that's volatile enough to evaporate after it's no longer needed. By having an evaporating oil included, padding lacquer frees you from having to master the critical steps of adding, then removing, the oil yourself. The technique for applying padding lacquer differs significantly from that for applying French polish. But the pad is made up the same way.

Making the Pad

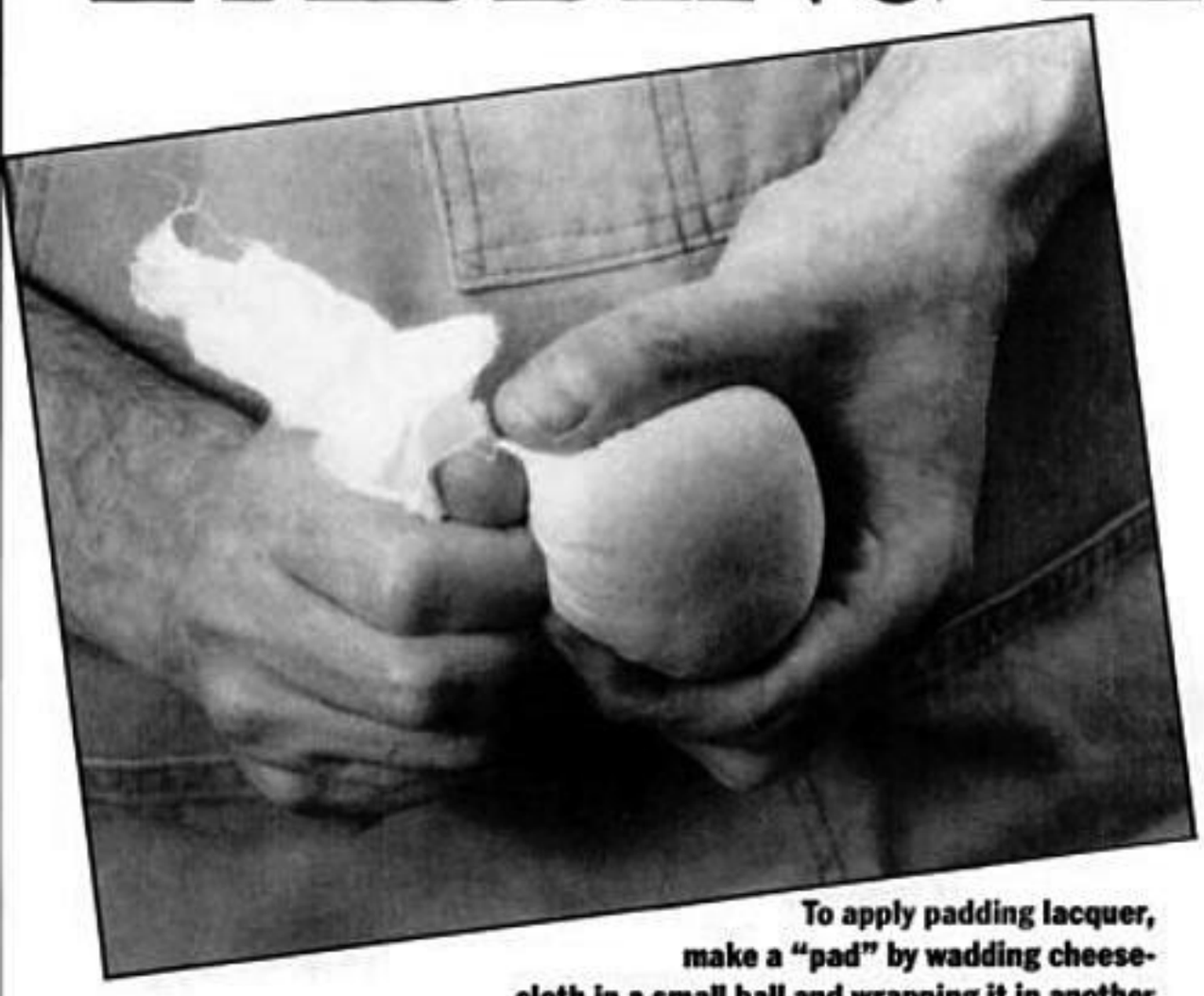
The pad used for applying padding lacquer is simply cheesecloth, cotton or wool wadded into a ball that you can hold comfortably in the palm of your hand. The material must be lint-free, and the bottom surface that contacts the wood should be smooth with no wrinkles.

PHOTOS BY JIM BIGGS



A quick and easy application of padding lacquer transformed this table's worn finish into a beautiful shine.

PADDING LACQUER



To apply padding lacquer, make a "pad" by wadding cheesecloth in a small ball and wrapping it in another piece of cloth with the ends twisted to make it tight.

Here's the best way I've found to make up a pad: Take a piece of cheesecloth 1½ ft. sq., fold it neatly into a ball that will fit in your hand. Take another piece of tightly woven cheesecloth, an old handkerchief or a piece of well-washed cotton bed sheet 6 in. to 8 in. sq., and wrap this piece around the folded ball of cheesecloth, as shown in the photo. Pull the ends of the cover cloth together, and twist them tight, making the bottom surface of the pad smooth and taut. If a wrinkle develops while you're padding, simply twist the ends a little tighter to remove it. This control over wrinkling is the reason I prefer to use a cover cloth. Otherwise, none is needed, and many instructions leave the cover cloth out.

An old rule of thumb in French polishing is that the pad improves with use and age. Instructions often suggest storing the pad in an airtight container, so it won't dry out between jobs. But for padding lacquer, just the opposite is true. To get good results, you must allow the pad to become completely dry while you're rubbing. This could take hours if the pad is wet all the way through. So it's best to make up a new pad for each job, or even more than one if you're working on a large area.

Preparing on Old Finish

Though it's possible to use padding lacquer over dirt, wax and a deteriorated finish, it's almost always better to prepare the surface first.

The first thing to do is get the surface clean. To clean off dirt, use water or soap and water. It usually doesn't hurt to use water quite freely, as long as you give the surface plenty of time to dry before padding. Proceed cautiously at first, just to be sure. To clean off grease, oil or wax, use naphtha or mineral spirits. If you're trying to renew an old finish that's cracked or rough to the touch, sand it smooth before applying the padding lacquer. You don't need to remove all the old finish, just smooth it. The process is identical to sanding between coats during finishing. I use 320- or 400-grit stearated sandpaper. This is a grayish-blue silicone carbide sandpaper that has a soap-type lubricant built in, so it doesn't clog up with the old finish as fast.

If you're working on a very old piece of furniture that has historic or monetary value, you should probably avoid sanding the surface, because you can destroy some of its value. If you're not sure what to do, contact a museum furniture conservator for advice.

Applying Padding Lacquer

The procedure for applying padding lacquer is simple. Dampen the pad with padding lacquer, and rub it over an area 4 sq. ft. or less. The trick is to rub the pad continuously over the area until the pad is totally dry and all the streaking has disappeared.

You vary the amount of padding lacquer on the pad depending on the size of your pad and the surface you're covering. Try one or two teaspoons to begin with, and adjust from there. The exact amount is not critical, and I just pour it from the bottle. There should be enough to wet the surface area you're trying to cover, but not so much that it damages the existing finish or drags the padding lacquer you've just applied when you come back over it with the pad.

To wet the pad, hold the tightly wrapped pad upside down in one hand, and pour the padding lacquer onto it. Tap it against the palm of your other hand to disperse the liquid. Begin padding by bringing the pad down at an angle onto the surface—grazing it like an airplane landing—and continue moving the pad slowly around the surface using very little pressure. If you stop moving, the fresh padding lacquer may bite into the surface. This will leave a mark which might require sanding to remove.

I usually begin padding with a non-overlapping pattern (see Fig. 1) to avoid the damage which may be caused by overlapping too soon. This pattern gets the first coat of finish down quickly. You shouldn't be concerned about covering the whole surface perfectly—any bare spots will be taken care of in the next step. I can usually cover 3 or 4 sq. ft. of surface in ten to 15 seconds.

Next, I switch my padding to another pattern where the strokes cross each other in large circles or figure 8s. If you cross over a previous pass too soon, the pad will grab or drag at the point of crossover. You'll feel the friction of the pad dragging, and the surface there will look rough. If this happens, return to a non-

crossover pattern, until the surface and your pad have dried some more. Light crossover drags will usually even out and disappear. Heavier damage, such as ridges, may have to be sanded smooth with 320- or 400-grit paper after the padding lacquer has dried a few minutes. Then apply another coat of padding lacquer.

With the second pattern I get more vigorous, increasing the pressure and speed on the pad. The circles and figure 8s help me avoid coming to a complete stop at any one place. It's not important what pattern you use, as long as you cover the entire surface area evenly, and keep the pad moving.

Now comes the most critical part of applying padding lacquer. As you rub, streaks will begin to appear, and you'll think you're just smearing the surface. Your instincts will probably tell you to add more padding lacquer. *Don't do it*. The smear marks, or "rag tracks," as a friend of mine calls them (see photo), are just what you want to see.

At this point you should increase the pressure on the pad, using both hands if you like, and continue moving rapidly over the entire area you're padding. As your pad dries out, it will become tacky, and the friction caused by the heavy rubbing will burnish out the smears and leave a high gloss shine, as shown in the photo. Don't stop rubbing until all the smeary rag tracks have disappeared. Be sure to have a light source positioned to reflect across the surface, so you can look for complete coverage and check your progress in removing the streaking.

If the area you're trying to polish is too big, your pad will become too dry before you've removed all the streaks. If that happens, you should start all over again, and reduce the area you're working on. If the area is too small, you might cross over too often and soften or damage the finish as you try to keep the pad moving. In this case, you'll need to slow down your movements, let the pad dry a bit, or use a smaller pad.

It takes about five minutes to pad a 4-sq. ft. area, which is a manageable size to work with. The time will vary, though, depending upon the brand of padding lacquer, the size of your pad, and how wet your pad is. If you're polishing a larger surface, such as a dining-room table, you'll have to break the surface up into several areas of manageable size. Then pad each area separately, overlapping them at the edges. If you have to work on a large surface for some length

If the old finish is cracked or rough, the first step in restoring it is to sand it smooth with fine sandpaper.

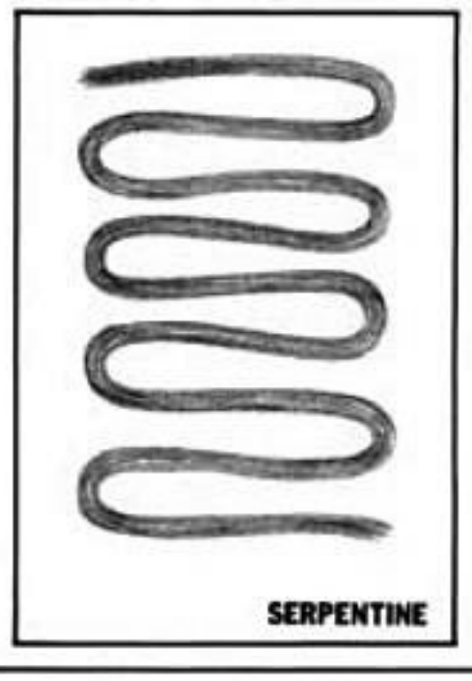
of time, wear an organic vapor respirator (available from Direct Safety Co., 7815 S. 46th St., Phoenix, AZ 85044, 800-528-7405) because the fumes can make you light-headed and temporarily affect your nerves.

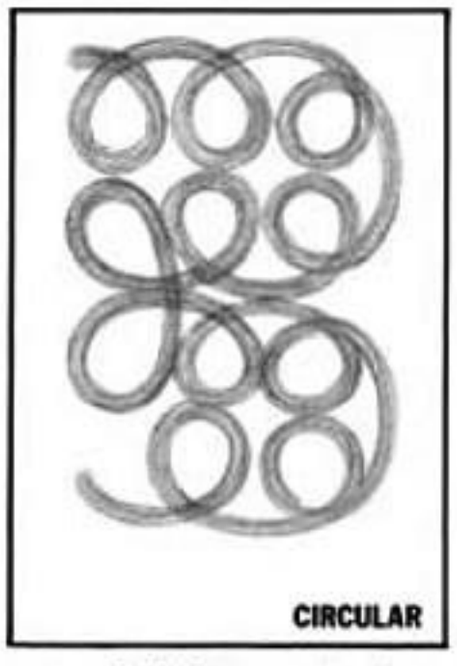
Getting the wadded pad into tight areas such as corners presents a problem. To solve it, remove the inner cheesecloth, and form it into a point that can fit into tight spots. The inner cheesecloth may also work better on rounded or hollow areas such as chair legs where you want the pad to conform to contoured surfaces. On very difficult areas such as carvings, I switch to a brush just like I would if applying shellac.

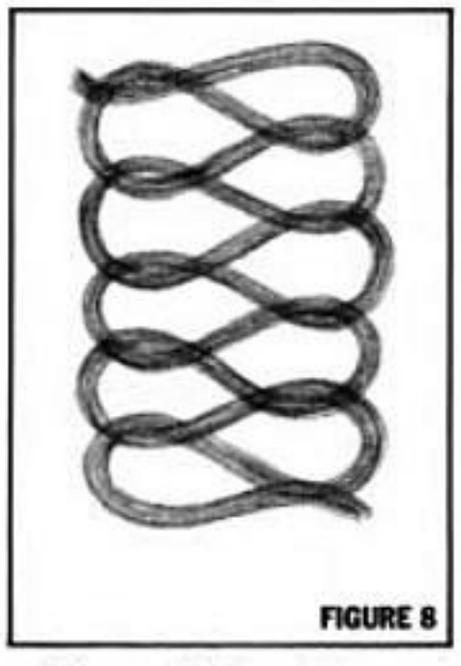
Some people like to do all, or at least part, of the rubbing with the grain, and some instructions even suggest applying the padding lacquer using a pendulum motion with the grain. But I like the look of fine, swirly lines better than straight lines, because they

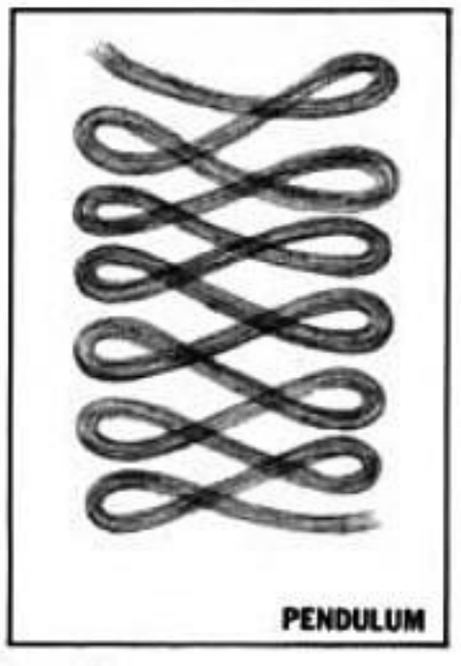
FIG. 1: PADDING PATTERNS

STEP 1 ***Start padding with serpentine pattern of non-overlapping strokes.***



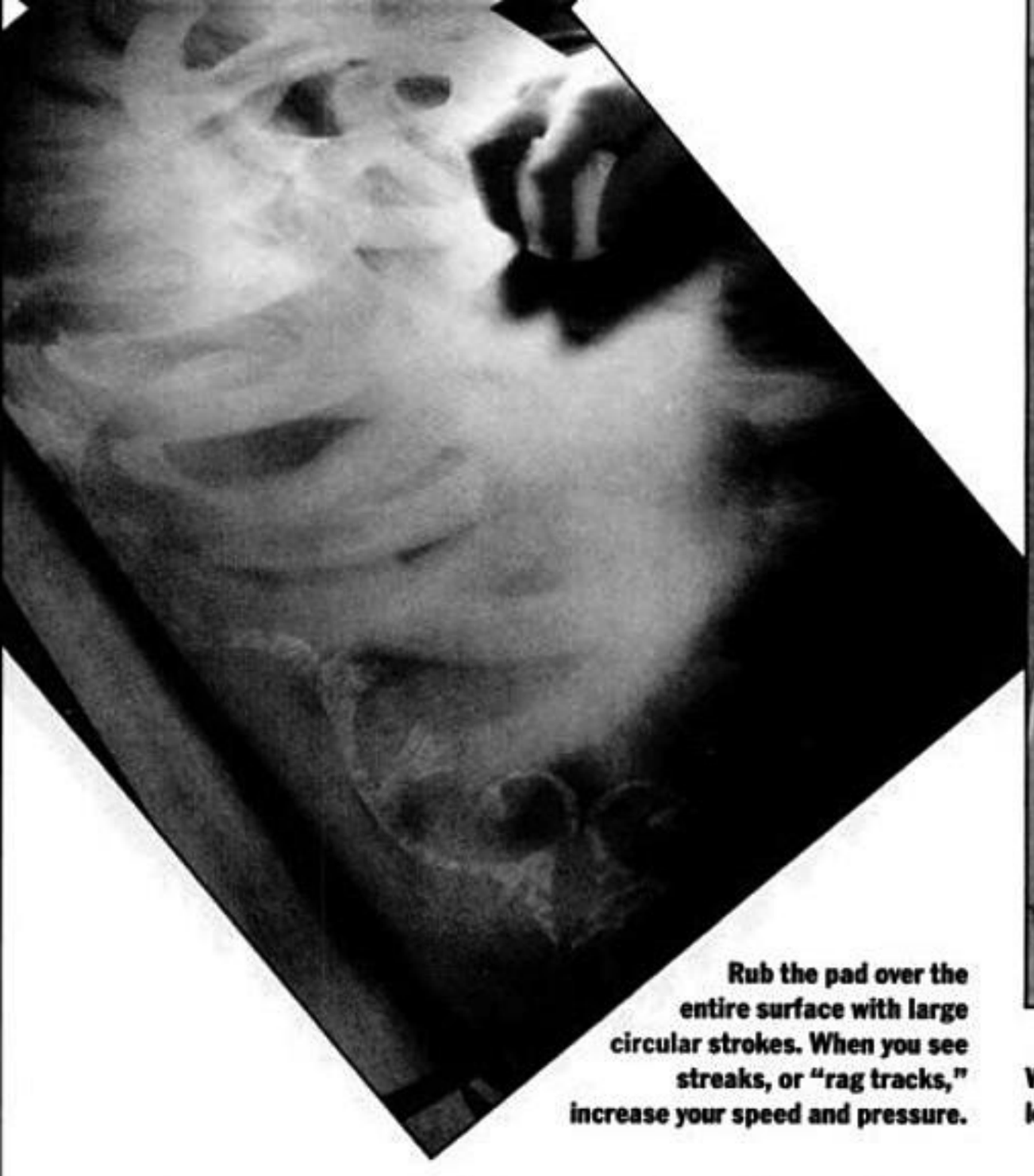






STEP 2 ***Switch to overlapping pattern like one of these. Keep pad moving until it's dry and surface is shiny.***

DRAWING BY SALLY ONORA



Rub the pad over the entire surface with large circular strokes. When you see streaks, or "rag tracks," increase your speed and pressure.

When the pad is totally dry, the streaks should be gone, leaving a beautiful shine.

show up less on a tabletop when viewed from different angles. It's similar to the effect you see on a factory-polished car when you catch the finish in the sunlight.

Some padding lacquers contain a less volatile oil that will stay on the surface longer than needed. This may trick you into thinking you're still leaving padding lacquer tracks, when really you're just smearing the oil. To test for this, run your finger across one of these tracks, and if you change the direction of the smear, then it's oil, and there's no reason to continue padding. You can remove the oil by wiping the surface with a cloth dampened with naphtha. You can also just leave the oil, and it'll slowly evaporate.

When you've finished padding, the bottom of your pad will be quite dry. If you can still see dull areas or sanding scratches at this point, you'll have to put on another coat of padding lacquer. But if the surface is smooth and shiny, another coat won't gain you any advantage. If the shine is too glossy for you, you can cut it back (make it a little less shiny) with 0000 steel wool, as with any other finish. If you want more gloss, you can rub the surface with rottenstone mixed with a little water or oil to make a thin paste, or use a commercial polishing compound.

Padding lacquer can be used over almost any finish. But it will give best results over shellac or lacquer, which are both evaporative finishes that cure by the evaporation of their solvent. (See November/December, 1989 *AW.*) Padding lacquer will fuse or "melt" right into them. It won't melt into reactive finishes, such as varnish or polyurethane, which cure by chemical reaction. Padding lacquer will form a thin film over these finishes and will probably crack in time. But you can still get many years of use out of an old, worn, varnish finish by padding it.

To determine if a finish is shellac, apply a dab of alcohol to an inconspicuous spot. If it's shellac, the alcohol will make it soft and sticky. If the alcohol has no effect, try lacquer thinner, which will soften a conventional lacquer finish. If neither solvent softens the finish, it's a varnish-type finish.

The two largest manufacturers of padding lacquer are Mohawk/Behlen and Star. (See sources.) Each company makes several different types of padding lacquer, which vary according to solvent-evaporation time, solids content and whether it has an amber or clear color. From my experience, the easiest products to use are Ultra Qualasole from Mohawk/Behlen, and Star-Lite French from Star. These are the padding lacquers I would recommend if you're just beginning.

Keep in mind that shellac has a shelf life of only a year or two. Since padding lacquers are shellac products, they also have a shelf life. But unfortunately, neither Mohawk/Behlen nor Star provide us with a date of manufacture on their containers. Just as with shellac, you'll know that your padding lacquer is too old if it doesn't harden properly. If in doubt, it's a good idea to test your older padding lacquer to see if it will harden correctly, before you go ahead and use it.

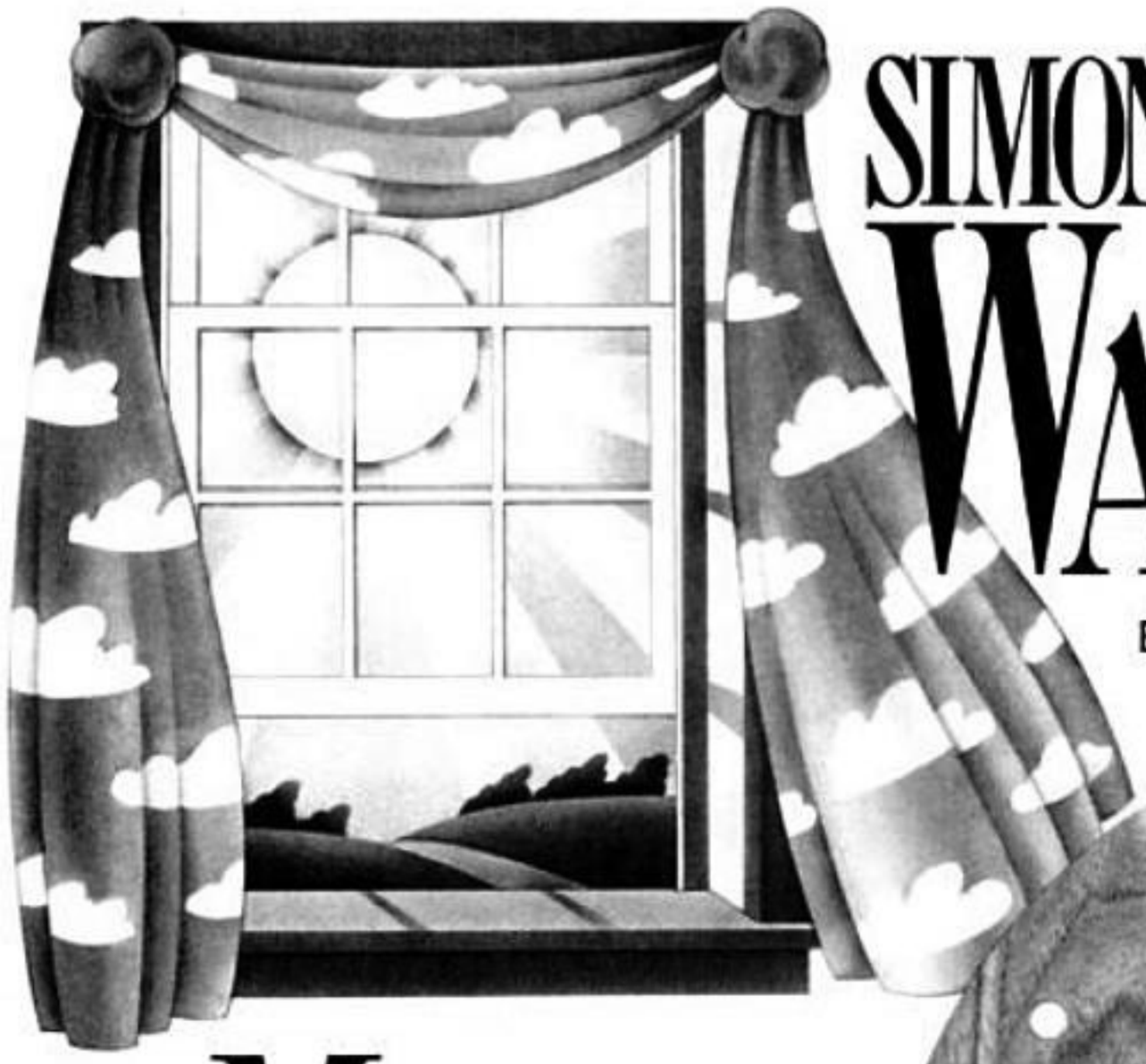
If you've never used padding lacquer before, I'd advise starting out by buying a fresh pint or quart and trying it on a piece of furniture that you intend to refinish anyway. You'll develop a feel for padding techniques and learn the finish's limitations. The worst that can happen is that you'll have to go ahead with your plans to refinish the piece. But more likely, you'll discover how easy and rewarding it can be to use padding lacquer. ▲

Bob Flexner restores furniture at The Workbench in Norman, Oklahoma. He wrote about shellac and varnish in the November/December, 1989 AW, *and has produced two video tapes:* Repairing Furniture, *and* Refinishing Furniture, *(available from Taunton Press, Box 355, Newtown, CT 06470).*

SIMON'S SIMPLE WALL CLOCK

BY SIMON WATTS

An Exercise in Turning Time



MITCH MANDEL

My older sister once claimed that if we dropped one of the lead weights found on our family's venerable grandfather clock out the third floor nursery window, it would make a hole right through the earth. I was equally convinced it would bounce.

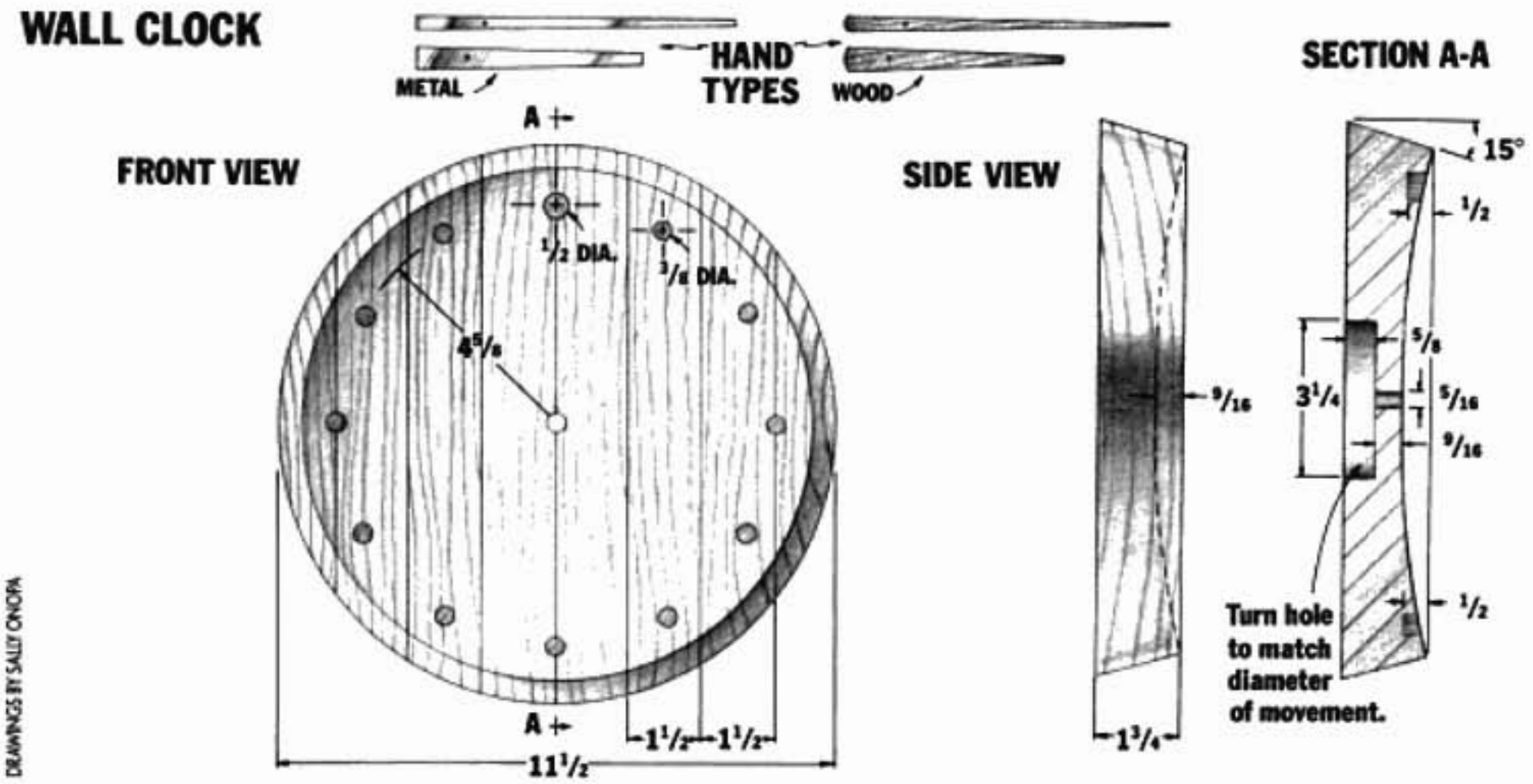
Experiential education was much in vogue, so we lost no time in putting our rival theories to the test. The result didn't conform to either theory, so we had to drop a second one to make sure. We retrieved the dented weights and returned them to the silent clock, but the cracked sidewalk remains to this day—and so does my interest in clocks.

I've made a number of clocks through the years, but this simple design remains my favorite. The clock body is laminated from strips of wood, bandsawn to an 11½-in. circle and then turned on a lathe. The hour markers are circular plugs of a contrasting wood. Clock hands usually come with clock movements, but if you like, you can make your own hands out of metal or wood. The quartz movement (I recommend the quartz movement and hands package AW-8/90 available from Precision Movements, 4251 Chestnut St., Rt. 29, P.O. Box 689, Emmaus, PA 18049, 215-967-3156) runs off a battery, so the clock can be hung anywhere.

You can use any wood you like. Some combinations that work well are ash with ebony markers and hands, cherry with walnut, walnut with stainless steel, ebony and copper, rosewood and silver, teak with rosewood markers and brass hands. You might even want to drill shallow holes for the hour markers, and then paint them inside, a different color for every hour—a Rainbow Clock—or is that too Californian?

Think about the different materials you plan to combine—whether they enhance each other's qualities or fight and squabble. Also, keep in mind that

DRAWING BY KATHI EMBER



most woods darken with age, so two woods that may have a pleasing contrast when newly worked may, over time, drift into an irritating sameness.

Making the Clock

The first step is to prepare eight strips of wood 1½ in. wide × 2 in. thick × 12 in. long. Glue these together, as shown in the drawing. I use plastic resin glue, because it allows more time for assembly. When the glue has set, feed the assembly through a thickness planer, and clean up both sides. Don't reduce the thickness to any less than 1¾ in., or you won't have room to house the clock movement. If you don't have a planer, just clean up the best face—this is the one that will show—with a block plane. Draw an 11½-in. circle on this surface, and saw just clear of the line.

First, mount the blank by cutting a 6-in. dia. circle out of ½-in. plywood. Glue this to the face side of the clock blank, so the centers coincide. Don't glue wood to wood directly, but make a sandwich with a thin piece of cardboard—the kind laundries use for stiffening shirts. Then you can easily remove the plywood by levering it off with a chisel. Center the lathe faceplate on the plywood, and attach it with wood screws. Make sure the screws are the right length, so the points don't protrude beyond the plywood.

Now turn a cylindrical hole to the corresponding diameter and depth of the movement you've purchased. Take the faceplate off the lathe, and separate the plywood from the blank. Turn the blank around, and screw the plywood and faceplate onto the back. If your faceplate is large enough, screw it directly to the blank. In either case, center the faceplate on the blank as accurately as you can.

Mount the blank, and with a gouge or scraper, turn the edge to the angle shown in the drawing. Move the tool rest so it's parallel to the clock face, and with a gouge, "dish" the blank to a depth of 9/16 in. Check this by laying a straightedge from rim to rim and measuring the depth at the center.

Next come the hour markers. Take the blank off the lathe, and leaving the faceplate attached, mark out the positions of the 12 hour markers. Drill these in a drill press using Forstner or Stanley Power Bore bits, ½ in. for the 12th hour marker, ⅜ in. for the rest. Test the match between your bits and plug cutters on a piece of scrap—the plugs should be a snug fit. Too loose and you'll find a ring of glue around each marker.

Now cut out the plugs, and glue them into the sockets. Instead of using a hammer or mallet, it's best to coax them into place with a wooden handscrew or the padded jaws of a vise. Make sure the grain lines in the plugs are exactly parallel to the original laminations.

After the plugs have dried, put the clock back in the lathe, and give the face—including the plugs—a light turning with a sharp gouge. Sand the disc while the lathe is turning. But for the final finish sanding, turn the lathe off, and with the clock still mounted on the lathe, sand the face by hand with the grain.

If you have a chuck for the tail stock of your lathe, put in a 5/16-in. dia. bit, and drill the hole for the threaded stem of the clock movement. Then take the clock blank off the faceplate, and plug the holes in the back left by the attachment screws.

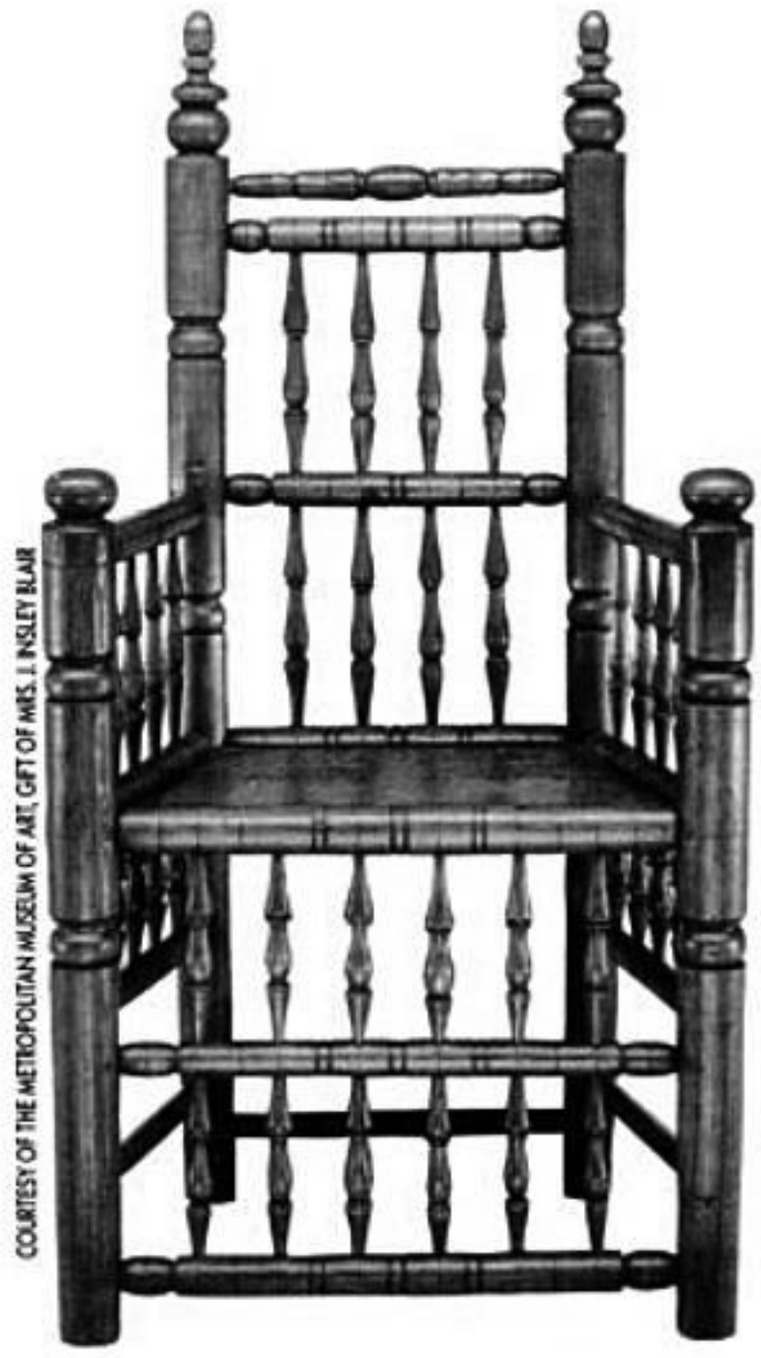
Finish the clock with several applications of oil (Watco or tung oil will do) and a final wet sanding with 400-grit wet/dry sandpaper. Make sure you wipe off all excess oil. I wax the faces of the clocks I make, so they are easier to dust.

Making the Hands

Some clock movements give you the option of a second hand, but I usually ignore it. Time goes by fast enough without a relentless reminder. If you make your own hands, size the hour and minute hands so you know which is which without having to check your wristwatch. Keep in mind that heavy, unbalanced hands will strain the drive motor, eat up batteries and the clock will run erratically.

All the battery movements I've seen have a slot in the back for hanging the clock. Use a round head screw with a large enough head to hold the clock securely. Quartz-crystal movements need no regulating. ▲

Simon Watts is a journalist and teaches courses in wooden boatbuilding. He lives in San Francisco, California.



COURTESY OF THE METROPOLITAN MUSEUM OF ART, GIFT OF MRS. J. INSLEY BLAIR

The Great Brewster chair named for William Brewster, a ruling elder in the Pilgrim church, is something of a small throne, a symbol of Brewster's authority. There are only a few known chairs of this kind in existence.

HIGHLIGHTS OF AMERICAN PERIOD FURNITURE

Part 1: 17th-Century Mannerism

BY DAVID DONNELLY

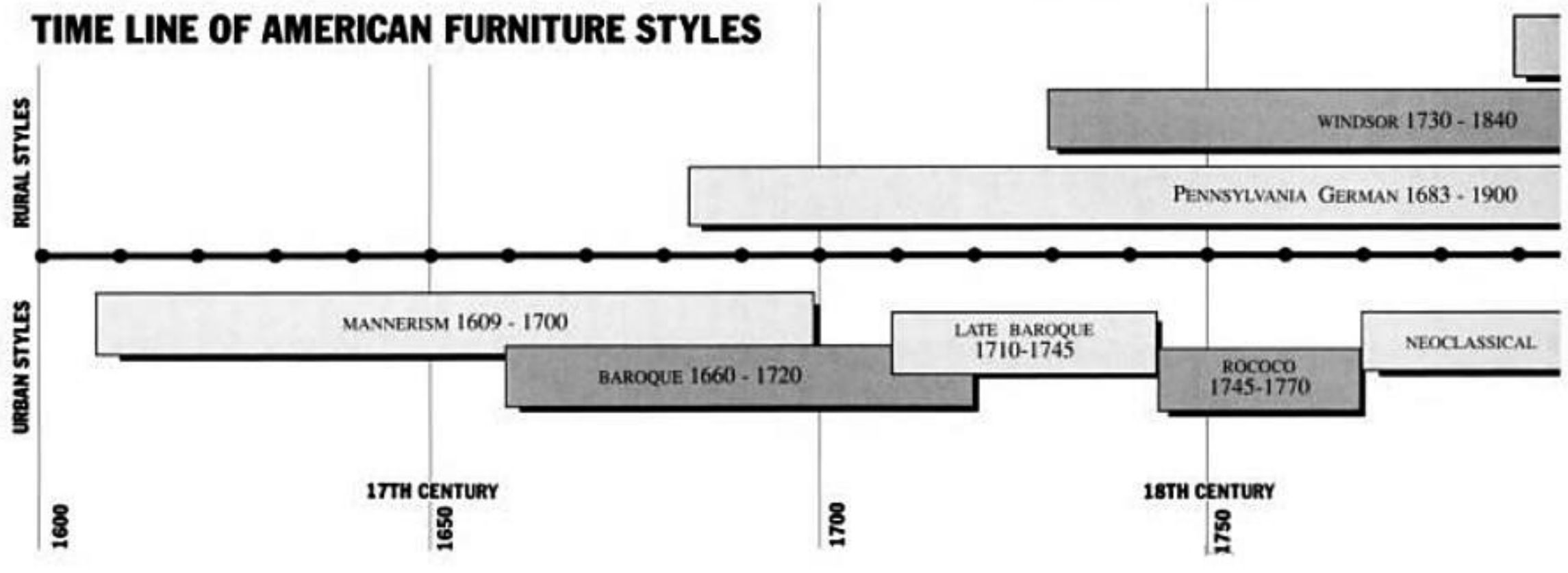
In appreciation of American furniture, AMERICAN WOODWORKER *announces the beginning of a new series: Highlights of American Period Furniture. Each article will feature one of the many styles that have been in vogue since the Mayflower landed.*

We'll describe the woods, construction techniques, characteristics of the pieces and the names of the makers. From the urban "high styles" of the wealthy, to the rural "country styles" of the common folk, the history of furniture weaves a rich tapestry of our American heritage.

New discoveries and interpretations are currently changing our understanding of American furniture history. We've learned, for example, that not all great colonial pieces come from New England; until recently, contributions from the Southern colonies had been overlooked. We've also learned that by redefining furniture as a decorative art with a historical lineage, it's no longer regarded as just a utilitarian craft.

Part I of the series begins in this issue with a look at 17th-century American furniture, a style now referred to as "Mannerism." Never heard of it? Neither had we, until we started looking at our furniture heritage with a fresh eye.

TIME LINE OF AMERICAN FURNITURE STYLES



MITCH MANDEL

The carved tulip-and-sunflower pattern on this two-drawer oak chest is a motif that frequently occurs on 17th-century furniture. Note also the split turnings and the "bosses" (wooden ovals) on the drawer fronts.

17th-Century Furniture

As Elizabethan, Renaissance, and Baroque influences were shaping England and Europe, the first settlers in the New World were chopping down trees in the forests just to survive. Louis XIV was lavishing in regal splendor in Versailles while early American colonists forged crude, utilitarian furniture to meet their basic needs. Unfortunately, no furniture survives from the early settlements, perhaps as a result of its crudeness, hard usage or temporary nature.

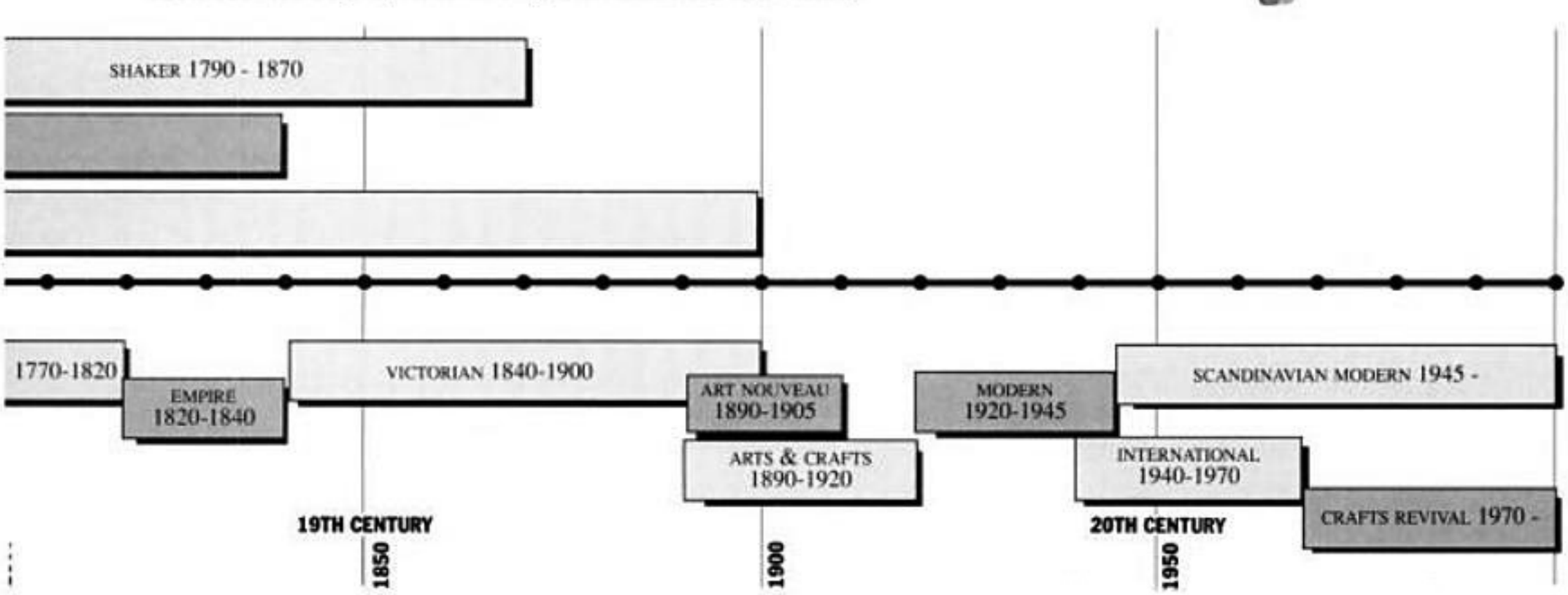
The earliest surviving pieces of American furniture date from the second half of the 17th century—a style called "Mannerism" (see sidebar)—when craftsmen finally had the leisure time to build stylish pieces. English influence is evident throughout the colonial period because most settlers came from England and wanted to keep up with English fashion. However, since even England's styles were influenced by countries such as France, Germany, Italy and the Netherlands, American styles are a combination of numerous cultures.

It's interesting to note that 17th-century American furniture reflects *rural* English taste, rather than the high-style, urban fashions of London. When need and function were more pressing than fashion, the earliest pieces were made by farmers, carpenters, or anyone with an ax. Though these pieces were primitive, they represent the beginning of our mainstream furniture lineage. Nevertheless, styles continued to evolve throughout the 17th century and became more refined as new design books from Europe circulated, new craftsmen immigrated and new settlers arrived from Europe, bringing furniture with them. Generally, American styles lagged behind English styles by about 10 years.

Initially, furniture in the New World was made by the settlers for their own use. As towns and villages took shape and more immigrants arrived, cabinetmakers began to appear. We know very little about these early craftsmen, but one cabinetmaker named Edward Johnson observed, "The Lord hath been pleased to turn all the wigwams, huts and hovels the

Sometimes furniture had to do double duty when space was at a premium. The top of this hutch table swings up to make a chair.

COURTESY OF THE HENRY FRANCIS DU PONT WINTERTHUR MUSEUM



FURNITURE HISTORY RECONSIDERED

Until recently, colonial furniture of the 17th century had been referred to as "Jacobean," named after James I, King of England. But actually, several monarchs reigned during the Jacobean era, so the term was never entirely satisfactory.

There is a current trend among furniture conservators and curators to rename American furniture styles to more accurately match the other decorative arts of the same style and era.

Elizabeth Gusler, teaching curator at Colonial Williamsburg, explains that styles do not evolve in a vacuum but are influenced by trade, politics, religion, and other factors. She thinks, "Using art historical designations rather than monarchs' or furniture designers' names allows us to cross geographic and political barriers and to relate the decorative trends in many media—furniture, ceramics, textiles, metals—throughout the Western world."

In the time line on the previous page, art historical designations such as "Baroque" and "Rococo" have replaced more familiar names such as "Queen Anne" and "Chippendale." In the 17th century, however, American furniture cannot be so neatly pigeonholed.

Seen in this context, and with the benefit of recent research in the field, most 17th-century New England furniture can be described as "Mannerist." The Italian word *maniera*, from which Mannerism is derived, means manner or style. Mannerist furniture combines these two qualities with "grotesque" ornamentation and Renaissance classicism.

Mannerism arose in the 15th-century Renaissance when the ruins of Roman emperor Nero's Golden House were uncovered. The deeply buried rooms, or grottoes, were covered with elabo-

English dwelt in at their first coming, into orderly, fair, and well-built houses, well-furnished many of them . . ."

Seventeenth-century colonists had very few furniture forms in their modest houses. In wealthier homes (which were still modest by European standards), court cupboards were used to display and store utensils and decorative items, while press cupboards were used for clothes. They would be the most important pieces in the house. Stretcher tables and trestle tables were generally accompanied by joint stools, because chairs were relatively uncommon and reserved for the head of the household. (See photos.)

PHOTOS COURTESY OF THE HENRY FRANCIS DU PONT WINTERTHUR MUSEUM

Court cupboards were used to display the family's cherished possessions. This one demonstrates the massive, turned balusters, the applied split turnings, and the flattened bun feet common in storage-type furniture.

Seventeenth-century furniture makers frequently combined geometric and floral carving, as seen on this oak armchair. Typically, carvings of this period are low relief. Pegs hold the chair together.

In our zest to reproduce and revive period-furniture styles, the 17th century has been left by the wayside. Many people find it massive, bulky, and just plain uncomfortable. Chairs are straight and stiff. Tables are heavy. Cupboards are overpowering. Carvings are too busy. Turnings are massive. And everything is extremely rectilinear. Placed in a historical context however, we can appreciate the artistry that rose out of our humble origins. Mannerist furniture laid the foundation for the styles to follow and is a reflection of 17th-century life.

Robert Trent, furniture curator at Winterthur Museum in Wilmington, Delaware disagrees with prevalent attitudes about 17th-century furniture. As one of the nation's leading experts on 17th-century furniture, he finds it extremely sophisticated. He believes,

rate frescoes of strange creatures, urns, and acanthus laid out in geometric patterns. Renaissance artists began to incorporate this "grotesque" (from grottoes) ornamentation into their work.

For many years, England was out of touch with the art of the Renaissance because of Henry VIII's split with Rome. But when Spain later invaded the Netherlands, Dutch and German craftsmen fled to England where they spread their knowledge of Mannerism. This was the style the Puritans knew when they later left for New England. Contrary to popular myth, the Puritans were artistically literate and enjoyed earthly artifacts.

The Mannerist furniture that they introduced to this continent exhibits exaggerated proportions, applied strapwork, and complex ornamentation. Repeat carvings and acanthus appear on frame-and-panel assemblies.—*D.D.*

An example of the "more is better" approach to carving, this oak chest demonstrates the common use of the carved panel.

"We are imposing modern taste on the past when we suggest that carved and joined furniture is cruder than later styles, which may be veneered or inlayed."

From this perspective, we can gain a new appreciation for the sophistication of twisted turnings, floral carvings, and the overall balance and complexity that these pieces display.

Four Qualities

Furniture from the 17th century has four distinct qualities—it is joined, turned, carved, and painted.

Joinery: Mortise-and-tenon joints appear on stools, chairs, and tables as well as on cupboards and chests (which incorporated a new feature—moveable drawers). On casework, the frame and panel was a common design element. Hide glue was occasionally used, but furniture makers commonly relied on the strength of pinned mortise-and-tenon joints to hold a piece together.

The early, oak joint stool with baluster-turned splayed legs was a common form of furniture in an age when chairs were fairly uncommon. The stool occasionally doubled as a small table.

Turning: Turned spindles are the most definitive characteristic of 17th-century furniture. They ranged from heavy, bulbous turnings, as in flattened bun feet and baluster supports on the court cupboard (see photo), to more delicate vase turnings and twisted turnings. In addition to structural turned elements, 17th-century furniture makers also applied split spindles to the fronts of casework as ornament. (See photos.) Turning was done on primitive spring-pole lathes or on belt-driven "great wheels" operated by apprentices."

Carving: Elaborate yet unrefined carvings covered many chests and cupboards. Common motifs included square and diamond-shaped geometric patterns and numerous forms of acanthus and foliage of Elizabethan and Renaissance origins. Perhaps the most beautiful recurring design is the tulip-and-sunflower pattern, seen here in the two-drawer chest. (See photo.)

Painting: Few original painted pieces remain to be studied, but we know that chests were sometimes painted or stained red, brown, or green. The same patterns that appear in carvings were painted as well, along with Tudor roses, birds, fleur-de-lis, emblems, and other patterns.

Oak, hard as it is to work with hand tools, was surprisingly the most common wood that the early settlers used. Later in the century, walnut, maple and pine became more common, with many pieces made of mixed woods.

By the latter half of the 17th century, Mannerism was giving way to the Baroque style, the subject of our next article. ▲

David Donnelly is a professional writer and video producer. He has been working with wood for five years. He's also the president of the Boise Metro Woodworker's Guild in Boise, Idaho.

BOOKS & VIDEOS

BOOKS

Biscuit Joiner Handbook

by Hugh Foster
(1989, Sterling Publishing Co. Inc., 387 Park Ave. South, New York City, NY 10016) 192 pp; paperback, $14.95.

Biscuit joiners have been around for some 30 years, but they have become popular only in the past ten now that competitive pricing has brought costs to an affordable level. Once the province of specialized professionals, the biscuit joiner is becoming a fixture throughout the woodworking community superseding the doweling jig.

Because joiners are now so prevalent, yet so new, more books are needed to cover this subject. *The Biscuit Joiner Handbook* attempts to fill this need but falls short of the mark. The text is plagued by overwriting, photographs that are poorly staged and incongruous with the author's intent, and often indecipherable graphics.

Foster's discussions of biscuit-joiner maintenance and the skills and techniques involving this tool should have been the meat of this book, but instead I sometimes found the thread of his text incomplete and hard to follow.

The book concludes with a chapter outlining two simple projects. Oddly, the line drawings of the projects lack dimension marks. Odder yet, the drawings don't quite match the photos of the objects being built.

BERNIE MAAS

Small and Unusual Woodturning Projects

by James A. Jacobson
(1987, Sterling Publishing Co., Inc., 2 Park Ave., New York City, NY 10016) 160 pp; paperback, $12.95.

Except for a few projects contributed by a "cutter" friend of Jacobson's, this book should be a delight to those folks out there in "Scrapers Anonymous," as the tool of choice is the roundnose scraper.

As a low-threat, visual source book of basic forms and functions, it's at its strongest. It makes no pretense at teaching the craft of turning but does introduce a variety of useful tools and techniques via the numerous projects. There is also a fair balance between spindle and faceplate work. An overview of basic finishing is included, and there is a consistent concern for safety.

Several techniques presented are somewhat unconventional, and true novices should be on their guard. Boring out small boxes on the drill press after the exterior has been turned seems curious, but a truly troublesome technique for me is the use of a bandsaw to separate the turned object from its waste block.

STEVE LOAR

VIDEOS

Wood Finishing

with Frank Klausz
(1985, Taunton Press, 63 S. Main St., Box 355, Newtown, CT 06470) 110 min.; VHS, $39.95.

If there is one area that gives woodworkers trouble it's finishing. Perhaps that's because, contrary to its name, one is never really through with finishing—the end product can always look a little better. Regardless of the reason, most woodworkers will benefit from this long and thorough video tape on the subject.

I was glad to see the tape open with one of the most overlooked and important areas of wood finishing: preparing the surface. Frank Klausz covers planing, scraping and sanding, showing what to look for in a surface and how to avoid tear-out with the plane. Throughout the tape, Klausz emphasizes these steps, crucial in achieving a beautiful finish. Noticeably absent from this discussion is machine sanding.

Stripping an old finish is examined in the next section, with emphasis on safety in working with potentially dangerous chemicals. Klausz demonstrates how to remove finish in various situations, from flat panels to carvings and turnings.

In the section on staining, Klausz illustrates the three basic types of stains: oil, alcohol and water. He goes on to explain the differences in appearance and application of each. This is an area in which I've had mixed results, and many of my questions remained after this overview.

The rest of the tape covers four different types of finishes: oil, varnish, lacquer and French polishing. With each type, he demonstrates a different technique such as wiping, spraying, brushing and rubbing.

Klausz has really bitten off a lot in trying to cover all types of finishing in one tape, and even at close to two hours you sometimes feel as if he has just scratched the surface. His delivery and organization are very clear and easy to follow. In fact, one of my few complaints is that he makes finishing look too easy.

Klausz is at his best explaining *how* to apply a particular finish and does not cover as well *when* to use one finish instead of another or *why* to incorporate a particular method. Of course, the beauty of a video tape is that you can actually see techniques demonstrated. Overall, Klausz is a very able teacher, knows his subject well and seems at home in front of the camera. This tape is a fine introduction to the subject of wood finishing.

BEN ERICKSON

Marquetry is the art of making designs with contrasting veneers. These veneers are sawn out, fit together and glued to a substrate. Marquetry blossomed as craft in Renaissance Italy, with works rivaling the paintings of the day in their realism. Today, marquetry is enjoying a renewed popularity, perhaps because it requires few tools, and veneers are inexpensive and widely available. Marquetry can transform a simple wooden object into a rich canvas—with all the timbers of the world as your palette.

PHOTOS BY SEAN SPRAGUE

"Heaven and Earth," by Michael Gillis, Thousand Palms, California. Kwila, Spanish cedar, satinwood, lignum vitae. Dimensions: H: 22 in., L: 45 in., D: 19 in.

"Heaven and Earth" (Front View).

Bedside Tables, by Jamie Robertson, West Concord, Massachusetts. Macassar ebony, holly, harewood, epoxy resin inlay. Dimensions: H: 26 in., W: 24 in., D: 15 in.

PHOTOS BY DEAN POWELL

Bedside Tables (Detail).

Standing Cabinet, by Masayuki Morito, Tochigiken, Kanumashi, Japan. Maple, walnut, lignum vitae, boxwood, lilac, dogwood, poplar. Dimensions: H: 64 in., W: 16 in., D: 16 in.

Standing Cabinet (Shelf Detail).

PHOTOS BY SEAN SPRAGUE

J. RUSSELL MIZE

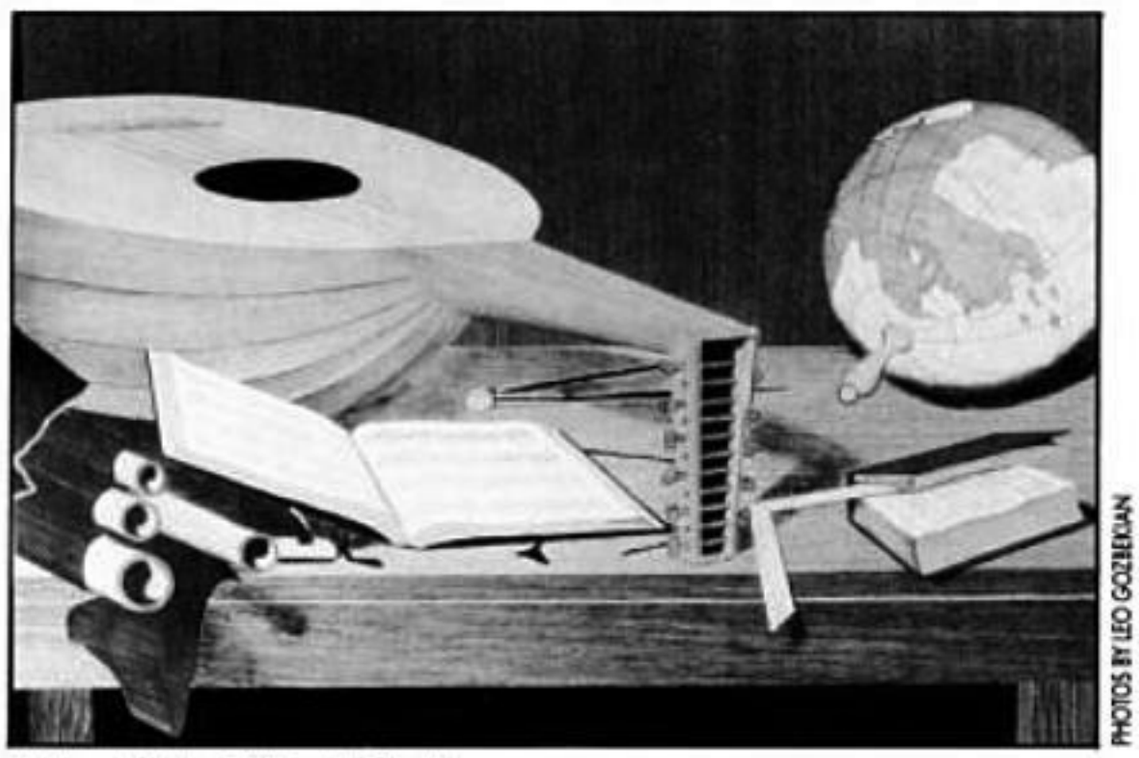
Serving Tray, by J. Russell Mize, Phoenix, Arizona. Walnut, purpleheart, Norwegian pecan, satinwood, Osage orange. Dimensions: H: 1¾ in., L: 20 in., W: 17 in.

GALLERY

DEAN POWELL

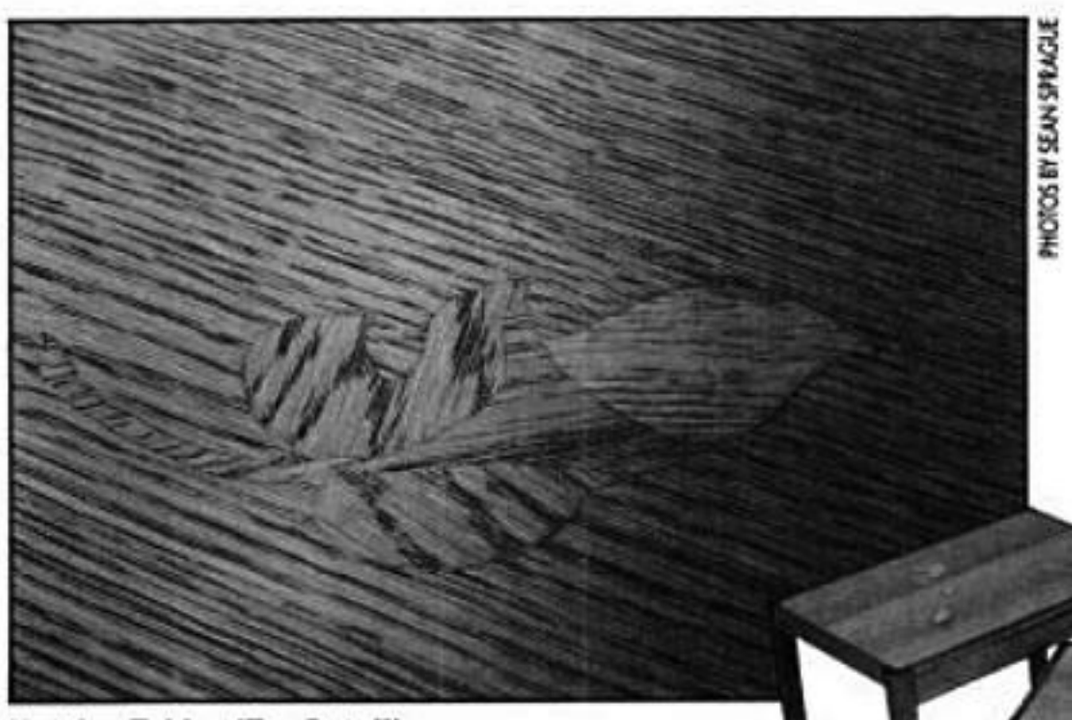
Chest of Drawers, by Jamie Robertson, West Concord, Massachusetts. Macassar ebony, holly, harewood, epoxy resin inlay. Dimensions: H: 72 in., W: 54 in., D: 21 in.

Hallway Cabinet, by Jamie Robertson, West Concord, Massachusetts. English brown oak, holly, Sitka spruce, rimu, padauk, satinwood, harewood, white mahogany, ebony, elm, epoxy resin inlay. Dimensions: H: 40 in., W: 40 in., D: 18 in.



PHOTOS BY LEO GOZEKIAN

Hallway Cabinet (Panel Detail).



PHOTOS BY SEAN SPRAGUE

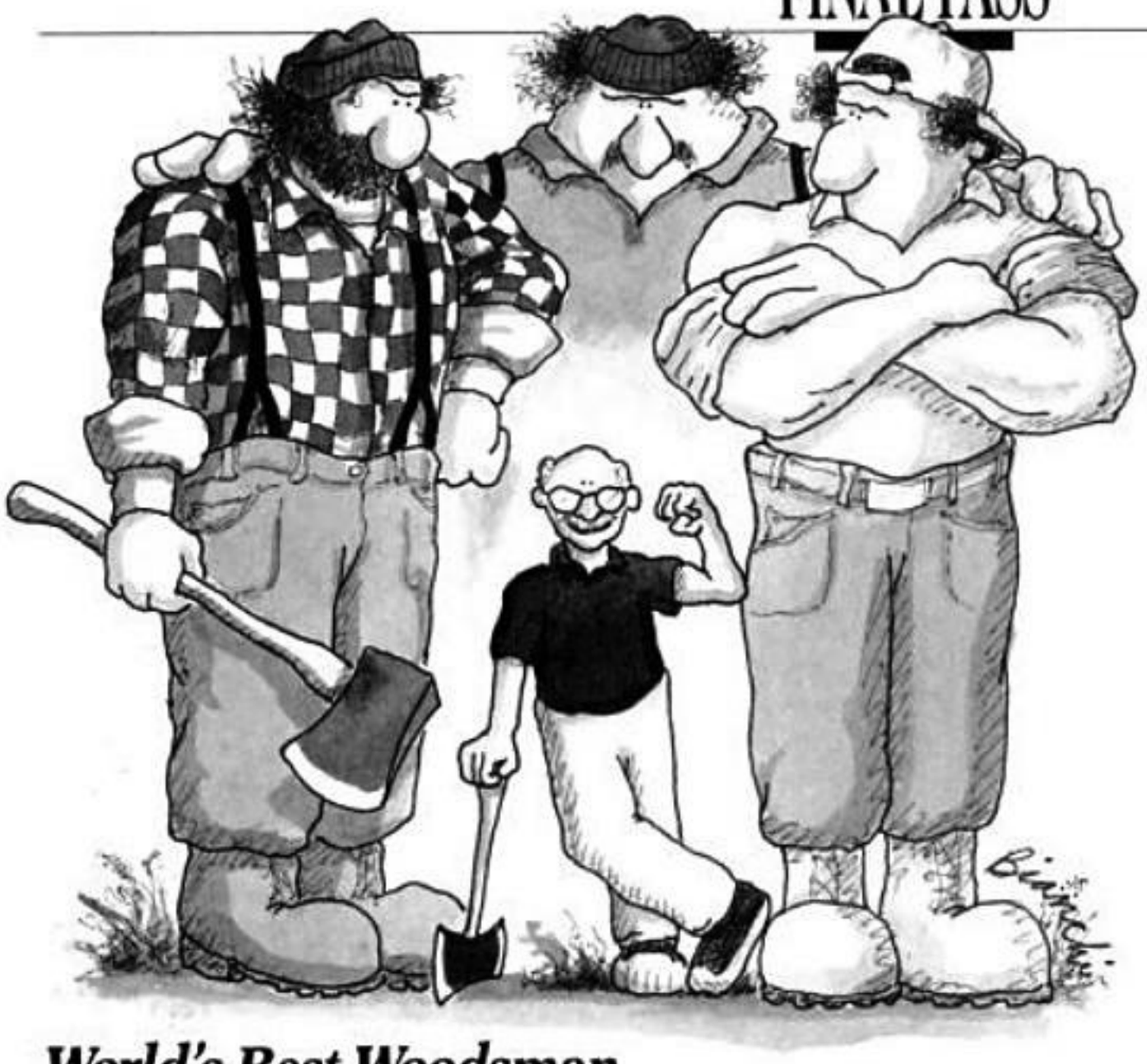
Nesting Tables (Top Detail)

Nesting Tables, by Timothy Coleman, Greenfield, Massachusetts. Japanese oak, teak. Dimensions: H: 23¼ in., W: 15½ in., L: 22 in.

STEVE PETERSEN

Jewelry Box, by Steve Petersen, Arcata, California. Pecan, rosewood, sycamore, tulipwood, rosewood. Dimensions: H: 3½ in., L: 6 in., D: 10 in.

Want to see your work in Gallery? Send photographs and a description of the piece to: AMERICAN WOODWORKER, *33 E. Minor St., Emmaus, PA 18098. Only black-and-white prints (4 in.×5 in. or larger) or color slides will be accepted. Please do not send color prints or snapshots. Enclose a self-addressed envelope for return of photos.*



World's Best Woodsman

Marseilles, France, is well known as a hub of dope trafficking. Gourmets know that it is where the best bouillabaisse is cooked. Still the most famous attribute for fame for this Mediterranean city is Marius. He is the man who can tell a taller tale than anyone. Here is one of those tales. Marius speaking:

"To build a major highway across the Alps a big forest had to be cleared. The contractor needed strong woodsmen and advertised for them. A good bunch of husky fellows showed up, most of them the 6 ft. 6 in., 250-lb. variety. Among them I looked as a midget.

The foreman in charge of the hiring did not want to hurt my feelings and did not talk to me until all these giants left. Then pointing toward the majestic trees he said, "To cut these big babies down is not child's play. You think you can do it?" "I don't think I can do it, I know I can," I answered. He thought for awhile, then showed me a tree about 6 in. in diameter and said, "Cut this one down for me." I took my ax and in three minutes flat the tree was down.

The man, somewhat surprised pointed toward a tree a yard thick at the trunk. "How about this one?" This time I rolled up my shirt sleeves, touched up my ax with my honing stone, and down was the tree in 15 minutes. The hiring man could not believe his eyes. He yelled, "You are hired, my boy. You are hired. But tell me where in hell did you learn how to use your ax so well?"

I told him the truth, "I learned it in Africa, in the Sahara Forest." "In the Sahara Forest? There is no such thing. The Sahara is a desert," he replied. "It's a desert *now*. It was a forest when I got there."

GEORGE FRANK

Super Conference

The Southern California Woodworking Conference is the Grand Prix of woodworking events. This four-day affair takes place this August 9-12 on the campus of Harvey Mudd College in Claremont, California—a half-hour drive from L.A. This year's conference features workshops on turning, chair making, power tools, furniture making, woodworking for kids, hand planing and much more. Demonstrators will include Rude Osolnik, Mike Dunbar, Sam Maloof, Art Carpenter, Garry Knox Bennett, Todd Hoyer, Kelly Mehler, Allan Boardman, Max Krimmel, Brian Boggs, Don Weber, Sheila Dawson and other well-known woodworkers. Housing and meals are available. For information call 213-679-2485.

It's a Dog's Life

If you're at the Cooper-Hewitt Museum in New York City take a doggone long look around. You just might find yourself in "The Doghouse," an outdoor exhibition honoring man's best friend.

On display are 24 novel dog houses by American architects and designers. Participants were asked to bone up on some basic elements of a dog's life—size, weather, habits—and to consider these when creating their canine quarters.

These pet palaces range from the

KEN FELKA

Lassie, come home! Park your barker in a TV dog house.

sublime to the ridiculous. Some designs take into account the very nature of the beasts. For example "Don't Fence Me In" is a picket fence with a hole in the center. Others deal with the practical side of pet owning. There are the portable houses; one folds up like an accordian, while another's parts fit together by way of tabs and slits. Another approach addresses the "Trojan Dog"—a twist on the mythical wooden horse—and the pyramid-shaped "Cheops Dog House," designed to re-energize your pooch, plays off the theory of pyramid power.

Next time you have to build new digs for Bowser, these designs might serve as inspiration.

If you have a case of puppy love, these dog houses and more can be seen at the Cooper-Hewitt until Oct. 14. For information call the museum at 212-860-6868.