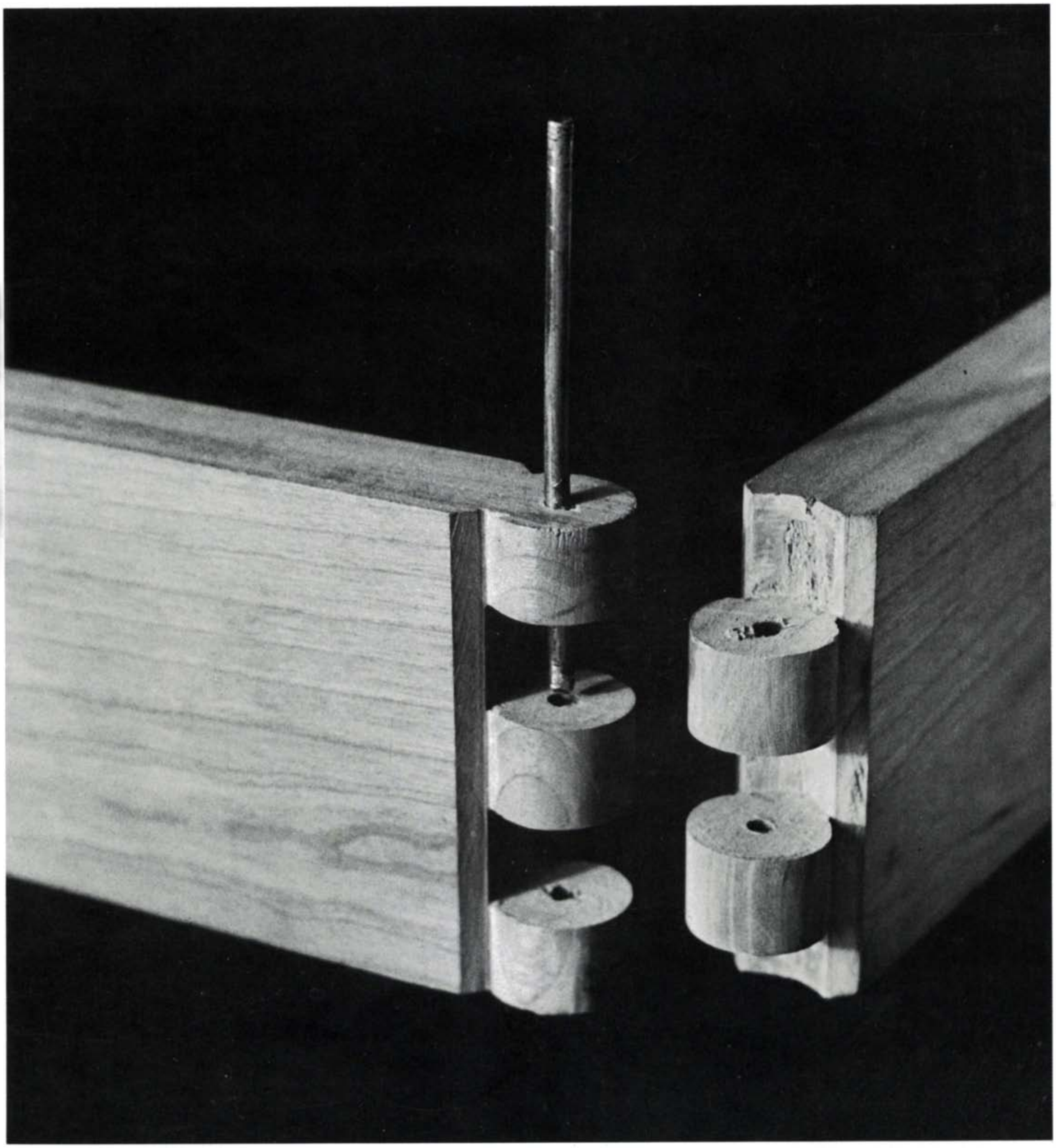
Fine WoodWorking



Making Tables

SEPTEMBER/OCTOBER 1979, NO. 18 $2.50

Editor
John Kelsey

Art Director
Roger Barnes

Contributing Editors
Tage Frid
R. Bruce Hoadley
Simon Watts

Consulting Editors
George Frank, A. W. Marlow
Lelon Traylor

Methods of Work Editor
Jim Richey

Assistant Editors
Laura Cehanowicz
Ruth Dobsevage
Rick Mastelli

Assistant Art Director
Deborah Fillion

Editorial Assistant
Mary Pringle Blaylock

Correspondents
John Makepeace, Alan Marks
Rosanne Somerson, Richard Starr
Colin Tipping, Stanley N. Wellborn

Production
JoAnn Muir, Manager
Barbara Hannah, Darkroom
Nancy Knapp, Typesetting
Cynthia Lee, Production Assistant
Jean Melita, Paste-up

Marketing Director
Jack F. Friedman

Marketing Representative
John Grudzien

Advertising
Vivian Dorman, Manager
Carole Weckesser

Advertising Consultant
Granville M. Fillmore

Subscriptions
Carole E. Ando, Manager
Gloria Carson, Dorothy Dreher
Marie Johnson, Cathy Kach
Nancy Schoch, Kathy Springer

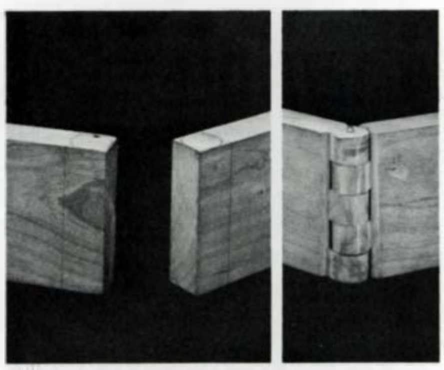
Mailroom
Viney Merrill, Manager
Robert Bruschi

Accounting
Irene Arfaras, Manager
Madeline Colby

Secretary to the Publisher
Lois Beck

Associate Publisher
Janice A. Roman

Publisher
Paul Roman



Cover: Knuckle joint for attaching the swinging support to the center of a gate-leg table, discussed by Simon Watts on p. 62. Above left: layout lines, and right: the assembled joint. Many of the articles in this issue focus on aspects of making tables, a fundamental problem in woodworking.

Fine WoodWorking®

SEPTEMBER/OCTOBER 1979, NUMBER 18

DEPARTMENTS

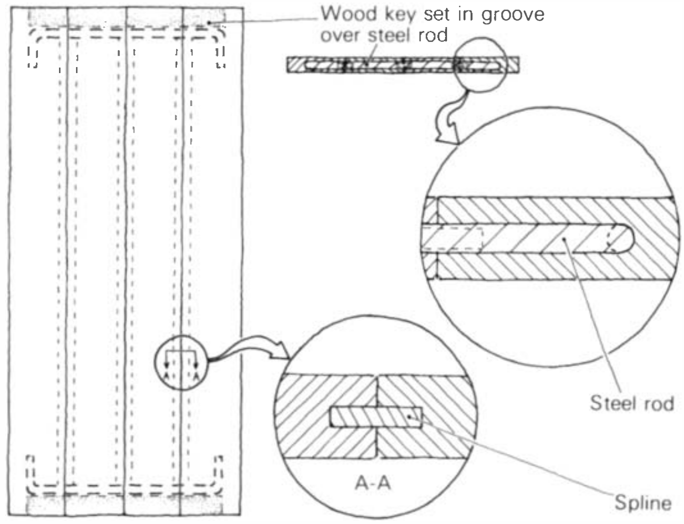
ARTICLES

Fine Woodworking (ISSN0361-3453) is published bimonthly, January, March, May, July, September and November, by The Taunton Press, Inc., Newtown, CT 06470, Telephone (203) 426-8171. Second-class postage paid at Newtown, CT 06470 and additional mailing offices. Subscription rates: United States and possessions, $12 for one year, $22 for two years; Canada, $14 for one year, $26 for two years (in U.S. dollars, please); other countries, $15 for one year, $28 for two years (in U.S. dollars, please). Single copy, $2.50. For single copies outside U.S. and possessions, add 25¢ postage per issue. Send to Subscription Dept., The Taunton Press, PO Box 355, Newtown, CT 06470. Address all correspondence to the appropriate department (Subscription, Editorial or Advertising), The Taunton Press, 52 Church Hill Road, PO Box 355, Newtown, CT 06470. Postmaster: Send notice of undelivered copies on Form 3579 to The Taunton Press, PO Box 355, Newtown, CT 06470. (Four-page insert included.)

Last night I was prodding through my *Fine Woodworking* library and ran upon a contribution from a subscriber giving directions for resurfacing sharpening stones. . . . Many years ago when my son was about seven years old (my son is now 50), I was digging through the rubble of a demolished building and picked up an antique Washita stone. It was hollowed yet seemed to be of good quality. We carried the stone home. That evening a half-dozen kids ranging from 5 to 10 years old were playing in the basement near my workbench. An idea struck me. I am a retired printer, active at that time. I tied heavy jute string around that stone horizontally in the same way a printer ties up type. I had a chunk of iron an inch thick and about the size of that stone. I tied it to the bottom side of the stone, for weight, then with a string some 3 ft. long, hung it behind a tricycle. Those kids took turns riding the trike in a figure-eight dragging the hollow surface across the basement floor. It took about 20 minutes to wear that stone down to a flat surface. I still have the stone and use it regularly in sharpening woodcarving tools. My father once flattened a stone by holding it against the side of a wet grindstone. That also was a success.

—*F. Eldon Heighway, Phoenix, Ariz.*

Tage Frid's article on wooden doors was especially good reading. I have made my son for his home a door similar to that shown in figure 3 on p. 79 of the July '79 issue. However, I had a different means of constraining the wood movement and hiding the metal rods. I bent 4 in. at each end of the two rods 90° in a machinist's vise to make a *U* shape. Then I inserted this into two holes and a slot cut at each end of the door with a backsaw and chisel when the door was still separate boards. I concealed the rod with a wood key glued and pressed into the slot.



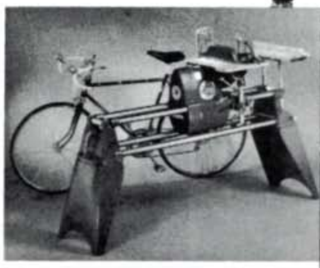
An advantage of this method is that mortises for lock and hinges can be cut and the door can be planed to fit its frame without metal interference. The construction requires only a saw and chisel, a standard brace and bit, and the vise. The splines I cut on a table saw.

—*Jack A. Freeman, Olmsted Falls, Ohio*

I feel impelled to comment on the design of Simon Watts' library steps (July '79). The author comments on a minor weakness in the back legs, while overlooking a weakness in

Five major power tools packaged into one big-capacity unit.

Now! Enjoy a complete home shop, at a substantial savings --- and in less space than a bicycle !



Imagine ! Five major power tools in less space than a bike !

Now, you can have the tools you need to turn out top-quality woodworking projects in a complete home shop like those you've dreamed of owning. And, you can do it within your budget -- and your limited working space !

To learn how, simply mail the coupon below. You'll discover how you can be prepared for all those money-saving, money-making projects like building furniture, cabinets, even doing your own home repairs and remodeling jobs. The innovators at Shopsmith have made it easier and more affordable than you'd ever imagine !

You Need Pro Equipment to Do Pro Work

To do jobs like these, you need the proper tools. And, if you've ever tried to build anything more complicated than a bird house, you know that's true ! You need more than a table saw and a couple of hand-held power tools to achieve the kinds of results you can be proud of.

In addition to that table saw, you should have a vertical drill press, a lathe, a boring machine, and a disc sander. But now, you don't have to spend a couple of thousand dollars to get the capabilities of all these machines. And you don't need a lot of space, either. The Shopsmith Mark V gives you all five of these tools in a single powerful, precise machine that requires about the same amount of space as an ordinary bicycle !

Outperforms Individual Tools

The time-tested Shopsmith Mark V is the only tool in the world that gives you all five major power tools in a single unit. Since it was first introduced in 1953, more than 325,000 woodworkers have chosen the Shopsmith as the best available solution to both their budget problems and their space problems . And it's easy to see why !

This single, easy-to-use woodworking system gives you a 10" table saw, 12" disc sander, horizontal boring machine, 16½" vertical drill press, and 34" lathe. Powered by a rugged 13.5 amp, 110 volt motor that develops 2 hp, the Shopsmith provides all the power you'll ever need for even the toughest jobs. And thanks to its exclusive speed dial, you can change speeds without ever shutting off the motor.

After about an hour's practice, you'll be switching tool operations in less than 60 seconds. You'll be able to perform dozens of operations like sawing, rabbeting, beveling, mitering, grooving, concentric drilling, spindle turning, doweling, edge sanding and metal drilling. When you're ready to do more sophisticated operations like mortising, dadoing, shaping, routing, molding and more, you'll find a full range of hard-working Shopsmith Accessories available to help.

Send Today for Free Facts

With the Shopsmith Mark V, you get more convenience, compactness and versatility for less money than you could with any combination of comparable individual tools. But that isn't all you get.

With the Mark V, you'll get precision, too. Thanks to Shopsmith's exclusive Versa-System, it even lets you do many things you just can't do with other tools. That's why thousands of people with more than enough space and unlimited budgets still choose Shopsmith !

Find out why the Shopsmith Mark V should be your choice, too -- whether you're just getting started in woodworking or been at it for years. Discover how you can actually put the Mark V "through its paces" – in the privacy of your own home – for a full month without ever risking a cent ! Mail this coupon today for the free facts !

Shopsmith

Dept. 1904, 750 Center Dr., Vandalia, OH 45377

The Mark V is a lathe of exceptional capacity (above) and a 10" table saw (right) with a 3¼" depth-of-cut and a 48" ripping capacity.

It's a 12" disc sander that will do things that other sanders won't do...like finishing edges to precise dimensions.

It's a horizontal boring machine that makes perfect doweling really easy ! The Mark V's exclusive feed stop assures identical hole depths.

It's a 16½" variable-speed drill press with built-in jigging features that make boring screw pockets and even round stock a "snap"!

Shopsmith Inc.

Dept. 1904, 750 Center Drive, Vandalia, Ohio 45377

Yes, please mail me your **Free Information Kit** on the Shopsmith Mark V. I understand there is no obligation and that no salesman will visit.

Name ____________________

Address ____________________

City ____________________

State __________ Zip __________

Workbench Price Breakthrough!

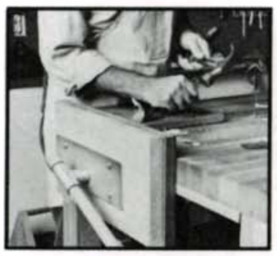
At Last! A Full-Featured Workbench At An Affordable Price

MADE IN U.S.A.

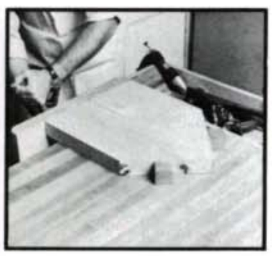
Until now, quality workbenches have usually been too expensive or too small. This huge 225 lb. Garden Way Home Workbench offers a 30″ x 60″, 2″ thick laminated work surface and is available direct from the factory at an incredibly low price. Made of solid rock maple, the Garden Way Workbench not only offers a spacious 12½ sq. ft. of work area, extraordinary sturdiness and clamping versatility, but is a fine precision tool itself that can be as useful as having an extra "pair of hands" helping you in your shop.

Unique Clamping System Holds Projects Dozens of Ways!

Our own "flip-over" vise design with 9″ x 18″ built-up hardwood faces interact with strategically located round dog holes providing secure clamping for a wide variety of projects nearly anywhere on the bench surface—even oversized items such as chairs, full-sized doors—even full sheets of plywood—can easily be secured.



1 "Flip-over" vises provide a solid workstop – yet turn over so top of vise is flush with bench surface for regular vise use.



2 Round dog holes with rotating bench blocks will grip odd-shaped work pieces and eliminate most jigs and fixtures.

3 12½ sq. ft. (30″x60″) of work surface interacting with vises and rotating bench dogs lets you hold large boards and planks – even a 4′x8′ sheet of plywood.

NEW! A Smaller, Lower-Priced Workbench From Garden Way

This new smaller Model B Workbench offers you the ideal worksurface if you enjoy a multitude of crafts instead of just woodworking, or if you concentrate on small projects and large projects are the exception. You'll also find this new smaller Workbench perfect for woodcarving, project assembly, or used as a children's project bench.

- ★ **2′ x 4′ spacious worksurface – a full 8 sq. ft.**
- ✱ **Full 1½″ thick laminated "butcher block" top.**
- ✱ **Rugged 1½″ x 2½″ rock maple legs, stretchers and stringers.**
- ✱ **Powerful 5″ x 18″ maple vises.**
- ✱ **Sturdy enough to withstand heavy workshop jobs.**

Which Size Garden Way Workbench is Right For You?

Model A	*Model B*
☐ Size-30″x60″	☐ Size-24″x48″
☐ Weight – 225 lbs.	☐ Weight – 108 lbs.
☐ Height of Work Surface – 34″	☐ Height of Work Surface – 34″
☐ Thickness of Surface – 2″ laminated rock maple	☐ Thickness of Surface – 1½″ laminated rock maple
☐ Total Work Area – 12½ sq. ft.	☐ Total Work Area – 8 sq. ft.
☐ Vises – Two 9″x 18″x1¾″ maple laminate	☐ Vises – Two 5″x 18″x1¾″ solid maple

TO: Garden Way Research
Dept. 91119W, Charlotte, VT 05445

YES! Please send me free details and prices on the New Garden Way Workbenches, including information on optional Tool Well and Tool Drawer and build-it-yourself Model A Kits.

Name ______________________

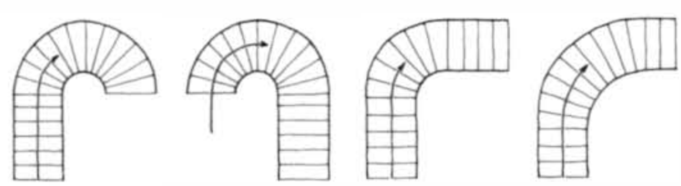
Address ______________________

City ______________________

State __________ Zip __________

design, namely, that the entire weight of a person standing on the top step is taken on the skinny pins of the dovetail joint, while the broad tails are doing nothing. The purpose of a dovetail joint is to lock two pieces together so they will not pull apart under tension, as, for instance, when one pulls on the front of a drawer. But in this piece, the top is not under tension at all, except when it is being picked up, and then only to the extent of its own weight. Thus, strictly speaking, a dovetail, straight or skewed, is the wrong joint for the piece. It would have been easy to be both mechanically correct and visually consistent in designing this piece, if the top were fastened on in exactly the same manner as the other two steps. Of course, an overlapping top would be even stronger.
—John S. Carroll, Emlenton, Pa.

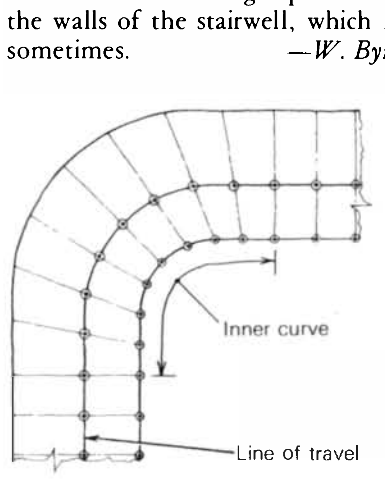
I have just read Laszlo Gigacz's excellent article about building a circular stairway (May '79). In designing a house, it may turn out that the perfectly circular stair shown in the article cannot be used, but any one of dozens of shapes may be needed. These are some of them:



In all of these variations I base the design on the use of a measuring line called the line of travel. This line I usually locate +15 in. from the centerline of the inner rail of the curved portion of the stair. Draw a plan of the two string lines of the stair at a convenient scale, say ¾ in = 1 ft. On this plan lay out the line of travel throughout its length, curved and straight portions. Divide the line of travel into equal spaces: I prefer 11-in. spaces but it can be more or less to fit. Divide the curved portion of the inner string into the same number of spaces and draw lines from these division points through those on the line of travel. These are the riser faces and they will hardly ever be radial lines from the center of the curve of the inner string, the way they are on a perfectly circular stair.

There are two advantages to this method. One, it produces a stair having uniform riser-to-tread relationships for its entire run, making it safer and more comfortable. Two, it makes possible an inner curved rail of smoother shape without unsightly, sharp jump-ups at the places where the curved portion joins straight portions. If the radius of the curve of the inner string is quite small, these jumps in the rail are sometimes unavoidable.

Of course the method has disadvantages too. One is that the risers on the straight portions are not always square with the walls of the stairwell, which makes carpenters unhappy sometimes. *—W. Byron Proctor, Pensacola, Fla.*



Divide entire line of travel into equal spaces. These will mark riser faces.

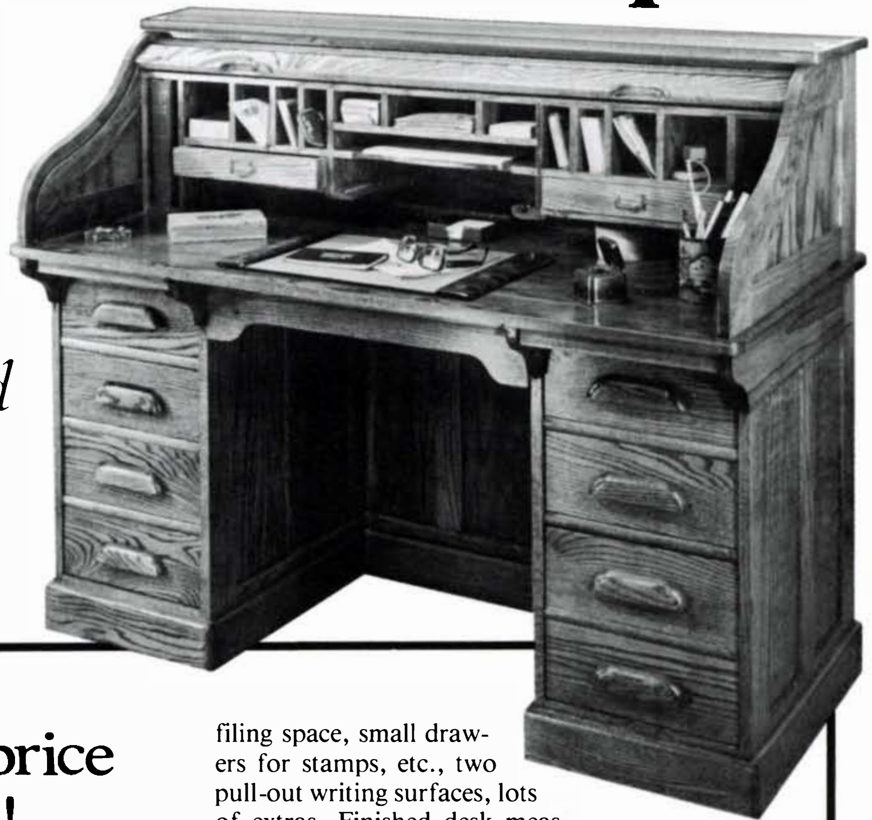
Divide inner curve into as many equal spaces as there are in the curved portion of the line of travel.

Connect points on curved portion of line of travel with points on inner curve for uniform riser-tread relationship.

Own this classic "**Roll-Top**"

OAK DESK

Comes fully assembled or as a partially assembled kit.



Worth at least double the Kit price when finished!

Here's the turn-of-the-century "Roll-Top" you've always wanted. A full size oak desk now yours at extraordinary savings . . .because you put it together yourself from pre-cut Kit parts.

Roomy sectioned desk features classic pull-down roll top, pre-assembled at our factory for accurate fit and ease of construction. Center-guide drawers on both sides open smoothly, provide the filing room you need. Roomy center drawer is 24" wide. Desk also features lots of "pigeon-hole" filing space, small drawers for stamps, etc., two pull-out writing surfaces, lots of extras. Finished desk measures 54" wide, 26" deep, 45" high; desk height is 30". Ample center leg room is 24½" wide, 26" high.

The Kit is designed to make woodcrafting a joy. Superb oak and oak veneer are pre-cut, sanded, and clearly marked to match the illustrated assembly guide provided. Complete with all hardware, drawer pulls, finish grade sandpaper, glue. No special tools or skills needed. When finished, you'll possess a magnificent showpiece for your home or office—*worth at least twice what you paid for the Kit!*

W-12T

FREE COLOR CATALOG INCLUDED

▶ Oak desk chair—a perfect match to desk. Patterned after furniture first used in the Bank of England! 23" wide, 24" deep, preassembled and ready to finish.

For VISA, Master Charge or American Express ordering
Call TOLL FREE: 1-800-247-5018
Iowa Residents: 1-800-532-1437

WOODCRAFT COLLECTION
Dept. 4VY/4VZ
1400 North Fruitridge Ave., Box 1174
Terre Haute, IN 47811

Please send me Roll-Top Oak Desk

☐ **Kit only** $499.00 617223 (freight collect) — (Allow a maximum of 4 weeks to ship)

☐ **Assembled and finished** $1,200.00 721324 (freight collect) — (Allow a maximum of 120 days to ship)

☐ **Also send me matching desk chair, assembled and ready-to-finish** $159.00 724062 (freight collect) — (Allow a maximum of 4 weeks to ship)

Enclosed is my check, money order or Visa/Master Charge/American Express Number (please include expiration date) for $________

N.Y., Iowa, Ind. residents please add applicable tax.

Print Name________________

Address________________ Apt.________

City________ State________ Zip________

Do you have a telephone? ☐ Yes ☐ No

☐ Please send me my FREE Woodcraft Collection Color Catalog only

OB

I want to compliment you on Dwight Gorrell's "Sawmilling" (July/August '79), a most interesting description of lumber at its source. In the early twenties John G. Niehart in his epic poem "Song of the Indian Wars" used a freely translated Indian's clever description of a steam sawmill: "How the white man harnessed up a fog to send a round knife screaming through a log." I hope you may find that expression as colorfully put as I have.

—Tom Barnard, San Clemente, Calif.

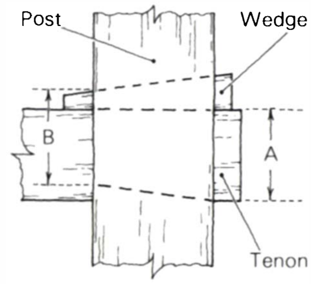
Cabinetmaker Robert Whitley's replica of the Oval Office desk for the John F. Kennedy Library (July '79) is very pretty, but it strikes me as most unusual. I have never seen the original, but if it, like the replica, has the head of the eagle on the Great Seal facing the 13 arrows in its left talon, then it must be some British joke. Seriously, I have spent 28 years in the Army, and have never seen the Great Seal eagle face any way except toward the olive branch. For a number of years I taught military customs and traditions. This was supposed to have some symbolism, although I cannot prove that the founding fathers looked at it that way. Is it a true replica of the Oval Office desk? I'm curious.

—James B. Reed, Portland, Tex.

Regarding the use of sheet-metal screws as opposed to wood screws ("Methods," May '79), sheet-metal screws are better for use in wood but a few facts are wrong. You stated that 1022 steel is a medium-carbon steel, but most steel manufacturers consider a medium-carbon steel to be between 1030 and 1040 and low-carbon steels to be between 1010 and 1030. Also, you stated that a case-hardened screw will damage the end of the screwdriver. If you were to buy machine-steel tools or case-hardened tools the tip would not be eaten away by continuous use. *—Michael McKinney, Lafayette, Ind.*

Regarding the use of old shoes to hold files and the wear that might result from such close contact, one might consider gloves. I have a set of five gouges that fit nicely in an old glove, with a drawstring laced through holes punched around the wrist. The string can be drawn tight for traveling, or hung on two nails driven into the wall. Gloves also work well for drill bits. If you really want to treat your tools, find a pair of old fur-lined gloves. *—Bob Shannahan, Weare, N.H.*

Here's another wedge/tenon joint to add to the Kirby article (May '79). I found it on an 1805 counterbalanced four-harness loom, serving to draw the post frame members together. I've not found this joint elsewhere, and believe it is quite scarce in 18th and 19th-century joinery.



The mortise is cut accurately to the shape outlined by the dotted lines. A few hard taps on the wedge and the joint is snug. Dimension *A* must be equal to *B*, or *B* slightly larger, to allow assembly. This joint is superior to the tusk tenon as there are no points where driving the tusk or wedge too tightly would split the grain. Also, this joint can obviously be easily disassembled.

—Norm Vandal, Roxbury, Vt.

. . . I was a little annoyed at George Nakashima's angry comments in the January '79 issue, concerning people who worked with him a few years, producing pieces that he's making money on and satisfying customers with, who then decide to leave to start their own businesses. It seems to me that this is not so terrible. Doesn't it sound like human nature—the need to learn, grow, progress, attain and succeed? The people were producing while they worked for him, I'm sure, and Nakashima might have even learned a few things himself from his employees. . . .

—Mark Plewka, Ferndale, Mich.

In Don Newell's article "Before the Finish" (May '79), his suggestion for the use of heat following water for raising the grain is good, but I feel a propane torch is a bit hairy. The following are alternatives providing more diffuse, even heat without the danger of scorching: an ordinary electric clothes iron, a household hair dryer (wear a dust mask—asbestos is dangerous), or by far the best, an electric heat gun, a beefed-up hair dryer capable of producing heat up to 500° F. A cooler setting of 300° will safely and quickly dry a surface. Higher heats can be used to warm surfaces for the application of stick shellac or hot glue with either thermoplastic or hide glue. This eases the problem of the glue or shellac hardening too quickly upon contact with the cold wood surface, and results in stronger bonds.

—George Danziger and Jane Clarke, Leverett, Mass.

In the "Letters" column of May '79, there was an item regarding the use of DuPont 57175 as a rust preventative. I called the DuPont technical information center and they verified my evaluation of this material. They say it will etch the surface to improve the grip of paint but it will not prevent rust. I prevent rust on my tools and machines with a hard automobile wax. It lasts a long time and reduces friction when the stock slides on the machine tables.

—Henry Gifford, Jamaica, N.Y.

In "Tall Chests" (Winter '77), Timothy Philbrick mentions the golden section as a revered proportioning system. This ratio of the smaller of two lines to the larger as the larger is to the whole was expressed several hundred years ago by a mathematician known as Fibonacci (Italian for "the son of the simpleton"), which I believe is a pseudonym. The sequence is obtained by starting with the number 1 and sequentially adding the next number and the former number. The golden-section ratio can then be obtained by dividing any former number into the following. For example: $1 + 2 = 3$; $3 + 2 = 5$; $5 + 3 = 8$; $8 + 5 = 13$. A short sequence would be: 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377. Take any number, for example 233, and divide it by the former number and the golden section is approximated to 1×10^{-5}. ($\frac{233}{144} = 1.618055556$). This is handy if you forget the ratio given in the text.

—Noel Williams, M.D., Concord, Calif.

Here's a tip: Take a Rockwell Unisaw table extension to a machine shop, have a hole bored between the ribs and three flats milled on the underside for stand-off bushings. Attach a router base underneath; *voila!* a router table with an adjustable fence. *—Bob Laughton, San Francisco, Calif.*

Errata: In "End-Boring Jig" (Nov. '78) the 9-in. veneer-press screw specified in the cutting list is incorrect. A 12-in. screw is necessary.

Methods of Work

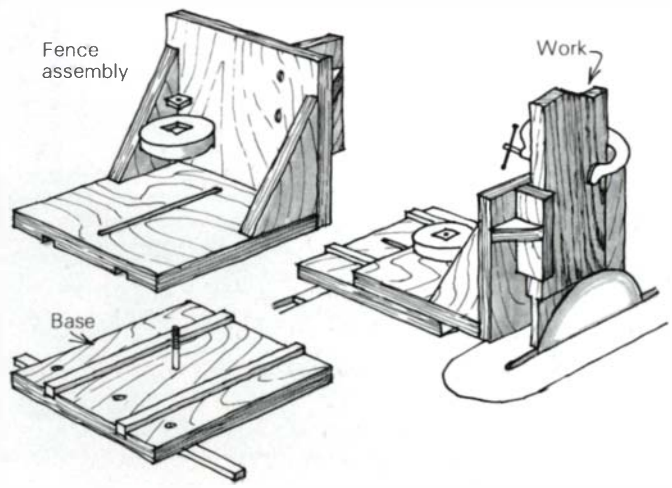
Table-saw tenoner

This jig, designed to cut tenons and bridle joints on the table saw, performs as well as expensive, commercial versions.

It consists of a base, which travels in the miter gauge slot, and a fence assembly. Dadoes in the fence assembly slide on rails in the top of the base to allow the blade-to-fence distance to be varied. The two pieces are locked at the right position by a nut mortised in a block of wood. Make the other jig parts of high-quality ¾-in. aircraft or hardwood plywood; don't waste your time with fir plywood.

To use the jig, clamp the work to the fence with a C-clamp, or a hold-down clamp mounted on the fence. Align the jig for the cut and push through the saw.

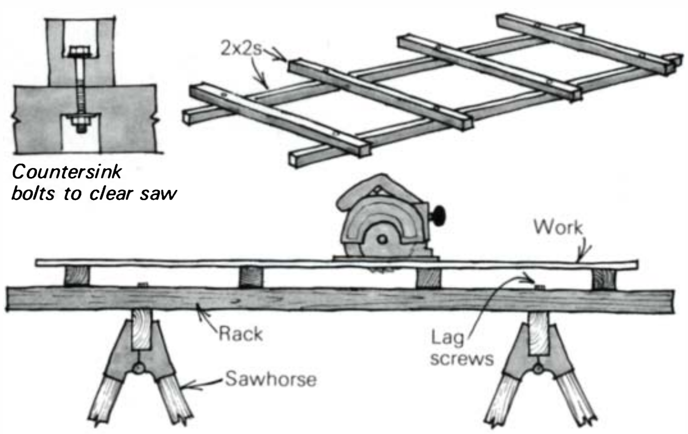
—*Larry Humes, Everson, Wash.*



Folding cutting table

Here is a simple, useful rack for supporting large plywood panels when cutting with a hand-held power saw. It also doubles as a gluing table and, with a sheet of plywood on top, as a spacious worktable. When you are not using it you can fold it, scissor-like, into a compact unit for storage in a corner of the shop.

Material consists of 24 ft. of 2x2 construction-grade fir, eight carriage bolts (¼ in. x 2½ in.) and four lag screws (¼ in. x 3 in.). Cut the fir into two long strips (72 in.) and four cross-beams (36 in.). Bolt the cross-beams to the long strips on 20-in. centers and 6 in. from each end. Countersink the carriage bolts a full ¾ in. into the cross-beams to clear the saw-



Methods of Work buys readers' tips, jigs and tricks. Send details, sketches (we'll redraw them) and photos to Methods, Fine Woodworking, Box 355, Newtown, Conn. 06470.

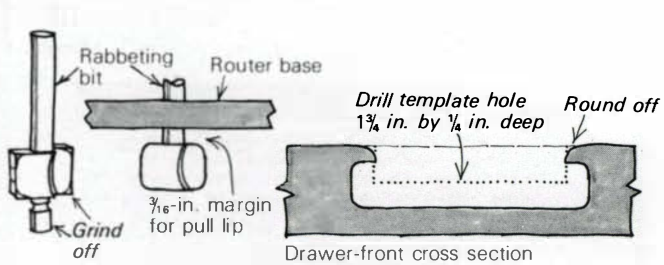
blade. Fasten the rack to two wooden sawhorses with the four lag screws centered 12 in. from each end of the long strips.
—*Stephen Wysocki, Colton, Calif.*

Routed drawer pull

Here's a simple and versatile drawer or door pull made with a modified router bit. Start with a small rabbeting bit (I used Stanley 82 150, which rabbets ¼ in. wide and 7/16 in. deep). Grind off the pilot and round the corners, taking care not to lose the correct bevel. Chuck the bit in the router with the cutter about 3/16 in. below the base.

Next drill or rout a template hole in the drawer front. I use a 1¾-in. multi-spur bit, boring to a depth of only ¼ in. so the bit's pilot hole will later be removed. A flat-bottomed Forstner bit would be better because it leaves no pilot hole. If you use a straight router bit, you can cut any shape template hole.

Now plunge the router with the modified bit into the center of the template hole and work it out to the edge, using the bit's shank to guide (apply paraffin) against the side of the template hole. Finish the pull by rounding the top with a reverse-curve spoon gouge. —*Miles Karpilow, Emeryville, Calif.*



Portable-saw guide

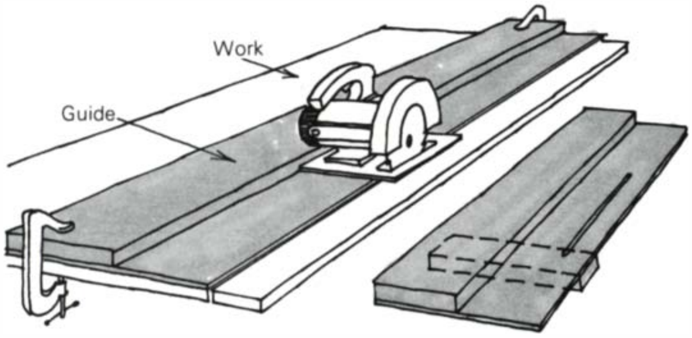
Surely I am not the only small-shop woodworker who has spent an inordinate amount of time trying to cut up large sheets of plywood or trim the ends off long, heavy boards on a table saw. I have been happy with my small table saw, but I'm delighted to find my portable circular saw will do equally precise work on unwieldy pieces with the help of a guide that takes just minutes to make. The beauty of the guide is that it positions the blade right on the cut-line in one step.

The main components of the guide are a ¾-in. wood straightedge nailed to a thin base of ¼-in. plywood or Masonite. The saw rides on the base and is pressed against the straightedge. A long guide for cutting large sheets of plywood is best held with two *C*-clamps—one at each end. Be sure to make the straightedge wide enough so that the saw's motor housing will clear the *C*-clamps. After nailing the straightedge to a base piece slightly wider than needed, just run the saw (with the blade you intend to use) along the base to trim off the excess. The guide is now ready to use.

A shorter variation of the guide is useful for cutting off long boards. Nail a strip of wood to the bottom of the short guide at right angles to the straightedge. Sandpaper glued to the underside will keep the guide from slipping when held at the far end with one *C*-clamp.

The short guide can also be used for cutting dadoes with a router. Just rout a slot into the base of the guide, carefully pressing the router base against the straightedge. Start the router cut over the right-angle strip on the bottom (remember to remove a bit of the sandpaper first). It's easy to clamp the guide at the right position on the workpiece by eyeballing the layout lines for the dado through the slot in the base.

—Rich Baldinger, Schenectady, N.Y.



Long guide for plywood

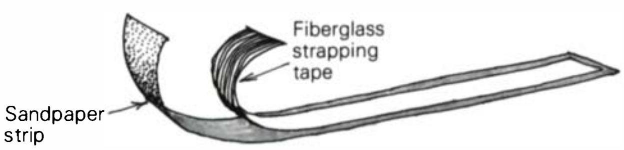
Short guide for crosscutting and routing

Long-lived sanding strips

Narrow strips of sandpaper used to sand turnings or curved objects tend to tear, cutting less efficiently the shorter they get, until they are so many useless pieces of expensive paper.

To make them last longer, back them with fiberglass strapping tape; they'll be virtually untearable.

—J.S. Gerhsey, Lake Ariel, Pa.



Roller support for ripping

Here's an inexpensive, adjustable roller support for long stock as it leaves the table saw or jointer. The support is made from an old rolling pin and a sturdy frame. The hand grips of the rolling pin are each supported by notched blocks which are adjustable for height by means of a bolt and wing nut.

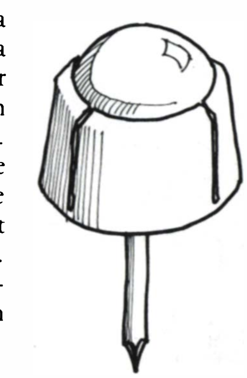
—*Rogier De Weever, Kelowna, B.C., Canada*

And another supporting idea

The key to an efficient table saw ripping support or panel crosscut support is a smooth-working, friction-free roller. I've found nothing that fills this requirement better or cheaper than ball-bearing furniture casters.

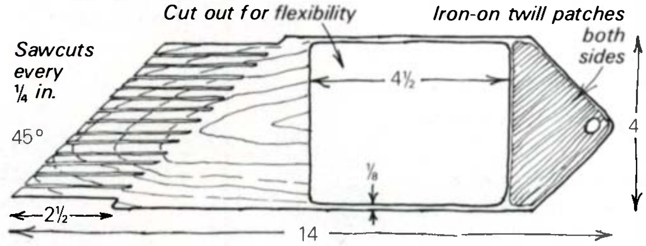
Fasten several of the casters in a close-spaced pattern on top of a homemade, adjustable stand. Or, for an instant support, fasten eight or ten casters to the end of a 2-ft. long 2x12. Then clamp the 2x12 in a Workmate vise at the right height. Since the casters roll easily in any direction just put the support where it's needed. There's no need to fuss with the orientation of the support as there is with other types.

—*Larry Joseph, Alva, Okla.*



Non-skid finger pressure boards

A small board cut 45° across the grain and kerfed to form fingers is quite useful for holding work against the fence in shaping and ripping operations. But the fingers jam unless you shim the board off the table. Also, the board tends to move under the clamps and lose tension. I solved both these problems by ironing on twill, iron-on patches sold for repairing work clothes. —*R. P. Sykes, Thousand Oaks, Calif.*



Q & A

What do you do with a piece of wood you can't identify? The Center for Wood Anatomy Research, part of the U.S. Department of Agriculture, usually can help when wood-identification manuals fail. The service is free, providing the number of specimens submitted for identification during a calendar year is reasonable. Here are some guidelines.

Wood is identified by cellular characteristics as revealed under microscopic examination. Several small, thin sections will be cut from the sample you send, and therefore specimens should be of a size that can be hand-held easily; 1 in. by 3 in. by 6 in. is recommended, but the Center will also handle cases where only small splinters can be supplied, such as with antique furniture. It's better to split out than shave off your sample—shavings are often brittle and may crumble when handled. Use a sharp knife or a small chisel to make two cuts across the grain at least ½ in. apart to a depth of about 3/16 in. Pry up your sample at one of the incised points with a knife or tap it out with a chisel.

Label all specimens clearly. Identification based on wood anatomy alone is accurate in most cases to the genus (general grouping) but rarely to the exact species, so include everything you know about the wood, such as the common name, geographic area of origin and sample source (chair, driftwood), to help in further identification. Enclose small samples in individual envelopes and write what you know on the envelope. Don't tape samples to cards because they can be damaged when the tape is removed. Send your samples to the Center at the U.S. Forest Products Laboratory, P.O. Box 5130, Madison, Wis. 53705. Samples won't be returned unless requested.

I have access to standing timber including mature red oak, ash, walnut, sycamore, maple, Eastern red cedar and hickory. I would like to begin harvesting and storing this wood. My questions are: (1) What is the best time of year to harvest trees? (2) Should the logs season before being sawed? (3) After sawing, should the boards be stacked for drying indoors or outdoors? (4) How long should be allowed for air-drying? (5) How should the log be sawed to obtain the best yield of the most attractively grained and most stable finished lumber?

—Park W. Gast, Jr., Lebanon, Ohio

(1) Some people schedule cutting to coincide with the lowest moisture content

of a tree. This varies with species and is minimum in the summer for some, the winter for others, but insignificant for many. A more important reason is damage from insects and/or fungi. In northern climates, winter-cutting is preferable because logs can be sawn and the lumber dried enough before the warm weather, which favors stain development. (2) It's best to saw logs as soon as possible after harvest. Lumber saws easiest when dead green. Also, prolonged storage, especially in warmer months, almost always results in some degree of stain or decay degrade. (3) If you do not have indoor humidity regulation, it is best to dry lumber outdoors in well-stickered, neatly stacked piles with overhead protection from rainfall. (4) Depending on density, air drying of 1-in. lumber may take 6 months to a year. Thick planks take much longer. (5) This is a tough question. "The most attractive grain" is a matter of personal preference; some like flat grain, some like edge grain. "Most stable finished lumber" would be edge-grained. However, the "best yield" would result from sawing around the log, removing clear, flat-grain boards from the more defect-free outer zone, boxing the defective material into the core. By quartersawing for edge-grain boards, most boards will have core defects along one edge. You must decide the compromise. —*R. Bruce Hoadley*

Walnut has a tendency to pick up when run through a molding mill. What material and method of application do you suggest for filling this surface roughness that will not affect subsequent finishing and final appearance?
—*R. Henderson, Albuquerque, N.M.*
Sharp shaper knives cutting good-quality walnut leave a beautiful, smooth finish on the molding. Knives that are dull, cutting walnut that is of poor quality, i.e., soft and spongy, will pick up or rough up the surface. If you are forced to use poor-quality walnut, get a smooth surface by using 150 to 280-grit garnet paper and a liberal amount of elbow grease. Leave the filler in the can. —*Lelon Traylor*

One of the things I just can't learn to do is to apply filler to open-grain wood. All the books make it sound easy, but I never can get the surface flat. I don't understand how you can avoid getting a slight concavity when you wipe the stuff off with a piece of burlap.
—*H.N. Capen, Granada Hills, Calif.*
With the exception of a special and hard-to-use water-based filler also in-

volving a great deal of sanding, no filler will fill the pores of the wood entirely. The subsequent coatings with finishing material are supposed to do that.

—*George Frank*

It was recently my pleasure to see a grandfather clock of superior quality. The miter joints of the moldings had not separated with the change from winter to summer humidity. All of my joints always separate. How can one negate the effects of humidity changes on miter joints?

—*Richard Fay, Atwood, Ill.*

Your molding separates because it moves with the sides of the clock as they expand and contract. It is necessary to affix the molding so that any discrepancy due to changes in dimension will occur at the back, not where the miters join. Therefore, nail the molding to the side as usual, but add an extra nail close to the one at the mitered end. Dimensional changes will follow the path of least resistance. Very little can be done for double-end miters. Should the conditions be wet when you're working the wood, cut the molding about 1/16 in. longer and force it into place. If less than normal moisture, cut to fit without pressure.

—*Andy Marlow*

I need to construct a dimensionally stable tabletop with a solid walnut appearance. My approach has been to use thin pieces of walnut about 3/16 in. thick rather than standard veneer. However, I hesitate to build such a top without some confidence in its ability to withstand the expansion strains.

—*W.J. Ripley, Clayton, Calif.*

Your best bet is to veneer *both sides* of a very stable sheet material like ½-in. particle board (¾ in. would be even better). Treat the top and bottom surfaces exactly alike and finish with the same number of coats. Try to keep the width of the walnut to 3 in. or 4 in. If you veneer only one side you are asking for trouble, and my guess is you'll get it.

—*Simon Watts*

I am interested in refinishing a number of antique Chinese bamboo bird cages. All have been finished with clear varnish to show off the grain of bamboo, which in itself is not terribly appealing to my Western eye. Can you suggest a source of information on bamboo finishing? —*Charles Berven, Hong Kong*

About 15 years ago a large plywood company imported a few hundred sheets of bamboo plywood from Japan. They were slow sellers and when the company decided to discontinue the line I bought the remaining 80 to 100 panels at a discount price. I couldn't sell them either, so I used them to line a game room in my house. Feeling that clear finish would be undistinguished on bamboo, I tried to dye it, but no dye would penetrate it. Since the customer (my wife) was not insisting on the color change, I put a couple of coats of clear lacquer on, and today I am glad I did nothing more. However, I have learned that there are dyes for bamboo, but I have no personal experience with them. I am therefore giving you a hearsay tip, for whatever it's worth: Use any aniline dye, which can be dissolved in acetone, and let us know how you succeed. —*George Frank*

I'd like your opinion on using mineral oil instead of linseed oil to treat and protect wood. I don't know anything about mineral oil except it is highly refined (edible) petroleum, it doesn't stink, and it's available in three weights. Thus, mineral oil could be a terrific treatment for salad bowls and tabletops. On the other hand, if it's so terrific, how come no one uses it? When my furniture gets its seasonal linseed oiling, the house plain stinks.
—*William Marsano, Toronto, Canada*

I do not consider mineral oil a wood finish. It would seem to offer little to "treat and protect wood," since it does not polymerize and would therefore be neither physically stable nor a barrier to moisture. If applied to raw wood, it would enter the cell structure, but changes in temperature and atmospheric pressure could result in its bleeding out on the surface.

I have used mineral oil as a vehicle for pumice and rottenstone in rubbing down varnish finishes. Unlike water, it will not swell the wood if the wood is incompletely protected by finish. It could also be used as furniture polish, to occasionally revitalize surface appearance by temporarily restoring light-reflectiveness and serving as a lubricant, but for this, I prefer lemon oil.
—*R. Bruce Hoadley*

Boiled linseed oil to which you add about 5% Japan dryer will offer far greater protection to wood than mineral oil. The correct manner to use linseed oil has much to do with the final result. The oil-dryer mixture should be applied generously and left 15 to 30 minutes on the wood, so it can penetrate well. Then, as much oil should be taken off as possible by rubbing the wood with rags, hard. The oiled surface

There's a wealth of information and ideas in the back issues of Fine Woodworking

Our readers tell us they regard *Fine Woodworking* more as a reference resource than as a magazine because of the timeless and hard-to-find nature of its contents. And because there is so much material to cover (new ideas and techniques pop up all the time) we don't intend to repeat ourselves editorially. All seventeen back issues are now available and you can have a complete set for your shop.

Winter 1975, Number 1—The Renwick Multiples, Checkered Bowls, Tramp Art, Hand Planes, Carving Design, Decisions, Woodworking Thoughts, Marquetry Cutting, Which Three?, Library Ladders, A Serving Tray, Stamp Box, All in One, French Polishing, Birch Plywood, Bench Stones.

Spring 1976, Number 2—Marquetry Today, Split Turnings, Eagle Carvings, Hand Dovetails, Mechanical Desks, Textbook Mistakes, Antique Tools, Spiral Steps, Gustav Stickley, Oil/Varnish Mix, Shaker Lap Desk, Chair Woods, Back to School.

Summer 1976, Number 3—Wood, Mortise and Tenon, The Christian Tradition, Hand Shaping, Yankee Diversity, Plane Speaking, Desert Cabinetry, Hidden Drawers, Green Bowls, Queen Anne, Gate-Leg Table, Turning Conference, Stroke Sander, Furniture Plans.

Fall 1976, Number 4—Cabinetmaker's Notebook, Water and Wood, Hidden Beds, Exotic Woods, Veneer, Tackling Carving, Market Talk, Abstract Sculptures from Found Wood, Workbench, Ornamental Turning, Heat Treating, Mosaic Rosettes, Shaped Tambours, Buckeye Carvings, Hardwood Sources.

Winter 1976, Number 5—Stacking, Design Considerations, Keystone Carvers, Carcase Construction, Dealing With Plywood, Patch-Pad Cutting, Drying Wood, Gothic Tracery, Measured Drawings, Wood Invitational, Guitar Joinery, The Bowl Gouge, English Treen, Shaper Knives.

Spring 1977, Number 6—The Wood Butcher, Wood Threads, The Scraper, California Woodworking, Bent Laminations, Dry Kiln, Expanding Tables, Two Sticks, Stacked Plywood, Two Tools, Pricing Work, Going to Craft Fairs, Colonial Costs, Serving Cart, Woodworking Schools.

Summer 1977, Number 7—Cooperative Shop, Glues and Gluing, Winter Market, Three-Legged Stool, Lute Roses, Bowl Turning, Wharton Esherick, Doweling, Spalted Wood, Antiqued Pine Furniture, Solar Kiln, Carving Fans, Bending a Tray, Two Meetings, Index to Volume One.

Fall 1977, Number 8—Out West, Steam Bending, Triangle Marking, Painted Furniture, Chain-Saw Lumbering, Rip Chain, Getting Lumber, Sawing by Hand, Gaming Tables, Two Contemporary Tables, Wooden Clamps, Elegant Fakes, Aztec Drum, Gout Stool, Two Tools, Measuring Moisture, The Flageolet, Young Americans.

Winter 1977, Number 9—Repair and Restoration, Designing for Dining, Tall Chests, Entry Doors, The Right Way to Hang a Door, Drawer Bottoms, School Shop, Health Hazards in Woodworking, Basic Blacksmithing, Carving Cornucopia, Carving Lab, Routed Edge Joint, Shaker Round Stand, Cutting Corners, Small Turned Boxes, Unhinged.

Spring 1978, Number 10—Two New Schools, Wooden Clockworks, Hammer Veneering, Claw and Ball Feet, Block-Front Transformed, Hot-Pipe Bending, Furniture Galleries, A Two-Way Hinge, Laminated Turnings, Chain-Saw Carving, Circular Saws, Louvered Doors, Small Workbench.

Summer 1978, Number 11—Harpsichords, Spinning Wheels, American Woodcarvers, Drawers, Turning Spalted Wood, Scratch Beader, Leather on Wood, Notes on Finishing, Building Green, Parsons Tables, Hanging a Door, Pencil Gauges, Dulcimer Peg Box, Tiny Tools.

September 1978, Number 12—Community Workshop, Greene and Greene, Holding the Work, Scandinavian Styles, Tambours, Stains, Dyes and Pigments, Spindle Turning, Cleaving Wood, Whetstones, Sharpening, Cockleshell, Dust-Collection System, Sanding, Used Machinery, Wooden Wagon.

November 1978, Number 13—Making Ends Meet, Scientific Instruments of Wood, Making a Microscope, The Harmonious Craft, Laminated Bowls, Preparation of Stock, Tung Oil, Relief Carving, Roll-Top Desks, Shaped Tambours, Cylinder Desk and Book-Case, Basic Machine Maintenance, Portfolio: A.W. Marlow, End-Boring Jig, Scale Models, The Purpose of Making, Lumber Grading, On Workmanship.

January/February 1979, Number 14—Guitarmaking School, George Nakashima, Lester Margon's Measured Drawings, Tapered Lamination, Improving Planes, Restoring Bailey Planes, Box-Joint Jig, Five Chairs: One View, World Globe, Koa Table, Incised Lettering, Bolection Turning, Air-Powered Tools, Polyhedral Puzzles, Design Sources, Have a seat.

March/April 1979, Number 15—College Dropouts, The Shape of a Violin, Stalking Mesquite, The Mortise & Tenon Joint, W.A. Keyser, Router Tables, Treadle Lathe, Freewheel Lathe Drive, Milk Paint, Flying Woodwork, Routed Signs, Staved Containers, Carved Shells, Flight of Fancy.

May/June 1979, Number 16—Working With a Handicap, Edward Barnsley, Locking the Joint, Harvesting Green Wood, Shop-Built Vacuum Press, Five More Chairs: One View, Hollow Turnings, The History and Practice of Marquetry, Silas Kopf's Marquetry, Before the Finish, Workbench, Circular Stairway, Three Stairways, Spiral Staircase, The Machinist.

July/August 1979, Number 17—Frederick Brunner, Sawmilling, Working with Heavy Timbers, Portfolio: Working Women, Bending Compound Curves, Furniture from Photographs, Routing for Inlays, Precision: Tips from the Die-Making Trade, Finishing Materials, Solid Wood Doors, Library Steps, Norwegian Woods.

To order the back issues, send us your name, address and payment along with a list of what you want. Each back issue is $2.50 postpaid. Connecticut residents add 7% sales tax. Make your payments to the Taunton Press, Inc. and send to the address below. *(A handy order form with postage-paid envelope is in the back of this magazine for your convenience.)*

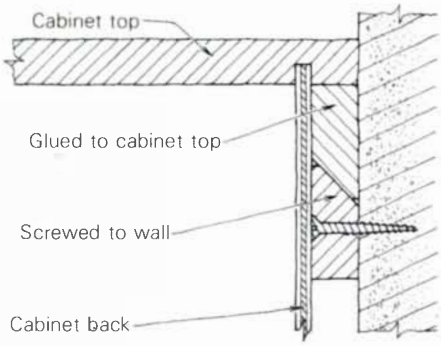
The Taunton Press 52 Church Hill Road, Box 355B4, Newtown, CT 06470

should be given ample time (a week at least) to dry. The microscopic film of oil that remains on the wood will go through a chemical change and will become hard, solid, like a fine coat of varnish. You repeat this five, six times and you build up a fine protective shield on your wood, which, because of the repeated rubbing, also becomes pleasantly smooth. True, linseed oil does not compete with Chanel No. 5 for pleasant smell, but the smell goes away with proper drying and hardening. Mineral, or paraffin, oil will not harden and I never use it as a protective coating. However, when French polishing I would never use anything else.
—*George Frank*

In solid hardwood wall cabinets, which methods are most preferred in mounting to a finished wall?
—*Mitchell Scheerer*

I assume your wall is Sheetrock or plaster covering studs and the cabinets are fairly heavy. You must mount with two 3/16-in. toggle bolts. Bore 7/16-in. holes in the wall and 3/16-in. holes in the cabinet back near the top. To keep the wall plaster from breaking out around the 7/16-in. hole, press a 2x2 square of masking tape over the spot before boring. —*A. W. Marlow*

There are many different ways to hang a cabinet, but I suggest the system explained in the drawing. —*Tage Frid*



Can you tell me how to sharpen a V-parting tool for carving? I am completely frustrated—I have read numbers of books (several contradictory) and there is no way that prevents me from ending up with a hook, a triangle of solid metal or a miniature veiner.
—*B. W. Thompson, Dobbs Ferry, N.Y.*

Woodcarver Rick Butz, of Blue Mountain Lake, N.Y., replies: To sharpen the *V*-gouge, first square off the cutting edge by holding the tool vertically and working the edge against the sharpening stone. This will angle the edge 90° to the shaft of the tool. Next, treat each side of the *V* as if it were a flat chisel and sharpen each outside bevel to a 15° angle. Be careful that both bevels are the same and don't round off the corners. A sharp hook will usually form at the point where the two sides of the *V* meet. Remove this by sharpening the point as if it were a miniature gouge—rock the tool back and forth across the stone, angling this lower bevel about 25°. In time, the hook and any excess will wear away and you will have an even, sharp edge. Next, strop the tool on a piece of leather or a cloth buffing wheel until all of the wire burrs are removed. The tool bevels, both inside and out, should be polished to a mirror shine. You can hone the inside bevels with a fine Arkansas slip, but avoid trying to sharpen the inside of the *V* to a perfectly acute angle. Instead, the inner angle should be treated as a small radius, and should blend into the flat planes on either side. Sharpened in this manner, your gouge will cut more efficiently and will be easier to control around curves.

I have a 9-in. Montgomery Ward band saw, circa 1949, that parts are no longer available for. I need to replace the rubber bands on the wheels but have been unable to locate any. All the catalogs list sizes down to 12 in., but no lower.
—R. McKenzie, Grand Junction, Colo.

A 9-in. band saw is very small indeed, and you will probably have to make the tires. I have used Eastman's 910 adhesive to glue O-rings for hydraulic cylinders. It works very well. Cut the rubber with a new razor blade, apply the adhesive and bring the ends together quickly and accurately, as the adhesive seizes instantly. Use a fixture to help align the ends to be joined.

—Lelon Traylor

EDITOR'S NOTE: Contact Eastman Kodak Co. headquarters at 343 State St., Rochester, N.Y. 14650 for distributors.

Follow-up

In response to the search for a honey-tan pine stain (May '79) I believe the following will fill the bill. Buy three tubes of artist's oil paint: burnt umber, burnt sienna and yellow ochre. For an antique pine I use 60% to 90% burnt umber, with most of the balance burnt sienna and a touch of yellow ochre. A stronger portion of yellow ochre should yield a honey color.

Mix the colors you want in a bowl. Then mix turpentine and boiled linseed oil, half and half, in another bowl. Finally, take an old rag, dip it in the oil and turpentine, then dab it in the paint and rub it on a scrap of wood to test the color. The oil mixture can be used without paint to thin out areas on the wood. When you are ready to begin staining your piece, be sure you have enough paint mixed to do the job. It is almost impossible to make a second batch the exact shade as the first.

—Eddie Trerillian, Columbia, S.C.

A clever expedient suggested in *Step-by-Step Knifemaking* calls for the use of ordinary brake-shoe rivets in sizes 7 and 5 to attach knife handles. It turns out that the shank of the size 5 rivets can be driven into the hole at the end of the size 7 rivets, providing a tight press fit. Order the size 5 rivets about three sizes longer than needed. They are then ground off past the hole to provide a tighter fit.

—Vernon F. Raaen, Oak Ridge, Tenn.

Concerning pawpaw trees (Jan./Feb. '79), in *Trees of North America*, the pawpaw *(Asimina triloba)* is said to range from Pennsylvania to the Mississippi and from southern Michigan almost to the Gulf of Mexico. I understand that this tree seems to be a vanishing species and nobody seems to know why. In wet areas of southwestern Michigan there are many pawpaw trees. They never get very large. I have never seen one more than 6 in. in diameter. It is commonly known here as the Michigan banana, due to the fact that its fruit resembles a banana. It turns black when over-ripe, like a banana, and the fruit is sweet and edible, as are the nuts inside. Indians made good use of this fruit years ago. I have found that this tree is difficult to transplant and to start from seed.

—Roger A. Rousse, Niles, Mich.

Supplies

Finding exotic materials and unusual supplies for woodworking is a constant headache. Here are leads to inquiries from previous issues:

—Ash splints: Peerless Rattan & Reed Manufacturing Company, Inc., 45 Indian Lane, Towaco, N.J. 07082; and Cane & Basket Supply Company, 1283 South Cochran Ave., Los Angeles, Calif. 90019;

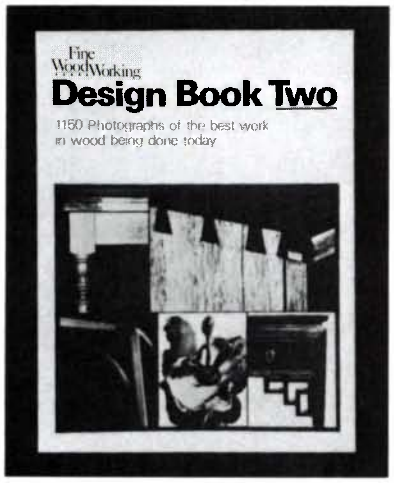
—Swing rocker castings: Heritage Design, Box 103, Monticello, Iowa 52310.

Readers can't find:

—Information on making a Swiss alphorn.

Send questions, answers, comments and supply sources to Q&A, Fine Woodworking, *Box 355, Newtown, Conn. 06470.*

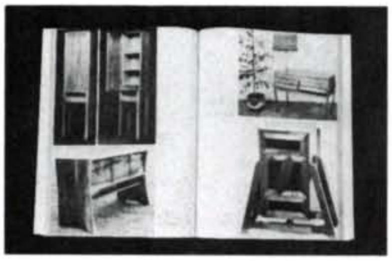
BOOKS FROM THE TAUNTON PRESS



9 x 12 inches, 288 pages. Postpaid Price: $12.00 softcover, $16.00 hardcover

NEW— Fine Woodworking Design Book Two
the state of the woodworker's art

Chairs, beds and stools; tables, desks and bureaus; tools, instruments and toys; cabinets, cupboards and houses; sculpture, carving and marquetry—and even a couple of canoes. *Fine Woodworking* Design Book Two is a lavish treasury of 1,150 photographs of the best work in wood by 1,000 present-day craftsmen. It covers a breathtaking range, from traditional favorites to contemporary wonders. If you like wood, you'll love Design Book Two. *Fine Woodworking's* original Biennial Design Book (1977) was such a smashing success that the editors invited *Fine Woodworking* magazine's 130,000 readers to send in photographs of the best work they had done since then. The response was overwhelming. The editors pored over thousands of entries to choose the very best photos of the very best woodworking. Design Book Two is the result.



Fine Woodworking Biennial Design Book—a photographic study of present-day woodworking

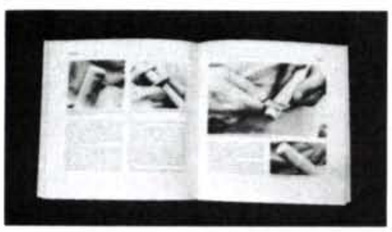
9 x 12 inches, 176 pages, softcover Postpaid Price: $8.00

Novice woodworkers, professionals and bystanders who love beautiful things made out of wood will treasure this superb collection of the best designs by present-day woodcrafters. Now in its third printing, this first design book contains 600 photographs, the pick of over 8,000 submitted to the editors of *Fine Woodworking* magazine. In its 176 pages you'll find both traditional and contemporary pieces, all outstanding examples of the innovative craftsmanship being practiced around the country today. Much of it comes from the studios of professional designer-craftsmen. But much also comes from the home workshops of serious and skilled amateurs. From antique interpretations to ultramodern fantasies, these striking photographs show what amazing things can be done with wood.

Fine Woodworking Techniques—selected by the editors of *Fine Woodworking* magazine

9 x 12 inches 192 pages, hardcover Postpaid Price: $14.00

This big book contains all 50 technical articles from the first seven issues of *Fine Woodworking* magazine—all reprinted in their entirety. This volume is a timeless and invaluable reference for the serious woodworker's library, for it contains information rarely found in standard woodworking books. Here is a diverse array of techniques from the experiences of 34 expert craftsmen—394 photographs and 180 drawings, as well as a complete index, add to the clarity of presentation. Wood-science professor Bruce Hoadley brings you his expertise on understanding wood, drying your own lumber and using various glues; English wood-turner and teacher Peter Child demonstrates the basic methods of bowl turning, and Tage Frid shows you how to make a workbench.



Make a Chair from a Tree: An Introduction to Working Green Wood—by John D. Alexander, Jr

9 x 9 inches, 128 pages, softcover Postpaid Price: $8.00

This introduction to working green wood acquaints you with the subtle sophistication of a chair held together by an interlocking mortise-and-tenon joint that takes advantage of the shrinking action of wood as it dries. Author John D. Alexander, Jr. takes you step-by-step through selecting and felling a tree, splitting out the parts of a chair, shaping them with hand tools on a shaving horse you build yourself, assembling the parts into a chair and weaving a bark seat. The result is a graceful yet sturdy and durable post-and-rung chair. The book, which contains 175 photographs and 75 drawings, presents a description of chairmaking clear enough for a novice, yet detailed enough to inform even the veteran craftsman. A book to read and benefit from even if you don't make a chair.

TO ORDER: Use the handy order form and postage paid envelope in the back of this magazine or send your order with payment to: (Conn. residents add 7% sales tax)

The Taunton Press 52 Church Hill Rd., Box 355C3, Newtown, CT 06470

Furniture Finishing Textbook compiled by J.H. Wiley, Jr. *Revised second edition, 1972. Furniture Production, 804 Church St., Nashville, Tenn. 37203. $12.00, paper; 122 pp.*

Finishing Technology by George A. Soderburg. *Third edition, 1969. McKnight Publishing Co., Box 2854, Bloomington, Ill. 61701. $13.28, cloth; 297 pp.*

Furniture Finishing Textbook was designed for vocational schools that prepare students for jobs in furniture factories. It focuses primarily on industrial finishing processes, but chapters of interest discuss stains and color blending, filling, sealing, top coats and rubbing. While industry rarely uses penetrating finishes, they as well as surface finishes are included. The writing is direct, clear and believable.

This book, like most others on finishing, contains far more material than we amateurs can digest or need. The profusion of alternatives is the real problem. How can we develop simple and durable finishing systems for our work? No one has yet written such a book and thus we struggle with recommendations that may or may not do justice to our masterpiece. Even though this book is not focused directly on our particular needs, it does contain a number of helpful facts.

Finishing Technology was designed to be a text for secondary and college levels. Soderburg discusses such processes as anodizing, plating and electrochemical treatments of metals as well as all aspects of woodfinishing (painting, novelty finishes, tumbling, roller coatings, etc.). The book is well organized, but the information of interest is highly diluted—less than 20% of the book. Soderburg does not appear to have had personal experience in the manufacture or evaluation of furniture finishes. While much of what he says is sound, the inclusion of comments that seem to be of dubious validity left me unable to rely on those sections of the text in which I was most interested. Thus Soderberg's book is of little use to woodworkers. I think we can devote our research time more profitably to other publications.

—*William A. Woodcock*

The Gougeon Brothers on Boat Construction: Wood and WEST System ® Materials. *Gougeon Brothers, Inc., 706 Martin St., Bay City, Mich. 48706, 1979. $20, cloth, 316 pp.*

The three Gougeon brothers developed the WEST System of wood-epoxy boat construction in the late 1960s. They see wood as a fiber that is bonded and sealed with resins into the forms necessary for a boat, rather than as planks cut and shaped to fit and bonded with mechanical fasteners. Wood-epoxy construction has a high weight-to-strength ratio, and its imperviousness to water eliminates many marine construction problems. Having proven successful in high-performance sailing craft and ice boats, it is being used to fulfill a NASA contract for the production of 60-ft. wind-turbine blades.

The Gougeon book is useful for anyone wishing to use or comprehend the wood-epoxy system for building a boat hull. It takes the reader through estimating, laying down and constructing a basic hull and its interior, including chapters on the whys of building your own boat, tools, engineering properties of wood, buying wood and resins, and a sensible chapter on health hazards. A chapter on lofting, or drawing full-size hull lines, is included. Mechanical systems and rigging are not covered.

—*Roger Barnes*

Woodworking and Places Near By by Carol Cox. *Hanging Loose Press, 231 Wyckoff St., Brooklyn, N.Y. 11217, 1979. $3.00 paper, 75c postage, 65 pp.*

In order to succeed, a craftsman, whether with wood or words, must have an affinity for the medium and the tools. Carol Cox has an affinity for both and in her book, *Woodworking and Places Near By,* she explores the craft of woodworking by fashioning words into poetry. Seventeen of her 50 poems deal with woodworking, the objects in the finishing room, maple blocks waiting to become bowls, zebrawood, padauk and bubinga, as well as with humbler aspects more particular to life than to art or craft:

Coffee cups, brown glaze on white
stand along the bench.
Spilled liquid leaves clumps of grey
sawdust around unfinished work.
The tools are dull,
and I have sat on my crooked stool
for hours
trying to think of mirror designs.

Throughout, Cox's poems are restrained but vigorous. Her concern is mostly with what is beneath the surface of the work, with what is just off to one side and usually ignored. Yet there is a pleasing familiarity:

I have learned to fashion
small, curved vases
from thin strips and thick slabs
of wood, to cut and shape
and polish with fine paper
until the piece gleams like a jewel.
I have come to know a little about
direction of grain
and strength.
I have learned to look carefully,
face near the ground
for delicate weeds, dark brown
and cream,
to decorate my work.
I have seen how one's breath
can be closed up inside a solid
block,
turned into a gift of loss,
a solemn nourishment.

Cox and her husband have been full-time woodworkers for about three years. Her specialties are shaped weed

vases and turned bowls and plates. Cox has been writing since she was fourteen years old, longer than she's been working in wood; her combination of the two is shapely, enlivening and gratifying.
—*Laura Cehanowicz*

The Elements of Dynamic Symmetry by Jay Hambidge. *Dover Publications, 180 Varick St., New York, N.Y. 10014, 1967. $2.75, paper, 133 pp.*

The Geometry of Art and Life by Matila Ghyka. *Dover Publications, 1977. $2.75, paper, 174 pp.*

The Divine Proportion by H.E. Huntley. *Dover Publications, 1970. $2.75, paper, 186 pp.*

How to develop pleasing designs is a common problem confronting the craftsman who starts with blank paper. Cary Hall's article in *Fine Woodworking* (Jan. '79) describes the problem, and his comments on the development of the "well-made mess" are for some of us uncomfortably accurate.

The Elements of Dynamic Symmetry deals with the basic principles of design and explores the development of various dynamic rectangles and spirals. Tables and figures are useful in developing dimensions for the components and total outline of a piece of furniture.

The Geometry of Art and Life is somewhat more philosophical and arithmetical in its approach. A quick glance could raise questions of practicality, but tucked away on almost every other page are statements and explanations that make the geometry of good design clearer and more useful.

The Divine Proportion is perhaps even more philosophical, and it is almost exclusively mathematical. From the designer's point of view, it contributes little of practical value and nothing that cannot be found in the books by Hambidge and Ghyka.

Neither Hambidge's nor Ghyka's book was written with furniture design in mind. They are not how-to books. Although well illustrated, the application of the principles to design is left to the reader. The results, when compared to what blind hope and eyeballing accomplish, are worth the effort.
—*George H. Rathmell*

Bill Woodcock, a part-time international business consultant, lives in Huntington, N.Y. George H. Rathmell, of Los Osos, Calif., runs a small antique furniture repair shop.

The Charred Bedroom Suite

BY GEORGE FRANK

When Maurice Lafaille invited me to lunch, I knew that he wanted something. When he took me to one of the finest restaurants in Paris I knew that he had something big on his mind. And it was.

In 1928 Lafaille was a young, handsome, talented and poor interior decorator, dedicated to beauty and innovation. When the main dish was served, he produced a small package, about 6 inches square. At his request I opened it and unveiled a finely detailed statuette of Buddha. He asked me what I thought of it, and I answered that it seemed to be exquisitely carved, a work of art without any doubt, but that I was far from being a competent judge of its value. "George, take a closer look at the hair," he said, and I did. The hair was made of fine lines, each about the thickness of a human hair, but the color of the lines alternated, light and dark, light and dark. Lafaille than produced a powerful magnifying glass. I saw that the dark lines were produced by fire, or burning, and the light ones were the natural color of the wood. How the wood was scorched in such narrow bands is still a mystery to me.

"And what do you think of it now?" inquired Lafaille. "Simple," I replied. "If I did not have this thing in my hand, I would say that such a job is impossible." Lafaille then dropped the bombshell: "George, I am designing a bedroom suite for the Baron Rotschild, and this is the finish you are going to do for me."

I called him an idiot, a dreamer, an imbecile, and told him that even if I could do the finish, it would take me at least 2,000 years. "George, you do it," said Lafaille. He paid for lunch and we zoomed back to my shop.

Lafaille was right; he knew me well. The problem did not let me sleep. The next day I borrowed my girlfriend's electric iron, my elderly neighbor's charcoal iron, several soldering irons—and got nowhere. I cursed Lafaille, but I kept looking for the solution. I spilled alcohol on the wood and set it afire, then tried slower-burning turpentine with the same results: zero.

Photo: Staff

The result of Frank's experimentation: before scorching, edge; after scorching, top.

George Frank, 76, is a consulting editor of this magazine.

There must be a special God helping woodfinishers. A lead pipe, carrying water to my kitchen, sprung a leak. I called a plumber, who fixed the leak with a blowtorch.

The next day I had my own blowtorch and as I scorched the surface of my sample fir board, I knew I was on the right track. With a stiff brush I could easily take off the completely charred soft part of the wood grain (the earlywood layer of each year's growth), uncovering light, uncharred wood beneath. The hard veins (the latewood) remained dark, scorched, intact. With each experiment I came closer to the solution, and the next day Lafaille took my samples to the Baron. He was thrilled. He sent his Rolls-Royce to fetch us, and that day I learned the true meaning of haute cuisine.

About two months later the Baron's bedroom suite was ready to be scorch-finished. Both the Baron and Lafaille came to the shop to watch me char the surface of the wood. If there is a God helping woodfinishers, there must be gremlins making innovators' lives miserable. The intense heat of the blowtorch made the wood shrink, crack, split and bend before our very eyes. In less than half an hour the bedroom suite was ruined, or at least the parts I burned with my blowtorch were. Tears ran from my eyes, not only from the smoke, but from the realization that I had failed.

Without any doubt the scorched finish was something new, original and beautiful and neither of us was ready to throw in the towel. Lafaille and I decided that the bedroom suite had to be rebuilt, but that the wood must be burned before furniture was made of it. Moreover, we adopted a frame-and-panel construction to allow further shrinkage. The Baron agreed, and assured us that he would assume the cost, regardless of how many times I had to rebuild his furniture. Two or three months later, we delivered the first bedroom suite made of scorched pine to the Baron Rotschild's country home at Chantilly. It may well still be there.

About a month later, when Maurice Lafaille invited me for lunch, I knew that he wanted something. He did. And by the time the main dish was served he produced from his pocket a handful of virgin hemp, but that is another story . . . ☐

Fine Woodworking pays $100 for readers' adventures; suitable length is 1,500 words or less—up to six typewritten pages, double-spaced. Send to Adventures, Box 355, Newtown, Conn. 06470.

CLASSIFIED

Well-equipped, established WOODWORKING SHOP for rent or lease in Vermont. Call or write: Simon Watts, (802) 387-5379. Putney, VT 05346.

CUSTOM FURNITURE AND RESTORATION SHOP for sale. Machines, tools, supplies, hardwoods included. Business with lease, $16,500. Business with brick storefront and apartments, $81,900. Workers-In-Wood, Box 166, Richmond, VT 05477. (802) 434-3349.

SAWMILL & 85-ACRE FARM. House & barn with shop, 10 miles from U.S. border. $39,900. J. Rattsmith, RR 1, St. Stephen, N.B., Canada. (506) 466-4412.

STUDENT-APPRENTICE position open. Contact by mail. The Dovetail Joiner, 300 Northside Dr., Bennington, VT 05201.

Are you interested in WOODTURNING as a hobby? Take a two-day intensive course for beginners from a qualified instructor. For further information write: PRACTICAL WOODTURNING, PO Box 102, Orangeville, Ontario, Canada L9W 2Z5.

CANADIANS. Demonstrations and immediate delivery. Inca Swiss-precision woodworking machines, Myford ML8 woodturning lathes, W&H molder-planers, Rockwell Delta, Shopsmith multipurpose machines. $1 for literature (will refund $5 with purchase). J. Philip Humfrey Ltd., Box 173, 33 Red Lea Ave., Milliken (Toronto), Ontario L0H 1K0. (416) 293-8624.

JUST OPENED—specialty lumber, 27 hardwood species at affordable prices. YUKON LUMBER CO., 520 W. 22nd St., Norfolk, VA 23517. (804) 625-7131.

ATTENTION
MANUFACTURERS & DEALERS
MESQUITE
KD SIS
HARDWOOD LUMBER
WHOLESALE INQUIRIES ONLY
CLASSIC GRAIN HARDWOOD CO.
902 E. Hughes Access Road
Tucson, Arizona 85706

A Cut Above
Veneer Supplies
Specializing in veneers
for the Home Craftsman
& Marquetarian.
Free Price List
P.O. Box 139
Greensburg, OH 44232

FALL SPECIALS

Cherry—4/4" $.98/ft.; 5/4" $1.15; 6/4" $1.25; 8/4" $1.50
Oak (Red)—4/4" $.98/ft.; 8/4" 1.50
Oak, WH (qtr-sawn)—4/4" $1.75
Mahog., Hond.—4/4" $1.35; 8/4" $1.49
Myrtle—(25% burl)—4/4" $2.40
Walnut—4/4" $2.10; 8/4" $2.75
Padauk (AF)—4/4" $2.30
Zebra—4/4" $2.40

All FAS, kiln-dried; F.O.B. Knox; payment before shipment; 25 foot minimum per item; $1.00 for retail list; wholesale also.

WOODSTREAM HARDWOODS
Box 11471
Knoxville, TN 37919 (615) 588-2878

Believe it or not, NON-WORMY AMERICAN CHESTNUT. 4/4 lumber up to 20 in. wide. Veneer 1/28 in. flat cut. This offering of this rare classic hardwood available in a very limited quantity. Veneer from 85¢, lumber from $8.50 b.f. MacDonald, Box 205, Bangor, WI 54614.

FINE LUMBER: Teak, mahogany, oak, maple, cherry, Ga. pine. KD, FAS. For your home, office or boat. Call (301) 544-1122 or send for our brochure/price list (50¢). F. SCOTT JAY & Co., Box 146, Pasadena, MD 21122.

REDWOOD BURL, OLIVE SLABS. Clock kits. Free brochure. Redwood Burl Esque, Dept. F-9, POB 207, Lompoc, CA 93438.

Old growth SOUTHERN YELLOW PINE for sale. T&G flooring and rough-sawn stock in various dimensions available. Call (413) 367-2673 or write The House Carpenters, Box 217-F, Shutesbury, MA 01072.

KILN-DRIED LUMBER—21 different Appalachian hardwood species, turning squares. Brochure price list 25¢. Marietta Hardwood Center, Box 803, Marietta, OH 45750. (614) 373-3658.

Table, clock slabs. CALIFORNIA REDWOOD, BUCKEYE, others. Col. Buckeye Savage, 760 Illinois, San Francisco, CA 94107. (415) 863-2115.

LOCAL LUMBER CO. Fancy hardwoods, custom milling and kiln drying. 161 Bowers Hill Rd., Oxford, CT 06483. (203) 888-6509.

WALNUT and OAK DOWELS. Furniture parts. Toy parts. Catalog 25¢. Woodworks, Box 79238, Saginaw, TX 76179.

AIR COMPRESSORS—quiet, artist's studio models. Free catalog. Call toll-free: (800) 547-4403. Artistic Air Brush.

IRONS AND CUTTERS. Offering the country's largest selection of plane irons and cutters at unbeatable prices. Send 25¢ for lists to The Tool Works, 76 Ninth Ave., New York, NY 10011.

INCA TOOLS. Dealer serving Georgia and the southeast. Visit our woodworking showroom or send $1 for catalog. Highland Hardware, 1034 N. Highland Ave., N.E., Atlanta, GA 30306. (404) 872-4466.

Hi-speed STEEL BRAD POINT DRILLS. 28 sizes in 3 different lengths. Odd Ball Supply, Box 133, No. Attleboro, MA 02761.

TOOL CONTROLLER from Century American Instruments. Control speed and direction of turn in one instrument. 5-amp $39.95/10-amp $59.95. Box 1014, Placentia, CA 92670.

SANDERS—U-BUILD PLANS. Sidestroke $4, string $5, flat-bed table $7, all three $15. Free brochure. McCall House, 1950-F, Lenoir, NC 28645.

IN SAN FRANCISCO, tools and supplies for the wood craftsman. SEABRIGHT HARDWARE, 1749 Noriega St. (415) 731-1274. Inca dealer.

3M Stikit Discs (sandpaper) and pad. Excellent for lathe-sanding. Trial kit $4.75. OHIO WOODSHOP SPECIALTIES, 190 Anderson Dr., Jackson, OH 45640.

HAND-FORGED IRON HARDWARE. Hinges, latches and pulls in traditional or your own contemporary design. Hammerworks, 1075 Pleasant St., Worcester, MA 01602. (617) 752-1484.

SWING-ROCKER CASTINGS. Gray iron cast hangers for restoring that old original or building new. $20/set of four. Full-size swing-rocker plans, $15. Heritage Design, PO Box 103, Monticello, IA 52310. (319) 465-3270.

Stainless steel and brass, SCREWS AND BOLTS. Small quantities, free catalog. Elwick, Dept. 347, 230 Woods La., Somerdale, NJ 08083.

TUNG OIL. The hardest-drying natural finish. Available in gallons, quarts and pints. Write for brochure on this amazing ancient China Wood Oil finish. Sutherland Welles, Ltd., Box 639-FW, Woodbury, CT 06798.

GOLD LEAF & RELATED IMPORTS. Write for products list, stating needs for latest prices. Art Essentials of New York, 180 E. 73 St., New York, NY 10021. (212) 472-2770.

Solid brass engraved NAME OR TITLE PLATES. Two-line sample, $1. V-B, Dept. FW, 807 E. Dana, Mountain View, CA 94040.

CONTEMPORARY FURNITURE PLANS—Catalog contains over 200 exclusive plans: beds, tables, chairs, rockers, sofas, desks, shelving and more! $2 refunded with first order. The Designery, Dept. BS-1, 521 W. Kirkwood, Bloomington, IN 47401.

200 MAIL ORDER SOURCES for woodworking supplies, tools, patterns. Many hard-to-find specialty sources. Only $3. Love-Built Toys-A9s, Tahoe City, CA 95730.

NEW AND USED BOOKS on wood, woodworking, carving, turning. We deal only in woodworking. Frequent catalogs. $1. R. Sorsky Bookseller, 3845 N. Blackstone, Fresno, CA 93726.

World's most complete WOOD AND TOOL CATALOG. 60,000 items 832 pages. Three pounds. $5 refundable. McKilligan, FW979, Johnson City, NY 13790.

WOOD & TOOL EXCHANGE

For Sale

26-in. band saw $500. 12-in. circular saw $300. Stationary gas-engine drive $100. Mrs. A. Rovery, 235 S. Ketcham, Amityville, NY 11071. (516) AM4-0444.

Dodds 20-spindle dovetailing machine, serial #2516. No motor and needs work, $300. (315) 689-6144.

American chestnut, 29 planks. 810 W. 1st St., Oil City, PA 16301. (814) 676-9141 Sat. only.

Buddhist lay monastery in NY State seeks donations of woodworking tools and machinery. All donations are welcome, tax deductible. Contact K. Malone D.B.Z., Beecher Lake, Star Route, Livingston Manor, NY 12758.

Four 17-ft. lengths maple bowling alley, 42 in. wide, strips nailed with iron clamps. Epoxy finish. Excellent for large assembly benches or cut into workbenches. $15/lin.ft. R.E. Malenka, R. 213 W. Market, Orwigsburg, PA 17961. (717) 366-2905.

Butternut lumber, AD, 1 in. thick, 10 in. to 17 in. wide, 1½ in. and 2 in., $1.60/bd.ft. Also walnut carving blocks 40¢/lb., butternut 25¢/lb. Art Shaw, RR 1, Lyndhurst, Ontario. (613) 387-3913 evenings.

Violin wood. Seasoned 2 pc. maple backs $30, fine spruce tops $18, maple necks $12. C. Mills, 3509 W. 72nd Pl., Chicago, IL 60629.

Walnut boards with natural edges 10/4, 11/4, 12/4—up to 18 ft. long, varying widths, AD 3 to 5 yrs. 0-1M bd.ft., $2.00; 1M bd.ft. up, $1.75. Arthur Reed, PO Box 356, DeWitt, NY 13214. (315) 445-0244.

Rockwell 22-802 knife grinder and jointer for 18-in. planer. Hardly used, $350. B.E. Shull, 1828 Roundhill Terr., Charleston, WV 25314. (304) 346-4168.

Hammon Trim-O-Saw E.C., 1-HP 3-PH double belt drive. Use for precision wood or metal cutting. Micro-adjustable table moves on ball bearings, $750. R.E. Hall, 1429 Montrose Ave., Dayton, OH 45414.

Pecan veneer, 1/28 in. Flitches up to 12 ft. long, 25¢ sq.ft. Also European yew veneer, 50¢ sq.ft. Excellent quality. Shipping extra. (618) 833-2684.

2-in. walnut up to 8 ft., dried 10-12 yrs. Random sizes $2, cut sizes $3. Don Hartzler, 7770 N. Ludlow Rd., Cable, OH 43009. (513) 465-3181.

Carved legs, turned legs, all shapes and sizes. Mahogany, walnut and birch wood. Shop trucks, 38x20x29 in. high. Meyer Kaplan, 1611 N. Sheffield, Chicago, IL 60614.

Inca 10-in. table saw, Sprunger 14-in. band saw. Richard Lizek, PO Box 621, Southwick, MA 01077. (413) 786-3301, 569-6713.

Inca Swiss 10-in. cabinetmaker's table saw, 1 year old, mahogany stand, many accessories. Asking $950. M. Gervan, RR #2 Perth Rd., Ontario, Canada K0H 2L0. (613) 353-2550.

Wanted to Buy

Miller-Wellman core box machine, patternmaker's feather-tooth saw, Maydole patternmaker's long-head hammer, clock turn. Robert Casperson, 1520½ W. Temple St., Los Angeles, CA 90026.

Parts for old Walker-Turner 14-in metal band saw, or where parts may be obtained. M. Harrison, 20612 Ave. 380, Woodlake, CA 93286.

For parts an Oliver 24-in. thickness planer, model 199. (618) 833-2684.

Stanley planes new and old. All types from nos. 1 to 444. Also aluminum Stanley planes, old wood planes and woodworking tools. Ivan E. Bixler, 6943 Cozaddale Rd., Goshen, OH 45122.

Used 2 or 3-drum sander with dust hoods, 36 in. to 42 in. width, either endless bed or roll feed. Must be in good condition. Vic Delagrange, R #2, Winthrop, NY 13697.

Will buy scrap, shavings, sawdust of padauk, Brazilwood, logwood and other dyewoods by pound. Contact Natural Dyer, J. Cross, PO Box 42, Walden, NY 12586

Parts wanted for Delta 12-in. wood lathe #1460: Set-over tailstock, #1461 tool support base, #697 floor stand, #1463 lathe bench, all accessories. A. Hedstrand, 801 Trilby Rd., Brooksville, FL 33512.

SITUATIONS WANTED

Woodworker with 2 years experience building custom looms and tables seeks position with established craftsmen. Stephen Zimmer, W. Main Rd., Little Compton, RI 02837.

Boatbuilder to trade skills in wood for land in San Juan or West Coast. Have all tools, will travel. Steve Ellis, c/o Apprenticeshop, 375 Front St., Bath, ME 04530.

Apprenticeship sought with craftsman in cabinet and furniture making. Very strong desire to learn. Will relocate anywhere. Kent Ambrose, 3718 Mira Pacific Dr., Oceanside, CA 92054.

Industrial Arts graduate with 4-year concentration in woodworking seeks apprenticeship in custom furniture/cabinet shop with experienced craftsman. Interested in quality work and career. Willing to relocate. Alan Lorn, 768 Othello Ave., Franklin Square, NY 11010. (516) 481-5096.

The CLASSIFIED RATE IS $1.50 per word, minimum ad 15 words. Payment must accompany order. The WOOD AND TOOL EXCHANGE and SITUATIONS WANTED rate is $1 per line, minimum three lines, maximum six lines, limit two insertions per year. Allow 30 letters or spaces per line, including name and address. The Wood & Tool Exchange and Situations are for private use by individuals only. Commercial accounts must use Classified. Please inquire for DISPLAY CLASSIFIED RATE. Send to: The Taunton Press, Advertising Dept., Box 355, Newtown, CT 06470.

Events

This column is for gallery shows, major craft fairs, lectures and exhibitions of general interest to woodworkers. To list your event, let us know at least three months in advance.

Pennsylvania Woodworkers Invitational Exhibition—work of 15 contemporary designer-craftsmen, Sept. 23 to Oct. 20. Kipp Gallery, Indiana University of Pennsylvania, Indiana, Pa.

Symposium West—Woodturning: design, materials and practice, Oct. 11-13. Instructors include Albert LeCoff, John David Ellsworth, Frank E. Cummings III, Bob Stocksdale. Contact Dale Nish, Dept. of Industrial Education, Brigham Young University, Provo, Utah 84602.

Architectural Dimensions—Contemporary furniture and large decorative pieces for the home by American craftsmen, including Bruce Beeken, Jon Brooks, Wendell Castle, Ed Moulthrop, Mark Lindquist. Sept. 11 to Oct. 20. The Elements, 766 Madison Ave., New York, N.Y. 10021.

New Handmade Furniture: American Furniture Makers Working in Hardwood—original work by 37 craftsmen, through Oct. 21. Ontario Science Center, Toronto, Canada.

Exhibit of Musical Instruments made by Irving Sloane—to Oct. 31. Woodcraft Supply Corp., 313 Montvale Ave., Woburn, Mass.

It's About Time—Handmade clocks and time-related objects, all media, Feb. 1 to March 14, 1980. Application deadline Oct. 15. Craft Center, 25 Sagamore Rd., Worcester, Mass. 01605.

Third Annual Invitational Wood Exhibition—Nov. 1-30. Westlake Gallery, 210 East Post Rd., White Plains, N.Y.

Containers—juried competition cosponsored by the Danforth Museum and the Massachusetts Association for the Crafts, Nov. 11 to Dec. 31. All media. Danforth Museum, 123 Union Avenue, Framingham, Mass.

Winter Market of American Crafts—Application deadline Oct. 1; fair dates Feb. 14-17, 1980. New Baltimore Convention Center, Baltimore, Md. Contact Carol Sedestrom, American Craft Enterprises, P.O. Box 10, New Paltz, N.Y. 12561.

Sixteenth Annual Piedmont Crafts Fair—all media, Nov. 2-4. Memorial Coliseum, Winston-Salem, N.C.

Third Annual Woodworker Show—Royal Horticultural Hall, London, Nov. 4-11. Travel arrangements through Russ Zimmerman, RFD 3, Box 57A, Putney, Vt. 05346.

Sacred and Ceremonial—multi-media exhibition, Nov. 17 to Dec. 24. The Gallery at Peters Valley, Layton, N.J.

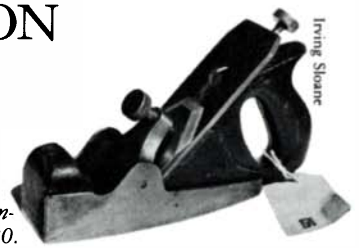
Craft Professionals of Vermont—traveling exhibition of 45 artists, all media. Oct. 4 to Nov. 3, T.W. Wood Art Gallery, Montpelier, Vt.

Carvers' Club Show—exhibition of 375 carvings, Nov. 9-10. South Glen Mall, Denver, Colo.

AT THE ARNOLD & WALKER TOOL AUCTION

6000 traditional tools on the block: Our man versus the Getty Museum

BY IRVING SLOANE

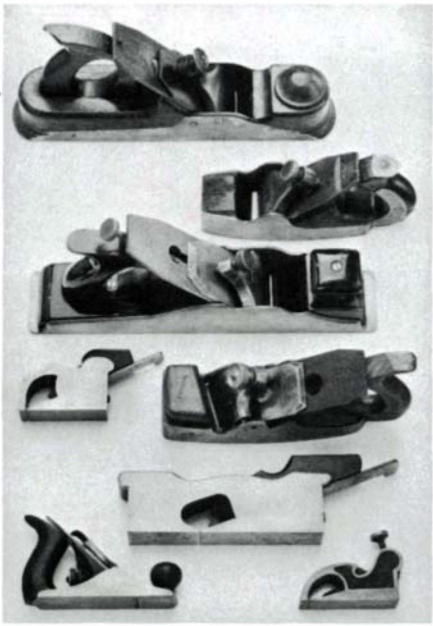


Irving Sloane

Norris adjustable coffin-sided smoother, c. 1920.

In 1974, Roy Arnold and Philip Walker, two personable Englishmen, formed a partnership to advance their interest in old tools to a pleasurable form of gainful employment. They set up shop in London as dealers in the traditional tools of the carpenter and other tradesmen. News of their enterprise first reached America through an article about tool collecting in the *New York Times*. Shortly thereafter I moved to Brussels and began receiving their catalogs, handsome productions with careful attention to photography, layout and indexing. Walker's informative texts are exemplars of technical writing relieved by human interest and wit. In 1976 they transferred their business to the small Suffolk town of Needham Market, 77 miles from London.

Last spring, when notice of the dissolution of their partnership arrived from London, I was surprised and saddened. Their catalogs had aroused my interest in the design and character of traditional tools, an interest that has broadened into professional involvement in the design of hand tools. Christie's, a London auction firm, was handling the sale of their stock. I sent for the sale catalog and quickly found a number of pressing matters that required my presence in London during the sale. There were several tools I wanted and besides, London is only 45 minutes by air from Brussels.



John Melville

Some of the planes at the auction (from top to bottom, left to right): cast-iron with cove-molded heel and toe, Spiers coffin smoother, Norris with patented screw adjustment, brass bullnose with ebony wedge, iron skew-mouthed 'coach-door' rabbet, Price gunmetal steel-soled shoulder, Stanley no. 1, Preston patented iron bullnose.

Traditional hand tools hold a sentimental appeal for many people besides craftsmen. In their simple forms shaped by long usage, smooth with the worn patina only hands can give, we feel directly the chain of the generations. Like other handmade artifacts, they sometimes exhibit the crudities antique dealers call charm, but more often they possess an arresting beauty, the result of functional design modulated by honest sentiment—a cupid's bow chamfer on the crosspiece of a miter plane, the faceted end of a cap iron, a sculptured plane wedge.

My main interest at the auction was planes. I use planes a lot, and for a long time a Norris adjustable coffin-sided smoother has been among my heart's desires. A good shoulder plane would also come in handy, as would a small chariot, or bullnose plane. They would have to be attractive specimens in good working order that could serve as prototypes for building my own planes. I am not a collector, I firmly reminded myself, and left Brussels in a mood of self-congratulation about being such a sensible, practical fellow.

At Christie's in South Kensington, all the tools were laid out on long tables in open bins for the presale exhibition. Six thousand tools in 1,043 lots, along with old prints and books, were up for the two-day auction. I introduced myself to Philip Walker, a tall, bearded gentleman, and we talked about tool collectors. "An interesting lot, for the most part, with above-average intelligence and tastes," he observed. "Professionals, doctors in particular, seem to find tool collecting an absorbing activity and, perhaps, a good investment." Walker is himself a spare-time woodworker; Arnold is a woodturner.

People moved about the tables, examining the extraordinary variety of tools. Bundles of molding planes of every shape—ovolo, astragal, cove, ogee, torus, side bead, tongue and groove, hollows and rounds—were available singly and in sets of 30 or more. Most seemed in good condition. There were specimens by famous 18th and 19th-century makers such as Wooding, Jennion, Fitkin, Frogatt and Gabriel. Fillister and plow planes, by both English and continental makers, were also abundant, along with braces of primitive form, Victorian plated braces and an elegant brass-framed ebony "Ultimatum" brace made by William Marples.

Metal bench planes, the category that interested me most, were less plentiful: a few miter and jack planes, and a number of straight and coffin-sided smoothers by Spiers, Norris, Mathieson, Buck and Preston. There were only two Norris adjustable smoothers of the 7½-in. size I wanted. I also noted a fine brass bullnose plane with a beautiful ebony wedge that might have been carved by Brancusi. Also a handsome bronze shoulder plane by Arthur Price. I carefully noted their estimated values from the list at the back of the catalog: the Norris smoothers, 40 to 80 pounds; the brass bullnose plane, 40 to 60 pounds; the Price shoulder plane, 50 to 70 pounds.

The exchange rate last spring was roughly $2 for the English pound. Walker's estimates seemed reasonable, and I penciled in lightly (to foil competitors seated nearby) the prices I would pay if pushed to the wall. I promised myself to observe these limits strictly and to avoid profligacy inspired by lunatic zeal.

Sixty pounds sounds like a lot of money for a small bullnose plane, but this kind of plane, along with the small chariot and block plane, is rare. In this case, however, the determining factors were plainly the beauty and flawless condition of a plane that was probably the one-of-a-kind product of an unusually artistic craftsman. The Price shoulder plane was in mint condition in its original box, a Yorkshire pattern with bronze sides, steel sole and ebony wedge. Here again the considerations were beauty and condition, not antiq-

uity, since Price was active as a planemaker from 1942 to 1967.

The Norris planes probably dated from the 1920s and had seen much service, but were in decent shape. The vertical screw adjustment, patented by Norris in 1913, also controls lateral adjustment of the plane iron. It is an ingenious device, superior to the mechanisms of most modern planes. The cutting iron is 3⁄16 in. thick, the apparent minimum for planes of that era; today's are about half that. These planes are heavy—about 4 lb.—and were manufactured to the highest standards. Lightness is not helpful in a plane, and a heavy blade reduces the possibility of chatter. I penciled in 70 pounds next to the one I liked and hoped for the best. I was also drawn to the plated beech braces, but decided to play those by ear. The exhibition was well attended both days, with much cautious annotating of catalogs.

On Monday morning, the auctioneer mounted his stand at 10:30 A.M. The room was full, with 200 people, some standing. Attendants held up each lot in turn and bids came quickly. Presently, the brass bullnose plane came up. I held my breath. My single bid of 50 pounds was quickly swamped, the price spiraled upward, and the plane was knocked down for 160 pounds.

I pulled myself together hastily because almost immediately came the Price shoulder plane. I was spared any need of bidding because the price soared to 240 pounds in seconds. The crowd began to understand that there were some high rollers present, two representatives from the new Getty Museum in California.

A pall fell over the proceedings. I left at lunch, hopes not quite iridescent, and spent the afternoon at the Science Museum a few blocks away, studying an excellent exhibition on the history of hand and machine tools. I moved about listlessly, dogged by the melancholy thought of returning to Brussels empty-handed.

Next morning, I regained my second-row seat and bided my time as well as one can in a state of anxiety; soon the Norris plane came up. Bidding opened at 50 pounds, and I was surprised to find myself bidding against only one other bidder. The Getty people were not interested. My opponent ran the price up to 80 pounds.

"The bid is to you, sir," the auctioneer prompted. I bid 85 pounds. The other bidder declined, and the plane was mine. I had gone 15 pounds over my limit, but triumphantly.

Thus emboldened, I bid on a plated brace that I had not even marked in the catalog. I got it for 50 pounds, then saw an Ibbotson brace I had marked for 65 go to the Getty Museum for 130 pounds. Their many purchases included a handsaw, c. 1870, for 420 pounds and an 18th-century Dutch plane for 1,100 pounds. Both had some incised carving, a refinement, presumably, that gave them the expensive cachet of folk art. My final bid was for a cast-iron shoulder plane with a wedge that might have been carved by Art Buchwald. It was valued at 30 to 40 pounds; I got it for 38.

At the end, I collected my tools and said goodbye to Walker and Arnold. The auction had worked out well for them with every lot sold, a kind of churning operation bound to fuel the broad interests of tool collecting and to float prices upward to new levels. The partners are now operating independently as friendly competitors in Needham Market. Their stocks, I suspect, will be quickly replenished due to their dominant position in the trade. A card to either Roy Arnold (77 High St., Needham Market, Suffolk IP6 8AN, England) or Philip Walker (Beck Barn, The Causeway, Needham Market, Suffolk IP6 8BD, England) will bring information about their catalogs, books and reprints of old catalogs. Fast trains leave regularly from the Liverpool Street Station, making Needham Market a comfortable one-day outing from London.

American collectors interested in English and European tools can apply to Christie's South Kensington (85 Old Brompton Rd., London SW7 3JS, England) and Sotheby's & Co. (34-35 New Bond St., London W1A 2AA, England) for subscriptions to sales catalogs listing tools. These include bidding forms that can be entered by mail. Tool buffs visiting London will also enjoy the tool exhibition at the Science Museum on Exhibition Road (South Kensington stop on the London Underground). A few miles outside of London, a large portion of the tool collection of Raphael Salaman, the famous tool encyclopedist, is on display at the St. Albans City Museum. □

Irving Sloane, besides being an aficionado of old tools, is a guitarmaker and the author of several books about making and repairing guitars. His most recent book is Making Musical Instruments *(New York: E.P. Dutton, 1978).*

Showcase Cabinets

The delicate interplay of glass and wood

by James Krenov

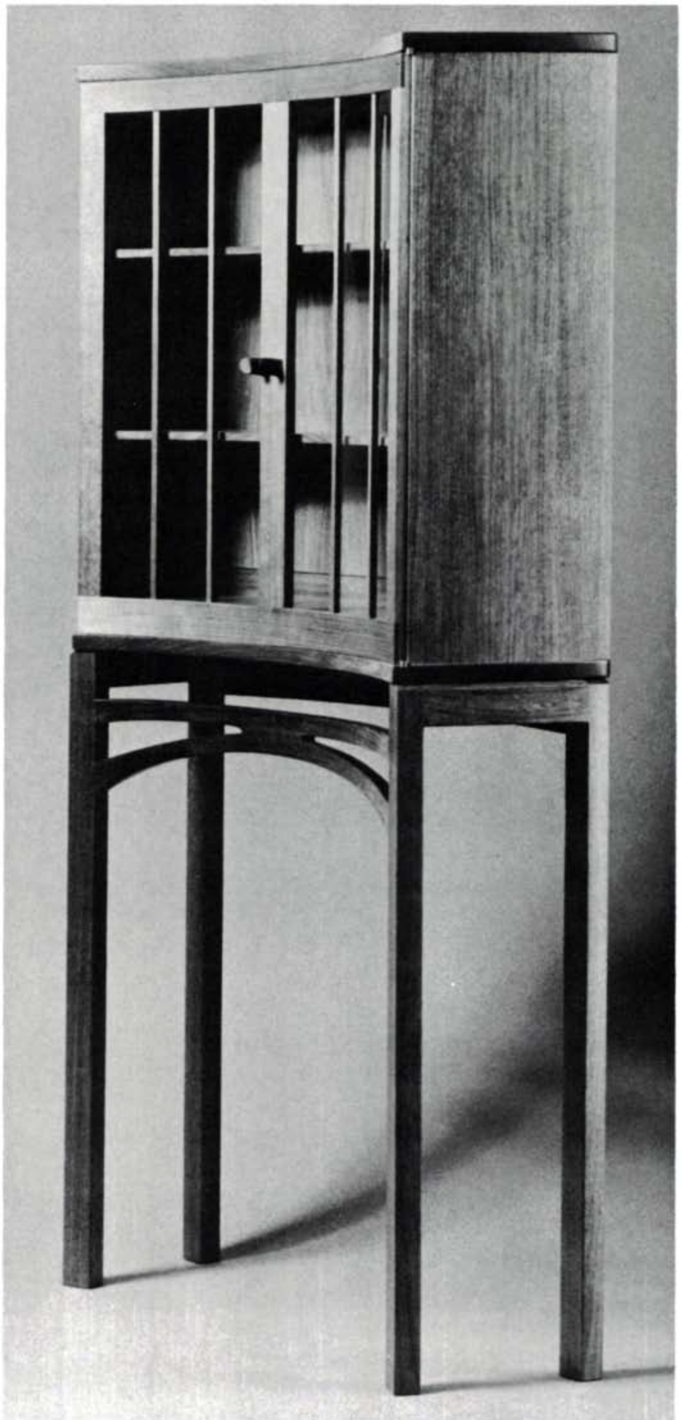
It is a puzzle to me why there are not more interesting showcase cabinets around. Certainly, living habits don't exclude this type of furniture. We do accumulate objects that are pleasing to behold and deserve a nice home of their own. Perhaps too many people have a preconceived, discouraging notion about showcase cabinets. Cabinetmakers may share such prejudices. Or the technical problems of doing doors with thin wood parts and closely fitted glass may discourage cabinetmakers. I suspect this is so.

A way of getting past these problems is to use pretentious, special-effects glass and wild wood in all sorts of bubbly shapes. Interesting, although we may be missing opportunities by not taking advantage of the effects that simple glass set in pleasing facets can create. Work with glass and wood, if it is to succeed, demands great accuracy, patience and a way of conceiving and then doing a piece that is different from what some of us have been involved with.

Someone says, "Showcase cabinets do not use enough wood!" This can be true. One is prompted (by mirrors and such) to forget, or at least to neglect, that this is in fact to be a cabinet, not an aquarium or a bar.

At first, I, too, thought showcases were not truly cabinets. Then, because I liked the function of such pieces, I attempted to achieve some sort of balance between the wood and glass as related to the purpose of the piece. The real challenge is the pleasing interplay between you as craftsman and those who will use the showcase. You express something personal—your own version of a concept that is also a certain mood, while making something for someone to use and enjoy. Through usage the piece will achieve further expressions.

Whatever mild interest I had in showcases from the outset has increased since then. It needn't always be so. Even a craftsman who tries to make such pieces with an open mind and a sense of the possibilities may conclude that it's not for him. Certainly, one of the things we should try to determine as craftsmen is the sort of work that is really for us. We are by our nature (the sum total of the traits we have or do not have) either finely tuned, meticulously inclined, or a bit of the opposite, the kind of people who do rough-cut, "unorganized" work. In the latter case this type of cabinetmaking is a frustration. Probably after trying we will then leave it. For those who discover something interesting here, I think such work leads to further discoveries and increased interest. Through one possibility you come to the next, and the next. That's the essential difference in our work between monotony or routine and this other thing, which really keeps it alive through the years. After all, I hope that some of us, in choosing our craft,



Showcase cabinet, Tasmanian blackwood (1977), 53 in. high, 30 in. wide (max.), 10 in. deep. The curved horizontal rails are laminated from resawn stock. Oil finish.

Photos: James Krenov and Bengt Carlen

are choosing a way to live and work and be happy doing it for a long, long time.

Generally speaking, there are four basic solutions to showcase cabinets. Each poses problems and invites variations. There is the flat, one-piece door or two flat doors in the same plane. The second solution is a *V*-shaped single door or two doors set at an angle to form a *V*. Another will be one or two doors forming a convex curve. And last, a door or doors making a concave curve. It is a personal matter which—if any—has a special appeal. The appeal will probably begin with something visual: One likes the way a *V* appears, the way light plays on its glass, the idea of related angles and proportions. Or maybe one of the curved doors is more inviting. Its softness, perhaps. At any rate, I believe the first thing that attracts us is visual, whether curve or flat or angled, glass and light as related to wood. After that, we must think in terms of the work entailed in some particular solution we like. We probably should try from the beginning to choose something both possible and worth doing.

Besides the idea with the various demands we might first conceive, there are in showcase cabinets an enormous number of details to be discovered; these we can play with and use. Some, of course, are directly anchored to the construction we decide on. Others—such as the various sensitive shadings we can use in connection with the doors, or the top and bottom pieces, the thin strips with which we divide the glass—are largely decorative. The center of this kind of work is aesthetic, yes, but it is also the physical relation of wood to glass, the fits we need and how these relate to the various steps of the work. There is perhaps more organized method in making showcase cabinets than in any other kind of cabinetry.

The sort and thickness of the glass is to be considered from the beginning. Once upon a time we had blown glass with a greenish or brownish tint; it was alive, the real thing. This is now almost impossible to get. The modern imitations of antique glass do not appeal to me, so when I cannot obtain blown glass I use ordinary clear glass, about 3⁄32 in. (just under 3 mm) thick. The average thickness of a door I make for a showcase cabinet that is, say, 16 in. by 30 in. or 24 in. by 30 in. is usually slightly under ¾ in.

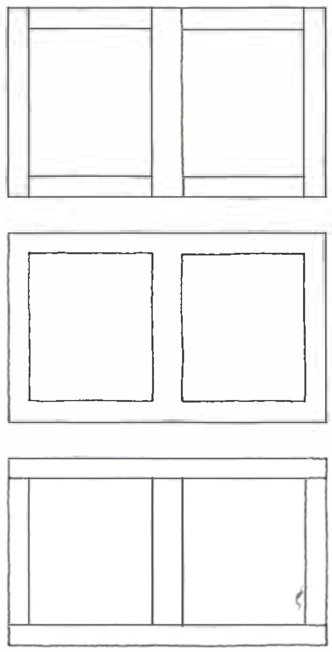
Simply put, flat doors are carefully chosen wood in pleasing proportions that belong to a well-balanced piece; they make a good first exercise. Curved doors are another and more involved matter. Usually one has to saw the laminates for the shaped parts and glue these up to the desired thickness on a mold. This is extra work, but it's worth it. I wouldn't try to make curved doors cut from a thick plank of solid wood. First, it results in a lot of diagonal or wrong-way grain, which makes the cutting of rabbets or slots for glass difficult and weakens the joints; and second, since it is very hard to predict exactly the visible pattern of wood on the pieces thus sawn, we're apt to end up with an imbalance.

Once you have an idea for a cabinet and have considered the practical problems themselves, it is time to think also in terms of proportion. There are various possibilities with doors that may or may not be simple in their construction. By placing the horizontal and vertical parts of a door in certain relations to one another, we can change the proportion of a given shape or size without changing the size itself, and in so doing make a door appear to be wider or narrower; higher than it really is or not as high. There are options. Nor do the various parts of such a door need to be flush. There can be intentional yet slight differences in the thickness of some members, which will introduce little subtleties and divide up the elements to give us proportions within proportions. These divisions are not for the sake of complexity, but because they are pleasant and give us variation instead of a single impression, something for the eye to play with. And it adds challenge in the work, since such details are worthwhile only when neatly done.

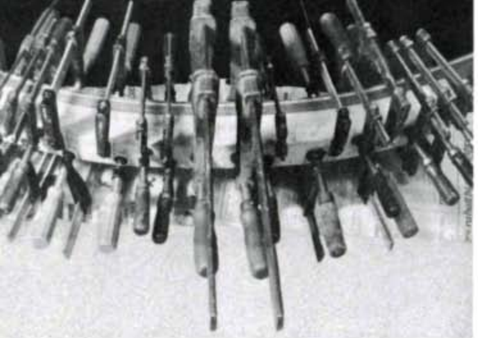
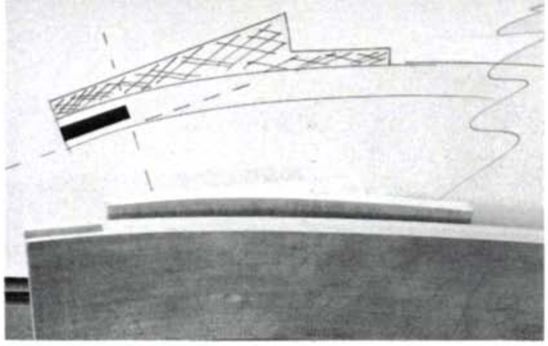
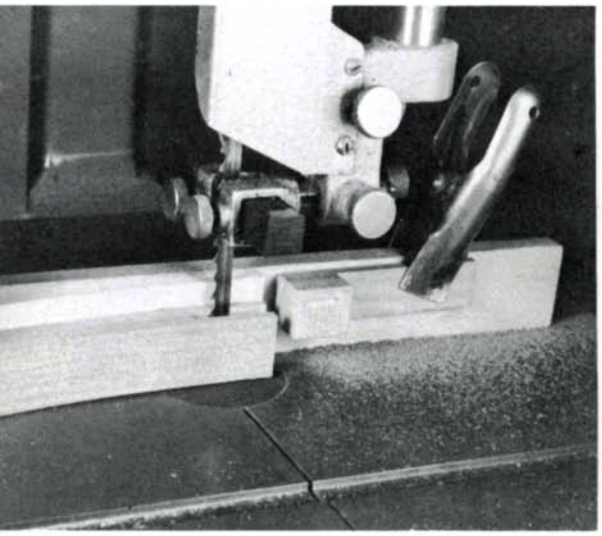
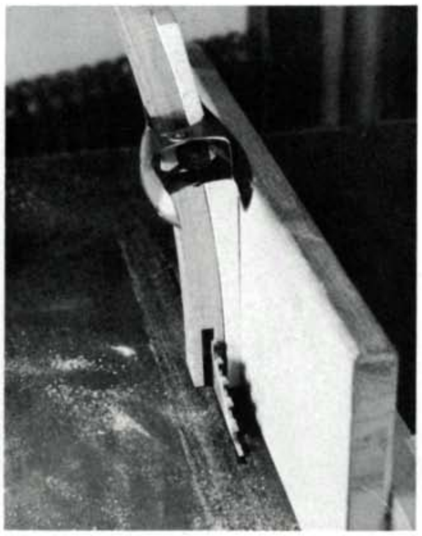
With curved doors it is best to have the curved parts themselves—that is, the top and bottom pieces of the door—extending out all the way. Thus the unbroken curve gives us a calm and complete sense of the shape of the cabinet; it is not

This article is excerpted from James Krenov's third book, The Impractical Cabinetmaker, © *1979 by Litton Educational Publishing, Inc., to be published this fall by Van Nostrand Reinhold Company. His other books are* A Cabinetmaker's Notebook *and* The Fine Art of Cabinetmaking.

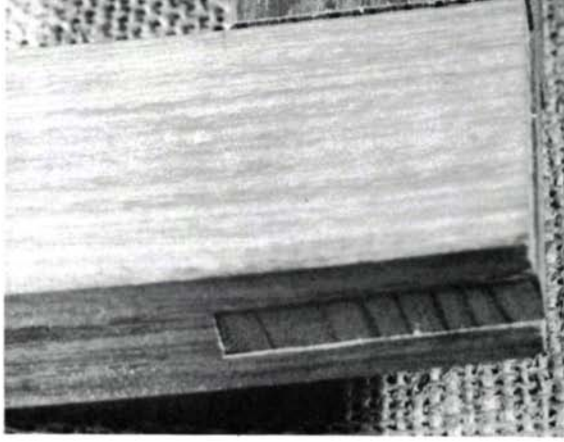
Wall-hung cabinet of lemonwood (1966) has variation of the V-door: two smaller doors about 60 cm (23½ in.) high.



Proportions: With the same outside measurements, a number of apparent variations are possible. Grain patterns will enhance or diminish the effect.

Thin wood layers glued to a curved form make the door rails. Start clamping at the center and work outward (top left). To make slots for the tenons, design a guide block for cutting slots that parallel the curve from a full-size drawing (top right). Using a spring clamp to tack the block to the wood, cut slots with a band saw or a table saw (bottom left, right).




The vertical parts of the door are slightly thicker than the laminated curves (top); later, they will be planed to the same curve (bottom). These small details make all the difference.

"chopped off" by the vertical sides of the door. It is important to get this feeling of wholeness, to let the curve have its full intention. In such doors I find that having the sides, top and bottom flush on the outside as well as on the inside results in a calmness; it gives the mood that goes best with the soft curved intention of the piece. One should try to accentuate this feeling in the details of the various other parts. Think soft. . . .

In its principal steps only, the work is apt to be as follows:

1) Concept of the piece, shape and size of door (or doors) related to whole.
2) If curves are part of the concept, mold for laminating. Saw and glue up laminates. Be generous with widths.
3) Vertical parts of door: Keep straight, true, and slightly thicker than laminated (horizontal) pieces.
4) Make slot and tenon joints as needed.
5) Dry-clamp, set up, then plan spacing of pins (vertical bars) to take various widths of glass. Replate these to position of shelves and whole cabinet as you'd like it. A bit of composing . . . take your time!
6) Lay out and make template (or templates) for routing rabbet in curved parts of doors. Do all this with care! Have scribe line along inside edge and stopcuts chiseled at ends. Rout a little at a time.
7) Assemble doors. Mark for rabbet in outside pieces and groove (or rabbet) in middle ones. Double-check margins as related to machining. Make stopcuts, scribe, and do all machine work, including bevel on inside of parts having groove. Before reassembling, plane the inward front edges on vertical door parts to a nicely rounded shape.
8) Assemble. See that rabbets or grooves meet as they should. Round edges along curved door fronts.
9) Make (shape) and fit vertical pins to hold separate pieces of glass. Cut them straight grain, and make lots of extras! Think about glass fit.
10) Glue up doors. Prepare everything, study setup. Dry-clamp first. (Neatness)
11) Clean all corners. Plane vertical parts of door to curve. Have plane iron razor sharp, fine set.
12) Do machinework for overlap fit of doors, angled to suit curve. Watch out!
13) Square doors. Check total width top and bottom when in right curve—make template or measuring stick—and proceed with work on cabinet case. (Lay out position of sides, how doors fit.)
14) Refit pins for glass, make rest of parts (to fit rabbets and pins) that hold glass in place, drill, countersink. Fit to doors using pieces of plywood as thick as the glass, or the glass itself.)
15) Final fit of doors. Polish and finish all door parts (handles?). Remove doors. Complete case, finish, make stand if needed. Go through all details before hanging doors for keeps!

The above list, or something like it, would be one of those reminders I make for myself on a scrap of paper. Since the various procedures are closely interrelated, it will be difficult for me to give you an exactly parallel description to suit your project—we should be together doing the work. As I have been through it many times by now and am (almost) used to the zigzags, it is hard to foresee what your difficulties, if any, might be. For the time being, you'll just have to ask and, I'm sorry to say, try to answer, your own questions.

Choose the wood carefully. Relate the graphics and the color to the intention of the piece as a whole. The choice of wood can make or break not only a cabinet that is all wood, but also a showcase cabinet. Don't fool yourself into thinking that with these cabinets the choice of wood is any less important than with others. Cut the various layers of laminate for the door with care, keeping them in a visual relationship to the cabinet shapes. I make them 2½ mm or 3 mm thick (roughly ⅛ in.); on a door about 20 mm thick there are seven or eight layers.

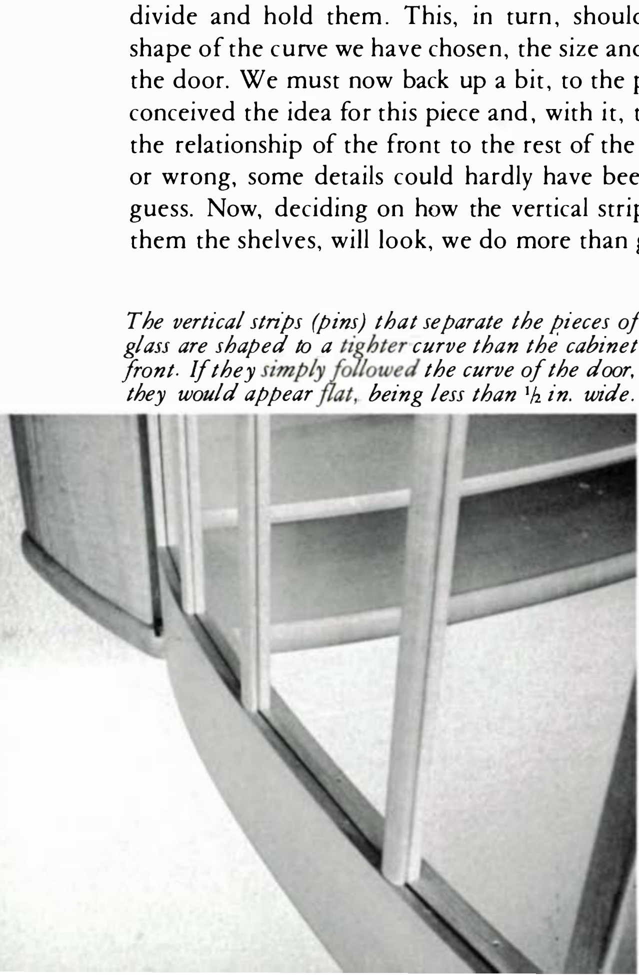
No matter how cautiously we work, there will be deviations along the way. Even at its best, our accuracy is not quite total. The laminated door parts will emerge nearly, but not exactly, of an even thickness throughout—and they are curved. The other pieces will need to be shaped (hollowed or rounded) later on to form the whole smooth curve of the doors. Before doing this, however, we must make rabbets and perhaps grooves in these vertical parts, and do so without going astray. Our objective, you see, is to have all the details coincide at the corners; we don't want to chisel and chip and scrape trying to fit glass to wood. To provide a working margin here I make the vertical parts of the door slightly thicker than the laminated parts. This gives me the chance to make small adjustments before machining and to shape these pieces afterwards. Actually, the work is not as complicated as it may sound, though it is necessarily exacting. Once you get the idea, you will discover a certain consistent logic about planning layout and methods. From then on, you can work without further accident—provided you achieve the right amount of concentration. Patience and care at every step are absolutely essential. If you are not set upon such an effort, perhaps it is better to avoid these cabinets altogether.

Having made the principal parts of our door—whatever the shape—and cut the various joints that are needed, we fit them together dry. Now comes the most critical part, the rabbets in the top and bottom pieces. It is necessary to solve the problem of rabbets in the horizontals before doing those in the side pieces. If it is a curved door, we must make a very exact template of the curve with the various facets. But wait! To do this we have to know the locations of the various sections of glass; their widths and the thickness of the strips that will divide and hold them. This, in turn, should relate to the shape of the curve we have chosen, the size and proportion of the door. We must now back up a bit, to the point where we conceived the idea for this piece and, with it, the main parts, the relationship of the front to the rest of the cabinet. Right or wrong, some details could hardly have been more than a guess. Now, deciding on how the vertical strips, and behind them the shelves, will look, we do more than guess. The difference between right and wrong in spacing these various facets of glass is a matter of sensitivity, judgment and experience. It's an elusive thing. And neither I nor anyone else can tell you when you've got it just right. You, yourself, have to feel it.

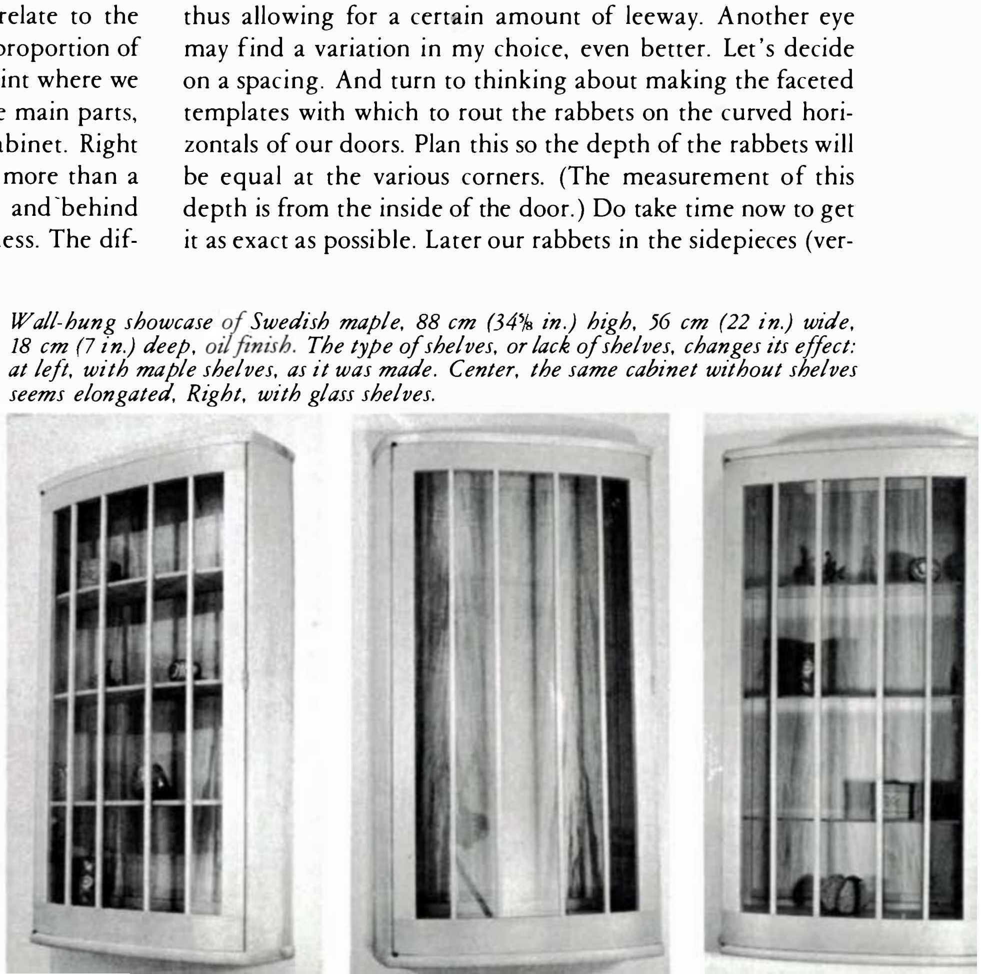
To "get it right," even in relation to ourselves, we should experiment with various curves and spacings. I tend to make my curves more tense at the ends; that is, the door is slightly less curved along the middle and then tightens toward the outsides. And after some experiment I have concluded that the pins (the verticals dividing the glass) need to be closer together toward the outside of the door and farther apart at the middle. How much and how little depends upon the curve and, of course, how one feels about the shelves that are going to be in the cabinet. These make a horizontal division that is not obvious when you have only the door in front of you, so consider that there will be horizontal lines here and that they will "shorten" the door somewhat—in the case of a curved door, they will make it seem wider than it really is. I use thin strips of wood to simulate shelves and tape these onto the inside of the door between the horizontals. I can then move them up or down, observing how the "shelves" affect the door, until I arrive at something I believe will be fairly good. Someone says, "But I can use glass shelves, and then there will be no negative effect." That is not always true, although sometimes glass shelves do work very well. Usually this is because the door and the rest of the cabinet do not need definite horizontal lines to compensate for exaggerations or deficiencies of proportion.

The cabinet is somehow meant to have glass shelves. In other cases, with a similar cabinet, shelves of glass may prove to be all wrong; one will discover this when one changes from glass to wood here. This is a matter of experience, of judging and observing, which also means experimenting.

Whether for glass or for wood shelves, I make two or three holes for shelf pegs at each of the levels that seem well placed, thus allowing for a certain amount of leeway. Another eye may find a variation in my choice, even better. Let's decide on a spacing. And turn to thinking about making the faceted templates with which to rout the rabbets on the curved horizontals of our doors. Plan this so the depth of the rabbets will be equal at the various corners. (The measurement of this depth is from the inside of the door.) Do take time now to get it as exact as possible. Later our rabbets in the sidepieces (ver-



The vertical strips (pins) that separate the pieces of glass are shaped to a tighter curve than the cabinet front. If they simply followed the curve of the door, they would appear flat, being less than ½ in. wide.

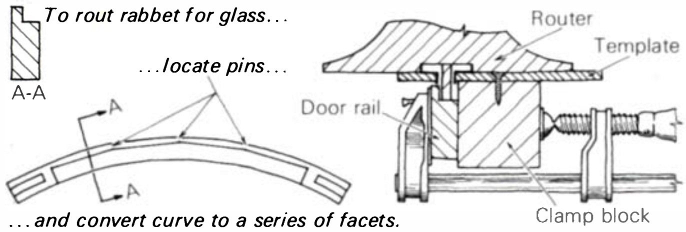


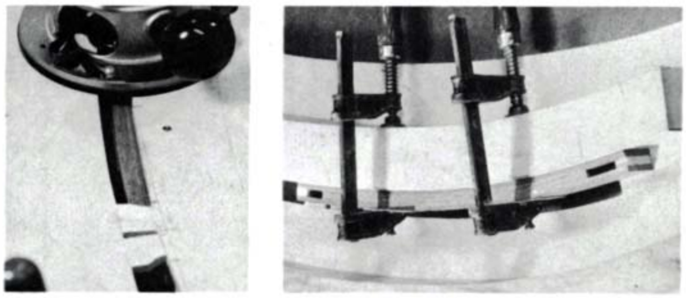
Wall-hung showcase of Swedish maple, 88 cm (34⅝ in.) high, 56 cm (22 in.) wide, 18 cm (7 in.) deep, oil finish. The type of shelves, or lack of shelves, changes its effect: at left, with maple shelves, as it was made. Center, the same cabinet without shelves seems elongated. Right, with glass shelves.

ticals) will be made to coincide with these, and this early care will pay off then.

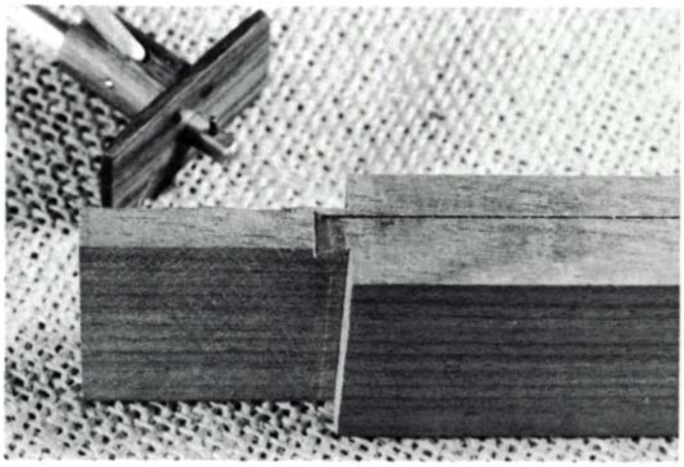
Usually I cut the rabbets about three-quarters of the depth (or thickness) of the door itself. In other words, there is rather little wood at certain parts (depending on the curve and how we divide it) of the front edge. The glass is up front in the door, rather than being set back. I think this gives a sense of lightness; the door appears less thick and therefore less awkward. Besides, there is more room behind the glass for the fitted wood pieces that hold it in place.

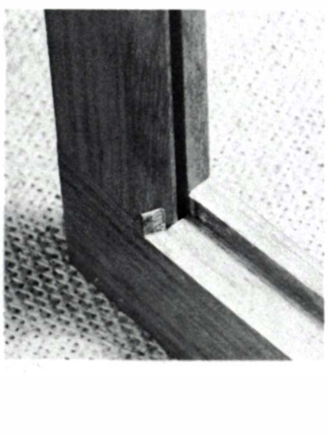
Making one door only, we need a single template, which





Once the pin spacing is determined, convert the curve to a series of flat facets for the glass and make a router template with which to cut the rabbets. This one, with both its halves alike (it could be in two parts), is for a pair of doors. The clamp support block (seen from below) is the same one used for laminating the stock. Rout with several small cuts rather than one large bite, to avoid chipping.





Before routing, a small stop-notch is chiseled at the ends of each cut, and the edge of the cut is scribed on the vertical parts (above). Where two doors come together (left), their parts are apt to be narrow and one can saw or rout a slot instead of a rabbet. The frame is then beveled inward from the slot, to afford a better view.

we shift from one surface of the clamp block to the other, being careful not to change its relationship to marks that indicate the positions of pins and rabbet ends.

We can do likewise with a pair of doors, or else make two identical templates, which we handily use without shifting them on the clamp block: The lower left-hand one is also the upper right-hand one, provided they are really accurate! All our planning is from the inside of the door. You will notice in the photos that the piece is clamped to the template so the router has access from what corresponds to the inside of the door part being worked.

We concentrate our attention and accuracy where it really counts—to the way the glass will fit the door. If there are small differences in the thickness of the wood at the front edge of the rabbet—between the door front and the glass—it does not really matter all that much; a very slight variation here will bother no one. Granted, however, we do try to get each of our measurements as accurate as possible. Gradually, the relationship of details becomes clear; we coordinate the steps and methods that are important, and we master them. We learn how to plan: where to allow in our measurements, and how much.

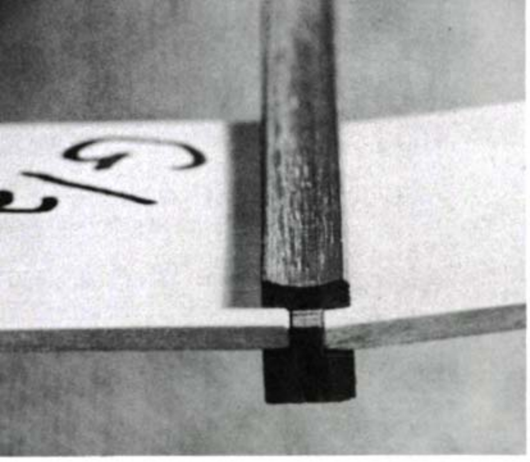
To do the rabbets neatly, we must prepare the various parts by marking off exactly where each cut is to be made. Mark (while clamped up) the starting and stopping points of each cut, and chisel a notch there to prevent chipping out. Then, if the grain is at all difficult, it is safest to ensure the lower edge of the cuts with a very fine scribe. We do the more complicated horizontal (shaped) pieces of the door first, then dry-clamp and mark accurately for the work on the sidepieces. Keep the margins as small as possible! With some doors, where one side (toward the middle of the cabinet) is narrow, I machine a groove instead of a rabbet to meet the adjoining rabbets precisely. And here again the accuracy needed is relative: An allowance on the inside thickness of this frame part helps us to arrive at a common depth from which to set exactly the table saw or router.

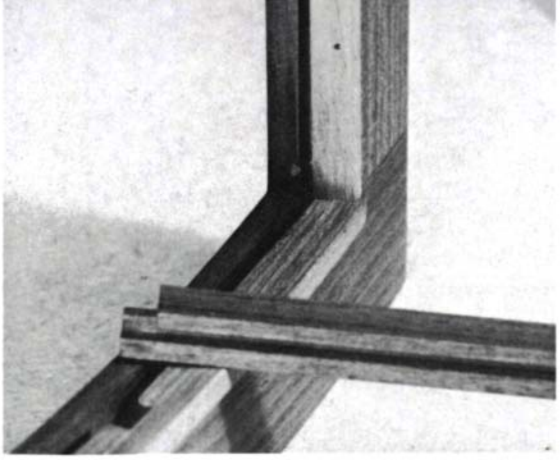
With the rabbets done, we can make the vertical strips or pins that will separate the panes of glass. From the beginning it is necessary to know the thickness of the glass we are to use. When we saw or rout the grooves to fit, there is one thing more to remember: The pieces of glass as they meet at these strips will be at a slight angle. The angle corresponds to the various facets making up the door in its curve. Each groove, therefore, needs to be a trifle wider than the thickness of the glass to allow for this slight angling. Take this into account, but you should not make the groove sloppy and allow too much for the thickness of the glass. Without a proper fit, the glass is liable to rattle as a car passes outside.

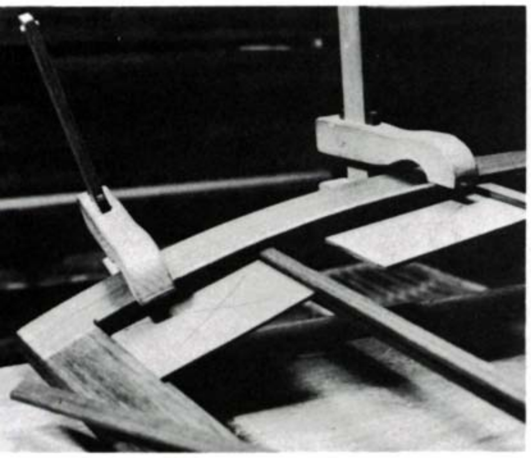
Some of you may prefer to cut the various pieces of glass to fit. This isn't easy! Having tried, I now go to my favorite *glasmastare*, as we call glaziers in Sweden, and have him do it for me. Before doing so I make a first assembly of the pins and the strips that are to hold them in place. Then, using scraps of thin plywood veneer, I cut slip-ins that correspond to the exact width of each pane of glass, all of which have a common length, namely the height of the door between rabbets. My *glasmastare* is very kind and patient; he cuts the glass extremely accurately. This, in turn, makes my work of final fitting much easier. If you plan to cut the glass yourself, try to do it as neatly as he does; it will pay off later on.

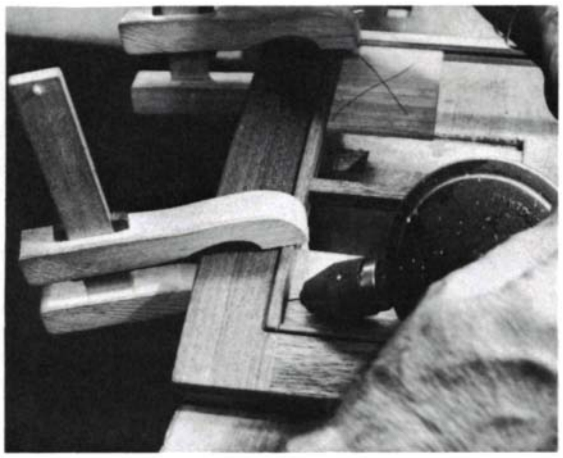
I have tried clumsily, with my photos, to show the various

Illustration: Christopher Clapp

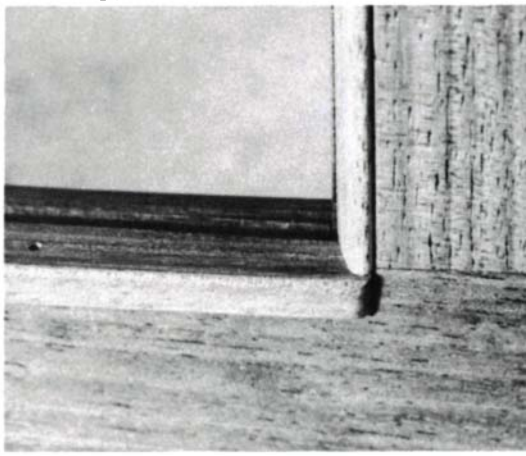








From left to right, top to bottom, account for the angle between the glass panels when routing grooves in the vertical pins, then cut the pins to shape. Their tenons fit cutouts in the beveled strips that fill the rabbets in the top and bottom rails. Clamp together and drill for the brads that hold everything in place, using thin pieces of plywood to maintain correct spacing.



And now it's done. The glass should fit snugly, so it doesn't rattle.

steps in fitting the glass and the wood parts that hold it in place. There are beveled strips at the sides of the door and shaped pieces in the rabbets, top and bottom, notched to fit the various pins between the sections of glass. Usually, when I make the laminated parts of the door, I make them wider than need be and then bandsaw two or three thin layers off the curved shapes. These I later use to secure the glass. With such pieces there is no splash grain, and they are neat and easy to work since they already have the shape of the door itself—I need only trim them to fit the rabbet and then notch them for the pins. I do not use screws here, but prefer brads. With these it is easy to remove the glass if need be by carefully prying up the hold-in pieces. First I drill holes in the strips the size of an easy fit for the brads. Then I place the glass in the door together with the various pieces of fitted wood to hold the glass. With a slightly smaller drill, now a very tight fit for the brad, I drill through the various parts at a slight inward angle, making my hole deep enough for the whole brad. I countersink ever so slightly for the head itself. The brads are small and hardly noticeable, so they do not bother us as we view the cabinet. I take it for granted that we have tapped and then set them without leaving any marks on the wood.

Before polishing and setting in the glass for keeps, I carefully fit the door with its hinges to the cabinet. To allow for the fact that it will sag a trifle from the weight of the glass, I make the door fit a bit tightly upward. Then I polish the door and the various strips that will hold the glass in place. If there is to be a handle, I fasten this to the door. I finish everything possible before I put in the clean glass and hang the door.

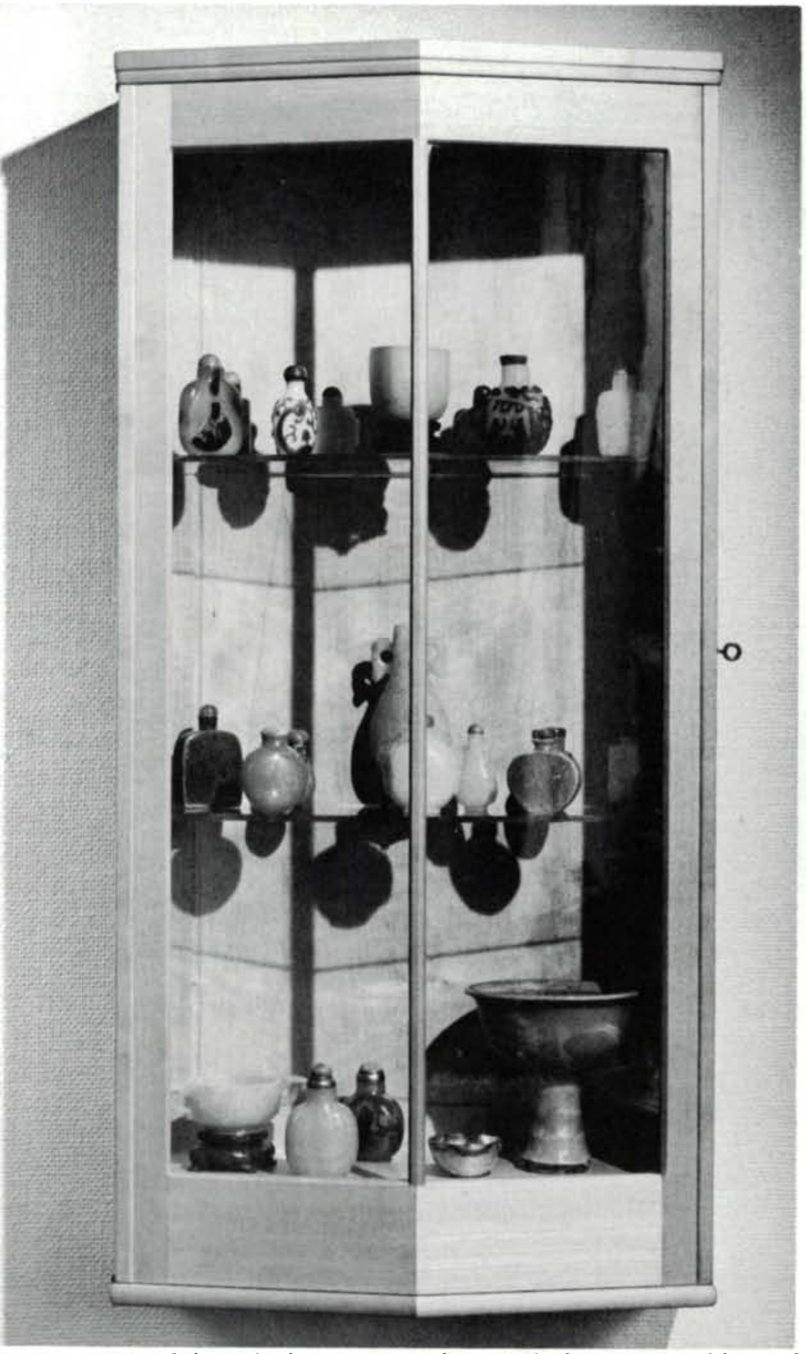
Trying to describe showcase cabinets, I find myself talking mostly about a door or doors and the process of making and fitting them. It seems a rather dull and one-note description. Actually, a showcase cabinet is much more than a door or doors, or a glass front with a few objects showing through. Still, the door is usually the most difficult part. I feel, therefore, that special attention to it and its problems is justified. When we can make a door on the level of our intentions for the rest of the cabinet, I believe the chances of success are very good indeed.

Our showcase cabinet is more than a glassed door or two. We should be aware of this rather early, so that when we sketch or draw or otherwise plan the piece with its important front, we think of it in relation to the whole: the degree of detail and refinement, the proportions, the amount of the back that will be exposed, how the shelves will affect the proportions as well as how they will cast their shadows upon the back piece itself.

Another point: Usually included in our idea of such a piece is the way it will be used—on a wall at a certain practical height, or perhaps with a stand that should be a pleasing part of it. Try to get a clear impression of these possibilities. When looking at the work during the various stages, imagine (or simulate) the final way the piece will want to rest. Come as near as you can to reality. This ability to achieve a well-balanced whole is dependent on observation (which becomes experience), and it is natural at first to be uncertain. When thinking of a stand, we may be tempted to imagine curves, shapes—not just a stand. All right, let your fancy go, but then allow for some other considerations. How will the stand serve its purpose, which is to support the case at the most pleasing height (with the doors open as well as closed)? How will the stand harmonize with the case? Harmony includes lines, and also volume; a stand has "weight," just as the case does. In reminding you of simplicity and harmony, I don't intend to be inhibiting; certainly a person with a mind for fantasy and taste can combine flair and harmony skillfully.

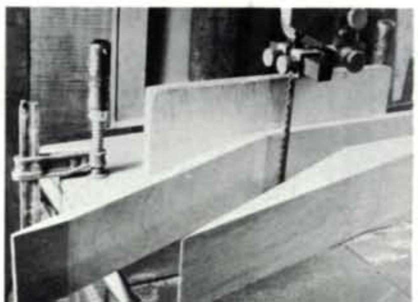
A last practical note: In showcases that have curves, the sides are apt to be set at an angle, which complicates the joints needed in a strong and well-made stand. I usually make these angled joints with spline tenons done neatly on the horizontal mortiser (that too-often overlooked machine). Take time to lay out properly, get all the angles correct and fits snug. Dry-clamp, and then study the stand with the case together. . . . Return, and look again. When you decide to glue up, have everything you need, including the specially fitted blocks that go with getting such pieces together.

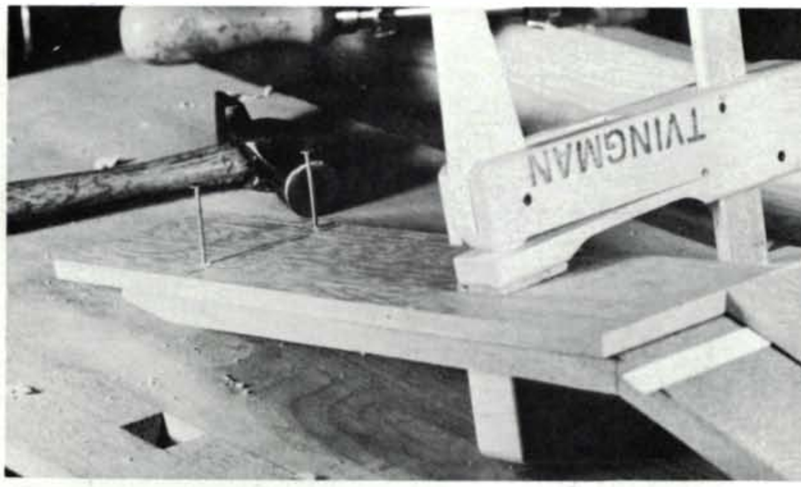
I hope and believe some craftsmen will go into this kind of work, discovering possibilities and satisfactions of their own. My attempts are limited; the illustrations here are meant only as a beginning. There is a great deal more to be done than I have even imagined. For those who try this path and then decide to abandon it, here's a consolation: One can learn something about oneself along the way. □



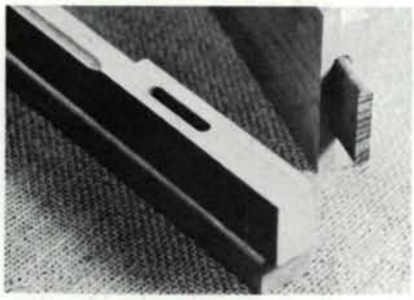
Swedish maple showcase (1965) has a single door set in a mild V, and measures 86 cm (34 in.) high, 46 cm (18 in.) wide, 19 cm (7½ in.) deep. Oil finish.

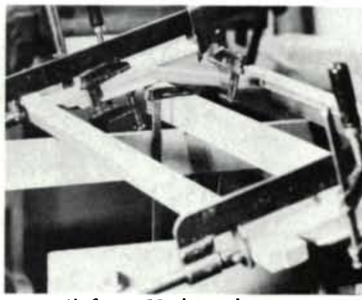
The horizontal rail for a V-shaped door is assembled from three pieces of wood. The inner piece (which forms the bottom of the rabbet that receives the glass) is bandsawn from a single piece of wood. This makes the basic shape without a complex joint.





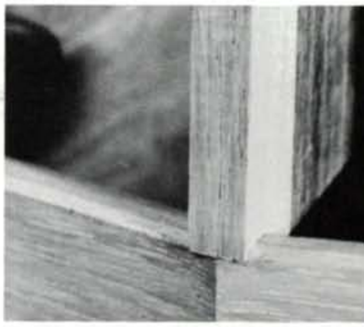
The two outer pieces, mitered at the middle, form the rest of the rabbet. Note that two thin shims of cardboard are used to raise each piece slightly while drilling for the stop-nails. When glued and clamped, with the shims removed, the miter fits tightly together.





Above left, the vertical sidepiece and bottom rail for a V-shaped door. Shading around spline tenon is a slight chamfer, to trap excess glue. At right, the door is glued in only one direction at a time. The other half is merely set in place dry. Clamping blocks have sandpaper against door surface, for a good grip.

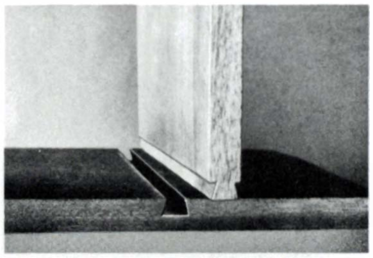
From left to right, top to bottom, stock for the middle pin is only 7/16 in. wide, so a hardwood stiffener (darker wood) is glued to the back of it. A neat slot is scribed and cut in the door rail, then the bevel is hand-planed. Slots for the glass are routed and the stiffener is removed. Both panes of glass are pushed into their slots in this center pin, then the whole assembly slides into the door frame from the back, to be held in place by wooden strips as before.



Tapered Sliding Dovetails

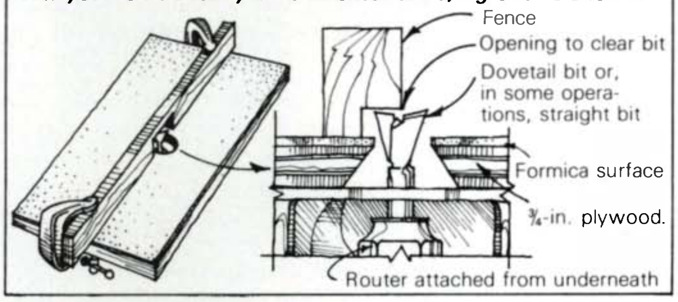
Router jig and masking-tape shim make for easy fit

by Brian Donnelly

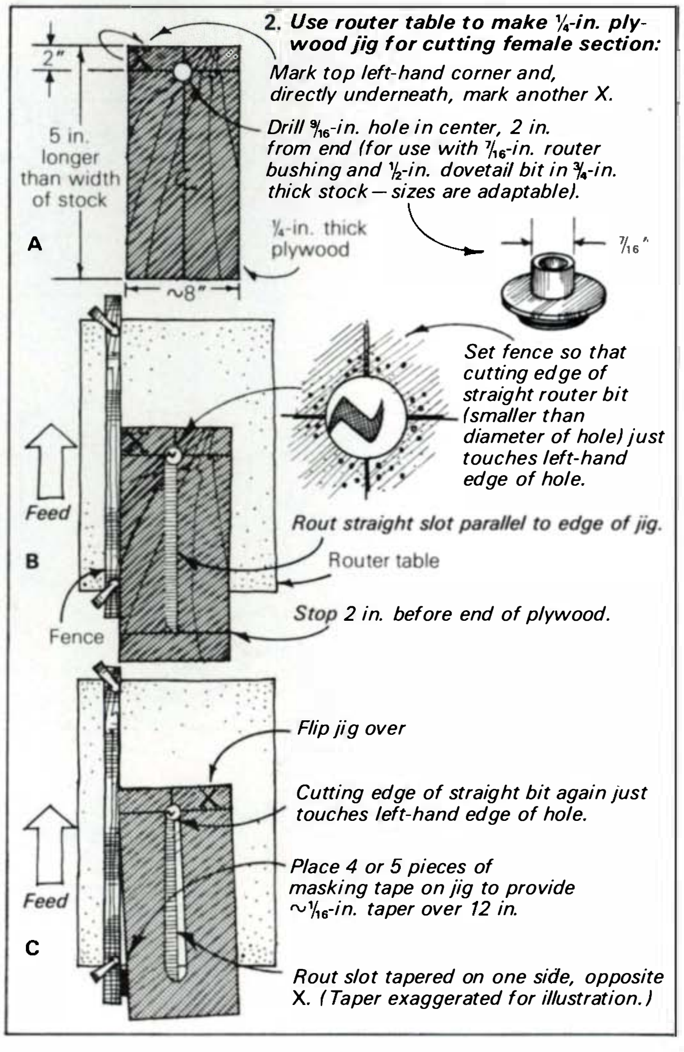


For carcase construction the sliding dovetail is a strong, attractive joint. With a router it is also easily made. Its problem, especially in wide boards of dense hardwoods, is that it tends to bind when being slid home. The solution is to taper one side (usually the bottom) of both the male and female sections so the joint is loose until the final inch or so, when firm hand pressure completes the job. To taper a sliding dovetail I use a router table, first with a straight bit to make a slotted plywood jig used in cutting the female section, then with a dovetail bit to cut the male section. Both the slot in the plywood jig (and thus the female section it produces) and the male section are given the same taper on one side by way of a masking-tape shim. My method is adaptable for any size work or joint. The bits, bushing and shim specified below yield a joint in ¾-in. stock that tapers from 11/16 in. to ⅝ in. over 12 in. Here's how I do it:

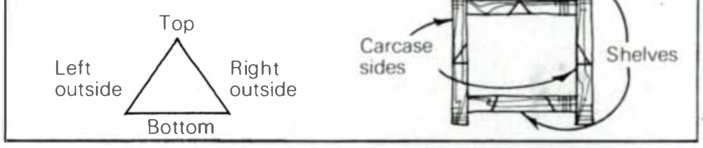
1. *If you don't already have a router table, rig one as shown:*



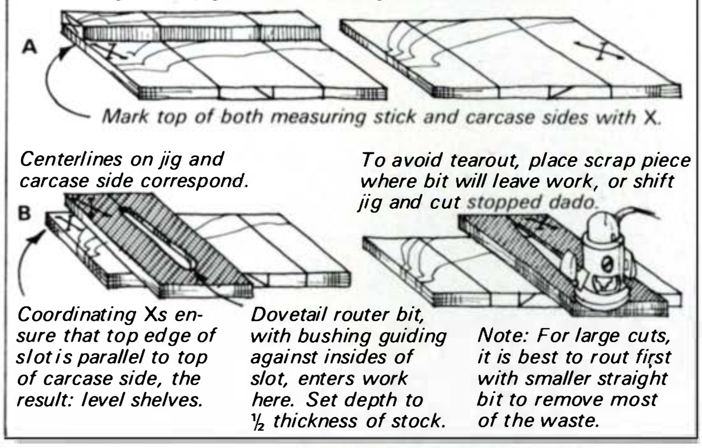
2. *Use router table to make ¼-in. plywood jig for cutting female section:*



3. *Mark cabinet parts with triangle:*



4. *Lay out and rout female sections on carcase sides, using measuring stick, jig, router bushing and dovetail bit:*



5. *Cut male section of dovetail on router table:*

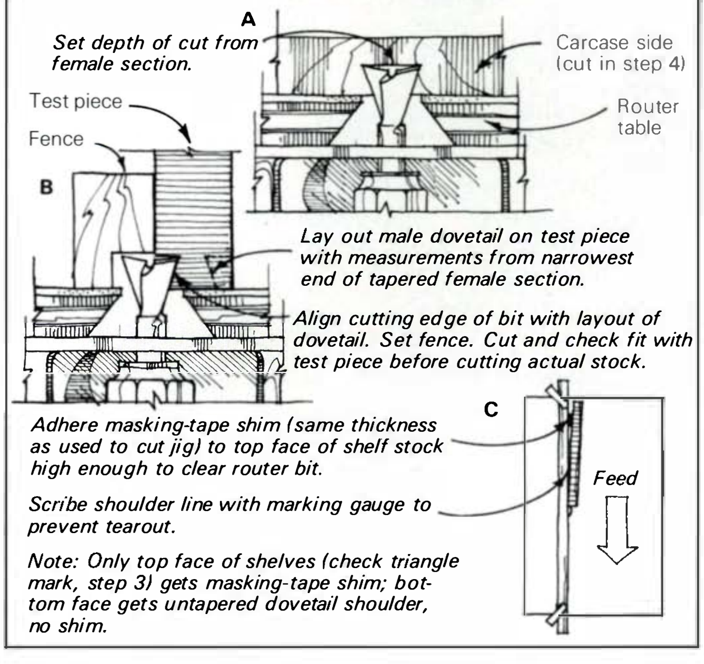


Illustration: Bob Crosby

The Haunched Mortise and Tenon

How to strengthen the corner joint

by Ian J. Kirby

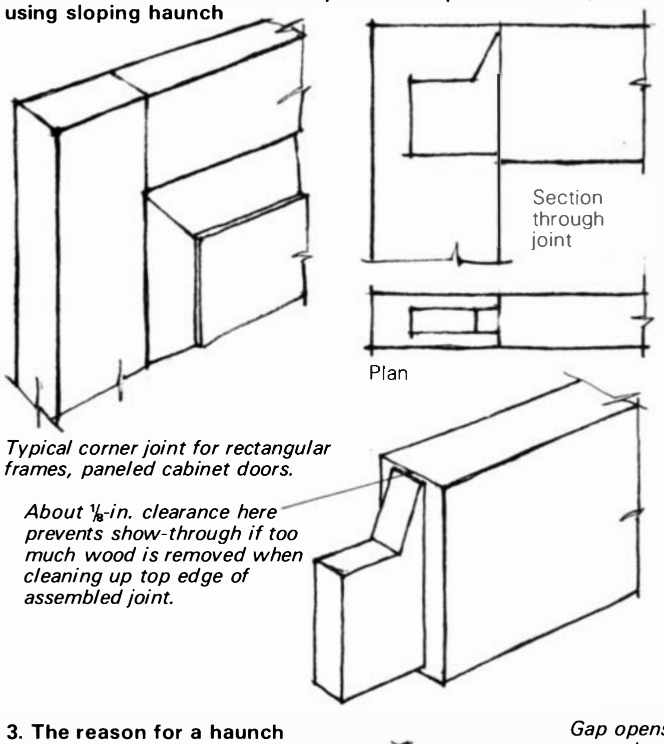
The most basic of woodworking problems is joining two pieces of wood together at right angles to form a corner. The most common joint for doing this is the mortise and tenon. We are usually in one of two situations: first, where two pieces of similar thickness are being joined, as in the corner of a door frame (fig. 1); and second, where a third piece of wood of dissimilar thickness is involved, as in a typical table or chair joint between apron and leg (fig. 2).

When designing these joints, note that the top edge of the mortised member—the vertical piece in the illustrations—will be in line with the top edge of the tenoned rail. If you want the final appearance to be as shown, then the joint must be stopped somewhere below the top surface. The usual solution is to add a haunch, which may be either square or sloping. Both variations strengthen the joint and increase the gluing area, and the basis for choice is visual. If you want a clean, uninterrupted line at the top shoulder of the joint, you would use the sloping haunch. If you don't mind the interrupted line or if the joint will be concealed, the square haunch is a little easier to make and a little stronger.

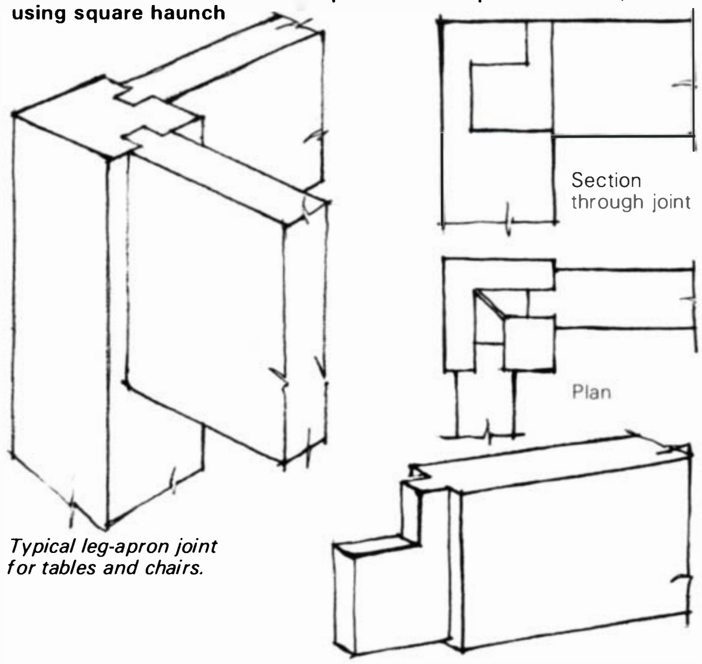
The illustrations show the form of the joints, and the elevations suggest suitable proportions. I must emphasize here that it is the responsibility of the designer to detail all the joint dimensions to achieve the visual effect he wants as well as the mechanical strength the structure requires.

The main reason for the haunch is strength. Resistance to twist is especially improved. If you leave the haunch off altogether (fig. 3), the result is that about a third of the width of the rail is free-floating, with no mechanical bond and no glue bond where it needs it the most. If you go to the other extreme and make a bridle joint, you sacrifice mechanical resistance to downward loading. Although glue is strong in shear

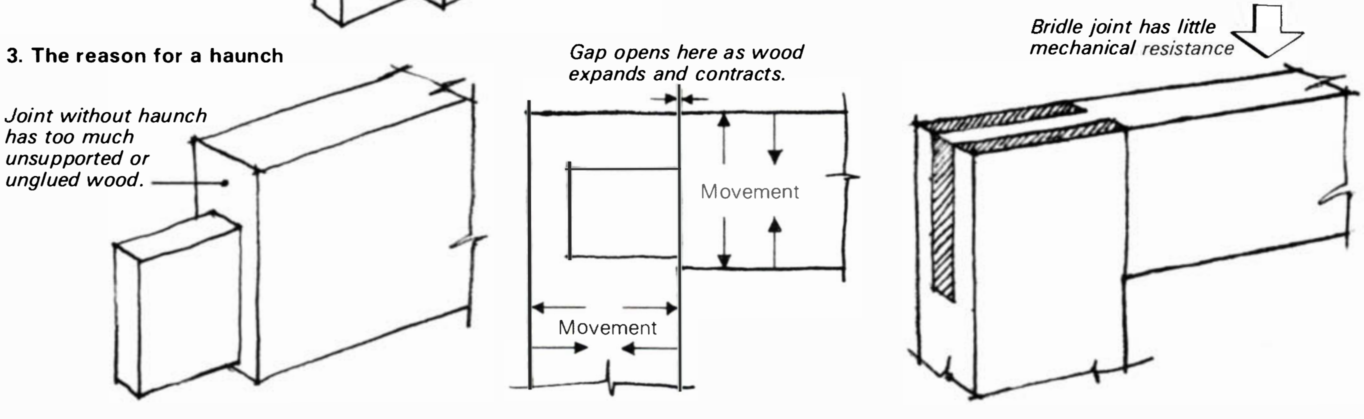
1. Mortise and tenon between pieces of equal thickness, using sloping haunch



2. Mortise and tenon between pieces of unequal thickness, using square haunch



3. The reason for a haunch

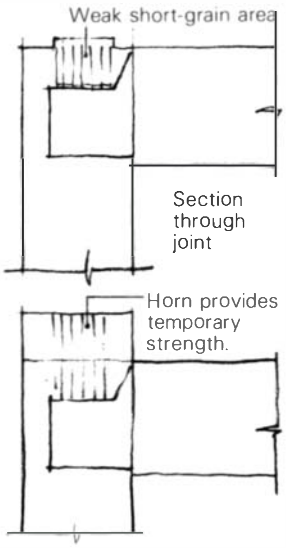


Illustrations: Ian J. Kirby

and the joint has a great deal of gluing area, the two parts meet at right angles. This puts considerable strain on the glue line when the wood shrinks and expands, and the condition is aggravated by the large amount of exposed end grain. In addition to the forces the object will encounter in use, you must consider seasonal shrinkage and expansion. These can exert far greater forces than ordinary usage will, although they do not occur or show themselves for some time. The most common fault in this regard is a gap appearing at the top edge shoulder line.

There is a peculiarity of manufacture common to both the sloping and square versions of the haunched joint. When cutting the wood to length, an extra ¾ in. should be left on the end of each piece where a mortise will be made. The wood should be knifed quite deeply all around at the true length where the top edge of the tenoned piece will be aligned. The extra ¾ in. of wood is left there until the joint is made and the glue is cured, whereupon it is sawn off. The extra wood, called a horn (fig. 4a), has the effect of making the mortise be more in the center of the piece of wood than right at the end. While the joint is being made, it helps prevent the wood tissue from splitting beyond the joint. While the joint is being glued and clamped together, provided it fits well, the piston-and-cylinder action can very easily crack the wood in the area of the haunch. It is also possible, especially on a blind joint, for a piece of short grain to pop right out alongside the haunch. The horn prevents these unhappy events. Since glue seals the piston-and-cylinder, the viscosity of the glue is also a factor. The thicker it is, the more slowly you should clamp the joint together—the excess glue has to go somewhere, and it needs a little time to flow out of the joint. Imagine the dilemma in the days of hot animal glue: As the glue cools, it becomes more viscous and starts to set, so clamping slowly doesn't work. Part of the solution then was the horn, and it still is.

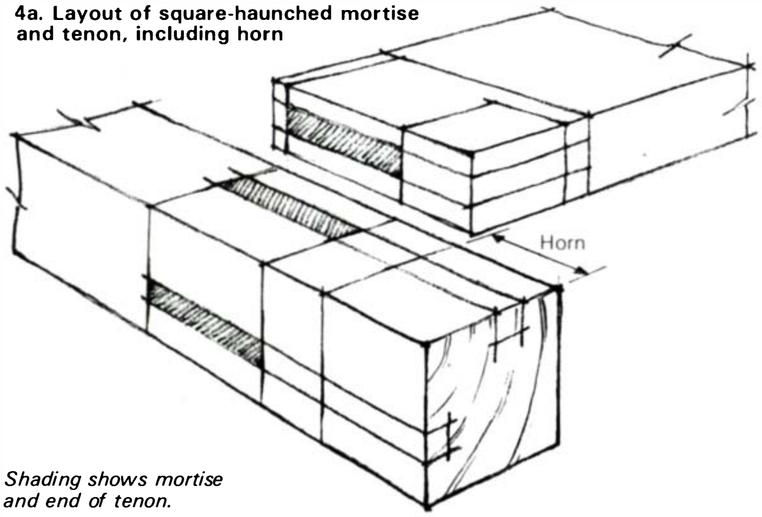
Short grain on mortise member is quite weak until joint is glued—top of joint may be pushed out if no horn is left.



The square-haunched mortise and tenon is marked out as shown (figs. 4b, 4c). A longer haunch would seem to give more gluing area, but it might also allow the mortise cheeks to curl away from the tenon. A haunch shorter than square gives too little gluing area. The tenon is sawn in the usual way, being sure to leave the shoulder lines for last.

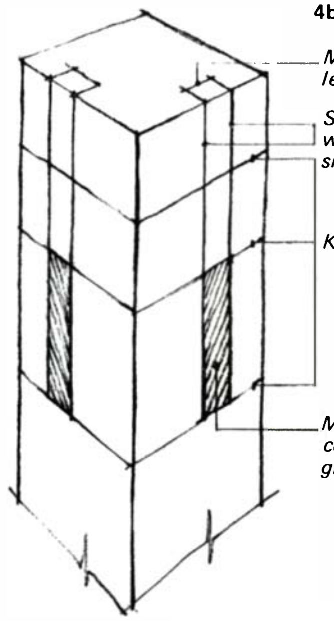
The mortise is chopped as usual, but only in the full-depth part of the joint. Remove the waste to accommodate the

4a. Layout of square-haunched mortise and tenon, including horn

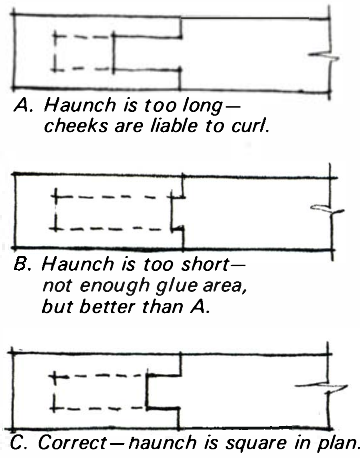


Shading shows mortise and end of tenon.

4b. Marking out the mortise



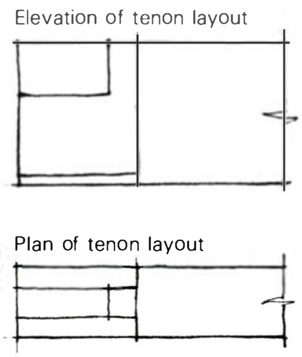
Haunch proportions



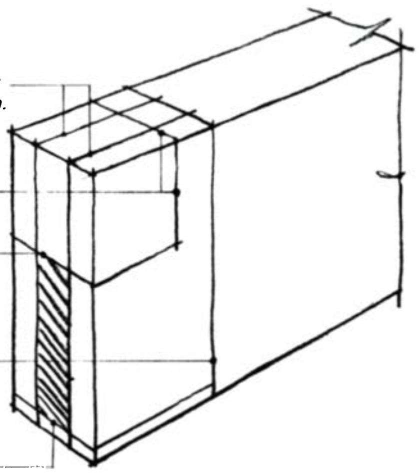
A. Haunch is too long—cheeks are liable to curl.

B. Haunch is too short—not enough glue area, but better than A.

C. Correct—haunch is square in plan.



4c. Marking out the tenon



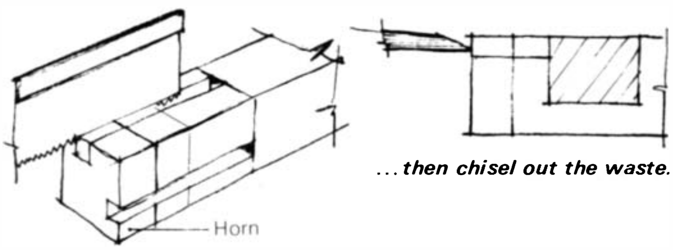
haunch by placing the workpiece in the vise at a slight angle and cut down the insides of the haunch lines with the tenon saw (fig. 5). Only a few inches of the saw can be used, but the method is fast and efficient. Sight across the back of the saw to make sure it is parallel to the top edge of the wood, and be sure that sharpening has not moved the saw's teeth out of parallel with its back. Once the sides of the haunch groove are sawn, remove the waste with the mortise chisel. Place it about halfway down the haunch groove on the end grain and give it a smart tap. Watch out for grain direction, in case it is running down into the joint and liable to result in more waste removed at the joint end than at the horn end. With care, it is not difficult to keep the haunch groove clean and parallel. Two points: The groove has to be cut in the horn, which seems a waste of time, but that's how it is. Second, don't try to chop the haunch groove the same way as the mortise. It is difficult this way to keep the bottom clean and parallel.

The sloping haunch joint is marked out in the same way as the square haunch (fig. 6). At its root, the haunch is usually as long as the tenon is wide—if the joint were sectioned here, it would look in plan the same as the square haunch. Saw the tenon cheeks and ends in the usual way, then saw the slope before sawing the shoulders. A common error is to saw the main tenon and shoulders before the sloping haunch, thereby removing the layout lines.

The full-depth portion of the mortise is chopped as usual. Then place the wood in the vise and cut the slope with the mortise chisel. There is no measurement one can make to get the slope right the first time. The normal method is to cut the slope short, check the depth at its root and remove the necessary amount. It is very easy to draw the joint showing the slope of the haunch coming right to the top of the shoulder line. But it should stop short, leaving about ⅛ in. of vertical shoulder before the slope begins. This allows for over-enthusiasm when planing the top edge clean. □

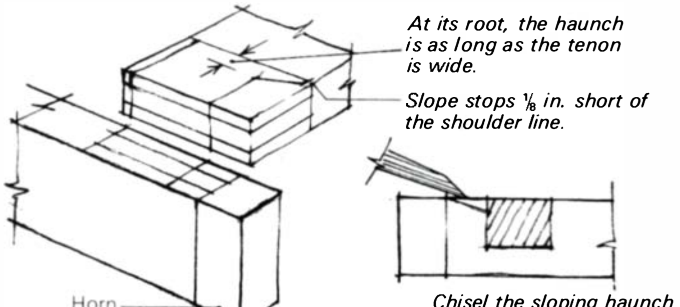
Ian Kirby is director of Hoosuck Design and Woodworking in North Adams, Mass. This is the third in a series of articles on the mortise-and-tenon joint; the previous installments appeared in March '79 and May '79.

5. *Saw down the walls of the haunch...*



...then chisel out the waste.

6. Layout of mortise and tenon with sloping haunch



Chisel the sloping haunch after the mortise is cut.

More on Mortising

And joining table legs to aprons

by Frank Klausz

There are hundreds of variations on the mortise-and-tenon joint and many different ways to make them. The method and the tools I learned to use as an apprentice in Hungary are different from the English way described by Ian Kirby in the March '79 issue of this magazine. Without saying my way is better I will tell you how I make a kitchen table with mortise-and-tenon joints, out of 3x3 poplar legs with 5/4 pine for the 4-in. apron and for the top.

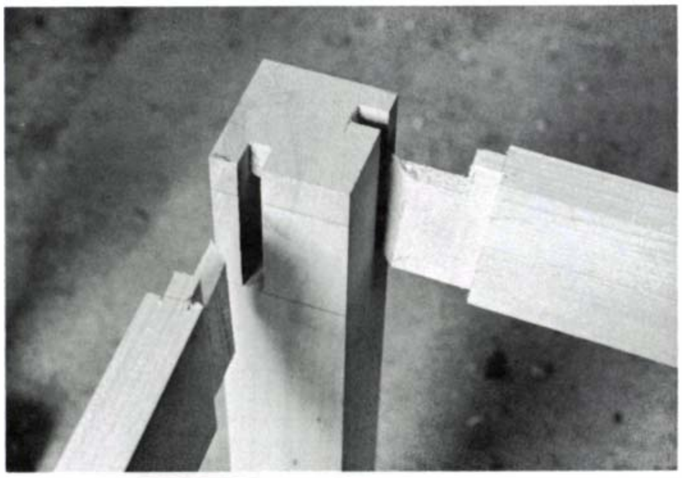
I disagree with Kirby on the following points: 1) the shape of the mortising chisel; 2) the method of sawing the tenon cheeks; and 3) how to mark out and cut the tenon shoulders.

1) Kirby corrects his chisels so the sides are parallel and square with the back. For me a chisel with parallel sides is a car without a steering wheel. The sides of my chisels are tapered 1° toward the front face as shown in fig. 2. This is better because you can twist it against wild grain to keep the mortise straight. The chisel back has to be straight, the edge sharp and the handle large and square with rounded corners and rounded top, so it can take a beating. The partially square handle is easier to steer and sight up—you can get a good solid grip. To make such a handle I turn it oversize, mount the chisel, then plane the flats.

I have three or four different makes of chisels, old ones, including a German ½-in. stamped D-FLIR Franc Wertheim, a French ⅜-in. stamped Peugeot Freres Agier Pondu, and a Hungarian blacksmith's made from an old file. These chisels were made with tapered sides purposely to do mortising. Besides being able to steer them, the sides rub less, and the clearance helps in levering out the chips.

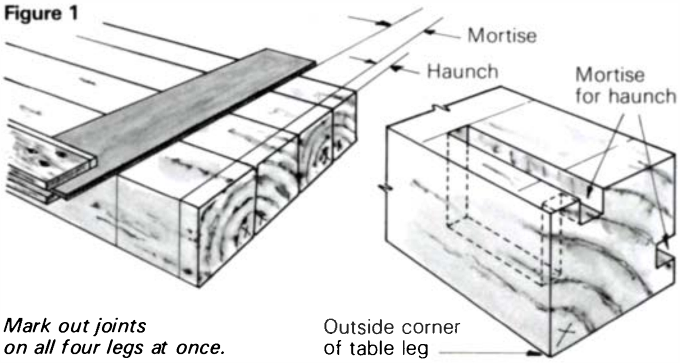
2) Kirby uses a backsaw for sawing the cheeks of the tenon and he changes the position of the wood several times. I use a bowsaw 30 in. long with 5½ teeth to the inch, a common ripsaw. I don't move the wood; I keep it straight upright in the vise at a comfortable height so I can occasionally check the mortise-gauge line on both sides. Start cutting the corner farther away from you, then come straight back across the end grain and down. Let the saw do the work, don't push it too hard. A beginner should practice with scrap wood, marking the whole length and sawing as far as the wood will allow. You end up with 10 or 20 inches of tenon.

3) Kirby makes the shoulder line with a knife, then saws 1/16 in. away from it for final paring to the line with a chisel. This method requires a master craftsman and extremely sharp tools, and I beg the beginner to stay away from it. I use a sharp, soft pencil to mark the shoulders. Then I use a bowsaw 23 in. long with 10 teeth to the inch. For a table apron I saw right on the pencil line on the inside of the apron and leave half the line on the outside for a perfect, invisible joint where it shows. If you're making a frame or a door, you have to cut both sides the same, either removing both lines, or leaving half of them. Either way, you avoid the unnecessary and difficult step of chiseling the shoulder.



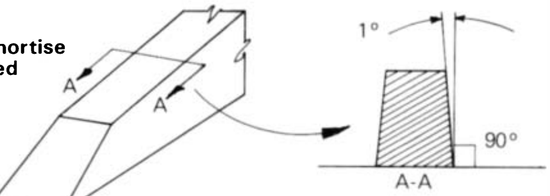
The completed joint before assembly. Tenon ends are sawn at 45° so they almost meet in the leg mortise.

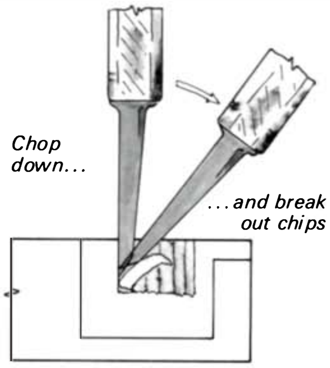
Figure 1

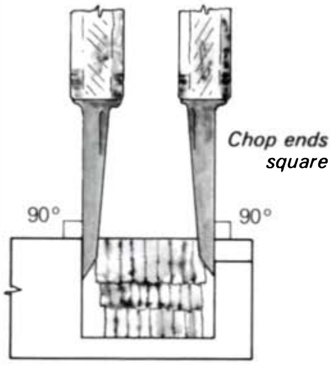


Mark out joints on all four legs at once.

Figure 2
Chopping mortise for haunched tenon







Chop and pare haunch mortise

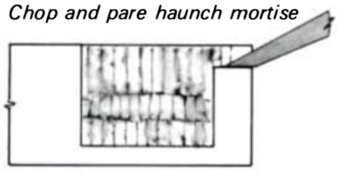
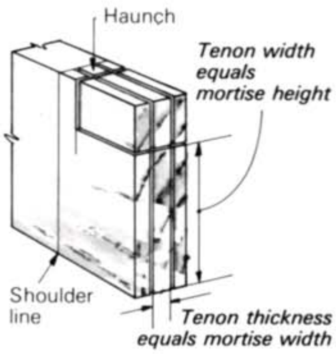


Figure 3



Lay all four aprons on bench, square across for shoulder lines, then gauge mortise width on each apron.

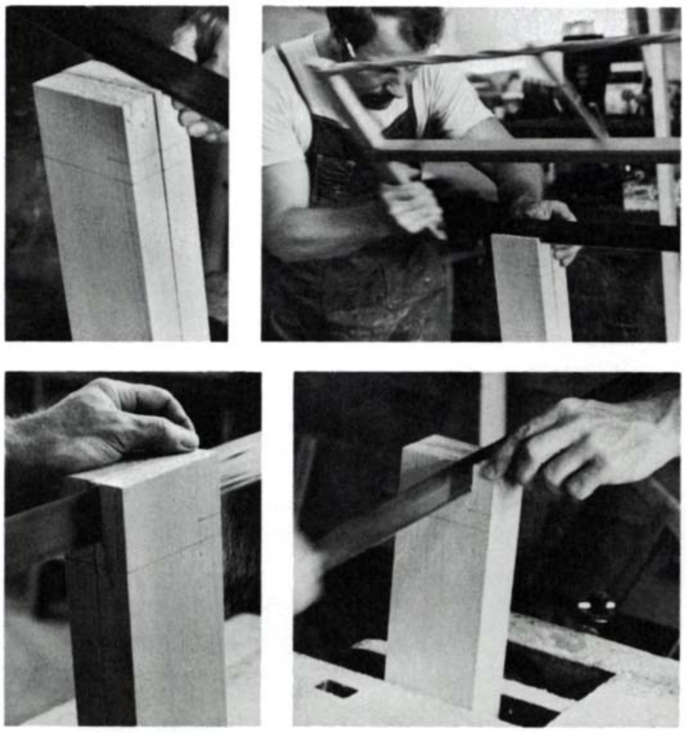
Making a kitchen table —Start by cutting and planing the legs to size, ready for laying out the joints. Mark the outside corners and line up the legs on the bench. Measure the depth of the apron and mark that distance across all four legs with a square and the sharp, soft pencil. Mark a second line the actual height of the mortise, leaving at the top of each leg an area for the haunch at least one quarter but less than one third of the apron's total width. Turn the legs and mark the other inside of all four legs with the same mortise and haunch lines (fig. 1). The haunch is very important; it keeps the apron from twisting. If this were not a table but a frame where the pieces were all the same size, or if it were small and delicate, it would also be important to leave an extra length of wood beyond the mortise, called the horn. This keeps the wood from splitting during mortising and gluing up.

Set the mortise gauge spurs to the width of the chisel, in my example, ½ in. Draw on the leg the thickness of the apron, ¾ in., setting it in from the edge ¼ in. Then move the fence on the mortise gauge so the spurs are in the center of the apron lines and mark the mortise. This sets the apron in from the outside of the leg. If you want a Parsons table, which has legs flush with its apron, you draw the apron outline flush with the outside face of the leg and set the gauge fence to center the mortise in that apron outline.

Find a good solid spot on the bench and clamp the wood down, ready for chiseling. Here my method is similar to Kirby's, except I would also chop out for the haunch. Start from the completed mortise and go toward the end of the wood, chopping straight down but not too deep. Then come in on the line from the end. If you are a beginner and the inside of the mortise seems too rough, you could smooth it out with a patternmaker's rasp, Nicholson No. 50. Make sure you don't round any edges.

Now to saw the tenons. Put the four apron pieces on the bench, mark the good side (the outside, which will show) and the bottom edge, and square the shoulder lines all around. Make neat, skinny pencil lines. Mark the haunch and from the actual width of the mortise, reset the mortise gauge and mark the tenon in the center of the apron ends (fig. 3). Also mark a scrap for a try piece. Put the try piece upright in the vise, saw in from the far corner then saw all the way down. Saw the shoulders, then try it in the mortise to see how snug or loose it is. The important fit is the width, not the thickness. How snug should it be? My father taught me, if you use

Photos: Staff; Illustrations: B. Mastelli



Clamp a pair of aprons upright in the vise to saw the tenon cheeks. Start sawing on the end grain, at the far side, then lower the saw so it cuts straight across and down to the shoulder line. Move to the side and saw the haunches together.

your mallet to bang it together it is too tight, if you use your hat it is too loose, so find the middle way and push it together by hand. If your scrap piece is too tight, cut away the mortise-gauge mark; if it is too loose, leave the line on. Make another try piece until you get it right—practice makes the master.

Put one pair of aprons upright in the vise at a time, and saw down all four cheek lines—one apron steadies the other and it saves time. Move around and cut down the top of the apron to the haunch, both pieces at once. Now to cut the shoulders, take the wood out of the vise and put it on the bench. To hold the work I have a special stop, which can be made of any hardwood, cut to the dimensions shown in fig. 4. Cut the haunch and then the shoulders using the 10-tooth bowsaw or any fine saw. Saw right on the line on the inside of the piece, turn it over and saw to leave half the line on the outside, the side that will show. Finally, you cut the end of each tenon at 45° so they can almost meet inside the mortise. Try the joints together. A beginner can use the rasp to correct the tenon if the joints are too tight. A good joint is rough from the chisel and saw, which makes a good gluing surface.

Before gluing, clean all four sides of the leg with a smoothing plane, round off the corners tastefully and sand each side before you rotate the leg to the next. This saves work. Some craftsmen argue about corners. I say you want a crisp straight line, but fine woodwork has no sharp corners, especially the outside corner, which will get kicked and

(continued at top of facing page)

Methods of an Old World Cabinetmaker

by Rick Mastelli

When you want to make utility dovetails for a toolchest, rough cabinet or bin, it's faster and easier to lay them out by eye and to saw rather than chisel the waste away. The heart of the procedure is an efficient routine, plus a bowsaw blade that looks like it's been run over by a train. For cabinetmaker Frank Klausz, it's no more trouble than nailing and at his shop in Bedminster, N.J., even the packing crates are dovetailed. It is a matter of pride: "It shows they come from a cabinetmaker." It is also a matter of experience and training: "In Hungary kitchen cabinets are dovetailed together. People take them along when they move, they must hold up."

Klausz's method is for rough work where the goal is a strong joint quickly made, not fineness. It is perfect when the work will be painted, for in that case he fills any gaps with a paste made of white glue and sawdust, pressed in with a flexible putty knife, and smoothed with a belt sander.

To demonstrate, Klausz crosscuts a length of pine 1x12. With a marking gauge set to the stock thickness, he scribes the tail board on its faces and edges, and the pin board only on its two faces. He will cut the pins first, but he does not lay them out beforehand—he judges the angles and spacing by eye. Accuracy comes from experience, but to know this can be done is to be inspired to try it: no ruler, no bevel gauge, no pencil. The pin board goes upright in the vise, the face that will be inside the box toward him. He picks up not a dovetail saw but a 23-in. bowsaw with a crosscut blade 2-in. wide. A few quick strokes cut the half-pins near the left and right edges of the board, the two kerfs converging toward him. Each subsequent cut will be parallel to one or the other.

Frank Klausz.

Klausz says the strongest joint has pins and tails of equal width, despite fine cabinetry's preference for slender pins with wide tails. Decide what you want, and make the third cut a tail's width away from the half-pin on the left, but parallel to the half-pin on the right. Now Klausz's saw divides the remaining space in half, or in thirds, or in half and half again, depending on how many pins he wants. Each of these cuts, always just to the gauged line on the faces of the board, is also parallel to the half-pin on the right. Next he places the saw between any two parallel cuts to divide the space into a pin and a tail, the tail being as wide as the single tail previously cut. The space to the left of this cut will be the width of a pin. But before sawing, he aligns the saw with the half-pin cut on the *left*, then he cuts all the remaining pin sides. Small inconsistencies in spacing or angle do not matter because the tail board will be laid out and sawn to match.

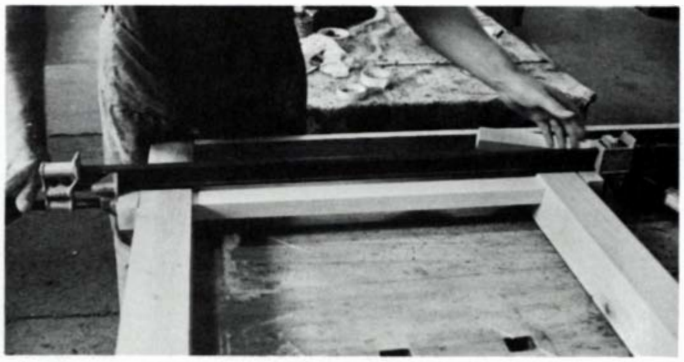
Now comes the trick. Instead of chiseling the waste, Klausz leaves the board upright in the vise and picks up what he calls a dovetail cutout saw. It's a 23-in. bowsaw whose ⅜-in. blade bends 90° in cross section, the line of the bend following a long diagonal from the tips of the first teeth to the top of the

(text continued on page 58)

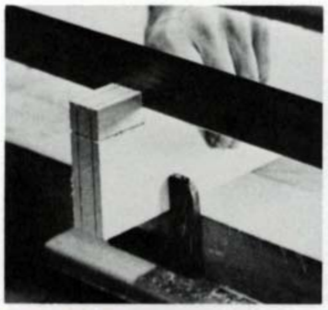
Photos: Staff; Illustrations: B. Mastelli

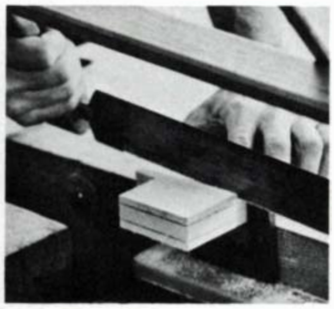
knocked round anyway. Office and children's furniture should be rounded even more. Next clean the apron with a smoothing plane and sand. The table is ready for gluing.

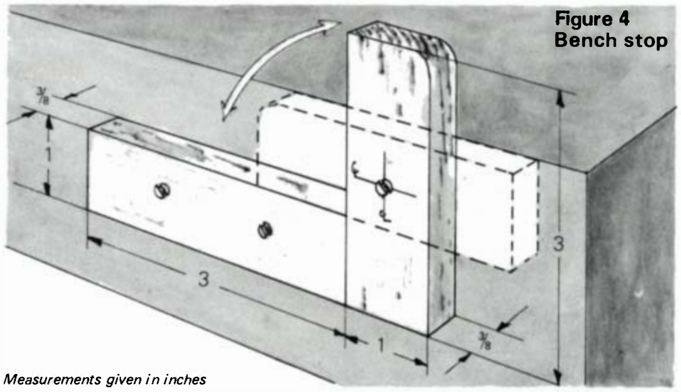
With the mortise-and-tenon joint it is important to put a thin, even coat of glue on the walls of the mortise but not to fill up the mortise. Most beginners use too much glue; on the other hand, most production lines use too little glue because they don't want to fuss with cleaning up afterward. On a big table it is easier to glue the two short ends in pairs, then glue the table together. Clamp with a bar or pipe clamp. Your scrap pieces from cutting off the shoulders are perfect blocks under the clamps so they don't mar the work. Make sure to check if it is square. The best method is to measure from corner to corner; it should be the same. □



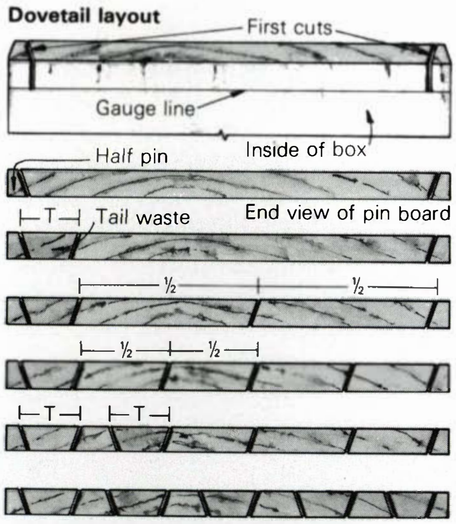
Glue legs and short aprons in pairs before gluing long aprons.

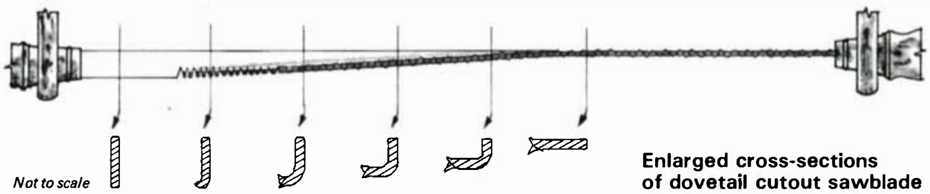




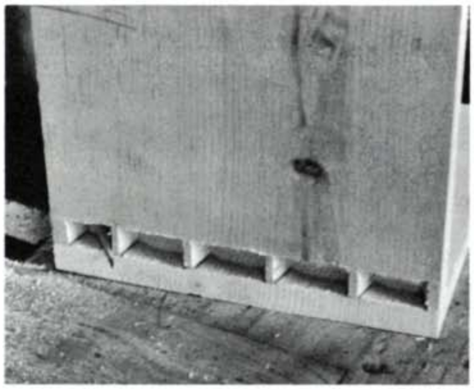


Simple bench stop, detailed at right, holds work for sawing haunch and tenon shoulders. Flip stop down to get it out of the way.

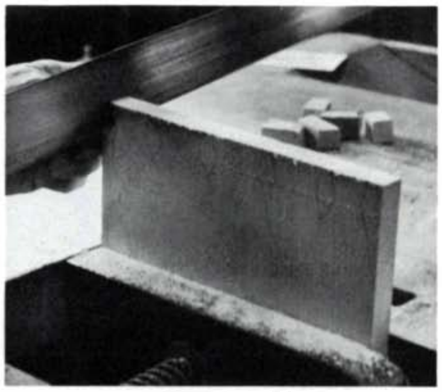




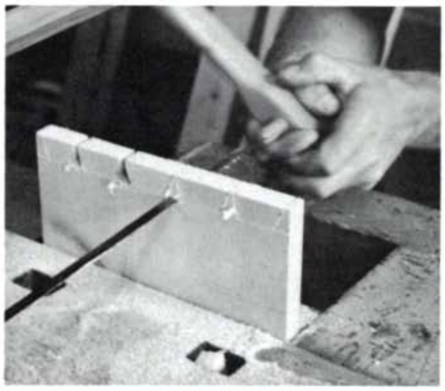
Left, Klausz saws the pin sides. He does not lay these out beforehand, but judges angle and spacing by eye, using the steps detailed at top left. Above, Klausz saws pin-board waste with the dovetail cutout saw. Its bent blade turns horizontally in the vertical kerf, then splits the gauged line that marks the bottom of the tail sockets.



Tail board is marked from pin board with a few flicks of the pencil, used here for the first and only time in the procedure.



Sawing tail sides. Klausz doesn't mark end grain with a pencil line perpendicular to the face, nor does he tilt the board in the vise.

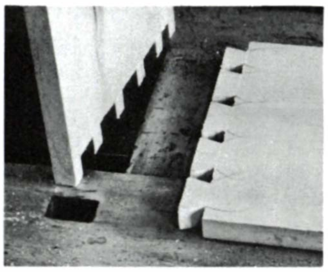


Dovetail cutout saw removes the waste; the splinters it raises can be filled with a white-glue-and-sawdust putty.

blade two-thirds the way back. The cross section of the last one-third is flat, at right-angles to the foremost part.

To use the cutout saw, Klausz drops the front of the blade, where there are no teeth, into the vertical kerf. He pushes sharply and the bent teeth cut sideways across the bottom of the socket between the pins. The first push threads the bend through the wood as the sawblade twists itself from vertical to horizontal. Subsequent strokes, using only the last one-third of the blade, split the gauged line and the waste pops out. In less time than it takes to describe, Klausz has completed the pin board. A saw like this is not available in America; Klausz brought his from Hungary, where it is a standard hardware item. The Germans have a backsaw whose blade is similarly bent, for the same purpose. The English would use a coping saw, as I did when trying the method myself.

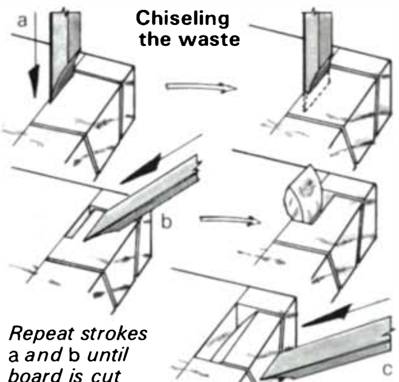
With the tail board flat on the bench, the surface that will be inside the box facing up, Klausz stands the newly cut pins in position and traces their outlines with a pencil. Then he puts the tail board upright in the vise, inside face toward him, and with his big saw splits the pencil lines just down to the gauge line. He does not stop to square any lines across the end grain; eye and hand can guide the saw well enough. The dovetail cutout saw again removes the waste between the tails, and he lops off the waste at the edges where the half-pins will fit. Now out of the vise and onto the bench to push the joint together. Six pins, five tails, in about three minutes.



Where fine dovetails are called for, Klausz chisels the waste in the usual way *(Fine Woodworking,* Spring '76), but again with an economy of motion that makes chips fly. First he demonstrates sharpening; it is another matter of pride that he has taught his apprentices to sharpen their tools well enough to shave with. Indeed, watching him slide a chisel or plane iron over his three stones is like watching a barber strop a razor. The coarse, medium and fine stones are mounted on a single board, but stepped to provide clearance for tool handles. First, some oil—a mixture of three parts kerosene to one of machine oil, squeezed from a plastic bottle. Holding the chisel in his right hand, right index finger and left middle finger pressed to the back of the edge, he rocks the blade up and down to find the flat of the bevel. Wrist and forearms locked, he moves from the shoulders, rubbing the bevel in smooth, quick circles. With the merest pause, he flips the blade onto its back and draws it along the stone. Then he flips it again, reassumes the bevel angle, and draws it toward him again. Flip, draw, flip, draw, from back to bevel, over and over, occasionally pausing to test the edge with his thumb. When he's done, a half-minute later, he proves the edge by shaving a patch of forearm. A barber with lather could do no better. Klausz recalls that his father one evening returned from the local beerhouse having wagered he could shave using cold, soapless water and a plane iron sharpened by 15-year-old Frank. Father won the bet.

Klausz saws the sides of another set of pins and lays the board on the bench to demonstrate chopping the waste. He stands the chisel just ahead of the gauge line, bevel toward the end of the wood, and taps. The bevel, sinking into the wood, drives the back of the chisel up to the line. Starting

Klausz's three stones are mounted on one board, stepped from coarse to fine to provide clearance for the handle of the chisel or the held end of the plane iron.



Repeat strokes a and b until board is cut halfway through... then tap end grain to remove waste.

right in the line would drive the edge too far back, causing a gap in the joint. Next he tilts the chisel away from him about 45° and shifts the edge halfway toward the end of the board. Tap, and a wedge of wood pops out. He alternates the upright with the tilted position until halfway through, takes a quick tap on the end grain to lift out the remaining waste, flips the board over and completes the job. Concentrating on the area in front of the gauge line where the waste is attached, and chiseling the end grain only once avoids wasted motion as well as torn grain at the bottom of the socket.

To round out an afternoon of demonstrations, Klausz lifts a 5-ft. frame saw from its hook over the archway that separates office from shop. The 4-in. wide blade from his father's shop in Hungary is newly mounted in a frame of pine and padauk. Klausz recalls that as boys he and his brother, John, spent Sunday afternoons on opposite ends of this saw, resawing. The brother, who now works in the furniture industry in Hungary, happens to be vacationing in America and today has been finishing repair jobs. Klausz stands a 4/4 piece of figured walnut, 10-in. wide, in his bench vise, and calls across the shop. "Come, John, for old time's sake." In a moment the old rhythms are back and the two men are sweating in unison. Two-thirds of the way down the walnut they stop to turn it end-for-end in the vise. A few more long strokes and it's done. Klausz displays the figured wood, now bookmatched, and spots a small discrepancy on his brother's side of the line: "Look, you went off." They laugh.

When he came to this country eleven years ago, Klausz had already completed his training as a master cabinetmaker. Most of the people he knew—from school, at work—were skilled craftsmen; cabinetmaking has been his family's occupation for generations. Finding he was not learning much in the millwork and furniture shops where he first found work here, he decided seven years ago to go into business for himself. Now 38, he employs two apprentices, one journeyman, and takes on no new customers. Mainly he rebuilds and reproduces antiques, though he does construct original pieces too, usually in his favorite Queen Anne style. The big frame saw is not just for display; when a piece calls for hand-sawn lumber, he uses it. For Klausz the long tradition of Old World craftsmanship is still current. Its practiced routines—how to position the stock in the vise or on the bench, how to hold the tool and apply it to the wood, what to do first and what next—are the difference between skill and fumbling. It is not the magician or the superman who produces clean dovetail joints in deft moments, but the craftsman. □

Frank Klausz and brother John resaw 4/4 walnut board 'for old time's sake.'

Production Problem

Making hundreds of square frames

by Henry Jones

Not long ago in this magazine the distinction was made between operations of risk and operations of certainty (*Fine Woodworking,* Nov. '78, pp. 24-27). Those of us who produce wood objects in some quantity must, of necessity, be concerned with the latter. More than that we must be inventors, even Rube Goldbergs, in a continuous quest for easier, faster, surer methods. A set of operations that turns out a product in the fewest minutes without compromising design or quality is the key to profits, even small ones.

Recently we went to work on the problem of making frames by the hundred: plain, ordinary frames such as you might require for a mirror or picture, a small glass showcase, or—our particular application—a stool/table with a panel top. We have developed a method that allows us to get the job done fairly rapidly, but it leaves something to be desired. We suspect that other readers have devised better ways and will think our method slow, even naive. Perhaps they will deluge the editors with mail. What we would like to see is more articles on methods and tooling for small production shops.

Here are the details of the frame problem and our solution: We produce square frames using hardwood 2x2s 16 in. long in batches of 100. That means cutting 800 ends, setting up four pieces at a time, gluing and clamping them, allowing time for the glue to set and removing the clamps. The assembled frame must fit over other jigs for routing and shaping. Thus, each frame must vary less than $\frac{1}{32}$ in. in dimension, squareness, twist of stock, flatness or any combination, or the frame won't fit over the subsequent jigs or will rattle loosely on them. We held the dimensions within about $\frac{1}{64}$ in. on all but five frames of the first hundred.

After experimenting we chose a plain miter joint with a corner block added later because, first, we could control length to within a few thousandths of an inch; second, we could apply glue quickly to the flat miters; and third, the joint would look good after we put a 1-in. radius on the corners. The glue block strengthens the frame (yet is hidden by the panel that fits into the frame) and enlarges the area against which a hanger-bolt and nut draw the leg top.

What seemed simple next

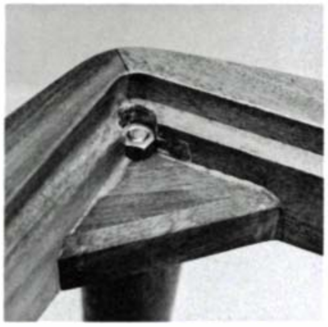


Photo (top) shows spot face on which leg top is seated. Hanger-bolt and nut (bottom) draw leg onto frame and glue block.

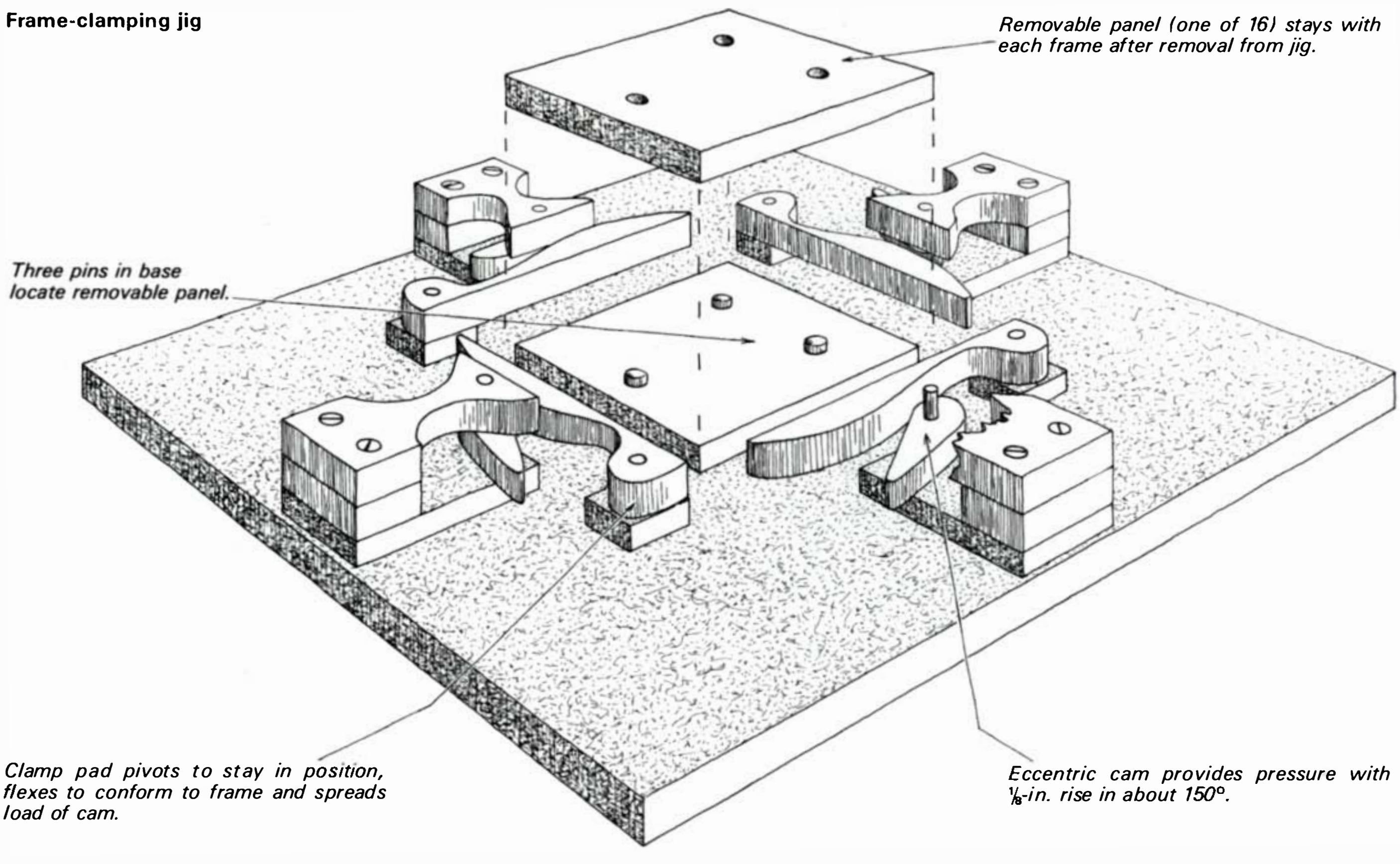
was to build a jig to clamp the four pieces in position so the glue could set. The jig had to be quick to load, each piece being automatically positioned, and the clamps had to bring the pieces into intimate contact for a strong, tight joint. It had to be accurate yet able to cope with a frame of four pieces, each of which might vary as much as .004 in. in length. We decided on an epoxy glue, WEST (see p. 33), which penetrates the wood, remains slightly flexible and sets hard enough in two hours to permit the clamps to be removed. Whoops! That's 200 hours just waiting for the glue to set, five weeks of eight-hour days. Economics demanded that gluing take no more than three or four minutes. Okay, build 25 jigs. But what would *that* cost? If there were a glue that set in one or two minutes, assembly would require only two jigs, but the timing would be tricky.

Finally we hit upon a Novaply (high-density particle board) base with three pins in its center to locate a removable Novaply square. A lever-action cam clamp is mounted on the base opposite the midpoint of each side of the square. We quickly made 16 of the removable central squares all exactly the same with an accurately set radial arm saw, and waxed the corners where there would be contact with glue squeezed out from the frame joints. Thus we can glue up one-sixth of the entire batch of 100 frames at once. Line up 64 of the mitered sticks, their ends overhanging the bench edge. One or two strokes with a small roller carrying epoxy glue butters one end of the whole batch. Turn the sticks and butter the other ends. To set up the jig, install a square over the three locating pins, place four sticks around the square and close the clamps. Because the clamp pads are only 6 in. long and 1 in. high, most of the edges of the frames remain exposed. A large, powerful rubber band stretched around the frame holds it snugly against the central square, so the clamps can be released and the frame with the square moved to a flat drying bench. With another square installed on the base, the cycle can be repeated. When all 16 frames are glued up, they are left to dry while other operations are performed. After two hours, remove the rubber band and the central square, rewax the squares and clean the frames for the next operations—routing, shaping and sanding—before applying the corner blocks.

In summary, with enough central squares, one worker could assemble 100 frames in less than a day, mixing glue, buttering ends, loading and unloading the jig, removing excess glue, stripping the frames of rubber band and central square, stacking dry frames and taking coffee breaks. But the time to cut and install the corner blocks must be added before the joint is complete. Since we run only 100 frames at a time, production time works out to more than two days—adding time for the operator to set up the jig, get his rhythm going and up to speed, then to clean up and put it all away. Our actual time for making 100 frames is about 14 hours, or about 8½ minutes per frame, not counting the 12 hours for drying (when done in 6 batches of 16, the optimum number for our jig considering WEST epoxy's open-assembly time). While the glue is drying, many of these and other operations can be performed on units that are not drying. We find that the total time breaks down as follows: About one-quarter of the time is spent cutting and deburring the miters, one-quarter gluing up at the jig, one-eighth stripping the dry frames of the rubber band and central square, and three-eighths cutting and applying the corner blocks. This means that the clamping-jig operation time averages out to two minutes per frame.

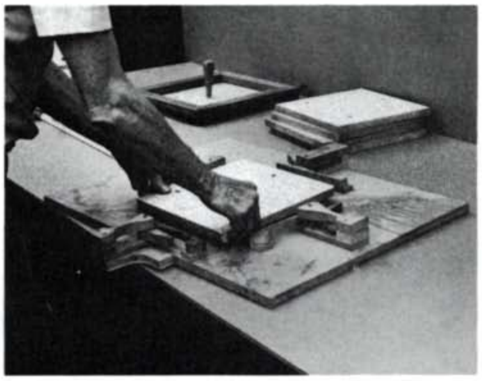
The weak points of the method are that the tolerances sometimes add up unfavorably and we get an out-of-square frame or one that is not quite flat. Our clamps are not quite powerful enough to make the glueline as inconspicuous as we would like it to be. In spite of this, tests have shown the joint to be very strong.

Frame-clamping jig

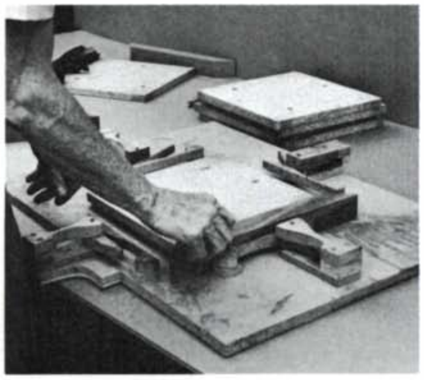


Photos: Staff; Illustration: Christopher Clapp

1. *Buttering mitered ends with epoxy glue.*

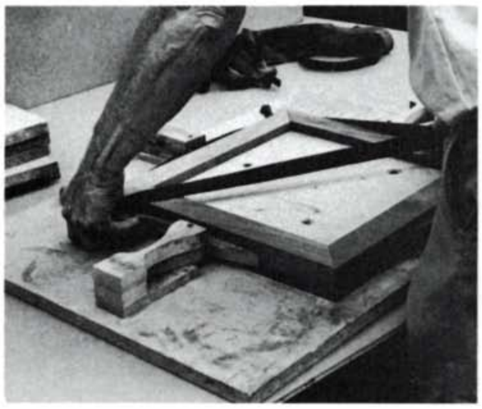


2. *Placing central square over locating pins.*

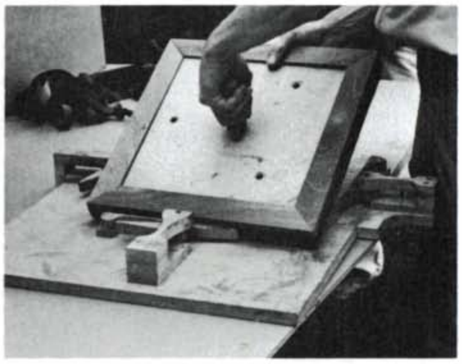


3. *Loading jig with frame parts.*

4. *Tightening cam clamps.*

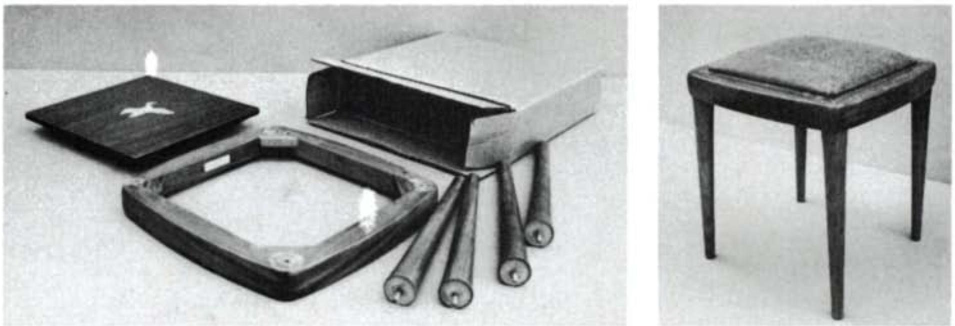


5. *Stretching rubber band over frame edge.*



6. *Removing frame, central-square, rubber-band assembly to drying bench. Jones uses removable handle for grip on assembly.*

7. *After frames are routed and shaped, Jones applies corner blocks, using go-bars.*



8. *The finished parts and the assembled stool/table. Central section, not a structural member, is easily pushed up and flipped over to change inlaid table into upholstered stool.*

We have had no trouble with our miters and expect none for several reasons. We are joining 2x2s only 16 in. long. Thus we have a large gluing area, a relatively short glueline (after shaping) and no long levers. Since each joint is supported directly underneath with a leg, racking is minimized. Our corner blocks are small and have less than ⅛ in. nipped off their apexes so they run right to the joint corner, adding glue area but not acting as large fulcrums to open the joint. The penetrating, flexible epoxy we use is superior, we believe, to animal glues in present-day heated houses, to yellow glues on end grain and to plastic resin glues, which are brittle. We allow time for the epoxy to penetrate by buttering many joint faces at a time, and we apply enough so that some oozes out all around. Visual inspection of dismembered joints have revealed they have not been sucked dry. As to the wood we use, it is very dry mahogany (about 8% moisture content) so that we can expect no significant permanent shrinkage. Expansion will be the first result of climatic change, and relaxation of this pressure instead of tension will be the result of the next climatic season. Actually this last does not affect miters as much as right-angle grain joints, but it brings up a small (and we think important) point of furniture design that is rarely mentioned directly: One reason to start with very dry wood is that one can design more successfully to withstand compression than tension at the glue joint. If the wood shrinks, it's hard to keep it from splitting, but wood can withstand a lot of compression before the fibers are detrimentally crushed. Our joints remain tight and strong for these reasons.

Our jig can easily be modified to handle frames of various sizes. All that is required are central squares (or rectangles) equal to the inside dimensions of the frames to be made, and cam clamps, which instead of being fixed to the jig base, are mounted on individual, movable sub-bases. Locating pins in the bottom of these sub-bases could fit into rows of holes drilled in the jig base from near the center to the base sides.

Still the method seems more complicated than need be. And a very good jig should produce cleaner joints. There must be a faster and easier way to glue up large numbers of simple frames with fine, strong joints. □

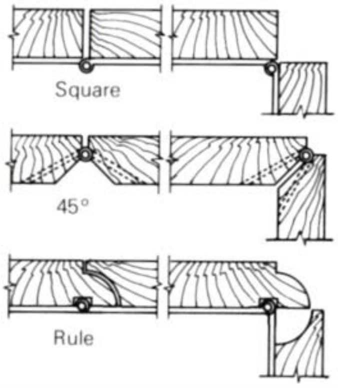
Henry Jones, 56, is an industrial designer who now operates his own small production shop in Vineyard Haven, Mass.

Drop-Leaf and Gate-Leg Tables

Graceful proportions make all the difference

by Simon Watts

Tables with hinged leaves have been made in America for at least 300 years, although no surviving examples date back to before about 1700. The early tables were often used in taverns and, when not in use, could be pushed back against the wall to make more floor space. The first drop-leaf tables had a square edge between the leaf and the top—simple but crude. The barrel of the iron hinge was left exposed and there was a substantial gap when the leaf was down.



Later tables had a 45° angle cut in the lower edge of each board, with the hinge set in from the underside. At some point an unidentified genius invented the rule joint. This elegant detail allows the hinge to be concealed completely. Special steel table hinges are now made that have one leaf longer than the other. This longer leaf is attached to the table leaf; the shorter leaf is attached to the tabletop. I rout a short recess for the barrel of the hinge but there is no need to set the whole hinge into the wood. It's just extra work, and results in making the hinge more visible when the leaf is down. The mating edge profiles are best cut with a router, although originally molding planes were used. In my experience it is a mistake to make the joint too snug because crumbs and other debris tend to get jammed in it.

The leaves of early tables were supported by slides or swinging brackets, but when larger tables with wider leaves were made, a swinging leg became necessary. These became known as "gate-leg" tables. For convenience I will call the first kind a drop-leaf and the second a gate-leg.

The leaves of a drop-leaf table should not be narrower than about half the width of the top. I usually make the top 18 in. to 22 in. wide and the leaves 10 in. to 12 in. If the table is much narrower the legs get so close together that it might overturn when used with only one leaf up. If the table plus leaves is much wider than about 44 in., it will look bulky unless it is made too long for the average dining room. A table 6½ ft. long seats eight comfortably.

The leaves do not have to be rectangular; they can be curved on the long side, with the slight disadvantage of reducing the space available at the end. I don't like oval-shaped drop-leaf tables because the curve crossing the rule joint makes part of the joint project in an unsightly way. Leaves can also drop from the ends of the table instead of from the side, although it is difficult to gain enough length for a whole place-setting without embracing a leg between one's knees.

The table shown in the photos and drawing was made for a family with three small children. I suggested putting a radius on the corners but the parents decided that would detract from its appearance so the corners were left square. By now all three children have met a corner head-on, and one required stitches. I think a furniture maker is obliged to point out this kind of hazard, but should not insist on doing it *his* way.

The choice of wood and the boards selected for the leaves are important. This is because the drop leaves are not restrained, except along their top edges, and if they cup or twist there is no structure to prevent them from doing so. For this reason I use a very stable wood, such as mahogany, and try to use boards whose annual rings run nearly at right angles to the surface (vertical grain). The leaves have to look good when down and should match the top and each other when up. Ideally, one ought to make leaves and top out of boards cut from the same tree.

Top and bottom surfaces of the leaves must be finished in exactly the same way. Otherwise, the side of the wood with less finish will pick up moisture or dry out more readily than the other, and the leaf will cup.

EDITOR'S NOTE: For another version of the gate-leg table, see *Fine Woodworking*, Summer '76. For other ways of making tables that enlarge, see "Expanding Tables," Spring '77, "Gaming Tables," Fall '77, and "Designing for Dining," Winter '77. For Parsons tables, see Summer '78.

The drop-leaf table shown in the plan drawing on the next page, has routed rule joints, (detail at right). Each leaf of the table is supported by four hinges—a pair near the ends, and a pair inboard of the slide supports.

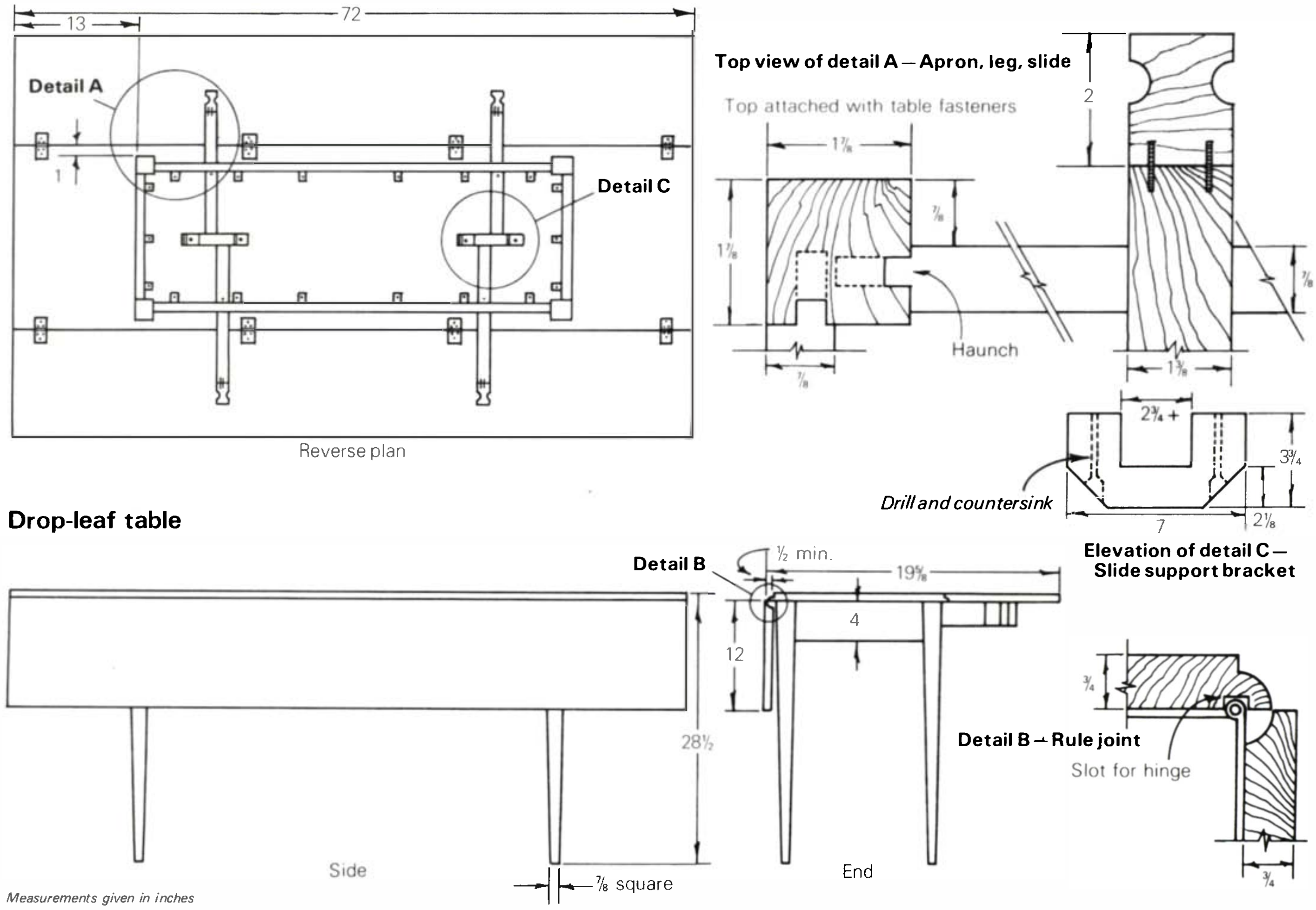
Photos: Richard Starr

There must be enough knee room for people to sit at the ends of the table. My experience is that a top-to-apron overhang of between one-fifth and one-sixth the length of the table accomplishes this and also looks right. The amount of taper of the legs is also important. Too much taper and the table looks nervous—as if it were about to get up and walk away. Too little taper and the whole piece begins to look clumsy. There are no rules except that what *looks* right generally *is* right. I always put a substantial chamfer around the bottom end of the legs where they meet the floor, especially if the piece is too heavy to lift. Furniture always gets dragged around and the legs eventually wear down. If there is little or no chamfer the legs can splinter.

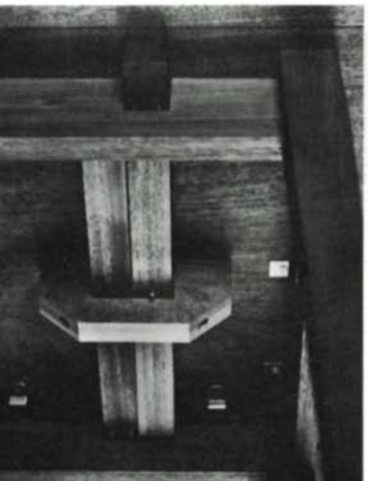
The most difficult detail on a drop-leaf table is designing the slides so they will support the leaves. Nothing spoils the look of these tables more than drooping leaves. I put a small blocking piece between the slide and the underside of the tabletop. This angles the slide up very slightly, and with a bit of adjustment the leaf can be made to lie dead level. If the leaves do begin to droop due to wear, the blocking piece can easily be replaced with one slightly thicker.

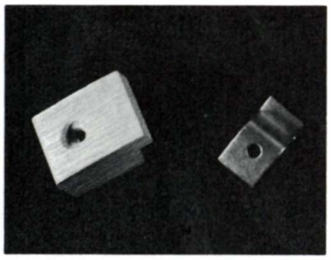
Some people make drop-leaf tables with a hinged bracket to support the leaf. This is not good practice because it strains the hinges and twists the apron. The strength of the table is in the joints between the aprons and the legs, so these must fit well and be properly proportioned. I use a haunched tenon joint and offset the mortises. The tenons should not meet inside the leg. If they do they seriously weaken the joint, which can then be split out by an accidental kick.

The top is attached to the base with steel tabletop fasteners



Photograph of a drop-leaf table, taken from below, left, shows slides and the support bracket. A brass pin in the slide stops its travel against the bracket when the leaf is down, and against the apron when the leaf is up. Two variations of the drop-leaf table, center and right: leaf with curved edge, and leaves that are hung from the ends of the table.





The top can be attached to the aprons with metal clips or with wooden buttons. Either device is screwed to the tabletop and engages a saw kerf running along the inside of the apron.

that fit in a groove or sawcut around the inside of the apron. They can easily be made in wood but the grain must run at right angles to the lip. The apron should never be screwed or glued directly to the top, as this would prevent movement between the two caused by changes in humidity.

The gate-leg or swinging leg has many similarities. Since the open leaf is supported by a leg and not by a slide, the middle section can be much narrower than the middle of a drop-leaf. This way a table that is rather large when open can be put against the wall when not in use, occupying very little floor space. However, if you make the middle section less than about 12 in. wide, the table is liable to get knocked over when both leaves are down. The maximum depth of leaf for a table of standard height (28½ in.) is about 25 in. Any deeper and the bottom edge gets too close to the floor and will be kicked. The shape of the top can be square, rectangular, round or oval, but if the length is more than about 60 in. a second gate is desirable, which interferes with seating. It also makes for a heavy leaf, awkward for one person to lift.

The rule joint is the same but because the leaf is deeper the choice of wood is more crucial. If a single wide board cannot be found, a number of narrower boards will have to be joined. Opinions vary, but my own feeling is that the heart side and the sap side of adjacent pieces should alternate. I think this reduces the possibility of the leaf curling if it is exposed to the heat from a stove or radiator. If possible, choose vertical-grain stock.

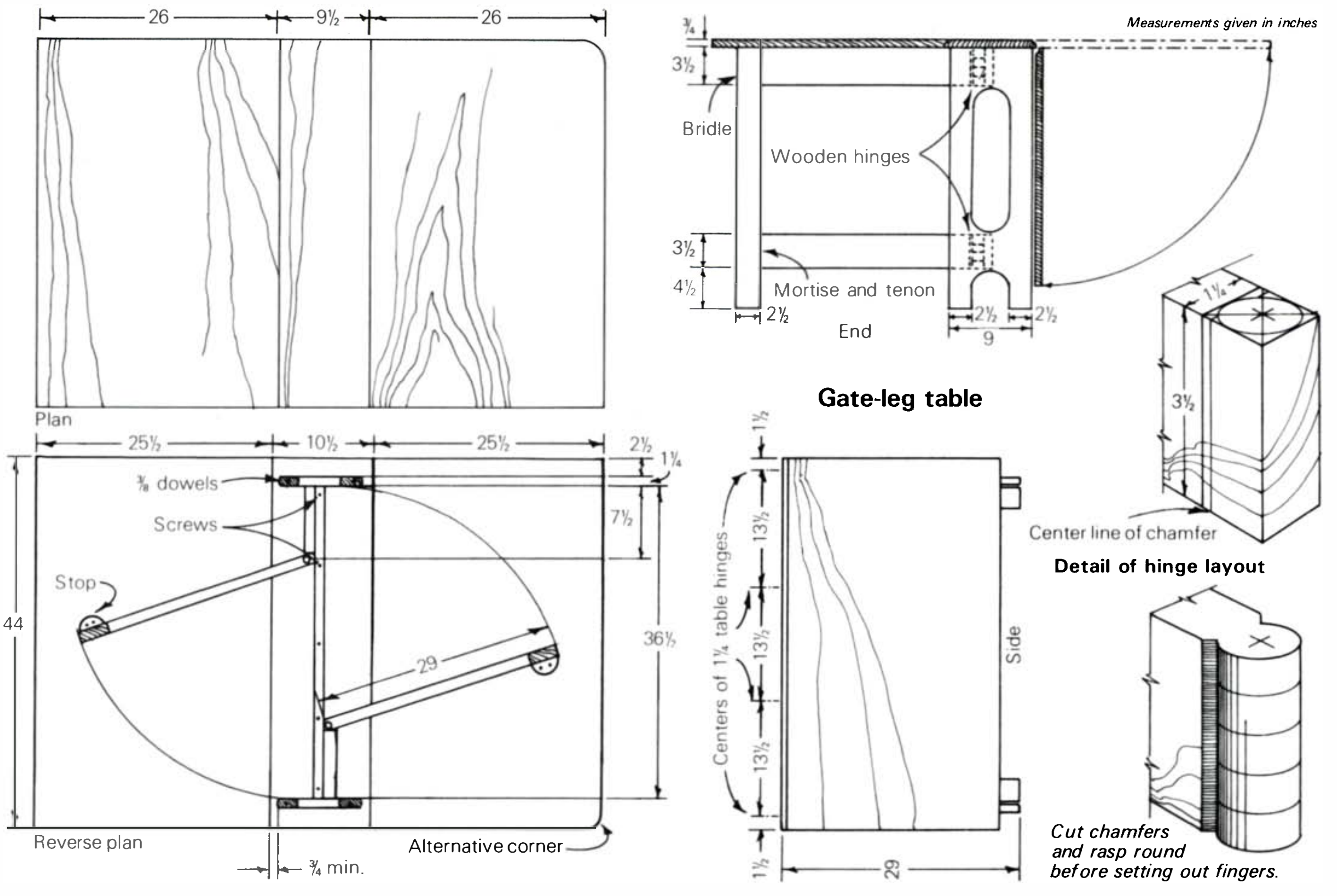
The boards to be joined should not have any twist or wind as this cannot be taken out by clamping. However, a bowed board can usually be straightened by putting it between two straight pieces or by pairing it with a board bowed in the opposite direction. Mating edges can be planed by hand with a long jointing plane or a power jointer. When using a power jointer, run the boards alternating their faces against the fence. Any errors (due to the fence not being precisely at right angles to the bed) will cancel, not accumulate. It is good policy to plane the boards with a slight hollow (less than ⅛ in. over 72 in.) so that their ends are pressed together and there is less chance of a joint opening under seasonal movement. On no account should there be any camber.

I always glue up stock on edge vertically, holding the bottom board in a vise or standing it on sawhorses. If you try and do it on the flat the glue always runs down to the lower edge and you get a starved joint. I also dowel with ⅜-in. by 2-in. hardwood pins on 8-in. centers to keep the edges from sliding on each other when clamping pressure is applied. Of course some use a spline for the same reason, but unless its groove is stopped near the ends, it will show.

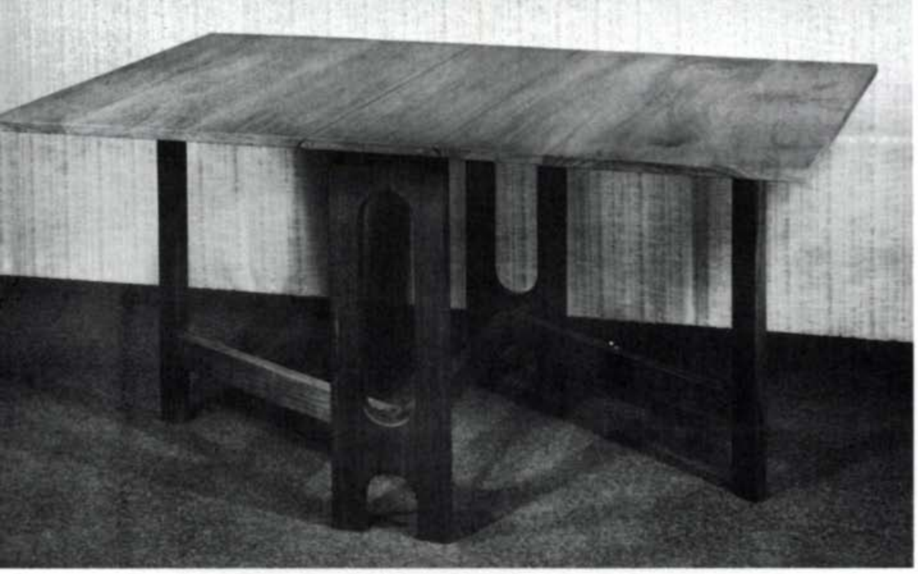
Before gluing, the boards should be set up dry in final sequence. They should be placed on each other vertically and should sit fair without any rocking. Check one side with a straightedge to be sure the surface is flat, then mark and drill the dowel positions. A quick way to close up the joints before

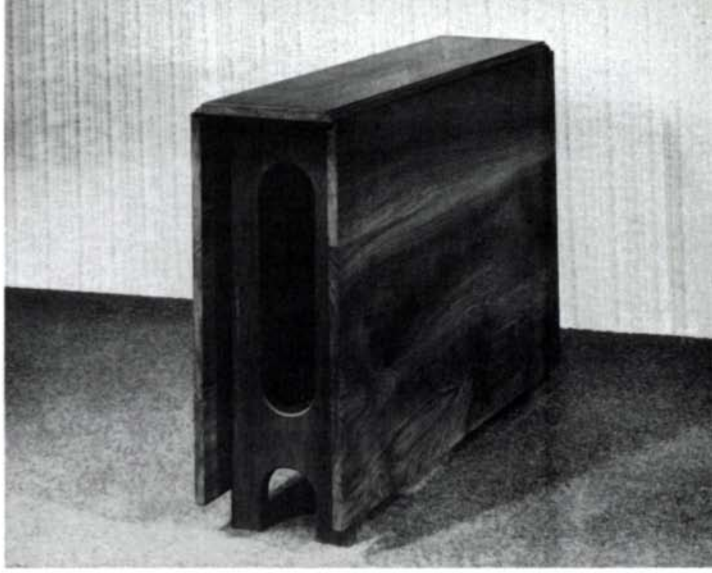
---

Simon Watts makes furniture in Putney, Vt.



Designed by Simon Watts; Redrawn by Bob Crosby





Gate-leg table in open and closed positions, as shown in the drawing on page 64. The gate-leg principle can also be applied to the more conventional leg-and-apron understructure, by adding a low rail between the legs where the gate can attach.

putting on clamps is to stand the whole assembly on the bench, pick up one end and then drop it—hard. Then pick up the other end and drop it too. It makes an awful racket but is far quicker than winding up the clamps one by one.

The clamps should be alternated from front to back of the assembly, and if the wood is not to be replaned, slip waxed paper or plastic under them to avoid staining the wood. A clamp over every dowel is good practice, and always put one at each end. Bar clamps are rigid but pipe clamps, if threaded at each end, can be made up with couplings to any length required. I like to keep some of each, but bar clamps over 6 ft. long are unwieldy. There should always be plenty of glue squeezing out of the joints, but beware of too much pressure—you can squeeze out too much and starve the joint.

The traditional wooden hinge can be mastered by anyone with a bit of patience who is willing to make one or two practice sets. This example pivots through 180°, but it can be stopped anywhere by varying the chamfer behind the knuckle itself. Square up the stock, then lay out the joint by gauging the stock thickness all around the ends of both pieces. Draw in the diagonals on both edges, to locate the center of pivot, and with dividers scribe the circular shape. The circle crosses the diagonal at the bottom of the chamfer; extend these points to the sides of the wood and square across. Now add pencil lines where the circle runs out on the faces and ends. The lines mark the point where no wood will be removed.

The layout completed, I saw the chamfers and the bulk of the waste with the table saw set at 45°, then finish the rounds with a rasp and sandpaper. Divide the width of the wood into four or five fingers, saw in on the waste side of the lines, and chisel out the waste from both sides, just as for dovetails. You can get at the inner hollow on the ends with an in-cannel gouge, but between the fingers the waste has to be removed with a chisel, bevel downward. Finally, fit the joint together and drill through both pieces at once for the pin. I usually use a brass pin, peened over at both ends so it can't fall out.

Make the end pieces of the table by cutting a board in half lengthwise; then bandsaw the waste and finally dowel and rejoin the two halves. A saber saw or a small frame saw could make the cutouts without splitting the board, but the finishing tends to be tedious. The frames and gates can be left square, chamfered or radiused. I prefer some rounding.

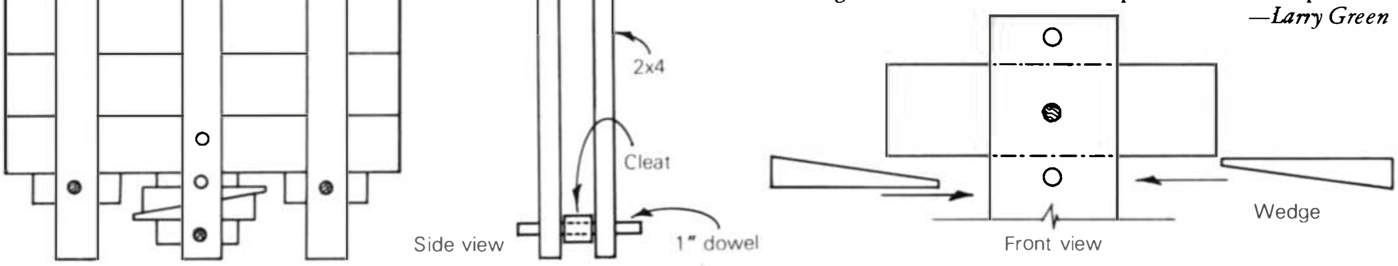
Any dry, reasonably stable hardwood can be used for these tables. I like walnut, cherry, teak and mahogany. I don't think they look as good when made out of blond woods such as oak or maple, but that's just an opinion. □

Cheap clamps

I don't like pipe clamps because the pipes bend under load and mar the work. I can't afford long bar clamps, so I make the 2x4-and-folding-wedge clamps shown in the drawing below.

The materials bill for each clamp is an 8-ft. or 10-ft. utility stud crosscut in half, a foot of 1-in. hardwood dowel, and some scrap for cleats, blocks and wedges. Avoid twisted 2x4s, although a little bow doesn't matter. Make the wedges about 12 in. long, tapering about 1 in. over 9 in., for slow, firm squeeze. Keep the dowel holes about 6 in. apart and span intermediate widths by adding spacer blocks between cleat and wedges. I usually take the clamps apart and use half of each as an assembly bed, then put them together right around the work. Add blocks until the narrow end of both wedges just fits the space, then drive the wedges in together. Keep the joints in line by putting hand-screws across them at the ends, and fine-tune with smaller wedges driven between the clamps and the tabletop.

—Larry Green



Making the Rule Joint
With hand tools, the process is as important as the product

by Alasdair G.B. Wallace

While inspecting repairs being made to the roof of his village church, the vicar was puzzled to see that an old woodcarver was putting the finishing touches to an elaborately carved angel's face. To the question of why such beauty should be located where nobody would ever see it, the craftsman replied that both he and God knew it was there. I recently was reminded of this story when a customer requested that I sign a butternut chest I had made. It occurred to me that whatever task we undertake, the finished product is in itself the quintessence of the craftman's signature.

In this age of mass production, personal signature has become the exception rather than the rule. The development and improvement of the tools of mass production have lessened the need for skills. Haste has become our byword, convenience our creed. The product has become more important than the process, and in the transition, something of inestimable value has been lost.

Unlike steel or plastic, no two pieces of wood are identical. Species, age, moisture content, cut, grain configuration, knot placement all contribute to the character of each piece and demand individual treatment. The proliferation of plywoods, chipboard and cheap veneers and the abhorrence of faults, knots and unusual grain pattern by those involved in mass production have almost obscured the diversity and beauty of this warm, venerable and versatile medium.

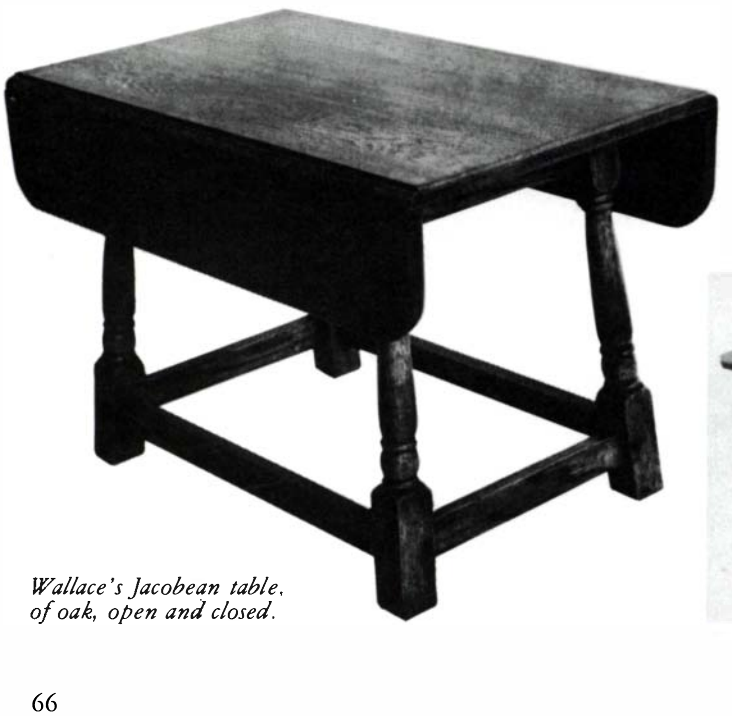
At Rendcomb College in England, my passion for manual processes stemmed from necessity. There were no power tools. A visionary headmaster, when questioned by a student about purchasing a table saw for the workshop, replied that ripping by hand was good for the soul. I still remember many hours of pumping a treadle lathe and hand-planing ¾-in. oak for ¼-in. panels. The sense of pride and accomplishment in the finished product was directly related to the time and effort expended in completing the task.

I continue in the manual tradition today because for me the process continues to be of greater importance than the product. Today's machinist will argue that leaving no traces of the saw, planer and shaper attests to his mastery of the tools and the care with which they were programmed. This is true. But machines, whether television or router, destroy the sensations of wonder, joy and accomplishment. The table saw's wail, the sander's whine, the router's scream deny a subtler, finer music and remove the woodworker from the personality of his medium. To submit to the machine denies the sensuous process so essential to the woodshop, and the work shows no trace of the craftsman, his tools, his labor. Wood is not homogeneous. Why then use a machine that by its very nature seeks to create a uniform product? Beauty lies in diversity, not uniformity. Hear the varying song of the plane as it skims oak, walnut or pine, the crunch of the chisel's edge cutting to the dovetail's line. Savor the perfumes of the crosscut in cherry, maple and elm.

It is important to realize at the outset that the mass-produced product and the handcrafted product do not compete in the same marketplace. Whereas the mass-produced product frequently assumes its market either ignorant or indifferent in terms of design and function—the short-range goal manifest in the stapled-drawer syndrome—the handcrafted product usually assumes a market aware and appreciative of form, function and signature. The onus is on today's craftsmen to educate the public, to demonstrate the superiority of their products. The creations of today's finest artists, such as David Brown, James Purdey, James Krenov (see page 44), will continue to be prized for their design excellence and for the personal signature they incorporate in an age of anonymous machines.

Two arguments will be posed by those who advocate machines to the exclusion of manual processes. The first is that the machine, once programmed, is labor-economical. One worker operating one or several machines will outperform one manual worker in quantity and uniformity of product. If efficiency is measured solely in these terms, the argument is irrefutable. The human price of such economy, however, exacts a terrible toll.

Equally pervasive is the argument that a relatively unskilled worker can, with the flick of a switch, in-



Wallace's Jacobean table, of oak, open and closed.

Photos: Alasdair G.B. Wallace

itiate a series of complex operations that result in a sophisticated product. This ease is, however, anathema to craftsmanship. The craftsman's skill is acquired through lengthy apprenticeship, exposure to many aspects of the art and hours of exacting labor. Practice may not make perfect, but it probably does result in continued development, both personal and functional.

When deciding whether to purchase hand tools, machines or a combination, the craftsman should bear in mind that anything that can be produced by machine can also be produced by hand. Space is probably of greater concern to the amateur than to the professional. The home workshop simply cannot accommodate all the larger machines—table saw, radial-arm saw, drill press, planer, jointer, lathe, band saw. For most amateurs, table saw and lathe commonly take preference, together with a selection of smaller power tools such as drill, sander or router. Krenov's observation that there is little point in ripping up the rough stock by hand and doing a vast amount of preparatory work with much effort is well taken. His apprenticeship served, he prefers to devote his skills to delicate detail imparted by hand. This is the essence of the craftsman—the judicious use of a few carefully selected machines to rough out the work. Elizabethan craftsmen of necessity employed the same principle: The pit sawyers supplied the boards; the craftsmen smoothed them, shaped them and signed them with their hands.

Of equal concern to most craftsmen is cost. As an amateur I cannot realistically contemplate the cost of a multiplicity of machines that would enable me to perform tasks I can already perform by hand. To submit to the machine would deny me the joy of creating with my hands, and would largely negate the sense of accomplishment. In R.L. Stevenson's words, "to travel hopefully is a better thing than to arrive, and the true success is to labor."

Hence my preference for hand tools. Using my grandfather's Stanley 45 and wooden molding planes, I become part of and continue a tradition as my hands impart to each tool a deeper, richer flesh-print. I select a hand-forged chisel bearing the faint initials H.W. on its worn maple handle. It fits the hand. As I use it, I relish the vision of history, and part of H.W. lives on in me and the works of my hands.

The small oak Jacobean double-dropleaf table shown on the previous page is a recent expression of this manual process. My decision to use rule joints between the tabletop and the leaves is in keeping with the Jacobean tradition. The rule joint satisfies aesthetically for several reasons. In neither the open nor the closed position is the hinge knuckle visible. The decorative character of the open joint enhances the finished product. The closed joint is strong—downward pressure on the open leaf is transmitted to the central tabletop, effectively tightening the joint rather than relying solely on the hinge and screws, as would be the case in butt joints.

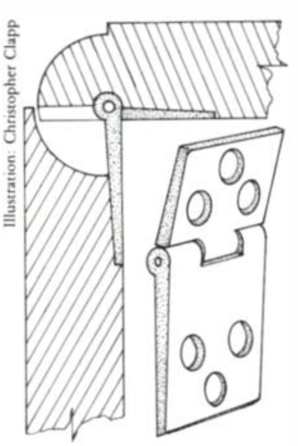
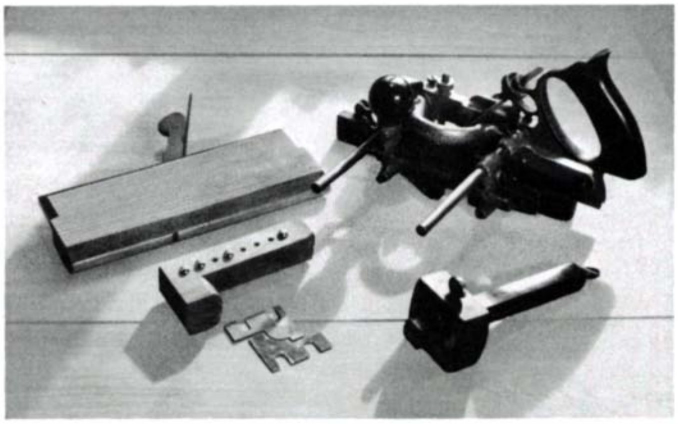


Illustration: Christopher Clapp

The rule joint takes its name from the brass-bound, boxwood rule that until recently graced every carpenter's tool chest. The drawing shows how the rule joint operates. If you think of the rule joint as two concentric circles with the center of the hinge pin as their center, you can see that the radius of the leaf arc is very slightly larger than that of the top. In laying out the joint, however, it is more practical to assume a common radius and sand to a perfect fit prior to finishing.



Tools for making rule joints include (clockwise from top) molding plane, Stanley 45, marking gauge and scratch beader with matched cutters. Wallace also uses a rabbet plane, not shown.

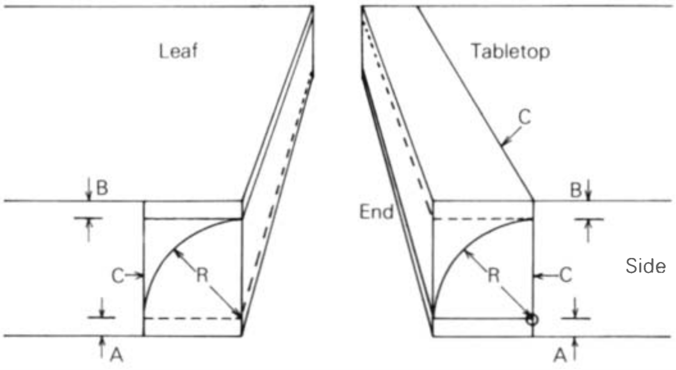


Illustration: Alasdair G.B. Wallace

To work the joint you'll need a multiplane or rabbet plane, a small round molding plane or a gouge, and a homemade scratch beader with matched cutters. (See *Fine Woodworking,* Summer '78, page 60.) The concave and convex cutters must match precisely, or the finished joint will bind or gap.

Because the dimensions of the joint are determined in part by hinge size, you must obtain the special table hinges required prior to layout. These hinges have leaves of unequal size and are countersunk on the side opposite the knuckle. They are available from Period Furniture Hardware Co., Inc., 123 Charles St., Boston, Mass. 02114, or from Ball and Ball, 463 W. Lincoln Highway, Exton, Pa. 19341, as well as major woodworking supply houses.

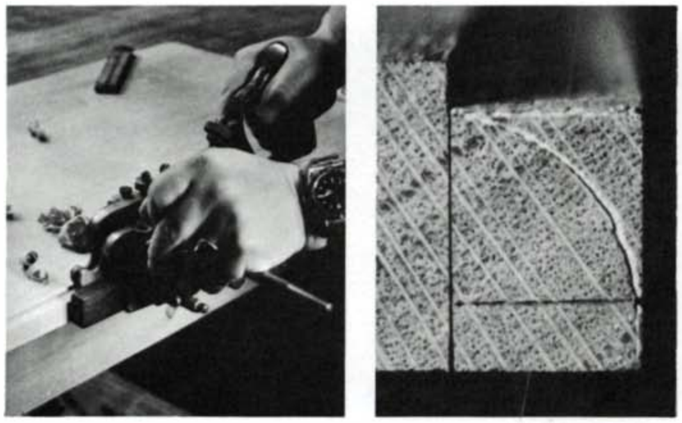
Once the top and leaves have been planed to thickness, work on the joint may commence. There are two reasons for leaving the top and leaves oversize at this stage. Construction of each joint reduces the usable width of the finished top by a measurement equal to the radius of the curve. This is critical if a round or oval top is planned. It is also easier to scribe the joint on square stock and work a decorative edge molding after completion of the rule joint.

First, true and square the adjoining edges. All measurements in laying out the joint are taken from these edges and precision here will largely determine the nicety of the final fit.

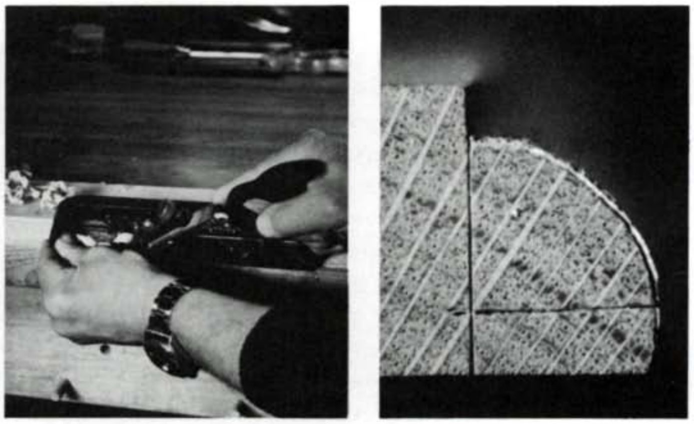
The drawing above illustrates layout procedure. Distance *A* is the thickness of hinge to pin center. The lower edges of both tabletop and leaf are scribed to this measurement on sides and ends. Distance *B* is the depth of the top fillet and is variable, but probably should be no less than 3⁄16 in. The upper edges of both tabletop and leaf are scribed to this measurement, again on sides and ends. *R*, the radius of the curve, is the distance between the top line of *A* and the baseline of *B*. The top of the table and the sides of table and leaf are scribed to this measurement (line *C*). Line *C* is also scribed on the underside of the leaf and on the underside of the tabletop in the hinge area (several inches in from the sides) to help center the pin later. The dotted scribe lines on the drawing may be superfluous if you've already tested the setting of the plane's depth gauge and fence on scrap, but I continue out of habit to use them as safety checks. The point at which *A* and *C* intersect gives the hinge center projected to the side of the tabletop. A divider or compass centered at this point facilitates scribing the curve on the sides of top and leaves.

I find it easier to work the tabletop first and test-fit the leaves to it. Small adjustments are thus made in the leaf arc, the concealed section of the joint. The center top portion always retains its true cylindrical section. Use either the Stanley 45 or a rabbet plane to remove fillet *B* on the tabletop quickly and efficiently. Remove most, but not all, of the waste. The bulk of the remaining waste outside the scribed curve is then removed from the radius with a rabbet plane. The scratch beader completes the shaping, leaving a surface that will require little if any sanding.

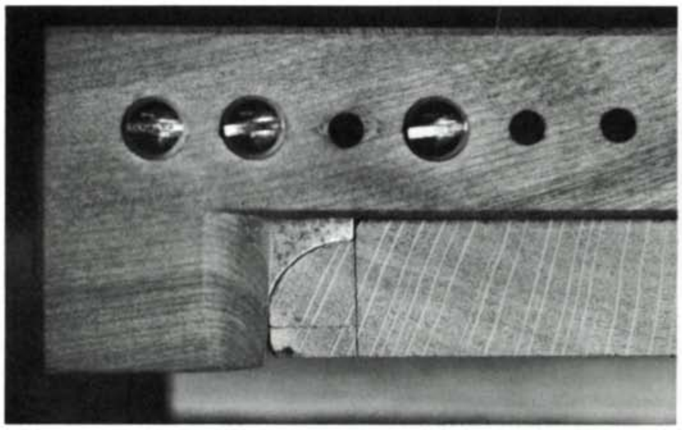
The leaf joint is worked in a similar fashion. The Stanley 45 or the rabbet plane is set to measurement *A*, the hinge thickness, and this material is removed. Most of the material inside the scribed curve can be removed with a rabbet plane, but be careful to remain within scribe lines *A* and *B*. On the resulting chamfer, use a molding plane to clean up to just



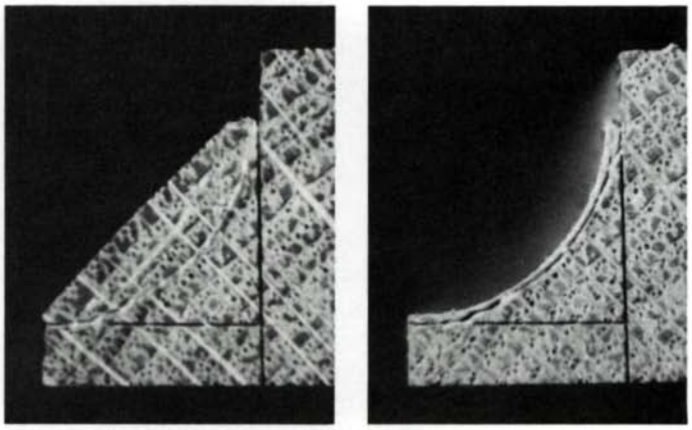
Wallace uses his grandfather's Stanley 45 to remove the fillet from the tabletop, left. A rabbet plane works just as well. At right, the fillet is cut to just shy of the scribed line.



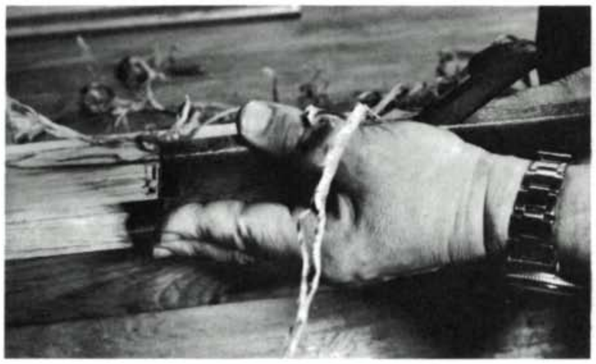
A series of passes with the rabbet plane wastes the bulk of the curve. The open side of this plane allows the iron to cut right to the shoulder of the fillet. At right is an end view of the roughed curve.



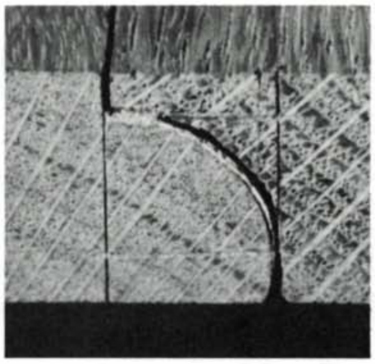
The curve is shaped to the scribed lines with a scratch beader and requires no further finishing. An alternative to scratch beader and matched cutters is a matched pair of sanding blocks carved to the precise curve.



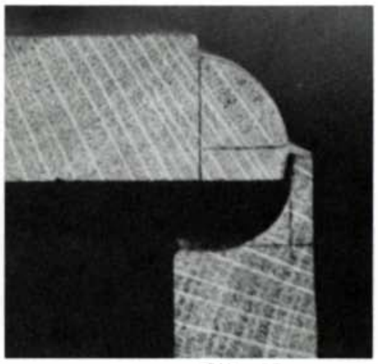
The joint for the leaf is worked much like the joint for the top. The rabbet plane, used to remove the bulk of the material, yields the chamfer, left. The molding plane or the scratch beader cleans up to the line, right.



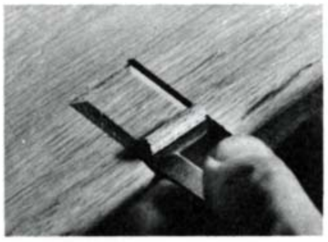
When cleaning up to the line, work the first groove into the chamfer by using your fingers as a fence.

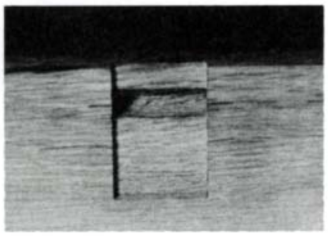


Test-fitting the joint. When closed, leaf and top should form a flat plane.

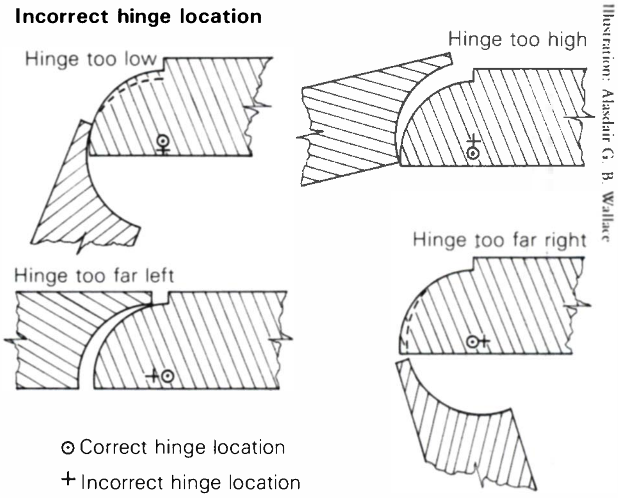


The assembled top. Hinge is invisible when leaves are up or down.





Fitting the hinges is an exacting task. Scribe and chisel the hinge recess, then the hollow for the hinge knuckle.



within the radius. The novice may at first find it difficult to use his fingers as a fence when working the initial groove in the chamfer with the molding plane. Butting a board next to the chamfer as a guide will do the job but will not help you master the convenient traditional technique. Finally, clean up with the scratch beader.

The leaf may now be offered to the tabletop for its initial test-fitting. Clamp the top to the bench edge with enough overhang so the leaf can operate. The leaf should glide evenly and smoothly over its mating surface and form, when in the closed position, a flat plane with the top. The precision with which the scratch-beader cutters were matched becomes apparent during testing. Any roughness during the fitting may be alleviated by judicious sanding of the leaf joint. Shaped blocks to which medium-grit garnet paper has been glued are most effective.

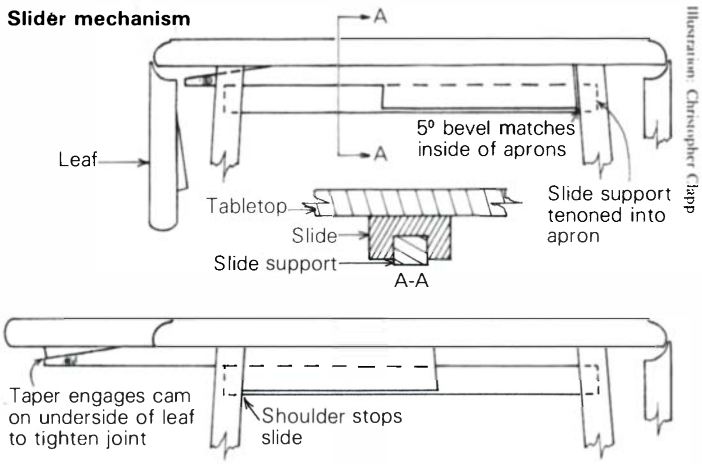
Fitting the hinge is an equally exacting task. I find it easiest to clamp the leaf to the tabletop face-down in the closed position with a strip of paper between to maintain a slight margin as the hinges are screwed tight. Align the center of the hinge pin, knuckle up, on previously scribed line *C* on the underside of the tabletop, and scribe around the hinge with a sharp knife. Chisel out the recesses thus scribed for the hinge plate and the knuckle.

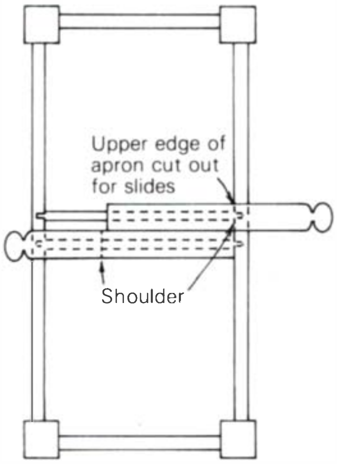
Once the hinges have been inset flush with the surface, which should automatically locate the pin center at the requisite depth, drill lead holes for each of two diagonally opposed screws closest to the knuckles. These two screws will be used to test the accuracy of the hinge location when the paper and clamps are removed. If you have been precise, you will have a perfect joint.

To test the joint, lightly clamp the tabletop face-up on the bench allowing the necessary overhang while at the same time supporting the leaf horizontally. Sighting along the joint edge while gently lowering the leaf will reveal any inaccuracies. If the joint binds or a gap appears, the hinge location is faulty. The drawings above, which have been exaggerated for clarity, identify the possible faults and their causes. To move the hinge laterally, lengthen the hinge recess at the appropriate end, plug and glue the initial test holes, and redrill for the new position. To move the hinge vertically, either shim the hinge or deepen the recess. Once the fit is satisfactory, the remaining screws should be carefully inserted prior to complete dissasembly for finishing.

Working the traditional rule joint offers a special satisfaction. Unlike the dovetail or mortise-and-tenon joint, both of which are static, rule and knuckle joints by their very action impart another dimension to the craftsman's art. They play an active, visible, functional role while at the same time contributing aesthetically to the whole. Evidence of the manual process—its diversity, its ingenuity, its minute irregularities and its failures—bespeaks the apprenticeship served and stands as a signature of personal creation. Look for these signs and, having found them, cherish them. In this age of machines they are increasingly rare. ☐

Alasdair Wallace, 43, of Lakefield, Ontario, teaches high-school English. Woodworking has been his consuming hobby for 12 years.





Woodturning Chisels

The squarenose, the skew and the woodturner's sway

by Peter Child

I encounter someone almost every week who persists in calling *all* turning tools "chisels"—so let us get this out of the way first. Woodturning tools fall into two main categories: cutting tools and scraping tools. The cutting tools are parting tools, gouges and chisels. Scrapers are not chisels.

There are standard and long-and-strong chisels. L&S is our term for heavy-duty. Chisels 1 in. in width and more should be the heaviest available. Blade weight is important for control. A 1¼-in. blade and tang should be at least 13 in. long, 5/16 in. thick and weigh over 1 lb. A 2-in. blade and tang should be 15 in. or more long, ⅜ in. thick and weigh over 2 lb. Handles for these chisels should be 10 in. or longer.

Bench tools such as planes, firmer chisels and carving gouges may have two bevels, a grinding bevel and a secondary, very short sharpening bevel, both on the same side of the blade. A woodturning chisel has two bevels, but they are on opposite sides of the blade and are both grinding bevels—no additional sharpening bevels. The chisel should be sharpened, and kept so, in a dead flat plane from heel to cutting edge. Avoid even the slightest rounding or "hill in the middle," as my old master called it.

Grinding and honing — I am fond of hollow grinding because it saves time in honing. I use a clean, dry carborundum wheel 6 in. in diameter by 1 in. wide, spinning 3,000 RPM. The wheel is unguarded because I need access to its top, but I wear safety glasses that supposedly can deflect a .22 bullet from close range. Must test them sometime.

For me, accurate grinding by eye is easy. Most of my pupils, however, make a complete hash of it because they are nervous at the grindstone and tend to grip the tool too firmly, sacrificing fluid, smooth control. Grip the tool only enough to *rest* the bevel on the stone and maintain the same angle while moving it back and forth. The grindstone, kept clean by frequent application of a star-wheel dressing tool, does all the work. Because (for comfort) I grind on the upper part of the wheel I cannot use the grinding rest, so I rely on my hands, elbows tucked in, to maintain the angle. To sidle the tool I move my body—the "woodturner's sway."

Child sharpens his chisels on top of the grindstone without using the tool rest. He determines the proper angle by eye and maintains it with a light grip, elbows held close to the body. With the 'woodturner's sway,' he moves the chisel back and forth across the stone.

For a start, hold the chisel lightly. Note the height at which you first make contact and take one light pass, then look at the result. There should be a faint grinding scar nearer the heel than the edge of the bevel, say just below center. If there is not, try another pass, again noting the height. When you are near enough, put the chisel on the wheel, and with minimum pressure *keep it there,* swaying from the body to move it slowly back and forth over the wheel.

Now take a breather and let the chisel do the same. A pupil of mine, who is a metallurgist, told me that quenching hot steel in cold water weakens the steel. Before starting the wheel again, lay the blade on it with the handle down, tool edge up off the surface. Slowly lift the handle and feel the groove fit itself onto the wheel. Now start the wheel, bring up the handle into the fit position and resume grinding. In a few seconds, with the blade held in place by the groove, slowly lift the handle, spreading the width of the groove toward the chisel edge. When it has extended to within 1/32 in. of the edge, stop.

If you have made the groove too wide by starting too far down the blade, the chisel will still work, though not keenly for long, as the cutting edge will be fragile and need frequent resharpening. This will gradually reduce the length of the bevel, so eventually all will be right again.

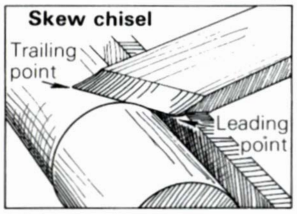
Hollow grinding removes metal that would otherwise have to be honed away. Because less steel is in contact with the stone, you can sharpen a hollow-ground blade faster. Honing gradually removes the hollow, and it takes longer, until you decide enough is enough, and regrind the bevel.

To hone the edge I hold the chisel upright, the handle supported on some firm surface, and rub the stone over the chisel. I find honing the other way, rubbing the chisel over a fixed stone, to be tedious and difficult—a rounded bevel almost certainly results. I use a lightly oiled, fine to medium, flat stone that fits my hand. With the stone firmly in contact with heel and edge, I rub until with the ball of my index finger I can feel a distinct "rag." Then I turn the chisel over and hone the other bevel until the rag appears again. I repeat this from side to side until there is only the barest trace of a rag, then remove it by stropping on a length of hide leather glued to a wooden base.

Using the chisel to smooth a cylinder — There are two chisel shapes, the well-known skew or long-corner, and the not so well-known bullnose or squarenose. They have distinctly different purposes. Most books and articles show the skew being used where the better tool for the job would be the squarenose. However, to illustrate its deficiencies, I will deliberately make the same error and start with the skew.

You need a piece of wood about 2 in. by 2 in. and as long as can be accommodated by the tool rest, say 10 in. It is easier if it is softwood, possibly pine, and easier still if it is green. First hand-plane or machine a shaving or two to see if it takes a good finish from the planer. If not, no amount of dexterity with the chisel will give a good finish. Mount the right piece in the lathe and rough out a cylinder. It is common to see this done with a shallow-fluted pointnose coving gouge, but this leaves a rippled surface. I use a 1¼-in. roughing-down gouge, which has a straight nose and a deep, half-circle flute. Easy to use and impossible to dig in, it takes wood down rapidly, leaving a fine, clean surface that requires only one or two passes with a chisel to make the job perfect. (See "Spindle Turning," *Fine Woodworking,* September '78.)

The purpose of the chisel is to plane the wood smooth. When we hand-plane in the bench vise, the plane is on top of the wood and easy to control. Try planing with the plane on the side of the wood and see how much control you have. In lathe work, using a chisel with the tool rest in its normal position, just under the centerline of the stock, has the same unsteady effect. Unlike any other tool between centers, use the chisel with the rest high so the blade lies almost on top of the cylinder rather than halfway down its side.



For the following instructions, we need to get our nomenclature straight. The long, acute corner is the *trailing* point; the other, obtuse corner is the *leading* point. The trailing point must not touch the wood or it will cause severe splintering, at the least. The leading point can touch the wood, but it blocks the shavings and is not good turnery.

Place the chisel on the right-hand end of the tool rest, its edge on the wood 1 in. from the tailstock. It is impossible to start the cut from the extreme ends of the cylinder because the blade must have support from the wood before cutting can commense. The trailing point should be safely away from the wood, and the blade tilted slightly so that only the lower left-hand corner of the blade touches the tool rest. The remainder of the under-blade is in the air, except where the edge touches the wood.

With the chisel on the wood and the lathe stopped, first see how far the chisel has to be lifted before the center of the cutting edge enters the wood just under top dead center. You will be surprised at how high the handle can come. Have someone turn the lathe slowly for you. Bring up the handle until the edge center starts to cut and push it along slowly, taking a small curl shaving. Do not push down hard with your left hand, or the corner where the blade touches the tool rest will make smooth travel difficult. Hesitant, jerky movements will result in a ribbed surface, or in a dig-in. Keep your left hand light; control is in the right hand, handle and body.

Start the lathe, spread your legs and make sure that you keep the handle against your right-hand side. Without moving the blade along the rest, lift the handle until the center of the blade wants to cut, then hold the handle tightly into your

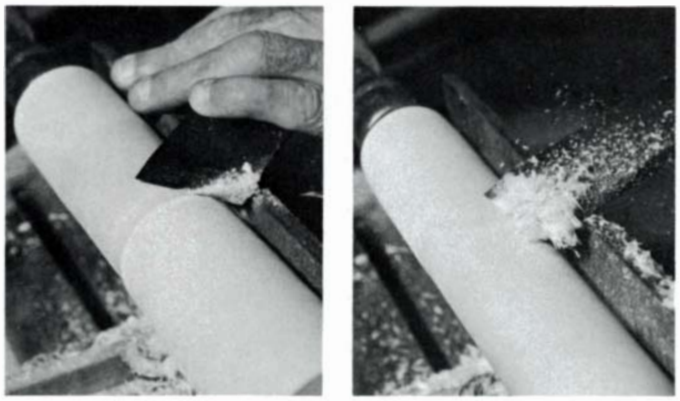


Photo at left shows a light trial cut from right to left with squarenose chisel. Only the center of the blade edge is cutting, slightly below top dead center of the cylinder. At right: a perfect full-cut. All of the edge except the points is cutting. Note that left hand is not necessary to steady the cut; control is in the right hand, chisel handle and body.

side and cut along, swaying from your hips and legs. The handle should not leave your side—your body goes along with it. Cutting tiny chips with the center of the edge is not using the chisel properly, but it will increase the confidence and understanding you need to follow the next instructions.

To get a proper shaving, much more of the edge than just the center must be cutting. You need to angle the chisel so that most of the bottom edge (toward the leading point) and a bit more of the top edge (toward the trailing point) come into action. Here is the problem with the skew. Because of its angle, the skew can be placed naturally on the wood only in the "amateur position," the trailing point well away from the wood. To get more of the blade cutting, with the handle firmly attached to your body, you have to move uncomfortably far to the left. It is not a good position to smooth from. So for this particular purpose the skew is out.

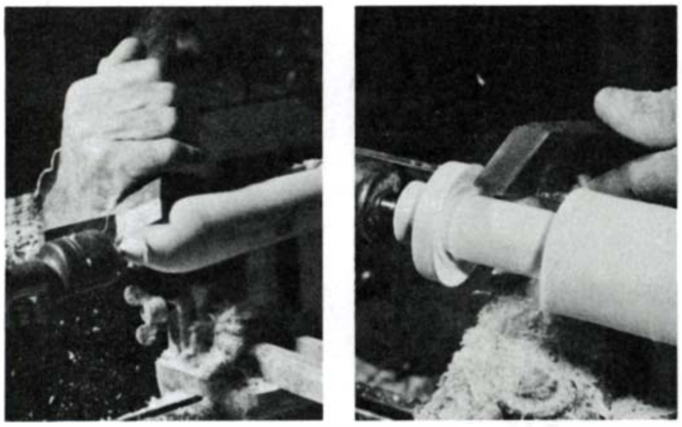
The squarenose chisel is far easier for smoothing a cylinder and much more comfortable. All the same rules apply, of course. If a 1¼-in. is available use it first for practice, cutting small with only the center, then move the handle over a little to the left so that more of the blade cuts, then a little more and the shavings are beautiful. A little too much and oops! Start again. Full-bodied cutting with a chisel means using as much of the edge as possible with neither the trailing nor the leading points touching the wood. As my old friend and master turner Frank Pain said, "Good woodturning runs very close indeed to spoiling the work."

A 1¼-in. squarenose is right for turning up to about 3 in. in diameter. For larger diameters you need a 2-in. and possibly a wooden heightener affixed to the tool rest so it comes up far enough. Actually a 2-in. is fine for smaller turning too: lots of blade so the trailing edge is comfortably away from contact. After practice from right to left, the right-hander can try cutting from left to right and become a leftie. Please remember to sharpen the chisel often.

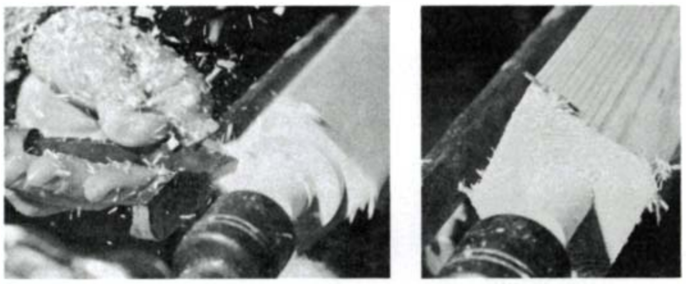
Using the skew in parting — The skew has the Achilles syndrome in its toe, not its heel. Because of its acute angle, the point is weak and susceptible to damage. If you cut with it incorrectly, the point overheats, and becomes weaker still. Take care in grinding and honing to keep the point angled properly, not rounded over. It must be exceedingly sharp.

Skew chisels are available in sizes from 2 in. to ⅛ in. I use a long-and-strong 1¼-in. for most work, and a lightweight

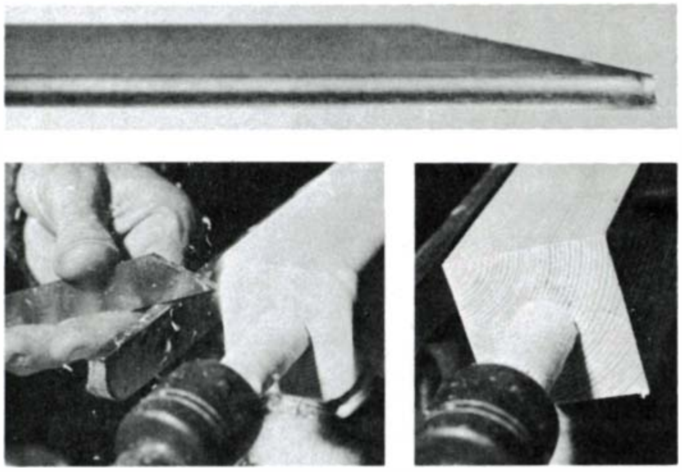
Cleaning up a rough parting cut with a skew chisel. Begin with handle down and over to the right so the left-hand bevel will be in contact with the cut surface. Slowly raise the handle, arcing the point into the work, to slice a thin section. Do not move the bevel away from the cut surface or end the cut with the handle higher than parallel to the floor; the tool is liable to kick.



Variations on the right-angle cut: curved taper (planing with squarenose chisel), left, and saucer cut (arcing in with skew chisel), right. In each case the bevel follows in contact with the cut surface.



Traditional parting tool leaves rough surface and splintered corners because the side of the tool scrapes rather than cuts the wood.



Parting tool (above) invented by Roy Child, incorporating a grooved and pronged cutting edge, parts cleanly, eliminating need for clean-up with skew chisel.

½-in. for parting off because I can manage it with one hand. I also use it to mark off distances between turning features for, say, copy turning. Light nicks along a cylinder are clearer and more precise than pencil lines.

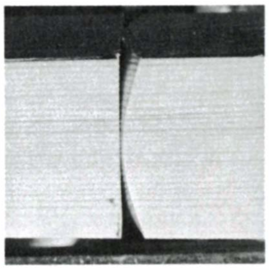
The skew-chisel cutting movement, different from the planing movement used to smooth a cylinder, always begins the same. Hold the chisel with the cutting edge vertical, skewed side up, and arc the long-cornered point (what for smoothing is the trailing point) down into the wood by raising the handle. The skew is like an ax, shearing across the grain. Pushing the point straight in (parallel to the floor) is just asking for trouble. Heat builds up rapidly and you have a bright blue tip. Most of my pupils never have the handle low enough at the start; if they do manage an arcing cut, the handle is too high on completion and the point ends below the center of the cylinder, resulting in a kick like a mule's.

Besides arcing the cut, the bevel must follow the point and stay flat against the cut surface, or you risk another kick. I do not offer the usual suggestion that the bevel *rub* the wood because pressing rigidly against the end grain can lever the point away and cause the blade to buck.

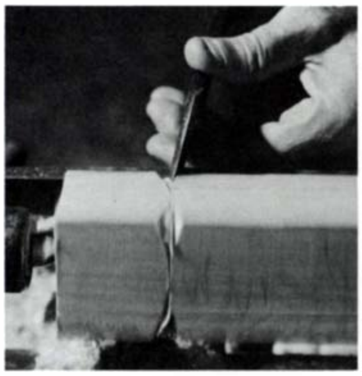
To practice, turn a length of 2x2 softwood to a cylinder and with a common parting tool cut notches ½ in. wide by ¾ in. deep, leaving ½-in. spaces between notches. The end grain will be roughed up because the side of the tool scrapes rather than cuts the wood. With the skew clean up the roughness on the right-hand side of the notches first—handle well down and the skew point up in the air. Start the cut at 11 o'clock and slice down the side of the notch in an arc. The handle is over to the right, the left-hand bevel in contact and only a thin slice of wood separates as you lift the handle. Too thick a slice is inviting trouble. A beginner's tool is guaranteed to kick. Do not attempt to cut the same notch again—move on to the next. Then try the left-hand side of the notches.

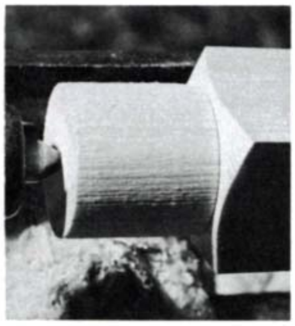
These cuts are all at right angles to the cylinder. It is possible to taper or curve the cut, but remember the point always enters first and the bevel is always in contact. You can also "saucer cut" to make inside curves, but not very deep ones.

Another job the skew does well is to form the pummels of furniture legs and the like—squares of wood left in turnings to take the rails in a mortise-and-tenon or dowel joint. The practice wood should be short lengths of 2x2. About 2 in. away from the headstock, make a line all around the wood with a try square and a soft pencil. You will see this line plainly when the lathe is going. Have a light behind the lathe directed toward you, and the corners of the revolving wood will show up in a blur, the darker shadow at the center being the size of the cylinder you have to reach. Make a cut down to this with a common parting tool. However carefully applied, this tool is bound to cause some splintering at the corners. Widen the cut toward the tailstock until there is room to clean up with the skew. Take the unwanted wood down to a cylinder with a ¾-in. squarenose roughing-down gouge.



One way to avoid the roughness of the parting tool is to use the skew alone to part the pummel. With the chisel on the tool rest, its handle over to the right so the left-hand bevel is at right angles to the work, lift the handle to arc the point in along the marked line. Cut no deeper than ⅛ in. Then





Rounded pummel is cut 'ax' fashion from alternate sides.

shift the handle to the left and cut the waste away, forming a half-*V*-notch. Another cut with the left-hand bevel at right angles deepens the nick, followed by another waste-removing cut. Continue until the cut extends to the face of the square. When you remove the waste with the gouge, the end of the pummel is clean and at right angles to the cylinder.

To make round end pummels, make the first cut arcing in to the left of the line, followed by a cut to the right. This forms a starting *V*-cut which you deepen by alternating from side to side until you have cut the wood down to the surface of the square. The point then smooths the curve, which the bevel follows.

The skew is also useful in the final stages of parting off. When wood is held between centers, you can part completely through only at the headstock. Use the parting tool first to turn down to the smallest safe diameter; depending on the wood I sometimes take it down to as little as 1/16 in. In very hard wood, boxwood, ebony and the like, a shallow, preliminary, diagonal sawcut helps a lot.

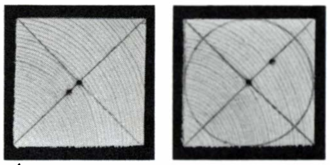
You needn't be afraid to bring the diameter down small. If you have had the unnerving experience of the wood suddenly fracturing and being thrown violently from the lathe, it's probably because you applied far too much pressure with the tailstock center when setting up. My drive center is a hardened four-prong, and I much prefer a live tail-center. Before setting up in the lathe I *hammer* the drive center into the wood in order to get a good deep drive from the four prongs. Then with the driving center in the headstock, I bring up the tail only a touch more than is necessary to fully engage the already prepared drive. I test for any slackness by vigorously rocking the wood by hand. I do not agree with those who center-punch each end of the wood, align it between centers and crank the tailstock in until the drive center engages. It's a pernicious practice that does the bearings no good.

Now when I have parted down to a judicious diameter I take the ½-in. skew in left hand alone, the right hand hovering over and around the turning but not in contact with it. One or two slicing cuts from the chisel and the finished turning, suddenly deprived of the power of the motor, comes to rest in my right hand. Try putting short lengths of ¾-in. diameter wood between centers, part down at the headstock end to ¼ in., then one-hand the chisel to nibble away. When you have recovered from the surprise that it is harmless and easy, you can progress to larger diameters. □

This is the fourth in a series of articles by master turner Peter Child, who works and teaches in Halstead, England. The previous articles appeared in the Winter '76, Summer '77 and September '78 issues of Fine Woodworking.

Turning four footstool legs off-center

This project involves some skew work and yields something close to a true cabriole leg. Begin with 2x2 sawn or planed hardwood, four pieces, 7 in. long. Draw diagonals at the ends, corner to corner, to obtain true centers. Now you need two other centers. The one at the headstock should be a little off true, say ¼ in., on any diagonal. The one at the tailstock should be on the same diagonal, but on the other side from true center, at a distance from true center equal to half the radius of the largest circle the square will hold. Draw this circle with a compass and be sure to locate the two off centers diagonally across the true centerline *(photo A)*. Two inches from the headstock end, square a heavy line all around with a soft pencil to mark the end of the pummel.



A

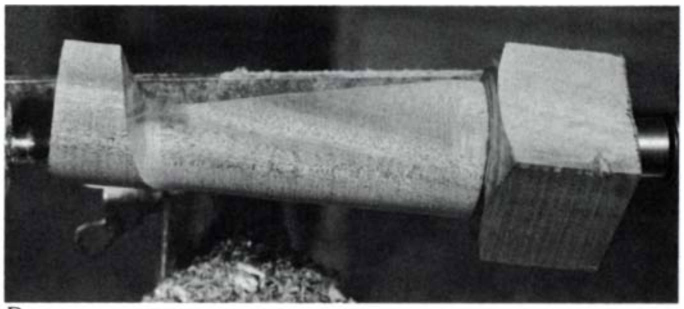
B

C

Set up the stock in the lathe between true centers and, with the skew, form the pummel. Then turn the wood between the pummel and the tailstock into a cylinder *(photo B)*.

Now set up the work between the other two centers and revolve by hand to make sure it clears the tool rest. When you start the lathe, you will see a shadow (better with a light behind the lathe), large at the tailstock and sloping down to nothing at the pummel. Within this tapered shadow will be a darker, conical shadow.

One inch from the tailstock, remove the wood making the faint outer shadow by alternating cuts from side to side with a ½-in. coving gouge until the bottom of the cove reaches the dark, central cone shadow *(photo C)*. Remove the rest of the outer shadow along the



D

length of the stock up to the pummel with a ¾-in. roughing down gouge. Stop the lathe and see what you've got *(photo D)*.

Finally, set the leg up once more between true centers and round off the toe with a long-and-strong beading and parting tool *(photo E)*. If the other three legs have been centered like the first, their shadow guidelines will be the same. Longer legs can be turned. The eccentric center at the foot is always half the radius, but the one at the headstock may need slight adjustment so that the conical shadows meet at the pummel. —P.C.

E

High School Woodwork

Students craft prize-winning furniture

by Laura Cehanowicz

To encourage the development of woodworking skills among high school students, Stanley Tools stages an annual competition in which good craftsmanship and original design get their just reward. The prizes are 20 cash scholarships, divided between two classes of applicants—students in 9th and 10th grade, and those in 11th and 12th grade. Each class has a grand prize of $1,000, three $200 prizes, three of $100 and three of $50. Students enter by sending plans, a materials list and a photo of the finished work; the cost of wood may not exceed $100.

Five of this year's winning entries appear here. Most of the students interviewed stumbled into woodworking by accident and were encouraged to take on challenging projects by enthusiastic instructors. Few of these students, however, when questioned about life after high school, see themselves as professional cabinetmakers. At least for now.

Eleventh and 12th-grade division grand-prize winner Eric Sheffield, of Adrian, Mich., has been working with wood for four years, the last three turning out jewelry boxes, cutting boards and the like in his own part-time business. His Endless Table with glass top, measuring 29 in. high and 4 ft. in diameter, is black walnut finished with Watco. The table is laminated in layers about an inch thick, secured by finger joints, then drawknifed, Surformed and sanded to shape. Sheffield, who graduated in June, will be studying engineering at the University of Michigan at Ann Arbor this September "I'm thinking of going into furniture design, but not right now. I want to go to college first," he says.

Tom Merry, of Waterford, Pa., captured a first-place award in the 9th and 10th-grade division with his cherry secretary. The front of the desk, which has a double curve, was first bandsawn, then belt and hand-sanded. The sides are glued up from five 2-in. to 3-in. strips of wood. The desk supports are operated by pulling on two small brass knobs. Merry, 15, took seven months to complete the desk, which measures 30 in. wide, 41 7/16 in. high and 17¼ in. deep. He prefers working in the traditional style because "it looks nicer."

Photos: Courtesy Stanley Tools

The mahogany piecrust table made by Barry Kent has an unusual ability: It comes apart and fits in a box 3 ft. square and 3 in. tall. The legs, which are dovetailed into the pedestal, are removable, as is the top, which is secured to the pedestal with a wooden pin. The table took second place in the 11th and 12th-grade division and measures 3 ft. in diameter and 3 ft. tall. Like many of the others, Kent, 19, of Marysville, Calif., prefers traditional work: "Modern furniture doesn't have as much design or technique." Kent graduated in June and is on his way to Texas to work in his father's shop learning auto mechanics, his true passion.

David Rowlette's acorn bed, which measures 59 in. wide and about 4 ft. high, is walnut finished with three coats of spray lacquer. The bed took grand-prize honors in the 9th and 10th-grade division and was his first major piece; before that Rowlette, of Berea, Ky., had taken general shop and made a cutting board. Rowlette, now 17, made a Queen Anne highboy last year, and Doug Roberts, his instructor, thinks Rowlette's fascination with the traditional could be a result of his influence. Rowlette plans to become an industrial arts teacher and will enroll in Eastern Kentucky University in Richmond after graduation.

The octagon drum table made by Roni Slater of Yonkers, N.Y., is poplar and measures 27 in. wide and 25½ in. high. The construction is frame-and-panel, and the front three panels swing open on a brass hinge. The table, which took third prize in the 9th and 10th-grade division, took six months to complete and now resides in the family living room. It was Slater's first piece of furniture; before that she "made wooden things to hang on the wall." Slater, 15, sums up her interest in the craft: "I'm totally left-handed, but that doesn't seem to matter in woodworking." After high school, Slater plans to go on to college, to study math. □

To Finish the Finish

Rubbing out dust, lint and brushmarks

by Don Newell

When it comes to finishing the finish, the type of material you're using will dictate which problems you face. Brushmarks and unsightly particles trapped in the hardened surface film, the bane of the wood finisher, are the most universal problems. Lacquer and shellac, which dry quickly, tend to show brushmarks, while varnish, which dries more slowly, is susceptible to dust. Fortunately, both problems can easily be solved by using the rubbing technique described here.

But first, where do the particles come from? The most obvious source is dust and lint settling out of the air, and sawdust kicked up from the shop floor. Second is dried particles of varnish released by inadequately cleaned brushes. Third is pinhead-sized clumps of varnish resin (called seed). These can be found in new, unopened cans of varnish, but are more common in partially used cans from the finisher's shelf.

Clean conditions are probably more important to good finishing technique than anything else, yet cleanliness is often neglected. The ideal finishing environment is a section of the workshop equipped with a filtered air-exchange system, but such a system is costly and takes space, and therefore is unavailable to most finishers. The practical alternative is a portable vacuum with hose and extension tubes, and a clean outlet filter. Before you open a can of finishing material, vacuum everything—the floor, the benchtop and the work itself. Then vacuum the ceiling, walls, tools and the tops of the lighting fixtures. Don't overlook your own hair and clothes. Many woodworkers mop the floor before finishing, but use only a damp mop. Too much humidity will interfere with drying of the finish, and excessive moisture will actually condense on the surface of freshly applied shellac or lacquer. This is the usual cause of "blushing" or "blooming," hazy white areas visible when the finish hardens.

As for dried particles from dirty brushes, even a good soaking in pure varnish solvent won't remove varnish that may have worked up into the heel of the bristles. The solution is simple. Obtain a wide-mouth glass jar with screw lid. Wash and dry it thoroughly, then nearly fill it with a half-and-half mixture of automobile engine oil and mineral spirits. After varnishing, use a rag to squeeze as much residual varnish as possible out of the brush. Briefly dip the brush into the oil/thinner mixture and squeeze it out again. Then leave the brush, with its bristles completely immersed, in the bottle overnight. The mineral spirits dissolves the varnish from between the bristles while the motor oil keeps the varnish fluid until it is removed.

After overnight soaking, mix up a concentrated solution of liquid soap and water in a coffee can. Squeeze out the brush and wash it thoroughly in the soap solution. Work the bristles vigorously between your fingers from heel to tip, again and again. Swish the brush up and down, then squeeze it dry. Using a fresh batch of soap-and-water solution, repeat the process. Then rinse the brush well under running water while working the bristles between your fingers.

If the brush is absolutely clean, there will be no odor of oil. If the brush smells or feels oily, wash it again. Then let it dry and wrap it in paper to keep it clean.

If brush-cleaning doesn't appeal to you, use a sponge-rubber applicator instead. These are sold in various widths, complete with wooden handles, at most hardware stores, or you can make your own from a small block of clean foam rubber. Used once and thrown away, these eliminate the dirty-brush problem. They handle differently from a brush though, so practice on scrap before tackling a real finishing project.

Particles of varnish resin, called seed, which come from the new or partially used can of varnish, are not so easily eliminated. Straining the varnish through a double layer of cheesecloth removes larger particles, but smaller ones pass through the mesh. If your varnish is seedy after straining, buy new varnish or plan to rub out the finish.

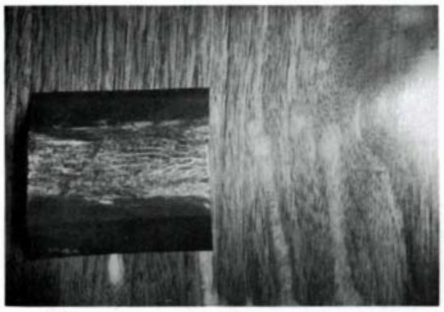
The rubbed finish — In the furniture industry, the process of adjusting the sheen of a finish to the desired degree of luster by abrading the dried film is called rubbing. Rubbing also eliminates specks and surface imperfections. It is totally different from the classic pumice-and-rottenstone varnish-rubbing technique many old-timers swear by.

Most hardware stores and all auto-repair shops carry carborundum or 3M brand abrasive finishing paper in a range of grits. The objective is to smooth the surface of the finish and cut off protruding particles embedded in the hardened film rather than to remove a measurable layer, so get a few sheets each of 400, 500 and 600-grit paper. One brand of 400-grit paper may feel much coarser than another—stay with a specific brand for uniformity.

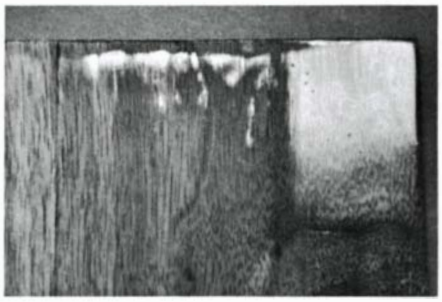
Cut each sheet into small sections, say 2 in. by 3 in., and fold a section around a felt or rubber block. The block distributes the pressure over the entire surface of the paper,

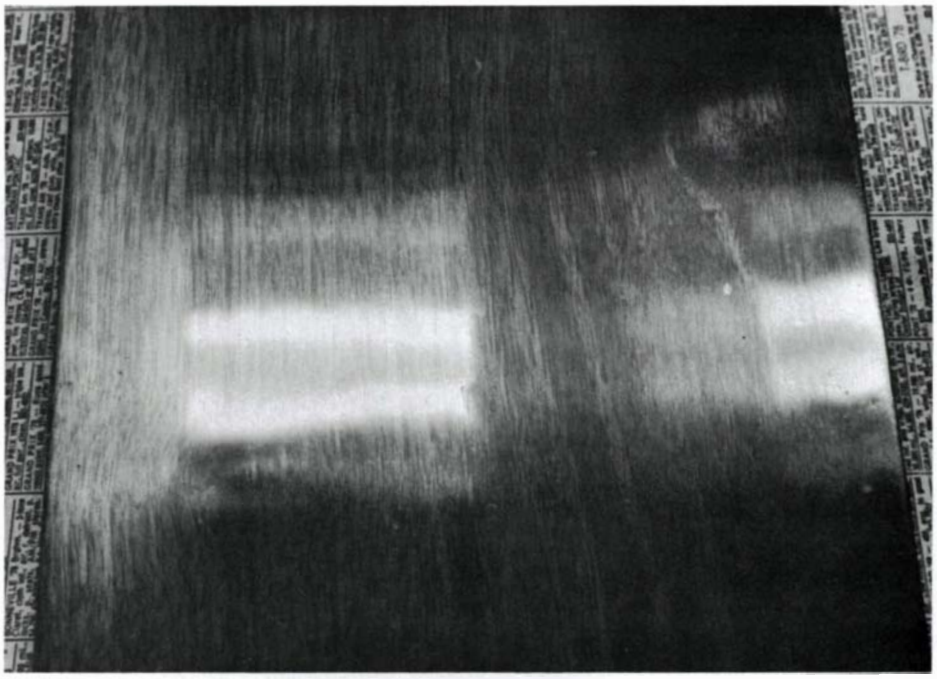
To rub out specks and imperfections, lightly stroke abrasive paper that has been wetted with mineral spirits across the surface in the direction of the grain.

Photos: Don Newell



Mineral spirits acts as a lubricant, keeping sanding particles from clogging the paper. If a coat of sanding 'mud' appears (above) you're not using enough. The shiny unsanded section of the panel (below, right corner) is the original varnish surface. Shiny spots on the edge show that the sanding block tipped as it passed over the edge, leaving an incompletely sanded surface.





Solid walnut panel shows effect of rubbing polyurethane gloss varnish (right half) and alkyd satin varnish (left half). The shiny strip at far right is original, unsanded polyurethane, loaded with specks and lint. The strip at far left is original, unsanded satin alkyd, equally full of specks and lint. After identical rubbing and sheepskin-wheel buffing of the two inner sections, the alkyd (left center) came up to a highly attractive but not glossy sheen. But the polyurethane finish (right center) has a visible scratch pattern from the sandpaper, and the luster did not improve with buffing.

minimizing the danger of rubbing completely through the finish at any one point.

Pour a small amount of mineral spirits into a flat dish. Starting with 400-grit, dip the block-backed paper into the liquid. Gently rub the finish in long strokes. At the end of each stroke, lift the block clear, return to the starting point, and start the next stroke parallel to and slightly overlapping the previous stroke. The danger with back-and-forth sanding is in cutting completely through the finish. Remember, gently, lightly, does it.

The surface of the finish must be kept wet at all times with the mineral spirits, which acts as a lubricant and keeps the sanding particles in suspension. Frequently dip the paper into the mineral spirits to wash the surface clean and to bring new thinner to the area being rubbed.

Periodically wipe the surface clean with a paper towel wetted with clean mineral spirits. Let the surface dry and examine it in a good light. If it has been abraded evenly, and there are no shiny spots indicating skips or misses, change to the next finer grit and repeat. Then go to the finest paper and stop. Even when cutting with grit as fine as 600, corners and edges must be treated carefully because it is easy to cut completely through the finish.

When all specks and imperfections have been cut down evenly, wipe the surface once again with fresh mineral spirits and a clean cloth, turning constantly to pick up all remaining traces of the sanding mud. Let the surface dry completely—half an hour or so.

If you like an almost matte surface, nothing else need be done. If you prefer moderate luster and the appearance of greater depth, one or two passes with a sheepskin buff chucked in an electric drill will suffice. If you're partial to a waxed finish, though it isn't my cup of tea, this rubbed and buffed surface will respond beautifully.

Different finishing materials react differently to the same treatment. Gloss lacquer generally sands and buffs out to a finish of outstanding beauty, with a rich luster that no ready-mixed satin formula can equal. Shellac surfaces can be sanded glass-flat, but if shellac is to be buffed, keep the buff moving constantly. Shellac is comparatively heat-sensitive and a stationary buff can quickly soften and distort the film.

Each varnish responds to this treatment differently. For example, a typical satin (low-gloss) soya alkyd varnish sands easily under thinner-lubricated abrasive paper. When it is dry-buffed with a sheepskin wheel, it develops a highly attractive, even luster. The ability of the luster to reflect an image is about halfway between that of the original (unsanded) material and that of a standard gloss varnish. Apparently, alkyd varnish is buffable because it flows under the friction of the wheel just enough to even out the fine scratches left by the abrasive paper. Yet its flow is not sufficient to generate the harsh shine normally associated with gloss varnish.

On the other hand, a typical high-gloss polyurethane varnish rubbed with abrasive papers and dry-buffed with a sheepskin wheel exhibits a haziness or grayness, and retains fine scratches. Unlike alkyd films, polyurethane varnish doesn't flow under the buffing wheel.

If polyurethane and other hard finishes are to be rubbed to a scratchless luster, one further step is necessary. After rubbing with the abrasive paper, clean the surface with mineral spirits and let dry. Then hand-polish using a good compound such as an automotive polishing compound sold for polishing out a clear finish. It should contain a fine, friable abrasive compound such as tripoli, which breaks down more and more finely as polishing proceeds. □

Don Newell, of Farmington, Mich., is a paint and varnish chemist and an amateur furniture maker.

Cabriole Legs

Graceful curves hold sway over 18th-century design

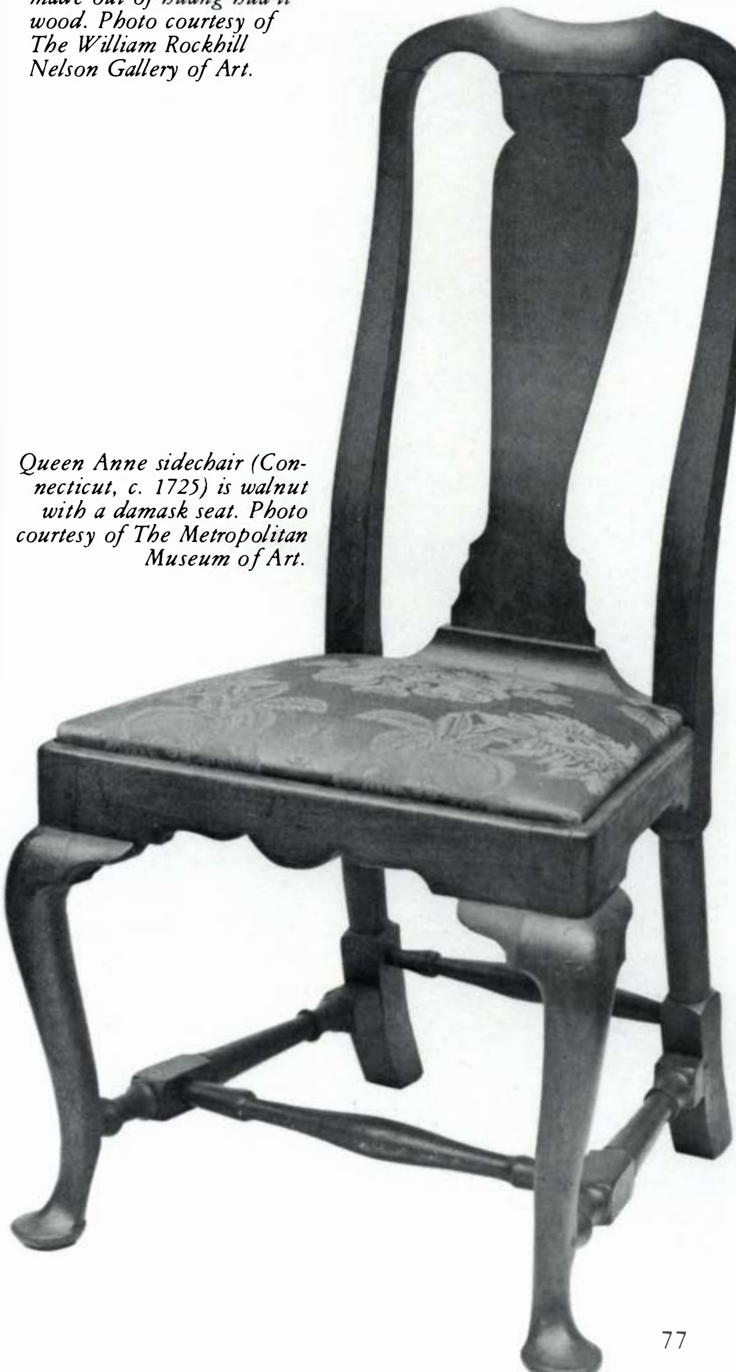
by Carol Bohdan

The chaste and restrained approach of Chinese chairs, such as this one c. 1700, is echoed in Queen Anne designs. Photo courtesy of The Metropolitan Museum of Art.

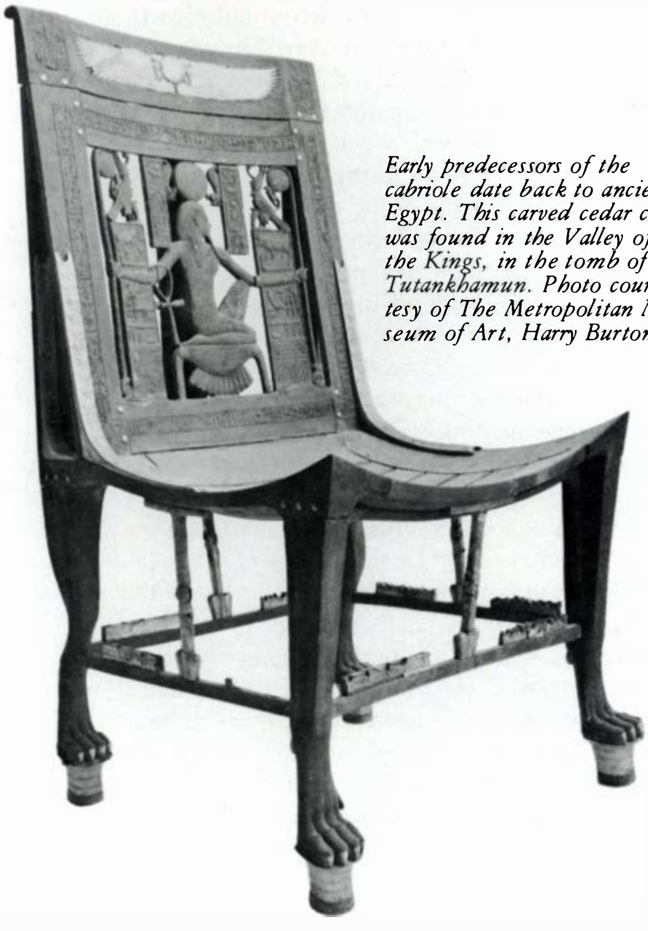
The cabriole leg is a decorative adaptation of a quadruped's leg from the knee down, which takes its name from the Italian *capriola*, meaning "goat's leap." It was known to the ancient Egyptians as well as to the Greeks and Romans, whose high-quality seats and beds were supported upon the legs of lions or beasts of the chase. It was from China, however, where the cabriole was known as early as the T'ang dynasty (618-907 A.D.) that it made its way West, transported by Dutch traders. Counterparts of the Chinese cabriole were seen in Portuguese, Spanish, French, Italian and English design by the last third of the 17th century. In France, the cabriole leg with a ball and claw foot *(Fine Woodworking*, Spring '78) was known as early as 1550, but the Chinese cabriole came to France at a time when design was in transition from the baroque of Louis XIV (1643 to 1715) to the rococo of Louis XV (1723 to 1774), and curvilinear forms were becoming increasingly important. The French were the first to formalize the idea of the reversed cyma-curved leg, and the first to call it cabriole.

The incorporation of the cabriole leg into Western furniture was revolutionary and affected a total rethinking of design as well as construction. It made the curving line, previously an aspect of baroque design, dominant, and did not depend upon elaborate carving for its effect, but upon well-

Late 15th-century Chinese table with cabriole legs is made out of huang-hua-li wood. Photo courtesy of The William Rockhill Nelson Gallery of Art.



Queen Anne sidechair (Connecticut, c. 1725) is walnut with a damask seat. Photo courtesy of The Metropolitan Museum of Art.



Early predecessors of the cabriole date back to ancient Egypt. This carved cedar chair was found in the Valley of the Kings, in the tomb of Tutankhamun. Photo courtesy of The Metropolitan Museum of Art, Harry Burton.

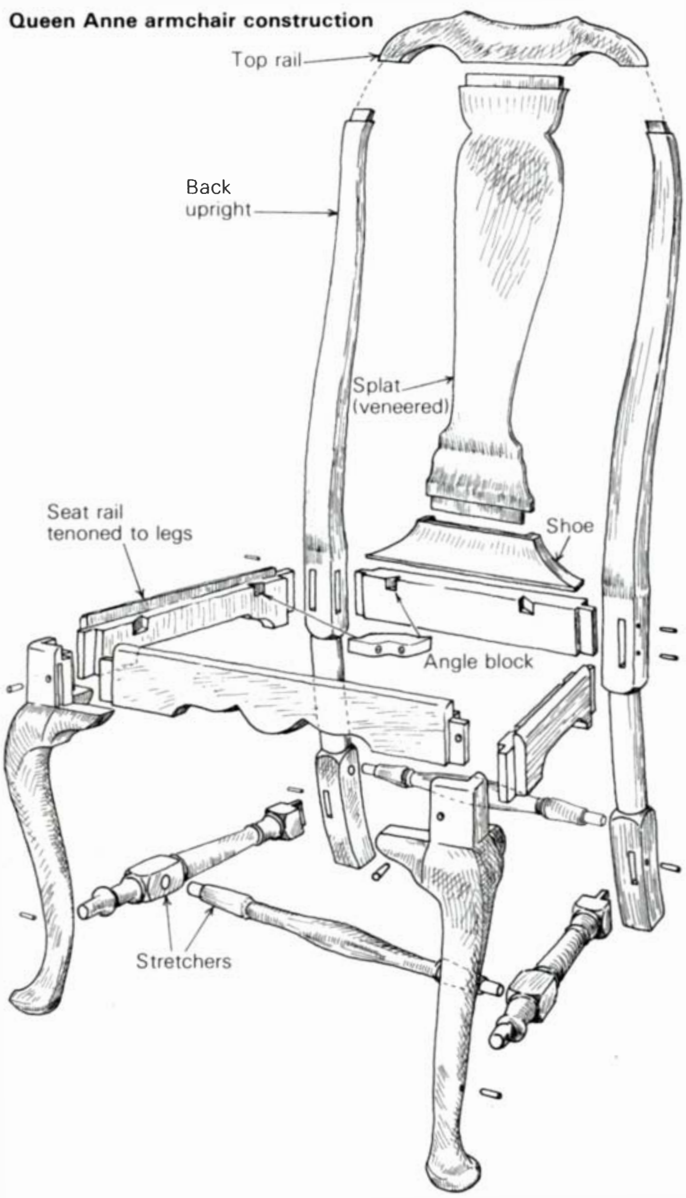


Illustration: Christopher Clapp. Adapted from *The Shorter Dictionary of English Furniture.*

Tripod legs keep furniture stable. Left, mahogany kettlestand (Newport, R.I., 1700-1785); center, mahogany basinstand (Newport, 1760-1775); right, mahogany candlestand (Charleston, S.C., 1765-1780). Photos courtesy of The Winterthur Museum.

thought-out and disciplined design. It stimulated a style of furniture in which the skirting of tables, the bonnets of tall chests and secretaries, the fronts of chests and the backs of settees, all echoed cabriole curves. This style expressed a demand for the best workmanship and a new interest in comfort, which developed in the more affluent, leisurely and relaxed atmosphere of 18th-century England. The finest expression of the cabriole is in the Queen Anne style of England and America, which closely approaches the chaste, restrained approach of the Chinese.

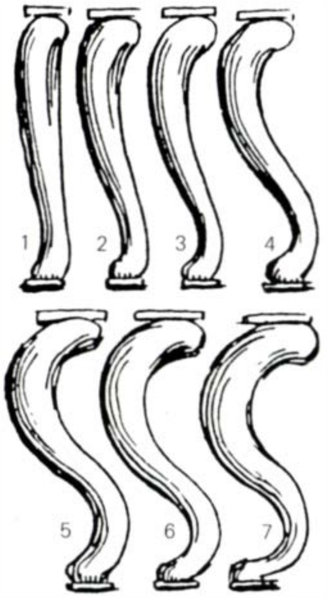
The cabriole curve was often extended to the entire design, as in the bonnet and doortops of this mahogany block-front desk with cabinet top (Boston, c. 1760). Photo courtesy of The Metropolitan Museum of Art.

The advantages of the cabriole leg are simplicity, strength and stability; elegance, utility and sound construction are united in the best designs. The type of chair used almost exclusively in the first half of the 18th century, through the reigns of Queen Anne, George I and George II, has shaped hoop backs and solid center splats veneered with walnut, which had almost entirely replaced oak as the principal fine furniture wood. In early chairs, the uprights are convex and retain the vertical line of Restoration furniture. The seat rail is straight, and the narrow cabriole legs ending in simple club feet are underbraced and united by plain, turned stretchers. Later on, the bowed shape of the uprights became more pronounced, and the top rail continued down to the seat frame in one unbroken line, as in Chinese chairs. The seat rail became convex, and the legs were slightly wider. Stretchers, which interrupted the smooth line of the curve and projected awkwardly from the fetlock, became unnecessary, because lowering the chair backs lessened the strain. The seat frame became a fairly deep, visible rail, rabbeted to accept the loose seat. The legs were firmly fixed to meet the front apron or curved in a manner that gave the utmost rigidity to the chair. The knees of the cabriole widened out.

Tables and case goods of this period were similarly strong and stable. Card and dining tables without stretchers were not only more elegant, but more comfortable to use. The tripod form, made up of three cabriole legs attached to a central pillar, lent itself to furniture destined to hold delicate and breakable items on uneven floor boards. Piecrust tea tables, stands for basins, candles, urns and kettles, and double and triple-tiered dumbwaiters for the serving of food and liquor, all depended upon the tripod form and its balance of curves for support and stability.

In 1745 the artist William Hogarth published a frontispiece to his engraved works in which he drew a serpentine line and placed under it the words "The Line of Beauty." In response to requests for an explanation of this, he wrote *The Analysis of Beauty* (1753) in which he explained what constitutes beauty and grace in certain forms and lines, including the cabriole leg. Commenting on an illustrative plate show-

William Hogarth's Line of Beauty



ing seven legs, the author says: "All sorts of waving-lines are ornamental, when properly applied; yet, strictly speaking, there is but one precise line, properly to be called the line of *beauty*, which in the scale of them is number 4: the lines 5, 6, 7 by their bulging too much in their curvature becoming gross and clumsy; and, on the contrary, 3, 2, 1, as they straighten, becoming mean and poor. . . ." This observation probably had little impact in the workrooms of London cabinetmakers, because by then the cabriole leg was passing out of fashion. In his *Gentleman and Cabinet-Maker's Director* (1754), Chippendale advocated a straight leg as a refreshing change from the cabriole, which had by then dominated English design for half a century.

In the American colonies, however, the cabriole leg persisted to the end of the century, and it was here that it enjoyed its greatest popularity. Regional styles developed rapidly—Colonial craftsmen each interpreted the cabriole independently, producing a richly diversified collection of legs deviating in all directions from Hogarth's line of beauty.

There are many ways to carve a cabriole leg. Massachusetts Bay furniture (Newburyport, Salem, Boston, Roxbury) epitomizes a fine, unbroken line in the undercut leg. Connecticut legs are more angular, carved with less confidence. Pieces from this area often display the broken cabriole leg, typical of embryonic English examples. New York furniture, made for predominantly Dutch patronage, is broader and bigger than its Colonial and English counterparts, with bolder lines exemplified by an exaggerated curve at the ankle. Squared cabriole legs are typical of New Jersey furniture, as is the use of a bracelet, cuff or "wrister" carved above the ankle, sometimes seen on English pieces. In the case of New Jersey, however, this ringlet is carved on only two sides and not all around the leg in a smooth line, as in English work. Virginia-made furniture has kneeless, almost straight, rounded legs, terminating in a slanted pad foot that is typical of early English cabrioles. A certain stiffness of carving almost always characterizes English provincial legs throughout the 18th century, the secret of the perfect curve never quite mastered by the country craftsmen.

The structure of cabriole chairs, whether of the Queen Anne or Georgian period, differs from one region of America to another, just as American chairs differ from English chairs. The way in which the front cabriole legs are fastened to the seat rail is often a clue to origin. In Philadelphia chairs, the framing around the seat is one continuous piece, and does not break at the corners. The leg is pinned from the top of the inside frame. The contour of the frame does not follow the seat, but is usually a perfect square, with sufficient thickness of wood to provide extra support for the round pin that goes down into the leg. In New York and New England the legs are carried behind the seat rail up to the top, so they actually form the curved corners of the seat. They are then braced on either side with inside blocks. The construction of the English Queen Anne chair closely resembles this pattern—the leg is pushed up into the seat rail, which is tenoned into and underbraced by a large corner block.

In Philadelphia, the Queen Anne chair and Chippendale chair achieved their richest forms, with a balance of interlocking curves and a selection of tasteful ornaments, reflecting the best of English design. The fine curves of Philadelphia furniture, with its graceful legs and delicate ankles, come closest

Gate-leg breakfast table of maple and soft pine (Massachusetts, 1725-1740) has almost straight legs, pad feet. Photo courtesy of The Henry Francis du Pont Winterthur Museum.

New Jersey dressing table, walnut, c. 1720, has characteristic wrister carved above the ankle. Photo courtesy of The Henry Francis du Pont Winterthur Museum.

Curves dominate design of walnut Philadelphia corner chair (1745-1765). Note trifid foot. Photo courtesy of The Henry Francis du Pont Winterthur Museum.

Philadelphia easy chair, 1750-1790, is mahogany, black walnut, yellow poplar and pine. Photo courtesy of The Metropolitan Museum of Art.

to Hogarth's ideal. The web, trifid, claw and ball and pad foot were all used by Philadelphia craftsmen, and the hairy paw foot, reserved in America only for pieces of the highest quality, distinguishes a choice group.

New England furniture in general is characterized by delicate and light proportions. The silhouette of the New England chair is more slender than its English prototypes and tends toward greater verticality. The extreme refinement and delicacy of cabriole legs may explain the persistence of turned chair stretchers, which are found in New England into the Chippendale period after they were discontinued elsewhere.

The "easy chair," known popularly today as the "wing chair," was a much sought-after item in America. By about 1770 this fully upholstered chair, with its curved back, arms scrolling in *C* or *S* curves and cabriole legs had passed out of fashion in London, but continued to be hugely popular in America. When exposed, the frames of these chairs reveal structural differences that were dictated by regional differences in design.

The cabriole motif has never been dropped from the repertoire of Western furniture design. In the Regency period (1810-1820) the evolution of the leg came full circle, returning to the style of its early prototypes. Fantastic and often bizarre designs for chairs and tables were enlivened by naturalistic lions' legs and paws or cloven feet, developed by such designers as Thomas Hope (1769-1831), whose designs were based upon sketches of ancient furniture he saw while traveling through Egypt, Sicily, Turkey, Syria and Spain. The cabriole leg was subjected over the course of 200 years to continuous usage, evaluation and interpretation. In the 1830s it appeared in English design books as part of a revival of the style of Louis XV. It appeared in the work of John Henry Belter (1804-1863), a New York craftsman working in the rococo revival style. It was used in French and Belgian designs in the era of Art Nouveau and it was seen again in the period of Art Deco, when such designers as Emile-Jacques Ruhlmann returned to the spirit of Louis XVI classicism. But, however interesting alternate interpretations of the cabriole style may be, more often than not they lack the innocence and unaffected grace of the original. □

Carol Bohdan, of New York City, is the publisher of Nineteenth Century *magazine.*

Making Cabriole Legs

Rasps smooth complex shape

by Edwin Krales

I first became interested in cabriole leg construction when I received a call from a prospective client about building a Queen Anne gaming table. At the time I knew nothing about cabriole style legs except that I liked them. Their grace and simplicity were appealing to me, and the skill required to make them seemed to be of an advanced level. For the most part I am a self-taught cabinetmaker, so I began doing the necessary research.

I looked at every different kind of cabriole leg I could find. The task was rather simple since I live in New York City, where antique shops and museums abound, and much of my business consists of repairing old furniture. I gained many insights into period and geographical differences (see page 77), along with threats from uniformed museum guards to stop crawling around under tables or be escorted to the nearest exit. Imagine such a reward for the quest for excellence and knowledge.

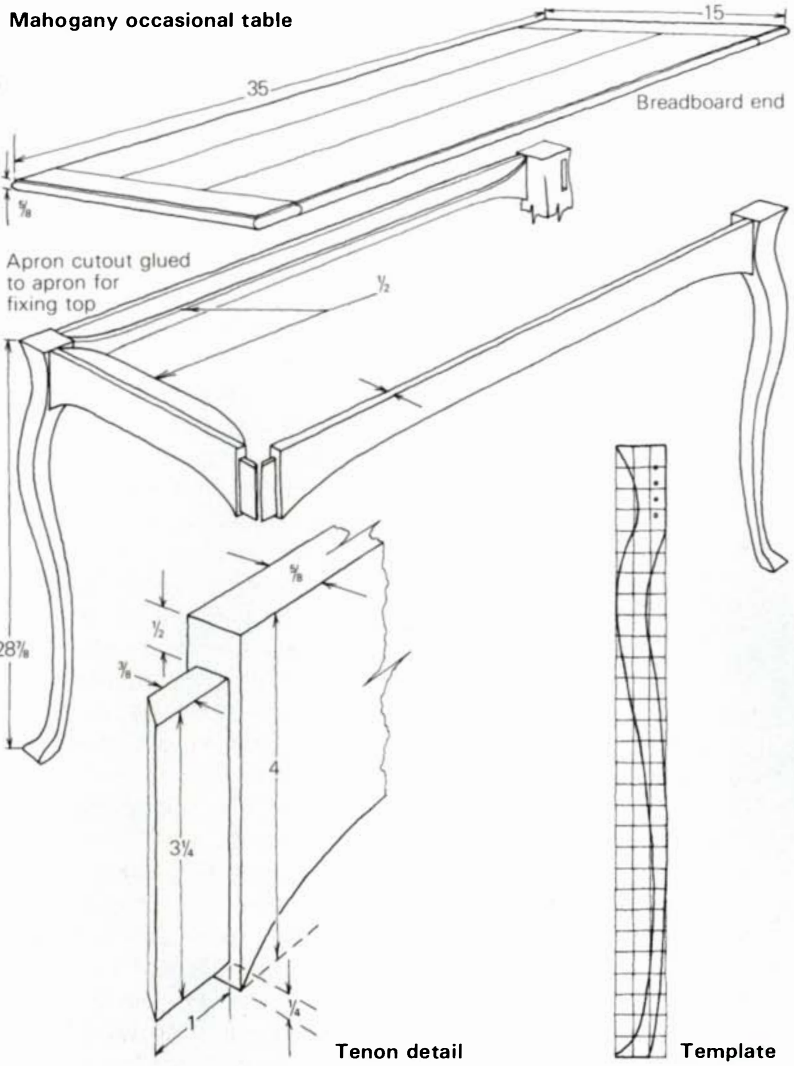
Once I had become familiar with the subtle shaping of the various historical styles, I had to make a template and find out how to get the curve out of a rectangular block of wood. This information might be in the library, but I have a pretty good rack of how-to books and I was unable to find any clear explanation. So I went to the local dump on Gansevoort Street and collected several large shipping skids that had frames made of 3x3s, of low-grade oak, maple and birch. I proceeded to grind them up on my band saw, along with a number of old legs from tables that were too far gone to repair. Finally, I realized that the template is simply the side view of the leg, and the same template is reproduced on two adjacent surfaces of a squared piece of stock.

To make a template when a leg is attached to a table, like the one in the local museum, take a piece of ¼-in. plywood, Masonite or stiff cardboard and cut it to length from the bottom of the tabletop to the floor. Then cut a slot at the top so it will fit snugly around the apron of the table. Slip it in place against a flat surface of the leg. Now take a new pencil and sand it in half for two-thirds of its length—from the side, it should look like a graphite sandwich. Trace the outline of the leg onto the template stock, with the flat side of the pencil tight against the flats on the leg. Where the leg becomes round, keep the pencil perpendicular to the template surface. You'll have to approximate only the upper portions of the leg on the back side, between the aprons, but don't worry—it is usually straight here. Cut out the template.

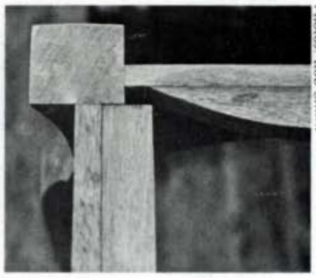
Hold the template up to your eye, as if it were a rifle, and sight the curves from top to bottom. You'll be able to see every imperfection in the cut you have just made, but you will also see the smoothness and flow of the line. Use a rasp and wood or cabinet files to remove the bumps from the line that you want, check it by repeated sightings, and finally finish it off with a cabinet file.

Rasps and wood files are among the most underutilized

Illustrations: Christopher Clapp



Staff photo

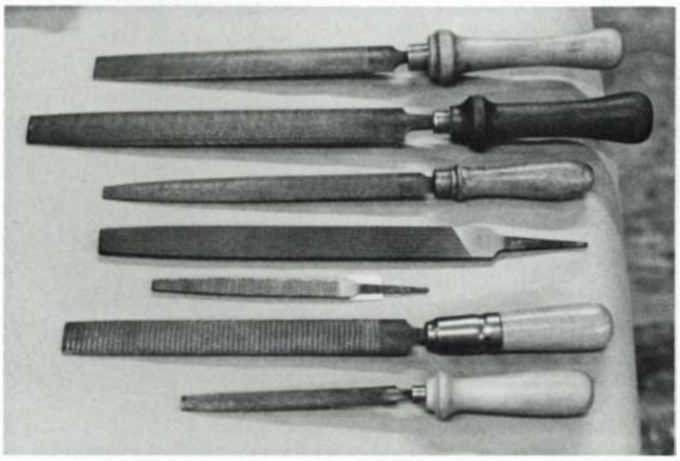


Photos: Rob Smith

Mahogany table of author's design is 35 in. long, 15 in. wide and 29½ in. high. The top is ⅝ in. thick, glued up from three boards with ⅛-in. splines; ends have 2½-in. wide breadboard-style caps, held in place by blind splines. The apron is 4 in. deep at the legs, and cut away to 2⅜ in. on a line continuing the curve of the legs, to increase the feeling of lightness. Cutouts from the aprons are glued to top inside edge, so top can be screwed on from below. Apron tenons are beveled at 45° so they will almost meet inside the mortised leg, and pinned with ⅛-in. dowels.

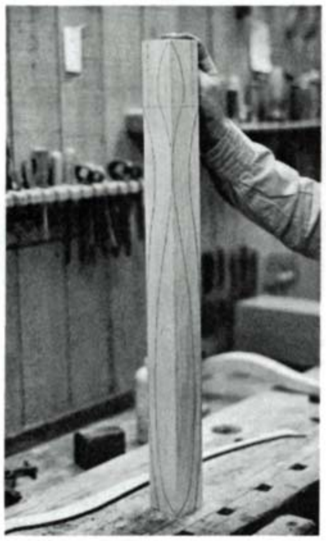
tools in the shop. The are particularly good for working woods with irregular, tough grain patterns that resist smooth cutting by edge tools such as spokeshaves and planes. The words rasp and file refer to the type of cut of the teeth. The terms coarse, bastard, 2nd cut and smooth refer to the fineness of the teeth, in that order. Rasps and files are made in several styles, evolved to suit the various branches of the trade. The types sold as wood rasps generally have large teeth in parallel rows, for rough work, and are the least suitable for cabinetmaking. Much better are the rasps made for patternmakers, cabinetmakers and lastmakers. Their teeth are usually arranged in curved or wavy patterns, so they don't catch in the grain of the wood. I buy my files from the Tool Works, 76 9th Ave., New York, N.Y. 10011.

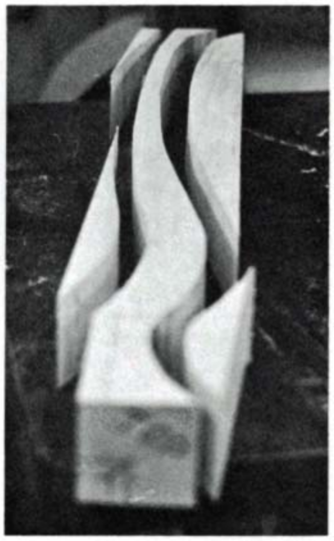
In making cabriole legs and for a great deal of other curved work, I have come to rely on several rasps rather than on the spokeshave, whenever the shape of the piece or the wood itself causes the grain to change direction frequently. Generally, the convex surfaces of a leg are worked with the flat side of rasps and files, and the concave surfaces with the curved side. When using these tools take as long a stroke as possible, pushing the tool away from you. Don't bear down too hard—



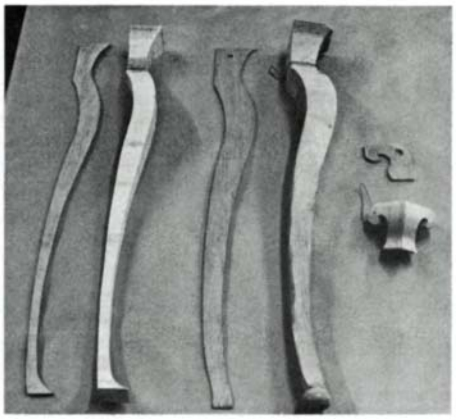
Rasps and files are better than edge tools for shaping complex curves, where the wood grain runs in several directions.

Lay out and cut leg-apron mortises while the stock is still square.





Trace the leg template on two adjacent sides of the blank, flipping it over so the knees meet at a corner. Bandsaw from one tracing, then tape the scrap back to the block to bandsaw side two. Three pattern legs, all in scrap stock, and the templates from which they were cut are shown below.



let the tool do the work. Be careful not to cut into the leg with the file's edges. By first working with the rasp and then the file you should be able to get a smooth line to the eye, and a smooth surface to the touch, ready for finish-sanding.

Once you have your initial template you will be able to see the correspondence between its shape and the resulting shape of the leg, and you will also be able to design a leg of your own. Some basic considerations include the foot shape (with or without carving or turning); the shape of the knee (it can be accentuated like a trotting horse's, with or without carving); the shape of the leg's top sections (flat or *C*-curved or eliminated entirely); and the overall weight of the leg. This last point is determined by the use to which the leg will be put. Chair legs must be shorter and squatter than the legs of an occasional table used only to hold up a lamp and ashtray.

The next step is determining the size of the stock necessary to produce four legs. This is easy—the width of the template taken four times, as thick as the template is wide, and the height of the table minus the top. But if you haven't made cabriole legs before, you should first make two patterns. The first is to see in three dimensions what the leg will look like, the second is to lay out mortise-and-tenon joints between the leg and the table's aprons, and to arrange the dowel pins that lock the joints. Cut a piece of stock to approximate length, square it and then cut it to exact length. Place the template on one face of the stock, lining up the back of the upper part of the template with the square edges, and trace it. No part of the template should overhang the wood, or the stock is too small. Then rotate the stock 90° and place the template so that the knees of the leg face each other, on adjacent faces of the wood. The backs of the template tracings should lie directly across the diagonal from each other. Bandsaw the back section of one tracing and keep the scrap. Cut out the front section of the same tracing. You will notice that you have just cut your other tracing off the wood, but that's okay. Tape all the scraps back onto the wood, using masking or paper tape. Six strips placed every five or six inches apart will usually do it. Retrace the template lines over the tape. Now cut side two and rejoice—the leg will appear as if by magic from the center of the tape-covered scrap. Now practice rasping and filing the surfaces so that when you cut your legs out of the good wood, you will know what you are doing.

For your joinery pattern, take another piece of genuine Gansevoort Dump stock and lay out the leg tracings as before, but instead of cutting right away, lay out mortises on the adjacent back sides of the leg, and the dowel-pin pattern on the two front sides. Any other details should also be prepared while the stock is in the square. If you want a ball-and-claw foot, turn an oversized ball. If a carved knee requires gluing on blocks, do this before you bandsaw. It is always easier to lay out and measure in the square.

Now that you are sure everything will work, you are ready for the real thing. Keep the following points in mind: Always work with truly square stock and don't slouch in this area, on the excuse that most of the squareness will be cut away. It will save much time and work later, when you have to fit the table aprons. Make all the leg blanks exactly the same length. If you have ever had to even up a wobbly table you'll know why. Fit templates from the top and back down to the foot, then trace. Make your mortising and dowel-pin layouts neat and square. Label everything as you go: front, back, top, bottom. Use the widest band-saw blade you and the curves can deal with. Experienced sawyers can execute these legs with ⅜-in. or ½-in. blades, which give a smoother and straighter cut. But the less experienced should use a ¼-in. blade.

If your leg can stand or almost stand by itself, its center of gravity and balance are right. If it looks and feels as if it is moving, it is perfect. □

Ed Krales, 36, operates The Joinery Fine Woodworking in Manhattan, a cooperative shop housing five cabinetmakers.

Contour Tracer

by Carlyle Lynch

Materials

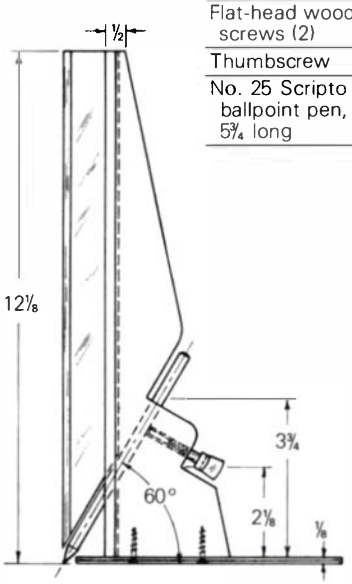
Pylon	¾ x ½ – 2⅞ x 12	white pine
Base	⅛ x 4¾ x 6¼	birch plywood
Dowel	3/16 dia. x ½ long	birch
Tracer	1/16 x 1 5/16 x 12	clear Plexiglas
Flat-head wood screws (2)	¾ x 5	
Thumbscrew	¼ x 20, ¾ long	
No. 25 Scripto ballpoint pen, 5¾ long		

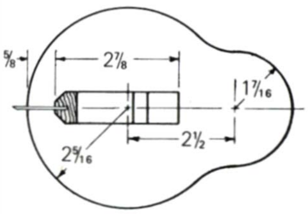
If you have ever tried to copy something as complicated as a cabriole leg, you will appreciate this homemade instrument. A thin edge of clear Plexiglas is simply slid along the profile of the object being copied while the index finger rests gently on top of a pen set into the pylon. Because the pen touches the pattern cardboard at a point immediately under the tracer edge, the dimensions of your tracing will correspond exactly to those of the object.

Each part to be traced must be positioned differently. For example, a piecrust tabletop would be placed directly on the cardboard; the leg of a Queen Anne lowboy would have to be supported horizontally above the cardboard. To trace the post of a four-poster bed, a piece of plywood with smooth cardboard taped to its surface must be clamped vertically to the square part of the post. The tracer, which is held horizontally, is then run up the side of the post against the cardboard.

I used white pine for the upright pylon of the tracer and ⅛-in. birch plywood for the base. The Plexiglas strip is 1/16 in. thick, its long edge beveled to 1/32 in. then sanded smooth. It is inserted into a 1/16-in. by 5/16-in. deep groove in the edge of the pylon—a 7-in. diameter hollow-ground plywood-cutting sawblade cuts the groove for a deliciously snug fit. A 1/16-in. router bit, a machinist's slitting sawblade or a scratch beader made from a ground piece of file tang (*Fine Woodworking*, Summer '78, page 60) will also do the job.

A 5/16-in. hole is drilled through the lower part of the pylon at an angle of 60° to the base to provide a sliding fit for a no. 25 Scripto medium-point ballpoint pen. If you use the equivalent Bic pen, which is slightly larger in diameter, ream out the hole with a 21/64-in. drill bit. Below and at a right angle to this hole, drill a tapping hole with a no. 9 twist drill, drilling into the hole for the pen. Tap this ¼-20 for a ¾-in. long thumbscrew. (A thumbscrew can be fashioned from a fillister-head machine screw into whose screwdriver slot a piece of 1/16-in. thick metal is sweat-soldered—brass preferred for looks.) The thumbscrew bears against a ½-in. long piece of 3/16-in. dowel, which puts a slight drag on the pen and prevents it from sliding out of place when the tracer is lifted. You may find that you can adjust the pen nicely enough not to have to steady it with your finger when the tracer is in use.





Illustrations: Carlyle Lynch

Fasten the base to the upright with two ¾ x 5 flat-head wood screws countersunk slightly to avoid scratching the pattern cardboard. I recommend light brown mounting board available from picture framers. It is smooth and dense, and can be purchased 3/64 in. thick in sheets 30 in. by 40 in.

Assemble the instrument and adjust the point of the pen to touch the cardboard precisely under the tracer edge. You may have to trim a tiny amount from the base of the pylon. Remove the tracer blade and brush on your finish, keeping it out of the tracer groove. If the groove will not friction-hold the Plexiglas blade, use a couple of dots of epoxy glue. □

Teacher, writer and craftsman Carlyle Lynch, of Broadway, Va., is the author of Furniture Antiques Found in Virginia.

Cabriole Templates

by Charles F. Riordan

Regarding the method of copying a cabriole leg: I secure a piece of stiff, white cardboard so that it cannot move against the side of the leg, and use a point source of light to throw a sharp shadow on the cardboard. The parts that touch the cardboard are traced directly, and where the parts curve away, you have a sharp outline to trace with no fear of a wobbling pencil giving false lines. The light has to be placed far enough away so it has no tendency to magnify the shadow and it has to be on a direct line perpendicular to the leg. Determine the best distance by calipering the leg and measuring the shadow to make sure they are the same. A good source of light is a slide projector, a quartz-iodine bulb or projector bulb.

Another good method is to use the replacement cylinder from a ball-point pen (no pencil-lead wear) fastened with a few drops of epoxy glue to a flat block of wood. The block size is immaterial, since all it does is cancel pen-point wobble.

I use both methods, and both work well. I also have used photography to copy shapes, forms and carvings in making exact copies of antique and other furniture pieces. Nothing like a good camera with a ground-glass view back for making an exact copy of a piece, with a scale included so that one may make an exact-sized enlargement and then chop it up into an exact stencil. □

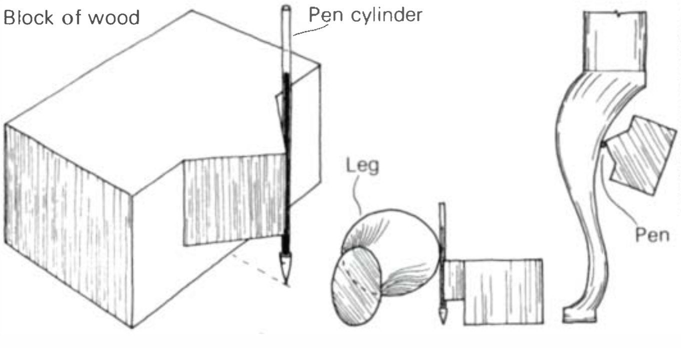


Illustration: Christopher Clapp

Charles Riordan restores and reproduces period furniture in Dansville, N.Y.

Paneled Doors and Walls

Colonial workmen relied on the right planes

by Norman L. Vandal

The earliest architectural application of bevel-edged paneling is found in wide-board wainscot, which covers or actually constructs the interior walls of our oldest houses. When applied to the interior surface of exterior walls, this wainscot was nailed horizontally to the vertical studs or planking which structurally supplemented the posts. Since the braced frame integrated with the chimney mass could support a second story, interior walls were never load-bearing, and in fact were structurally unnecessary. To divide chambers, and to provide a finished surface in both rooms, early housewrights used wide boards joined at the edges and fastened to floor and ceiling beams. These walls were from 1 in. to 1⅛ in. thick, the same dimension as the boards.

The conventional tongue-and-groove joint with the addition of a decorative bead was sometimes used to join such wainscot, but a beveled edge set into a groove on the adjoining panel appears to have been most common. For constant thickness and to make a wall with both surfaces in the same plane, the boards were beveled on both sides, resulting in a decorative feature visible on both sides of the wall. Feather-edged paneling is another name for such a wall treatment.

Panels joined by a simple tongue and groove had the undesirable habit of showing shrinkage as the two butted edges pulled apart. Feather-edged panels, having no distinct dividing line when viewed face-on, belied movement with the seasons, an important reason to use this type of joint. The beveled-edge joint was also used to construct interior and exterior plank doors. Wide boards were joined in the aforementioned manner and held together by clinch-nailed battens. Exterior doors were made of double-layered boards, the inside layer being horizontal and clinch-nailed through the vertical exterior layer. Original doors of this type are quite rare, time and weather having taken their toll.

In work dating from late in the 17th century we see many

(Text continued on page 86)

The paneled wall comes with its own vocabulary—one not found in modern dictionaries. Here are working definitions:

Fielding (or raising)—Sawing or planing a shoulder and a beveled edge all around a rectangular panel. The untouched center field thereby becomes raised.

Mullion—Vertical member within a framework. Also called a muntin, especially in windows.

Rail—Horizontal sticks of wood forming the top and bottom of a frame, to hold a panel. Rails are tenoned at both ends.

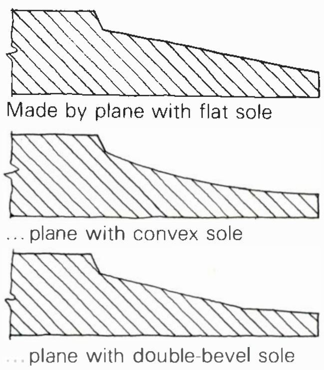
Stile—Vertical sticks of wood forming the outside edges of a frame that holds a panel. Stiles are mortised at both ends.

Frame—The rails and stiles, grooved on their inner edges, and assembled around a panel.

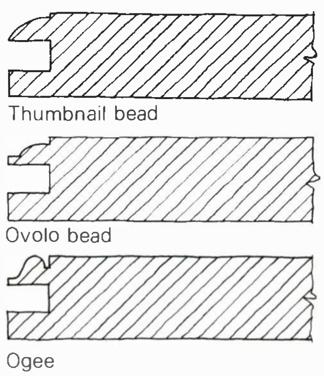
Stick—A long, narrow piece of wood suitable for making into rails and stiles. The process of planing a molding into the edge of a stick is called sticking, and so is the result. Such a molding is said to be stuck (as opposed to a separate molding nailed or glued in place).

Spring—The angle at which a plane is held to the stock.

Panel profiles



Rail and Stile profiles



Norman Vandal

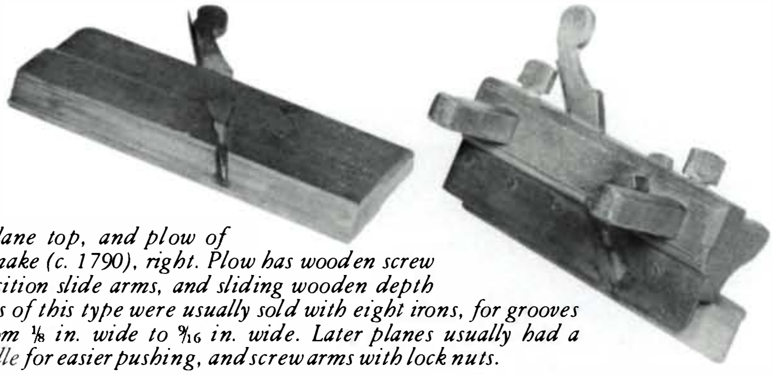
18th-century fireplace wall in a Massachusetts house, restored by author.

Norman Vandal

Kitchen was built and installed by author, during restoration of an 18th-century house.

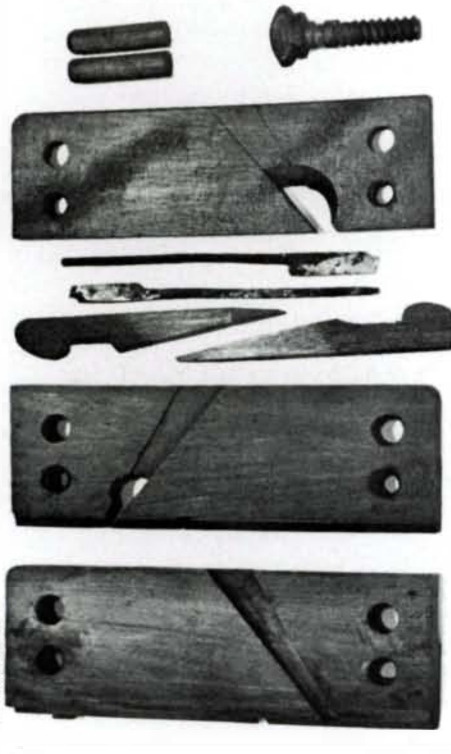
Three panel-raising planes, circa 1800. Left, raising jack made by J. Butler of Philadelphia, has adjustable fence and depth stops, and nicker cutter ahead of skewed iron. This prevents tear-out when working across the grain. Plane at center was made by A. Smith of Rehoboth, Mass.; right was made by S. Kimball. All three planes are 14 in. long, and range from 2⅛ in. wide to 3¾ in. wide.

Planes in use. Top, the A. Smith plane from previous photo; bottom, English panel plane, 3 in. wide by 8 in. long, has adjustable fences on sole and side for width and depth control.



Molding plane top, and plow of unknown make (c. 1790), right. Plow has wooden screw locks to position slide arms, and sliding wooden depth stop. Planes of this type were usually sold with eight irons, for grooves ranging from ⅛ in. wide to 9/16 in. wide. Later planes usually had a closed handle for easier pushing, and screw arms with lock nuts.

Rare 18th-century combination planes, which cut grooves in rails and stiles and molded the edge in one operation. Plane at left, made by J. Woods, has two irons; plane at right, maker unknown, has a single iron.



Norman Vandal

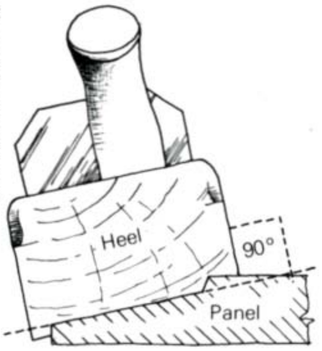
A rare, three-part molding plane made by Isaac Field of Providence, R.I., between 1828 and 1857 should have a third iron, missing when the plane was found, fitted to the central section. When first discovered at auction, all three parts were held together with a wooden screw. The plane parts did not fit together well, and a little experimentation revealed that they were never meant to—the main body (right in the end view) was fastened to one or the other parts. Attached to the central section, the plane simultaneously plows a groove for paneling and sticks the molding on one face of rails and stiles. With the central piece removed and the two outside bodies attached together, the plane at once plows the groove and sticks the molding on both sides of rails and stiles, for doors with panels fielded on both sides. The groove is ¼ in. wide and ⅜ in. deep, the moldings are both ⅜ in. thick. Plane from the collection of W. B. Steere, No. Kingstown, R.I.

EDITOR'S NOTE: The panel planes shown here are from the collection of Kenneth D. Roberts, who has written and published the book, *Wooden Planes in 19th Century America*. He has also written extensively on the history of clockmaking, and publishes facsimile editions of old tool catalogs. For more information, write Roberts at Box 151, Fitzwilliam, N.H. 03447.

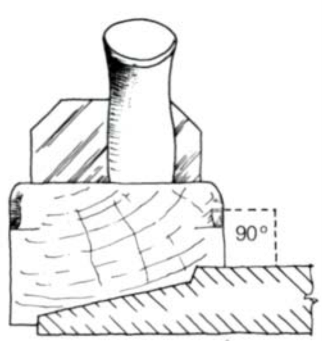
more raised-panel doors. A framework of mortised-and-tenoned rails and stiles formed the structure that housed the panels, which were beveled like the feather-edged boards. A groove was plowed into the framework's interior edges, into which the panels were fitted. On feather-edged boards a bevel was planed only upon edges running with the grain, whereas for raised panels, a bevel was also cut across the grain on the top and bottom edges. Many of the earliest doors had two wide panels, one above the other divided by a center rail. Later, four panels, two above two, became most common. The grain of the door panels always ran vertically, and the outside stiles, or vertical frame members, extended the full length of the door. Panels were never fastened, and were allowed to expand and contract freely yet invisibly.

On one side of a door, the inside edges of the rails and stiles were often given a decorative molding, mitered at the intersecting corners and forming a frame surrounding the raised panels. This treatment became the rule for most doors, despite the complications it caused in the making of the joints. Some doors were molded on both sides, but these are as scarce as they would have been difficult to make.

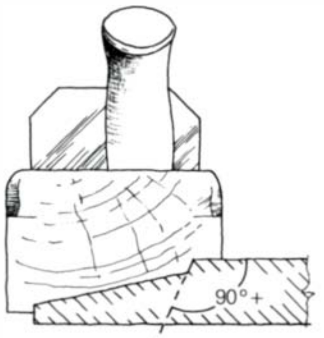
Illustration: Christopher Clapp

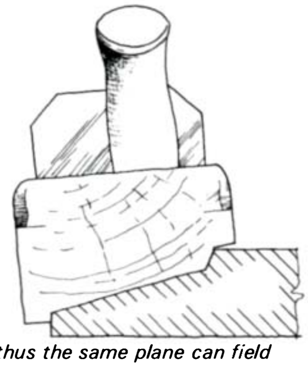


Sprung raising plane is held at 90° to bevel surface.

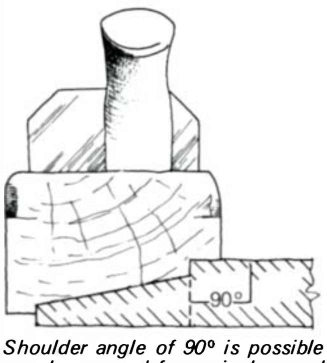


Regular raising plane is held at 90° to panel surface.

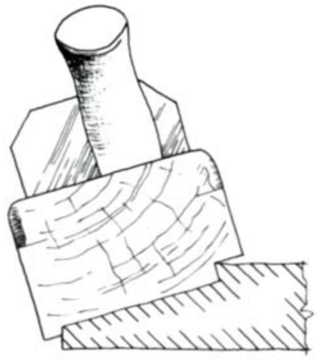




Shoulder angle is greater than 90°, thus the same plane can field panels of various thicknesses.



Shoulder angle of 90° is possible on planes used for a single panel thickness



... but on thicker stock such a plane undercuts the shoulder.

Near the end of the 17th century, wainscot on the surfaces of fireplace walls was replaced with sections of raised paneling joined in the same manner as the doors. An exception was the occasional use of an ungrooved framework of rails and stiles with rabbeted edges, on which bolection-type moldings were applied to house the raised panels. In all but rare examples, the decorative molding on the rails and stiles apparently was considered a necessary element of style. The back surfaces of raised-panel walls were never finished off unless they divided chambers and were visible in both rooms.

Toward the middle 18th century, raised-panel walls were nearly always of great beauty and style. Proportions were refined and the joinery was exacting. Walls adjoining the fireplace walls were sometimes sheathed entirely with wainscot to a height of about 3 ft.—the level of the window sills—and finished off to the ceilings with plaster. Stairways and entrance halls were embellished with paneling conforming to the geometrics created by the angles of the stair stringers. Raised-panel walls were integrated with ornate cupboards and fluted pilasters supporting elaborately molded cornices.

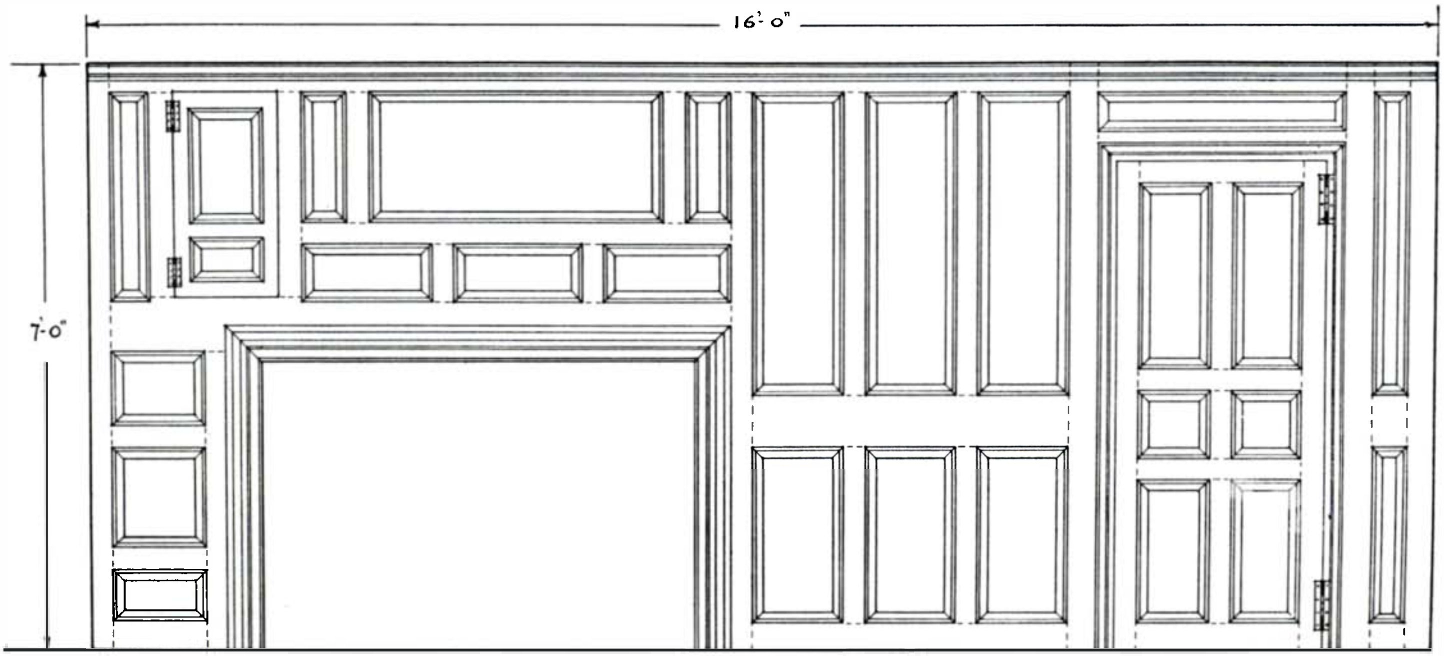
In the latter part of the Georgian period, the mantle with overmantle became the point of interest and portions of walls which were formerly paneled were now simply plastered. With the Federal period, raised paneling had all but disappeared. Even the overmantle was deleted as the fireplace surround became the focal point. Only the raised-panel door survived, its form and function being unsurpassed.

Panel-raising planes — Panels that were raised, or fielded, with raising planes exhibit two tell-tale characteristics. The shoulder of the beveled rabbet, where the feathered-edge meets the raised surface of the panel, is never perpendicular to the surface of the panel. Careful study of the soles and irons of planes will substantiate this fact.

Raising planes cut the shoulder and feathered the panel edge simultaneously. Because a single plane could be used to field panels of different thicknesses, the relationship between the angle of the bevel and the surface would have to vary. If the plane shoulder was designed to be at a right angle, on panels of heavy thickness the shoulder would be at an angle less than 90°, with obvious impractical consequences. Designing the plane to cut a shoulder bevel at greater than 90° avoids this problem. Of course the width of the groove also becomes a factor in the angle of the bevel.

Second, careful study reveals a convex sole on many planes, and a consequent concavity on the beveled edges of many panels. Not all planes have this feature, however, and it would be foolish to assume that panels with a flat bevel were not fielded with raising planes. On many planes, this convexity is actually a sole with two surfaces meeting at a shallow angle, its vertex where the panel would be fully seated within the groove of the rails and stiles. Planes of this sort, and those with a convex sole, have an advantage over the flat-soled type because the cabinetmaker can fit his panels to the groove with greater accuracy—the panel edge resembles a tongue more than a wedge.

Raising planes will seat themselves when the depth stop comes in contact with the panel surface, the cut being complete. However, the angle at which the plane is held to the stock will determine the thickness of the tapered edge. Scribing a line with a marking gauge and holding to it with the cut is one way to obtain consistent accuracy. A great many raising



Parlor paneling, Forbes or Barnes House, East Haven, Conn., from The Domestic Architecture of Connecticut *by J. F. Kelly, Yale University Press, 1924 (Dover, 1963). The dotted lines, added by Vandal, indicate joints between rails, stiles and mullions.*

planes were made sprung, that is, they had to be held perpendicular to the bevel surface and not to the surface of the panel. This allowed the planemaker to make a tighter throat on the plane, greatly improving the smoothness of the cut.

Panel-raising planes, regardless of basic type, always had their irons set on a skew. This facilitated cutting across the grain on the ends of the panels. Planes that have a spur cutter or nicker preceding the iron are at an advantage over those without, as they pre-cut the shoulder and eliminate tearing across the grain. Planes with an adjustable fence allow the user a greater variety in panel-edge widths, but do not function any differently than the fixed-fence variety.

I can vividly remember questioning a friend's purchase of a raising plane, thinking my own method of using fillester and block planes quite effective in fielding panels. Combining efforts on a project with this same friend gave me the opportunity to use his plane. Its effectiveness was unquestionable, a special tool performing a very specific function.

The thickness of the edge of the panel could only be determined from the actual width and depth of the groove plowed into the rails and stiles. For this reason frame stock was probably gotten out first, then the panels made to fit the dimensions of the preassembled rails and stiles. Stock for the frames was grooved with either the conventional adjustable plow plane or with a plane similar to the groove plane in a set of match planes. After the frame stock was grooved or plowed, if a molding was to be used, it was now stuck with the proper plane. The grooving and molding combination plane eliminated this second step, as it could cut the molding along with the groove. The scarcity of this plane indicates that a two-step procedure using the plow and molding planes was most common. The 18th-century molding plane shown on page 85 (second box from top), has an ovolo bead configuration found on a number of Federal-period doors.

The molding was stuck upon the entire edge for the full length of the stock. The excess where the rails and stiles meet was later removed in the mitering and mortising process. Tenons were cut only upon the rails, and were of a length allowing them to pass through the mortises in the stiles. Keeping the thickness of the tenon the same as the width of the groove facilitated making the mortise, but was not always the rule. In building a door, for example, the rails and stiles could be cut to dimension, the stiles being the total height and the rails the total width. The outside stiles, extreme vertical members of a panel framework, extended unbroken for the unit's full height. The two extreme horizontal members, the rails, extended unbroken between the outside stiles into which they were tenoned. Within this framework various arrangements of panels and framework could be devised.

Making panels — In reproducing raised-panel work, there are five basic principles necessary for historical accuracy. First, the cabinetmaker must extend his tenons entirely through the outside stile stock. Second, he must observe the rail and stile relationships mentioned in the previous paragraph. The discontinuity is immediately apparent when a raised-panel door (which was designed to hang vertically) is recycled as an overmantle. Let the doors remain doors. Third, he should field his panels in a manner resembling those fielded with a raising plane. Panels may be gotten out with various types of power machinery, but the time could be better spent making a raising plane which could be used repeatedly. Fourth, he must fully house the tenons within the stiles, and not cut corners by making deep slots in the ends of the stiles to accept the tenons. Doors made with slip joints can be pulled apart from top to bottom and are inferior in their ability to control seasonal movement. Fifth, he must not misinterpret the relationship between the tenon, the groove and the miter at the intersection of the molded edges.

Since the molding is stuck on the inside edge for the entire length of the frame members, that portion of molding where the stiles join the rails must be removed, as shown in the drawing on the next page. The molding on the stile is first mitered with a sharp chisel guided by a pre-mitered block clamped to the stock. The waste beyond the miter cut is then chiseled off or sawn off with a fine backsaw, so that the shoulder of the rail can butt against a flat edge on the stile. The molding of the rail must be mitered to fit the molding of

Miter block for trimming molding

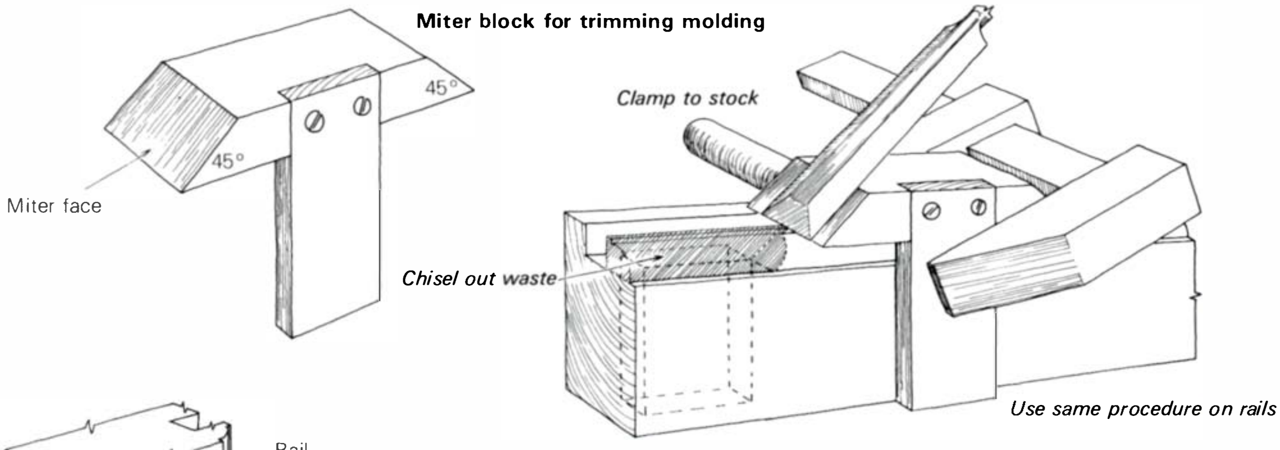
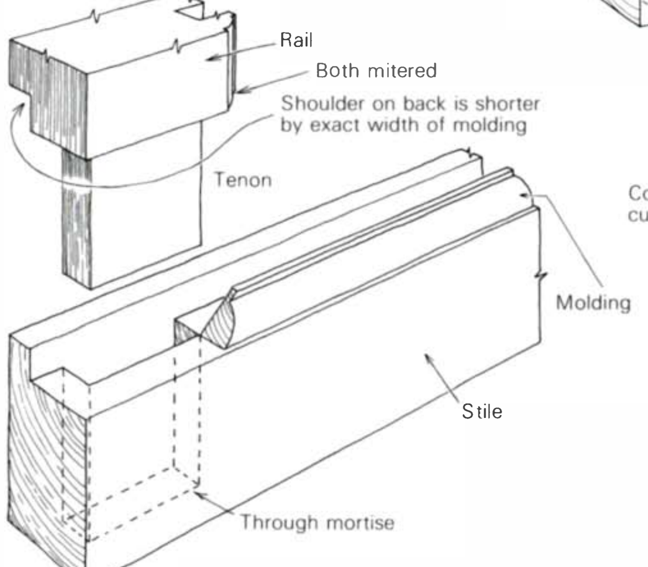
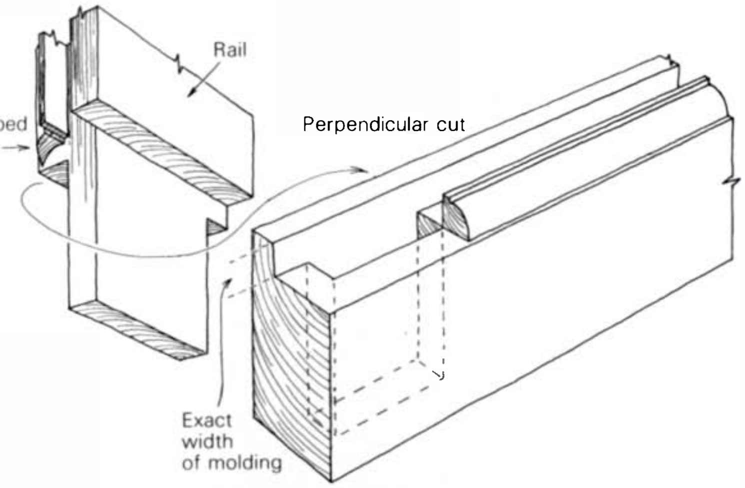


Illustration: Christopher Clapp



Mitered mortise and tenon joint of rail and stile



Coped mortise and tenon joint of rail and stile

the stile. Where the molding is not contoured, as on the backs of the rail and stile above, it needn't be mitered, and a simple butt joint suffices. Simply cut the rail shoulder so that the back face of the tenon is longer from end to shoulder than the front face, by the exact width of the molding.

Instead of the miter, a coped joint was most frequently used to join the moldings at the intersection of rail and stile. Here one molding is cut away so that its profile exactly and neatly fits over the adjoining molding. As with the miter, the joints on the reverse side of the door or wall unit are simply butted. When viewed face-on, the coped joint looks the same as the mitered joint, and it sometimes takes careful study to differentiate. The coped joint has one superior feature: It overcomes separation of the miter due to cross-grain shrinkage. The coped portion moves over the adjoining molding like a slip joint. If doors or walls are painted during humid weather, the coped joint becomes apparent in dry weather, when shrinkage draws the coped portion away from the line of paint and reveals an unpainted section of molding.

Only frame members having a tenon, generally the rails and center or mullion stiles, are coped. The moldings on the mortised members, generally the stiles and where the mullion stiles fit into the rails, are not coped. They are cut off square and perpendicular to the length of the stock, flush to the ends of the mortises.

The coping is done by first mitering the molding, as on the fully mitered joint. The actual cope cut is made with small carving gouges at a right angle to the face stock along the curved line created where the contour of the molding meets the plane of the miter cut. This line represents the shape of a molding of the same configuration coming into the coped molding at 90°. It is important to note that in using either the coped or mitered joint, the moldings stuck upon the edges of all frame members must be consistent. The coped portion of molding should fit snugly over the adjoining molding when the tenon is fully seated.

The pin holes, having already been bored through the stiles, are now used to locate the drilling points on the rail tenons. These are bored slightly closer to the shoulder of the tenon, so that the joint will be drawn together when the framework is pegged during final assembly. Pins are riven or split out and then whittled to approximate roundness. A slight taper is helpful in drawing the joint, and can also be easily whittled. The irregularities in the pin are enough to hold it within a perfectly round hole, bored slightly smaller than the rough diameter of the pin. Splitting and shaping pins require little effort, and scrap stock can be used.

In this day of power machinery and sophisticated glues and laminates, the art of getting out a raised-panel door or section of wall in the old manner has been forgotten by those outside of a circle of traditional craftspeople, knowledgeable tool collectors and old-house enthusiasts. It is a tribute to these people that the panel-making trade persists, to a limited but increasing degree. □

Norm Vandal, 30, of Roxbury, Vt., builds and restores traditional houses during the summertime, and makes period furniture during the winter.

EDITOR'S NOTEBOOK

Art furniture show, woodworking conferences

by John Kelsey

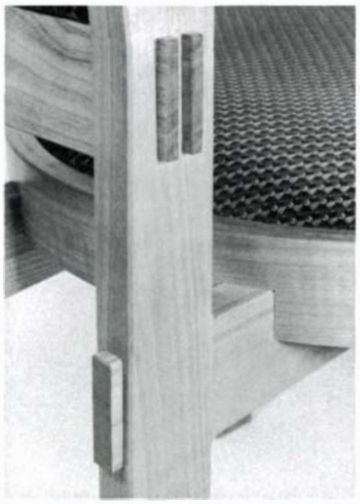
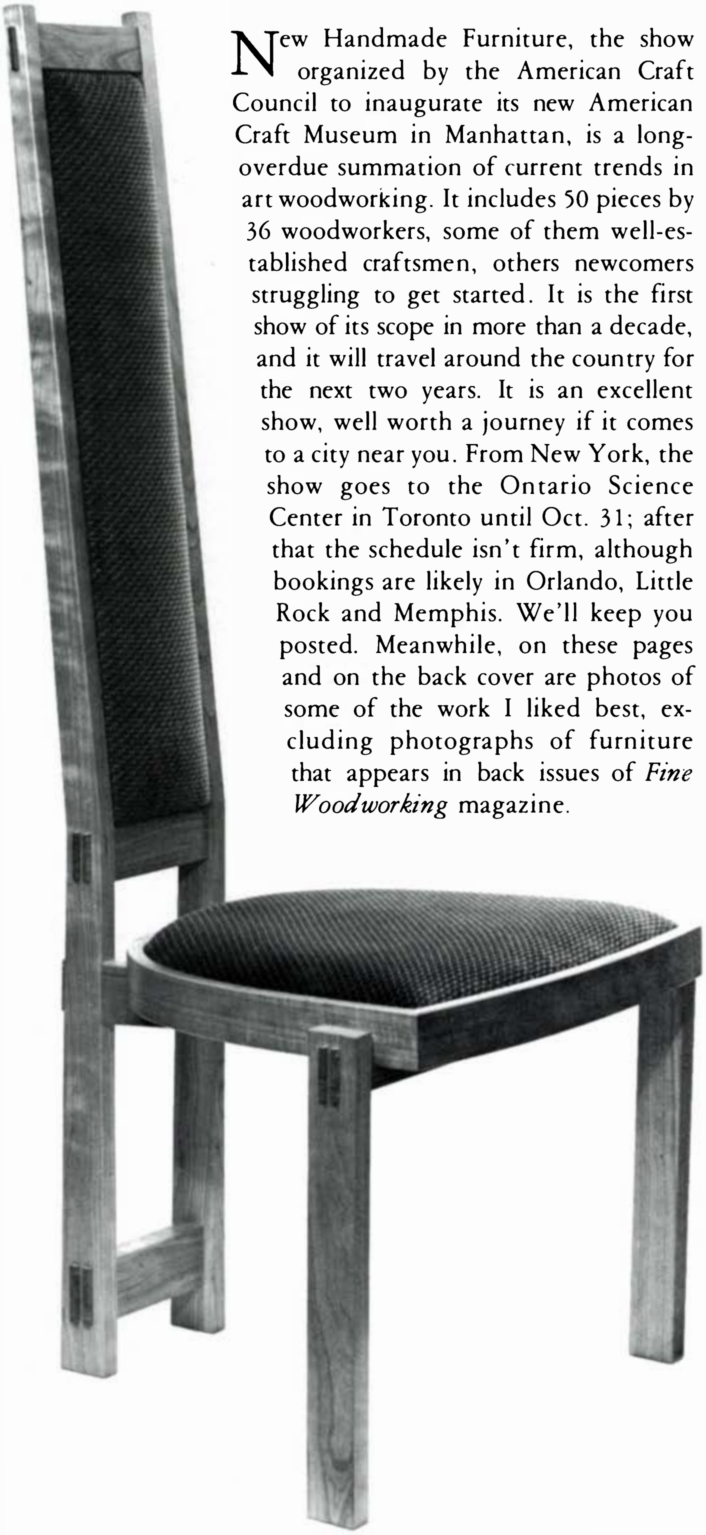


Photo: Doug Long, Photocraft

Detail of Hurwitz chair.



Chair by Michael Hurwitz of Newton, Mass.: cherry and cotton velveteen; 48 in. high, 20 in. wide, 22 in. deep. This chair is comfortable, and the exposed joinery is properly neat and tight. But given the stresses a chair has to withstand, one wonders whether the joints should be pinned or wedged, especially the large tenon connecting the seat support to the back leg. Photo: Bob Hanson.

New Handmade Furniture, the show organized by the American Craft Council to inaugurate its new American Craft Museum in Manhattan, is a long-overdue summation of current trends in art woodworking. It includes 50 pieces by 36 woodworkers, some of them well-established craftsmen, others newcomers struggling to get started. It is the first show of its scope in more than a decade, and it will travel around the country for the next two years. It is an excellent show, well worth a journey if it comes to a city near you. From New York, the show goes to the Ontario Science Center in Toronto until Oct. 31; after that the schedule isn't firm, although bookings are likely in Orlando, Little Rock and Memphis. We'll keep you posted. Meanwhile, on these pages and on the back cover are photos of some of the work I liked best, excluding photographs of furniture that appears in back issues of *Fine Woodworking* magazine.

Museum director Paul J. Smith selected the furniture to be exhibited from craftsmen's slide portfolios. He also installed a continuous slide carousel showing another 60 pieces that he wished to include, but could not fit into the gallery. Even so, several craftsmen have three or four pieces on display and thus seem over-represented, while some notable stylistic and technical trends are hardly evident. Smith deliberately chose furniture, not sculpture, but his emphasis still was on visual impact—some of the work is just barely functional. I also noticed that the pieces most closely derived from traditional furniture embody the best craftsmanship, whereas the wilder fancies sometimes aren't as well made. The drawers and tambours on some pieces were stuck shut, the combined result of working to tolerances that are too close and of the museum's unfortunate lack of humidity control—New York is notoriously muggy in the summertime.

National showings of art furniture are rare because the logistics of selection, shipping and insurance are difficult and expensive. New Handmade Furniture was supported by the National Endowment for the Arts, with matching funds from the lumber industry's Hardwood Institute and operating support from the New York State Council on the Arts. It received extensive coverage in the New York press and is bound to be widely noticed wherever it travels. This is probably its most significant contribution—more people become aware of what woodworkers are capable of doing, and are consequently more willing to buy or commission their own furniture from local craftsmen.

• • •

The group of woodworkers who are organizing "Wood Conference '79: The State of the Art" want you to know that they are going ahead from Friday morning, Oct. 5, to Sunday afternoon, Oct. 7, at the State University of New York campus in Purchase, which is near the junctions of Interstates 684 and 287 north of New York City. In the words of their brochure, "this conference will provide a very special opportunity for professional, paraprofessional and serious amateur craftsmen in wood to get together for an intensive weekend talking about wood and woodworking." The program centers around seminars conducted by leading craftsmen in the areas of design, tools and techniques, health and safety, and marketing. There will also be a gallery exhibition and a small trade show. Registration is limited to 300 people; the $50 fee does not include meals or lodging but the college has free camper hookups and tenting grounds, and there are quite a few motels nearby.

Some of the participants have been talking about forming an organization or a guild for woodworkers, and they'll probably try to make that happen during the proceedings. If you want to get in on it, go to Purchase.

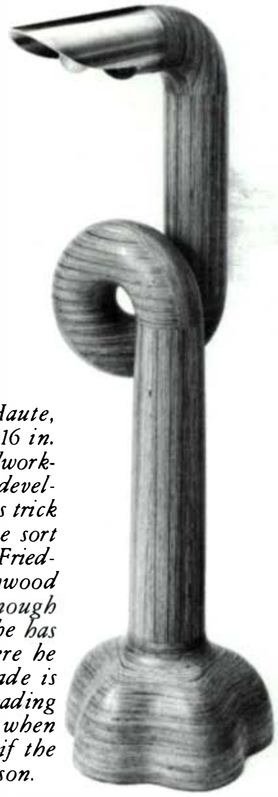
• • •

The following weekend, Oct. 11-13, there will be a woodturning symposium at the Industrial Education Department of Brigham Young University in Provo, Utah 84602. This is the first time this popular event has moved from its usual base in Newtown, Pa. Symposium West is being organized by Dale Nish, who teaches woodworking there and who wrote the book, *Creative Woodturning*.

• • •

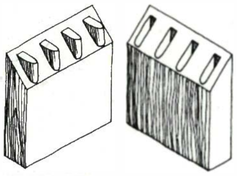
I must warn readers who answer ads in back issues of *Fine Woodworking* that we have received complaints about not getting wood ordered from Craftwoods of Calgary, Alberta, Canada. One reader lost $300 with nothing to show for it but months of hassling. The Calgary police have been notified.

Table Structure by Daniel Loomis Valenza of Durham, N.H.; English brown oak and red oak; 13 in. high, 46 in. wide, 60 in. deep. Valenza's table is minimal sculpture and function seems incidental, although there is no reason it wouldn't work in front of a sofa. The top, a beautiful wide board of brown oak, can swing from side to side and the red oak beams are suprisingly heavy—it's not in danger of toppling over. Photo: Bob Hanson.

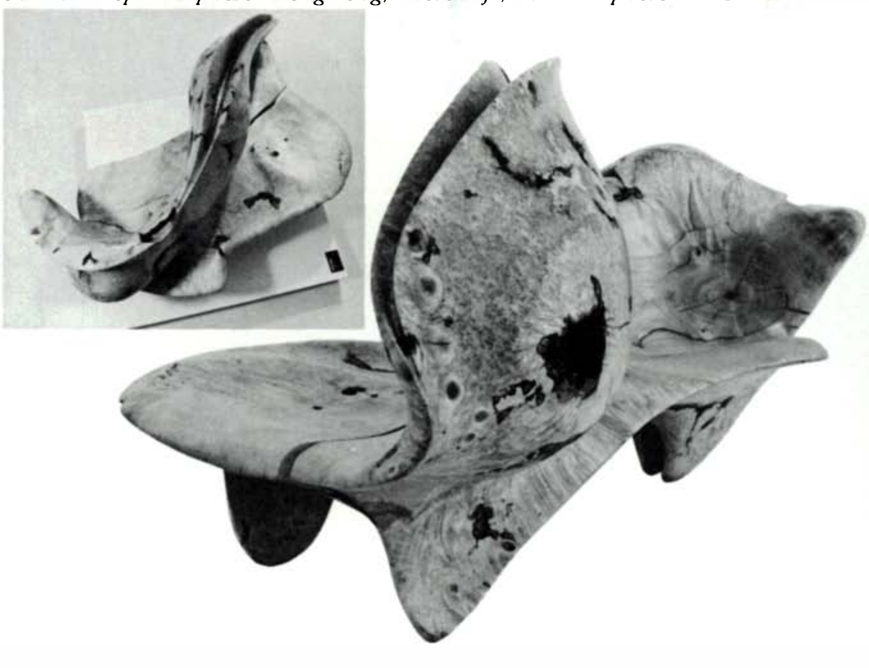


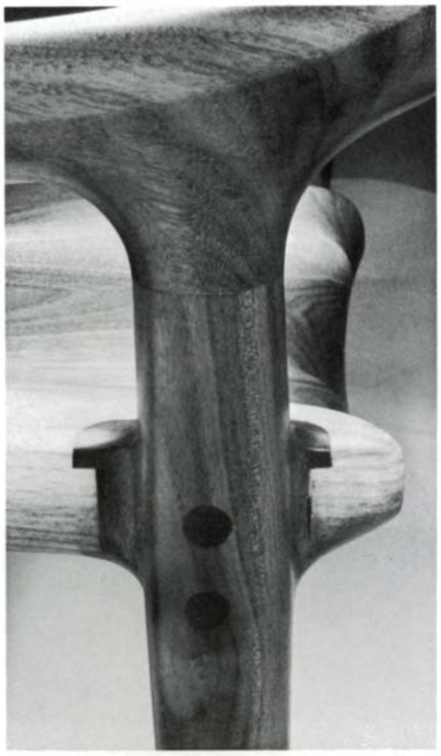
Reading lamp by Alan Friedman of Terre Haute, Ind.; birch plywood, brass; 47½ in. high, 16 in. wide, 16 in. deep. Friedman teaches woodworking at the University of Indiana, where he developed his approach to stacking plywood. His trick is a powerful pneumatic staple gun of the sort that industry uses to nail crates together. Friedman uses it to tack bandsawn layers of plywood in place, and often the staple grips well enough for the glue to cure without clamps. But he has to make sure he doesen't put staples where he will want to carve later on. The brass shade is about ¼ in. thick and quite sharp at its leading edge. Because people sometimes wobble when standing up from reading, I'd feel safer if the shade's edge were blunter. Photo: Bob Hanson.

Chest of drawers by Richard Kagan of Philadelphia; black walnut; 61½ in. high, 37½ in. wide, 23 in. deep. The carcase corners are mitered and joined by full-blind splines that cross the miter line; the technique is explained in Fine Woodworking, *Winter '76, pages 32-33, and shown at right. A sliding dovetail joins the drawer fronts and sides, which are grooved to run on a slip let into the carcase sides. This is a spartan piece of furniture made rich by the figure of the walnut, and it closely follows traditional principles, with the delightful result that each drawer can be opened with one finger, pulling at one corner. Photo: Doug Long, Photocraft.*



Loveseat by Howard Werner of Mt. Tremper, N.Y.; poplar burl; 36 in. high, 42 in. wide, 66 in. long. Werner is a young craftsman who is adept with the chain saw for carving stacked assemblies and large pieces of green wood. His settee is a remarkable example of the possibilities open to those with the tools and skill to go directly to the tree, for it is one single chunk taken from the butt of a burled poplar. Free-form pieces like this are difficult to photograph—you can't read the whole form without walking around it. Hence two views, from above and from one end. Top view photo: Doug Long, Photocraft; end view photo: Ed Oleksak.



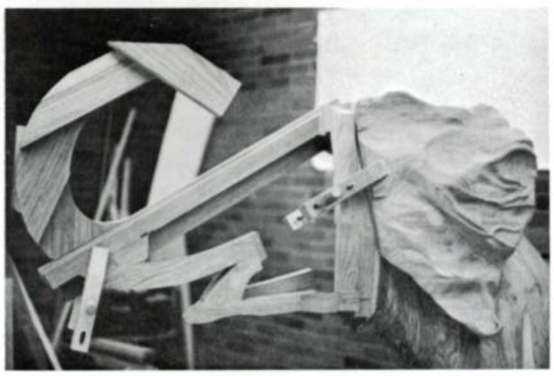


Game table by Joyce and Edgar Anderson of Morristown, N.J.; teak; 28½ in. high by 40 in. dia. The Andersons, like Maloof, are survivors from the days when almost nobody made a living by making furniture, and this table is a sophisticated example of where their years of experience have taken them. The top is divided into quarters, each made up edge-glued wedges radiating from the center. A brace below joins the center of each segment to the center column, while loose splines near the rim keep everything in line. Whatever the humidity, the wood is free to move as it will, yet the top stays perfectly round and perfectly secure. All that changes is the width of the space between the segments. Photo: Doug Long, Photocraft.

Settee by Sam Maloof of Alta Loma, Calif.; walnut; 32 in. high by 42 in. wide by 24 in. deep. Maloof has been making fine furniture for a living since the 1950s, each piece a little more refined than the one before. His joinery is exacting and inventive, as you can see in the detail, and his furniture is as carefully finished underneath, where you don't see it, as on top, where you do. The three-dimensional curve of the arm is bandsawn from solid stock. Photos: Doug Long, Photocraft.

Elephant desk

Although not yet a herd, the rhinodesk on our back cover is more than an isolated fancy. For while it was being assembled in Michael Speaker's Los Angeles garage, Chris Schambacher of Ellensburg, Wash., was independently taking another technique toward a similar end, this elephant desk. Schambacher stacked his elephant from 600 board feet of shedua, a dark, African wood. The drawers and writing surface (hidden behind the belly tambour) and the tusks are bird's-eye maple. The beast weighs almost 1,000 pounds, is 9 ft. 6 in. long and almost 7 ft. high at the top of the ear. After stacking the form, Schambacher roughed the carving with gouges and rifflers, then smoothed it with various Merit disk and flap sanders.



Rhinodesk

A rhinoceros with a desk hidden inside? A desk cleverly disguised as a rhinoceros? Whichever, this rhinodesk leaves no doubt about where craftsman Michael Speaker stands in arguments over whether form must follow function.

Speaker, 32, a painter, filmmaker and Hollywood animator who'd rather be a sculptor in wood, started from a contour map of the rhino's shape to get the ribs and struts right. Working with a Sears bandsaw and various power hand tools, he constructed the beast's plywood skeleton and built into it the mechanism for the fall flap, drawers and various compartments. Then he soaked plates of ⅛-in. lauan plywood in hot water to make them pliable and nailed them to the skeleton to create a smooth skin. Finally he glued more than 15,000 little tiles of koa, a warm red-and-brown Hawaiian wood, to the plywood skin. The inspiration for this came, Speaker says, from the ancient burial suit of jade tiles that was featured in a recent exhibition of archaeological finds from China. Six drawers flank the locking desk flap, seven more surround the pigeonholes inside the belly cavity, and the rhino also sports a head door and a rump door giving access to deep, leather-lined pockets. The creature weighs 300 pounds, measures 7 ft. 8 in. from nose to tail and is 42 in. tall—two-thirds of life size—almost as big as the one-car garage in which it was built.

Rhinodesk made its national debut this summer in the New Handmade Furniture show (page 89), and it will tour the U.S. with the show for two years. Then it goes on display in Europe.

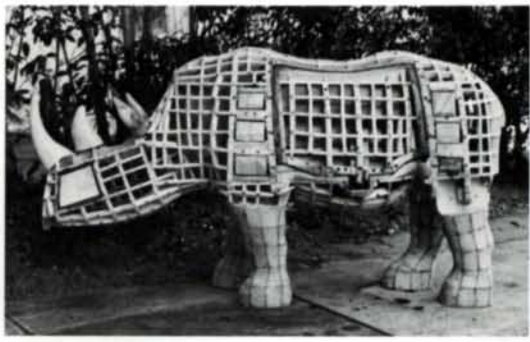


Photo: M. Speaker

Photos: Doug Long, Photocraft