Fine WoodWorking

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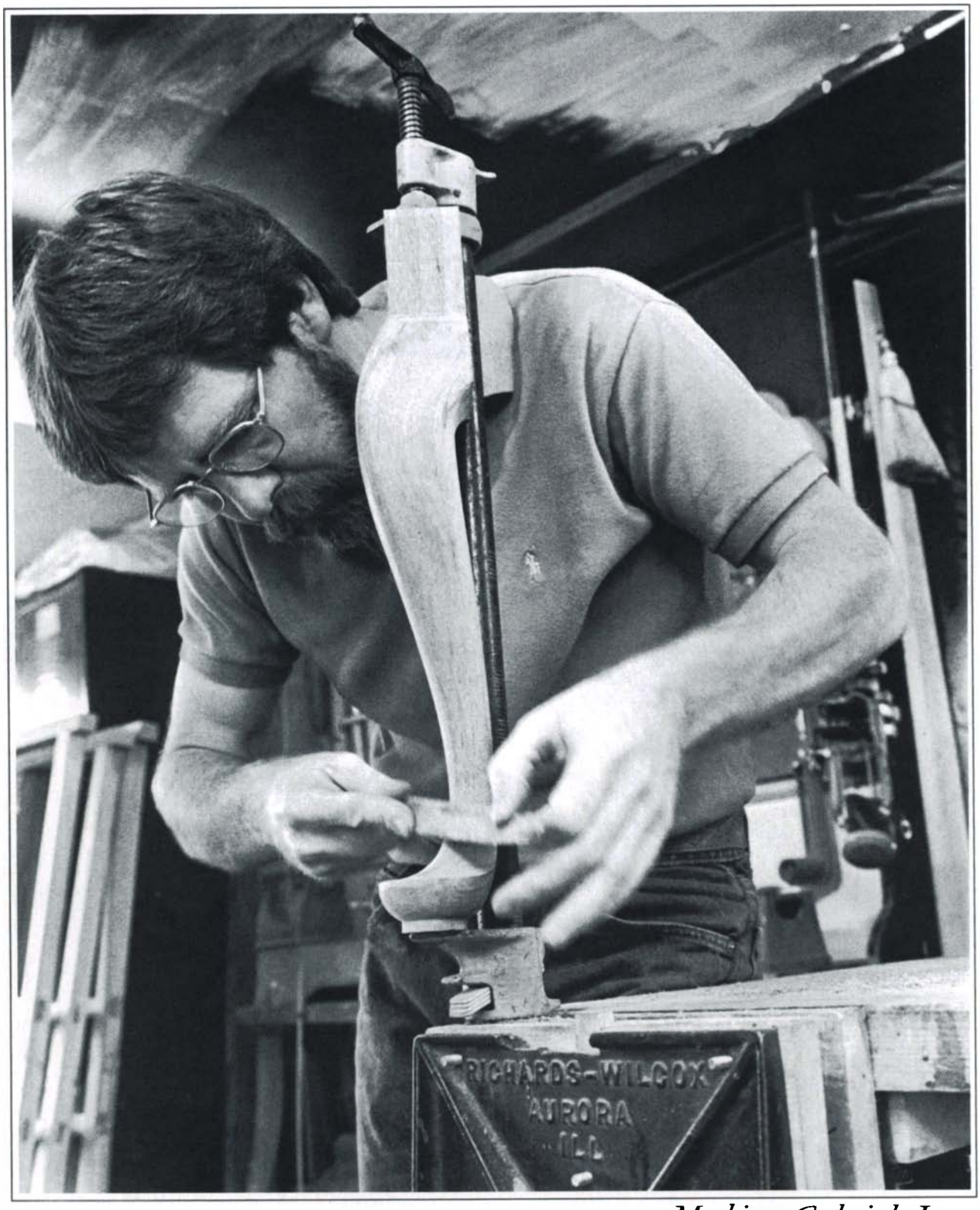

Making Cabriole Legs

A message to the readers of Fine Woodworking magazine from Las Vegas entrepreneurs, Richard Malott and Junior Sealey

WE HIT THE JACKPOT IN LAS VEGAS

WHEN WE BOUGHT THE AUSTIN HARDWOODS FRANCHISE

Facts

- Started August, 1980 in the depths of the recession
- Began showing profit after four months
- Sales first year $370,000
- Sales second year $725,000
- Recovered entire initial $90,000 investment in 20 months
- Doubled our warehouse capacity July, 1983 from 6,000 to 12,000 square feet
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Opinions

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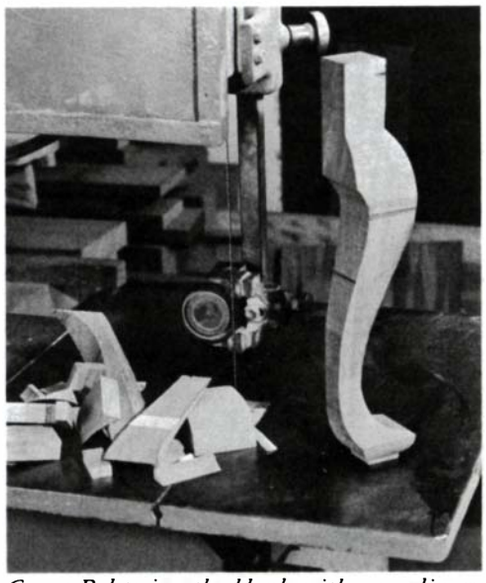

Cover: Bolstering the blank with an ordinary pipe clamp, Phil Lowe refines the ankle of a shapely cabriole leg he's bandsawn and spokeshaved out of a mahogany plank. There's more about how to make Queen Anne legs, plus plans for a graceful piece of furniture using them, on p. 32.

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SEPTEMBER/OCTOBER 1983, NUMBER 42

DEPARTMENTS

ARTICLES

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Letters

Hardwood dealer Paul McClure, in his article "Whither Rosewood" (*FWW* #38), has chosen a comfortable and profitable view of the plight of the world's hardwood forests. The reality of it is shown in Central America where giant mahoganies are being cut right around small villages of Indians, with neither the logging company nor the government offering the local people any compensation. Perhaps he hasn't heard of the "tree huggers" of northern India who, in the tradition of Gandhi, attempt to protect their trees from the loggers' chainsaws with their own bodies. A friend of mine who recently visited Madagascar was amazed at the difference over a previous visit. The hardwood forests are almost gone. In their place has sprung up brush which in places is being overgrazed by goats, leading to immense arid areas almost totally devoid of vegetation.

A few years back, I noticed that a *Playboy* playmate of the year was given, as one of her promotional gifts, a large rosewood and brass bathtub from the Rosewood Bathtub Company of California. Truth be known, the world's remaining hardwood forests are not being cleared for agriculture. Much of the third world's forest wealth is being turned into knick-knacks and toys by and for Western playboys. Shown to Central American Indians or tree huggers, most of the things we make of these woods would seem to them a poor exchange for the life of their forests.

As a woodworker, I consider all trees the sacred material of my profession. As certain species become ever more rare, they are the more valuable and sought after. Many species are already far too rare to be turned into objects, however beautiful or useful. I am thankful for the others who share this view.

—Gregg Blomberg, Lopez, Wash.

Some people are saying that the world's rain forests are being destroyed for the sake of the timber that can be extracted from them. By no means does all tropical timber come from rain forests. Rio rosewood (*Dalbergia nigra*) and kingwood from Ceará (*D. cearensis*) do not, for example. But it is remarkably difficult to find out exactly where the different kinds do come from. Can anyone help with this information? What about Indian rosewood (*D. datifolia*), East African blackwood (*D. melanoxylon*) and Indian ebony (*Diospyros* spp.)? Do they or don't they come from rain forests? What one really wants perhaps is a list of the decorative tropical timbers which do *not* come from rain forests.

—David W. Pye, Sussex, England

As the sole manufacturer of "Taos Furniture," a registered trademark and tradename of LifeStyle de Santa Fe, Inc., we would like to clear up some misconceptions caused by the article in *FWW* #40.

Jim Hill did start a furniture company around 1970 called Hill's Furniture. In 1976, Robert Powell bought that company and renamed it Taos Furniture, Inc. Subsequently, in 1981 the name was again changed, to LifeStyle de Santa Fe, Inc., which is anything but a "cottage industry." We furnish hotels and other commercial establishments across the country, as well as many residential, office and interior-designer related jobs (photo, above right).

We have received concerned comments about some of our design details as a direct result of Rannefeld's article and would like to clarify some points.

The article states that the pinned bridle joint has been all but abandoned because of problems with wood movement. We kiln-dry our own wood to below 8% moisture content and have no problems at all with the open mortise-and-tenon joint. Air-dried Ponderosa pine can take more than six months to dry thoroughly, even in the arid Southwest.

David Hoptman

A reproduction of a New Mexican chest, by the company that developed the 'Taos' style featured in FWW *#40.*

As the platform for seat cushions, we recommend rope for both comfort and practicality. Upholstered seat cushions tend to creep off wooden or particleboard platforms. We make the back bolsters using muslin sacks stuffed with kapok, which looks and wears better than the polyester-wrapped foam and is more comfortable.

—Andrew S. Peterson, Santa Fe, N.Mex.

The article on Taos furniture (*FWW* #40) was inaccurate about the origin of the "Taos" style. It was Larry Hill, Jim Hill's older brother, who first constructed the daybed that later came to be called the "Taos bed." Jim and his wife, Megan Lloyd Hill, were the artist/owners of Hill's Gallery of Contemporary Art and Crafts—a Santa Fe gallery that established itself as a major showplace for contemporary crafts and avant-garde art from 1970 until its closing in 1982. It was Hill's Gallery that was the major outlet for the Taos bed of Larry Hill and it was Megan Hill who coined the name "Taos bed." The name was strictly a marketing device, with no particular historical or design reference to Taos, N.Mex., or Taos Pueblo. In fact, between "daybed" and "Taos bed" it was briefly known as the "Santa Fe bed"—somehow, the Taos bed seemed a better fit, so it stuck.

It has always intrigued me that this one item soon led to a whole line of "Taos" furniture marketed by Hill's Handcrafted Furniture. *—Richard L. Cook, LaCienega, N.Mex.*

In regard to Karen Tyne's reply on truing up a level (*FWW* #41, p. 22), this method works for me: In the edge of a board, drill two holes which $\frac{5}{16}$-in. fine-thread bolts will thread into. The distance between the holes should be about 2 in. less than the length of the level. Make a notch in the head of one of the bolts.

Secure the board in your vise with the bolt heads pointing up. Place the level on the bolt heads and turn the unnotched bolt until the bubbles indicate "level." Rotate the level end-for-end (be sure to stay on the same edge) and turn the notched bolt, counting the number of turns, until the level indicates "level" again. Turn the notched bolt in the opposite

direction half that number of turns. Provided the board hasn't moved, the bolt heads are now very close to being truly level. Proceed with adjusting or replacing the vials using the bolts as a gauge.

To set the level plumb, screw the bolts into an exposed stud in the back of the garage. Since the level will be rotated from one edge to the other edge instead of end-for-end, it is essential that both edges be parallel for this method to work.

—Bob Sonner, East Aurora, N.Y.

I recently made the acquaintance of the small Inca bandsaw. Both of the machines I used had a serious tracking problem and frequently derailed their blades. Now a friend in Vermont tells me that his Inca suffers from exactly the same disability. I wonder if this is merely bad luck, or whether these machines suffer from some fault in design or manufacture. Prospective buyers would do well to check the tracking carefully by actual use before purchasing.

—Simon Watts, Berkeley, Calif.

EDITOR'S NOTE: Henry Lanz of Garrett Wade, a major importer of Inca tools, told us that poor tracking of bandsaws doesn't appear to be a widespread problem. Mistracking could be caused, however, by improper tension, the wrong blade or misaligned wheels. He recommends checking tension first. For blades up to ⅜ in. wide, the Inca's tension indicator should be set at 4, and at 5 for ½-in. blades. Wheel alignment, a less likely cause of mistracking, can be checked with a straightedge. If the wheels are askew, the lower one can be unbolted and aligned with shims between the wheel and its mount.

Here's an idea I have found to be useful in my home shop. My workbench is built around the headboard and footboard of a hospital bed. The top is tongue-and-groove, 2x12 yellow pine (used, 80 years old, from an old farmhouse). The legs can be extended by the cranking mechanism so that the height can be adjusted to suit the worker. Also, I can roll it up so that it is the same height as my tablesaw. I can then rip a 4x8 sheet of ¾-in. plywood without help from anyone.

—James A. Welch, Crowell, Tex.

In response to W.B. Lord's letter (Q&A, *FWW* #40, p. 32) about router-bit slippage. I had a similar problem with the collets in my Makita router that took me weeks to figure out. The collets have three cuts in the sides that seem the same, as do the sleeves that adapt the diameter of the collet. On closer examination, however, they are cut through only in one place, and these through-cuts must be aligned for the collets to grip securely. *—Clifford W. Moran, Larchmont, N.Y.*

William Lego's fold-away ladder (*FWW* #40, p. 14) is a good idea which I've used a few times in construction and remodeling. But his 1½-in. dowel running through the top of the ladder is a tripper at the worst possible spot. I suggest blocks screwed to the outside of each riser, leaving the passage unobstructed. *—Dick Alexander, Lakeville, Conn.*

Like the many people whose letters I have read in *Fine Woodworking,* I spent years looking for the ideal rust preventive. I tried WD-40, wax, chalk, etc., and found them all wanting. But several years ago I discovered 3M Dry Lubricant (catalog number FS4-6635). The lubricant is Teflon suspended or dissolved in a rapid-drying solvent in a spray can. Since it is a spray, it coats and penetrates corners and holes thoroughly. It dries in a few seconds, leaving a thin, dry, waxy film on the surface of the object sprayed. Whether this visible film is wiped off or not seems to be immaterial. If left on, it does not transfer; if wiped off, it still prevents rust for years. The last time I sprayed my tablesaw, for example, was four years ago, and even though my garage is somewhat damp, there is no rust. . . . This lubricant's sole disadvantage is that it cannot be found in the local hardware store. But it can be obtained from industrial supply houses, companies that handle abrasives and adhesives, and those that deal with plastics technology. It costs me about $6 a can.

—Stephen M. Miller, Oakland, Calif.

I am fascinated by Herbert Consor's ingenious lathe machines (*FWW* #40). Other readers might like to know that there is a company that sells drill rod, gears, pulleys and bearings by mail: Small Parts, Inc., 6901 N.E. Third Ave., Miami, Fla. 33138, (305) 751-0856 or 759-8167. They would make a good source for the bearings, etc., in Mr. Consor's machines, and they are pleasant people to deal with.

—C.A. Smith, Lake Wales, Fla.

Having been an ardent aficionado of woodworking and cabinetmaking all my life, I proposed to the Tropic Star RV Retirement Park in Pharr, Tex., that they set aside space for a woodworking shop. They agreed, provided that the shop would be self-sufficient. With an opening like this, three of us put $20 each in a kitty and we were off and running.

We started with a beat-up tablesaw, a bandsaw and a jointer. Then the park owner came through with a new tablesaw, a 6-in. belt sander and a wood lathe.

The shop is kept open six days a week and is available for any park resident. A "sign-in" and "sign-out" log book is kept, and last season there were 2200 entries.

—George O. Pease, Pharr, Tex.

The article on making a pencil-post bed (*FWW* #41) caused great mirth in my house. I went through the same sequence of events as did the author, except that it was my daughter who asked for the bed. I might add one suggestion to speed the process along and make it easier: Instead of planing all eight tapers, make the first four on a long taper jig, just like any other taper. Then plane the octagon. I found a drawknife to be useful in producing the curved chamfer at the beginning of the taper. *—Robert M. Weiss, Poughkeepsie, N.Y.*

As an optician by trade and a woodworker for pleasure, I enjoyed Howard Bruner's article on wooden eyeglass frames (*FWW* #41). A word of advice, however: Compound curves result when lenses are ground, and it is much better to carve the rabbet to fit the lens than to try to make the lens fit a precarved rabbet. *—Scott Cramer, Sugar Hill, N.H.*

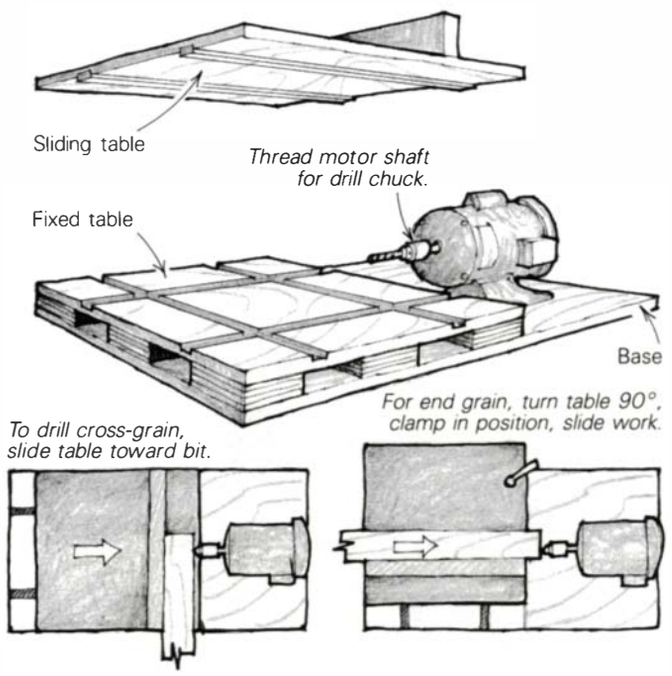
Re David Papke's letter about crate wood in *FWW* #41. I once bought some monkey pod and teak from Jim Curry in Apia, Western Samoa. When he said he would crate it, I asked him to select clear wood for the crate. I paid a dollar extra and had exotic wood for furniture.

It is said that in the early days of the Model T, Henry Ford was explicit in specifications for crates in which suppliers shipped parts. A certain wood, a certain size, or no more purchases. When the crates were taken apart, lo and behold! the wood was exactly the size of Model T floorboards.

Henry Ford and Thomas Edison were friends. Edison had a famous rose garden entered by a turnstile which required a heavy push. Ford said, "Tom, why don't you put some oil on that thing?" Edison took him aside and said, "Don't tell anyone, but every guest who goes through that turnstile pumps a gallon of water into my house."

—Pendleton Tompkins, San Mateo, Calif.

Low-tech horizontal boring machine



My home-built horizontal boring machine isn't as sophisticated as M.G. Rekoff's (*FWW* #37), but it's simple in design and sturdy enough to do an outstanding job. Its simplicity comes from a sliding table that moves the stock into the bit rather than vice versa.

To begin, you'll need a ¼-HP to ½-HP, 1750-RPM motor, with its shaft threaded to accept a ½-in. drill chuck. I made the base, the fixed table and the sliding table out of ¾-in. Baltic birch plywood.

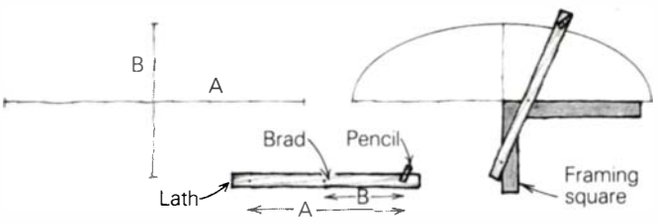
Cut two square pieces the same size for the fixed table and the sliding table, then make all dado cuts at the same rip-fence setting to ensure that the dadoes align. Glue and screw hardwood runners into the dadoes in the sliding table. These runners should then fit either pair of tracks in the fixed table.

Next bolt down the motor assembly and the fixed table to the base. Shim the fixed table so that the sliding table will be at the proper height relative to the bit. Glue and screw a fence to the top of the sliding table.

The height of the sliding table is not adjustable in this design. This presents no hardship for me because most of my boring is in 4/4 and 5/4 stock. I shimmed the fixed height so that my machine would normally bore 5/4 stock. To switch over to 4/4 stock, I place a sheet of 1/10-in. plexiglass on top of the sliding table. *—Ed Devlin, Rothsay, Minn.*

Drawing an ellipse

Here's how to draw all or part of an ellipse with a lath and a framing square. First, lay out the major and minor diameters of the ellipse on the workpiece, and clamp a framing square on these lines with its outside corner at the center. Install a pencil in a hole near one end of the lath, and measuring from the pencil, drive two brads through the lath, one at distance A from the pencil, the other at distance B. Clip off the brads

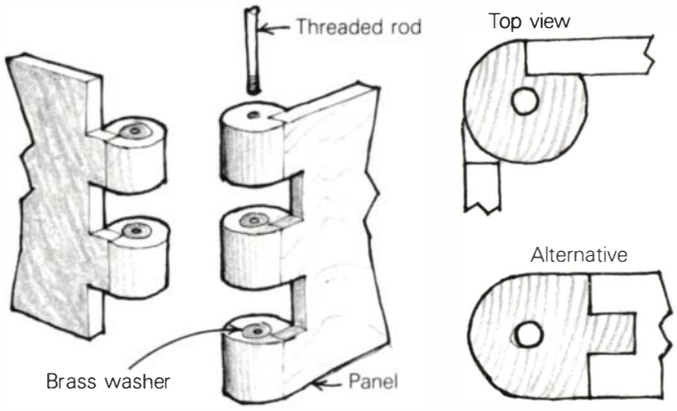


so that they don't protrude more than the thickness of the square. If you swing the lath, keeping one brad riding the top edge of the square and the other brad riding the side edge, you will scribe one-quarter of the ellipse. Flip the square, re-clamp, and repeat the procedure to complete the ellipse.

—Frank Grant, Round Pond, Maine, and Matt Longenbaugh, Darrington, Wash.

Segmented hinge column

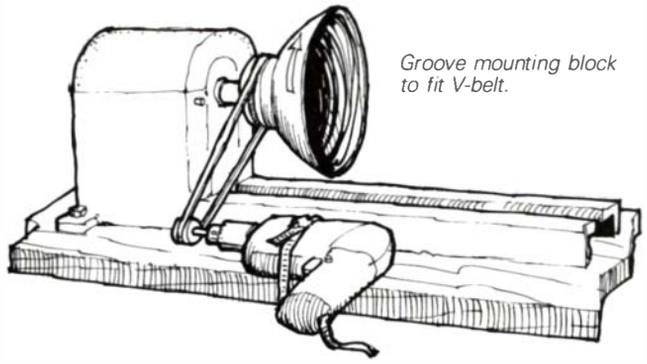
This segmented joint works like a hinge for pivoting panels or doors, but also is a structural member capable of supporting loads like any other column. The hinge is composed of three basic elements: a pin, bushings and wooden joint segments. For the pin I use an ordinary threaded rod. The bushings are washers cut from brass shim stock. Wooden joint segments are made from a large dowel. The design of the joint segments may vary depending on strength requirements, panel thickness and aesthetic preferences.



To make the hinge, first notch the dowel by passing it over a router mounted in a table. To keep the dowel from turning, tack a thin board to it. Cut the shaped dowel into segment lengths, keeping in mind that their length shouldn't exceed that of your drill bit. Next, drill the bushing hole in each segment. Proper alignment is important, so clamp a locating block to the drill-press table so that the bushing hole will be straight and centered. Assemble the segments on the threaded rod with brass bushings between, then glue the segments in place, one panel at a time.

—Peter Kaphammel, Jr., Abbotsford, B.C.

Reversing lathe rotation for sanding



Here's how I reverse the rotation on my lathe for sanding turned bowls. This approach reduces the problem of the faceplate unscrewing from the spindle, as often happens if you reverse the motor or the drive belt. After the bowl is turned, I cut a pulley groove in the glue block. Then I chuck a ply-

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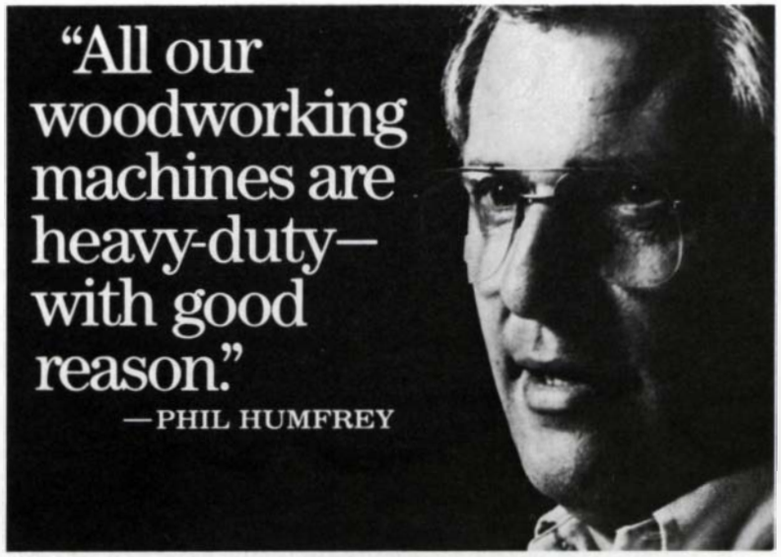

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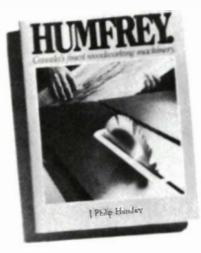

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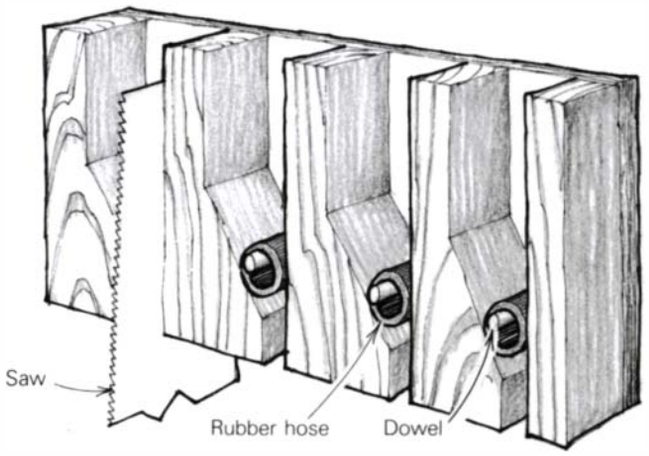
wood pulley mounted on a ¼-in. bolt into my electric drill. I mount the drill to the lathe bed and use a small V-belt to turn the bowl in reverse rotation.

Be sure to remove the lathe's drive belt before starting up the drill. Otherwise, the drill motor would be fighting the inertia of the heavier lathe motor. This method will work on stock held between centers, too. Just leave enough waste stock at one end for a pulley groove.

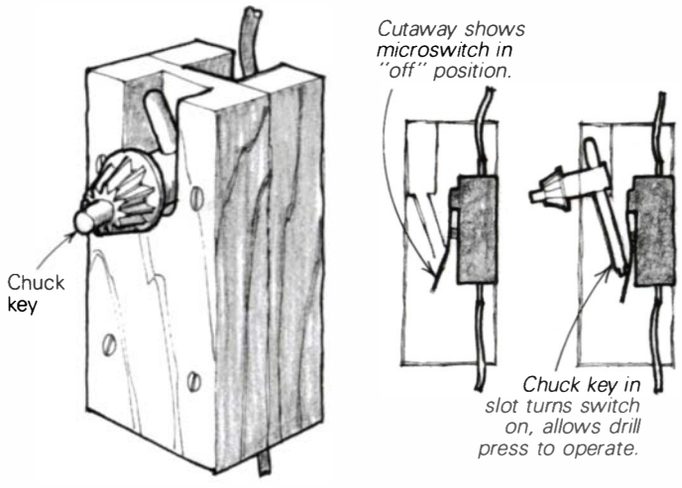
—Lawrence A. Fortier, Pleasant Ridge, Mich.

Handsaw storage rack



This shop-built saw holder provides a convenient place to store handsaws and straightedges that may be leaning against a wall or lying about in your workshop. To use it, slip the saw in from the bottom and give it a tug down to wedge it in place. I used ½-in. plywood for the back of the rack and 2-in. material for the partitions. I found that rubber hose from an automobile heater works better for the grippers than plastic garden hose, which is too smooth. The dimensions aren't critical, but if the dowels are too high, the hose won't pinch the sawblade. If they are too low, the hose jumps to the floor when you remove a saw. Trial and error will find the happy medium. *—Kim Anderson, Loyalton, Calif.*

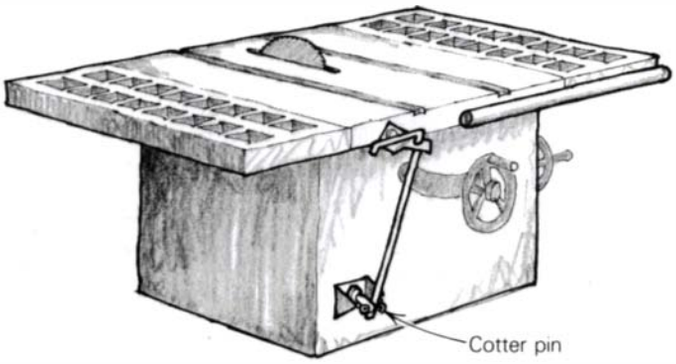
Drill-press safety switch



If, like me, you've ever been barely missed by a flying drill-press key you inadvertently left in the chuck, you'll appreciate this inexpensive safety device. It consists of a lever-operated microswitch encased in a box fastened to the front of the drill press. The weight of the key dropped in a slit in the box moves the hinged lever on the switch and closes the circuit. The drill press should be wired through the device so that the existing on/off switch will operate normally only if the key is in the slot. Since several types of switches are available, make sure the one you use is a heavy-duty, motor-rated switch that will carry the amps your motor draws.

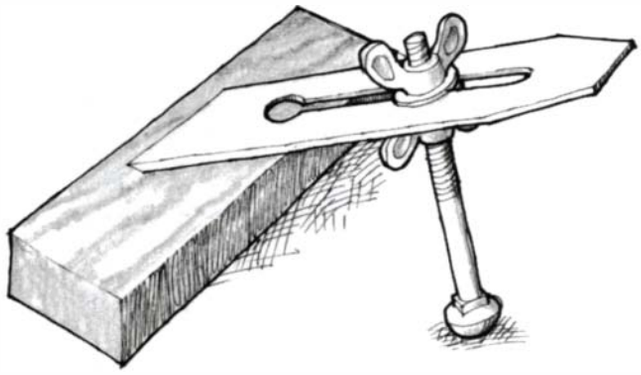
—Wesley Glewwe, West St. Paul, Minn.

Accessible saw switch



I recently bought a nearly new tablesaw, and soon decided that I could not get used to the location of the motor starting switch, which seemed too far away for comfort and safety. To correct the problem, I attached an extension rod to the switch so that I could shut the saw off instantly without contortions. The rod is supported by an aluminum plate that I twisted in a vise to the correct angle and attached to the saw table in an existing bolt hole. *—Alfred Gorski, Stratford, Conn.*

Plane-iron honing tool



Here's a simple, inexpensive jig for honing slotted plane irons. Just attach a 4-in. long, ⅜-in. or 7/16-in. carriage bolt to the iron, as shown in the sketch above. The round head of the bolt slides easily on the bench, maintaining a constant honing angle. For fine adjustment or for honing microbevels, you can shim the stone, or twist the bolt up or down a hair.

—Paul Weissman, Centerville, Ohio

Improved hot-glue faceplate technique

To avoid screw holes and to speed assembly, I attach turning blanks using hot-melt glue chips and a torch-heated faceplate. Aluminum faceplates work better for this method because they conduct heat well and cool quickly. If your faceplate is iron, you can attach a thick aluminum face to the faceplate with flat screws.

First, be sure the bottom of the blank is flat. Then heat the faceplate with a torch and place it on the turning blank to warm the wood. Cut thin discs of hot-melt glue (no gun needed) and place them on the heated blank in amounts proportional to the bulk of the blank. Use enough to secure your

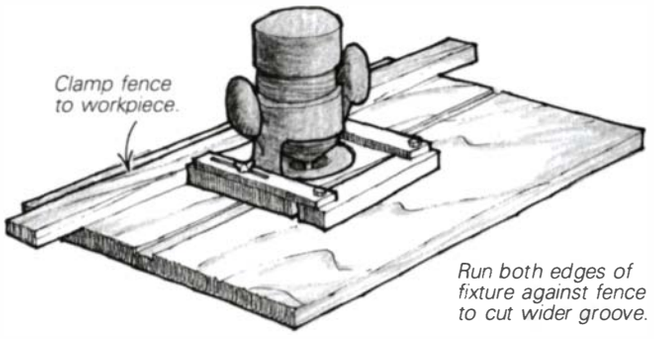
doubts as well as your wood. Place the faceplate on the blank, and clamp in position until cool.

After turning is complete, aim a torch at the faceplate, heating it enough so the wood falls off with a gentle tap. While the glue is still hot, clean up the faceplate with a rag and scrape the glue from the bottom of the turning.

—Randy Kalish, Belen, N.Mex.

EDITOR'S NOTE: Several readers have expressed concern for the safety of previous faceplate attachment methods using hot glue or double-sided tape. Kalish's method seems more secure than these. Nonetheless, each reader should test this, or any other new technique, to be sure it is safe in his own application.

Variable-width dado fixture



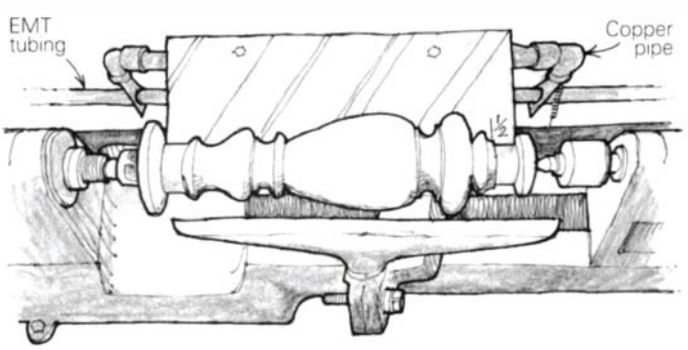
This variable dado fixture will allow fine adjustment of the dado width from bit diameter to double the bit diameter. The fixture works on the principle that one edge of the router base is farther from the bit than the other. To use, clamp a fence in place on the workpiece and make one pass with the wide side of the fixture against the fence. Turn the router around (narrow side to the fence) and make a second pass.

To make the fixture, cut a 9-in. square from ¾-in. hardwood plywood and rout a ½-in. deep recess in the center to receive the router base. Rip one edge off the fixture and reattach it with two cleats, as shown. Slot one cleat to allow adjustment. The other cleat is fixed, and the adjustable edge is pinned to it so that the edge can pivot. You will have to trim the corner of the base outside the pivot point so that the adjustable edge won't bind. After the fixture is attached to the router, check to be sure that the distance from the bit to the adjustable edge is slightly (1/16 in.) less than the distance to the fixed edge. If it isn't, saw a little off. Otherwise, slight adjustments over bit size are impossible.

—Jere Cary, Edmonds, Wash.

Lathe template fixture

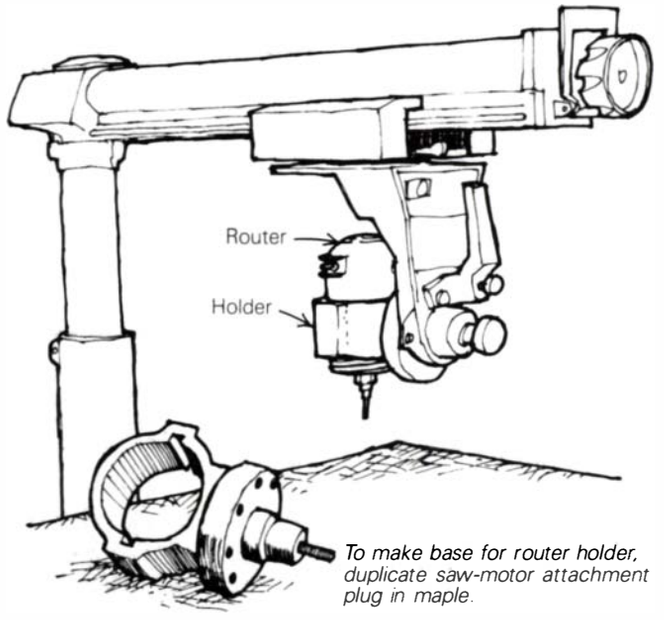
A few months ago, while teaching lathe duplication methods to my cabinetmaking class, I discovered a novel and efficient method of rapidly producing identical turnings. Mount a template of 16-ga. metal on a swinging arm at the back of the lathe. After the stock has been turned round, swing the template against it with a light spring, maintaining enough tension to prevent excessive bounce. By cutting from the front in normal fashion and referring visually to the template at the rear, you will be able to quickly and accurately produce any number of identical turnings with few rejects and a minimum of tedious measuring and calipering.



To keep each turning the same diameter, scratch a final diameter reference on a short, straight run at each end of the template. Work each end of the turning to these reference diameters first, then the gap between the reference diameters and the template will show the maximum cut depth to be taken from the workpiece's high spot.

My version of the duplicator is made from ¾-in. copper pipe, copper pipe elbows and a length of ½-in. EMT conduit. Solder up a U-shaped assembly from the copper pipe, flatten the pipe on each of the U's legs and drill to pivot on the conduit. Flatten the crosspiece of the U and drill to attach the template. Adjust the angle at which the template hits the work by heating the joints of the U and turning the template to the proper position. *—Doug Christie, Fort Grant, Ariz.*

Pin-router adaptation for radial-arm saw



You can easily convert a radial-arm saw to a pin router. This tool will open up a whole new world of operations, and make many familiar tasks—such as rabbeting for book shelves or cutting mortises and slots—much easier.

To convert my Sears 10-in. saw, I merely duplicated on the lathe, in rock maple, the saw-motor attachment plug where it fits the motor support arm. I laminated the ring assembly that holds the router from plywood. Then I glued and bolted together the laminated rings and the maple plug to form a single unit. Details of this fixture would vary to suit the saw/router combination. For specifics about setting up the pin and using templates, see *FWW* #29, pp. 63-65. Also, if the setup is combined with a machinists' dual-feed rotary table, to hold and move the work, very precise work is possible.

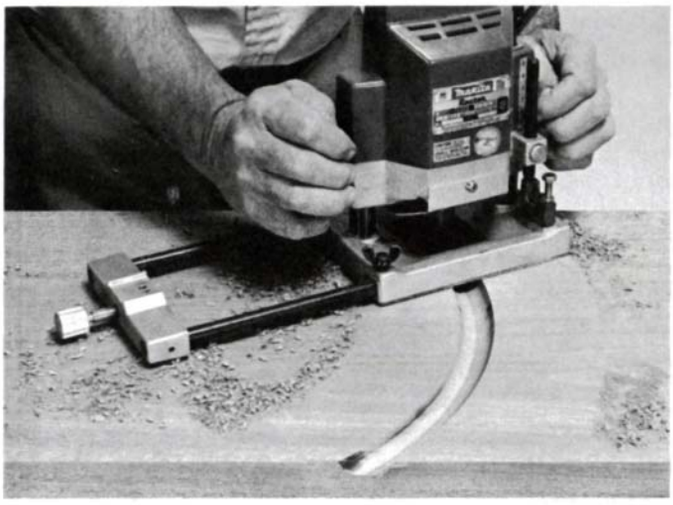
The router is normally used in the vertical position, but it can be rotated to any orientation (just like the saw) for special routing cuts. *—Donald Wigfield, Moneta, Va.*

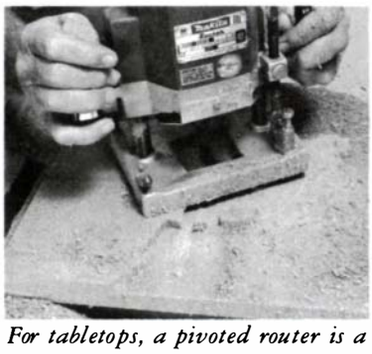
Methods of Work buys readers' tips, jigs and tricks. Send details, sketches (we'll redraw them) and photos to Methods, Fine Woodworking, *Box 355, Newtown, Conn. 06470.*

Routed bowls and tabletops—*In his book* Shaping, Veneering, Finishing, *Tage Frid says that beginners shouldn't attempt outboard lathe turning of pieces larger than 18 in. in diameter. Instead, he recommends working with a router rigged on a center pivot arm. How does this router arrangement work? Do you need special router bits for this? I have a very light-duty lathe and would like to try some large turnings. This seems like a safe solution.*

—Mark R. Westerman, Frontenac, Kans.

TAGE FRID REPLIES: For large bowls and tabletops, a router setup is safer and faster, especially for beginners or for woodworkers who own light lathes. In the photos below, you can see how the router method works. For demonstration purposes, I'm routing a dish in a wide board. Of course, the wood would be larger if I were making a bowl or a tabletop.





For tabletops, a pivoted router is a safe alternative to the lathe.

You need a router that has at least 1½ HP, and it should accept ⅜-in. or ½-in. shank bits. Smaller routers won't work so well because the ¼-in. shank bits they take snap off. I use a Makita router with two bits, a carbide-tipped two-flute straight cutter and a core box (round-end) bit. To make a pivot pin, I drilled a hole in the top of the router fence and threaded it for a 3/16-in. stovebolt. The bolt should stick out a little less than the depth to which you want to rout. A nut on the inside of the fence keeps the pin from unscrewing. If a larger diameter is needed, extend the fence with steel rods.

To rout your board, drill a hole in the center to accept the pin. Don't go too deep, though, or the hole will show when you're done. If I were making a finished piece, I'd rout the outside of the circle first, taking several shallow passes instead of one deep one, to keep the wood from burning and the bit from vibrating too much. You could skip this step, as I did in the photo, and bandsaw the circle round later on. Next do the inside edge. If you want the sides of your bowl to join the bottom in a radius, as in the lower left photo above, make the inside cut with a core box bit of the right diameter. Put the straight bit back in the router and continue wasting material, working toward the center in ¼-in. passes until you can't move the router any closer. A circle about 7 in. in diameter will be left in the center.

Remove the fence and, holding the router freehand, rout away as much wood as you can. As the island of wood in the middle gets smaller, holding the router level will be harder, so be sure to leave enough for the router base to rest on. Be very careful—one slip will ruin all your work. To remove the last of the high point, use a hand plane or a chisel or both, followed by a scraper for final smoothing.

Homemade wood filler—*I've heard of cabinetmakers using sanding dust for filler. I've tried mixing my dust with glue and water, but the filler always turns darker than the wood. A friend suggested that I mix my sanding dust with lacquer, fill, sand and then finish, but my filler still turns darker than the wood. Any suggestions?*

—Tom Caudill, Louisville, Ky.

GEORGE FRANK REPLIES: There are several fillers on the market, the main ingredient of which is wood dust. These fillers are sold in various shades, and though you can try to mix them together to get the color you want, it's almost impossible to get them to match the wood 100%. Hence the need for homemade wood fillers.

We old-timers made filler by spreading hide glue on the end grain of a piece of wood of the species to be filled. Scraping the end grain with a sharp chisel made a paste thick enough to fill gaps in the wood. Talcum powder, chalk, scrapings of a lighter wood, or some powdered earth color can be added as needed to vary the color and texture. In this filler the hide glue is the binder, but you can experiment by using clear or even tinted lacquer, or liquid shellac as a binder. The quality of your sawdust is important—the finer it is, the better your chances of success. Above all, though, you must experiment.

Saving a blued chisel—*The factory bevel on my woodcarving tools was too blunt, so I ground them to a more suitable bevel on my bench grinder. Despite my best efforts to avoid overheating, about ¼ in. of the edge discolored, presumably ruining the temper. Is it okay to just grind away the discolored metal and proceed with honing? Or would it be better to try to retemper the blade?*

—Roderick Shaw Jr., Tampa, Fla.

JERRY GLASER REPLIES: Losing the temper of a tool to the grinding wheel is a common problem and one I've experienced many times myself. The simplest solution is to grind away the blued portion and start over. Only the heat-affected zone is softened, and by removing the blue, you'll be getting back to the tempered part of the tool. I don't advise retempering by heat-treating. Manufacturers have a difficult enough time producing tool steels of consistent hardness, and attempting it at the home-shop level is liable to be disappointing. Some machine shops do heat-treating, but the process is expensive and doubtful since the exact composition of the steel must be known in order to temper it correctly.

Grinders burn tools for several reasons, but the small wheels most home-shop grinders have, coupled with too vigorous metal removal, are frequently to blame. Using a small wheel, say, 6-in., makes it easy to grind the tool at an included angle that is too small. The resultant edge is thin and can't conduct the heat of grinding into the tool body fast enough to prevent bluing. If the wheel is a fine-grit, the problem is worse because the wheel cuts more slowly, tempting you to push harder. I find that an 8-in. dia., 1-in. wide, aluminum

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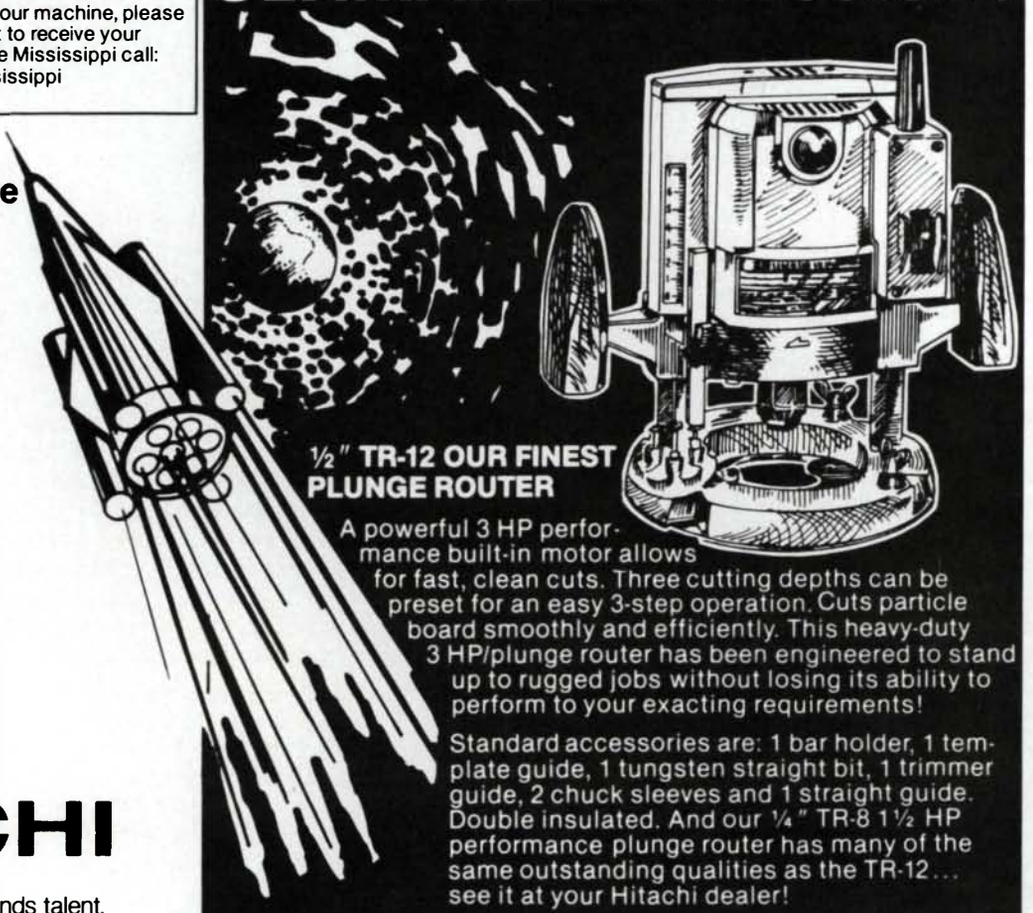

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oxide wheel, such as a Norton 32A60-J5VBE or its equivalent, is suitable for most tool grinding. This is a 60-grit, medium-hardness wheel designed specifically for fast, cool cutting of tool steel. A clogged wheel invariably burns tools. So before any grinding job, I suggest you resurface and true the wheel with a grinding wheel dresser, a tool available from industrial supply houses.

If you use a light, consistent touch and don't grind the edge at too shallow an included angle, you should be able to remove the softened steel without further bluing. For more on grinding, see *FWW* #39, pp. 68-69.

Finding doussié—*As I read James Krenov's books, I am puzzled by the apparent nonexistence of his favorite wood, doussié. I've researched wood books from A to Z, but this beautiful wood still eludes me. Can it still be found, or has it been, as Krenov says of other woods, hunted down to extinction?* —*Dave Kolanek, Wolcott, Conn.*

JAMES KRENOV REPLIES: No, doussié is not extinct. Not yet. An *afzelia,* it can be found in West Africa, where it is rather common. Some is exported. In fact, during a recent trip to Sweden, at the firm that supplied me with wood for many years, I saw three fine logs. I bought and we quarter-sawed one log, 1700 bd. ft. of it—clear and beautiful, beige and tan colors, open pores, the end grain typically bamboo-like. The wood in this log was only slightly rowed, and it responded well to a fine hand plane. I have seen doussié dark brown and quite smooth. It can be definitely rowed, though, with ripples of reddish hues running through the tan.

Doussié is a stable, reliable wood, more heavy than hard. It has a solid ring, what I call a quality sound. But it is not a tough wood; it does not flex or bend well, and in joinery such as mortise and tenon it has to be properly dimensioned so as not to fracture under strain. Also, it tends to split if carelessly worked.

Most doussié is not really difficult to glue. Sanded, it may feel "fat" and resist glue or finish more than when cleanly cut. Doussié works well with very sharp cutting tools, though on rowed areas it is safest to use a cabinet scraper.

Like people, woods age differently. Doussié ages with dignity, deepening to a medium or dark brown, usually with a reddish undertone, depending on exposure and finish. What kind of finish? That depends on the person and purpose. I can only answer in the light of my own experiences with, and feelings for, this fine wood. So I'll say don't smear anything on doussié. Enjoy it as it is. If you want another color, use another wood. Doussié wears well with an oil finish, however. A doussié table—or any interior work—treated with fine oil will look good for many years. If you want a dry finish that is less apparent, a coat or two of polish followed by a little Renaissance wax, or even polish alone will do. Goddard's or any such oil-based wax will give an in-between finish. Tung oil, used carefully, is also good.

You may wonder whether this wood is expensive. I'm tempted to say it should be. Actually, it is not, at least not everywhere. Strange things happen in the wood market, though. On the one hand, good, reliable woods are being neglected, misrepresented and misused. We craftspeople contribute to some of this. Elsewhere, amid blasting, bulldozing and burning, species of wood are found and marketed. And again we craftspeople are there, attracted by the flash of bright colors and new names. Many, though not all, of these woods are an expensive disappointment. They check and twist and spring, leave sandy sawdust on our dulled bandsaws, play havoc with hand tools, are difficult to glue, and later, in the piece, take their final revenge as the seasons change. True, some fine old exotics, even classics, can be found, but you or I might have to sell our machines in order to afford them.

EDITOR'S NOTE: We checked with a couple of New York firms that specialize in wood importing, and found that although doussié is a favorite material of European cabinetmakers, it is not commonly shipped into the United States. Importers such as William L. Marshall Ltd., 450 Park Ave. S., New York, N.Y. 10016, will ship directly from Africa if sufficient quantities are bought. For smaller

(continued on p. 18)

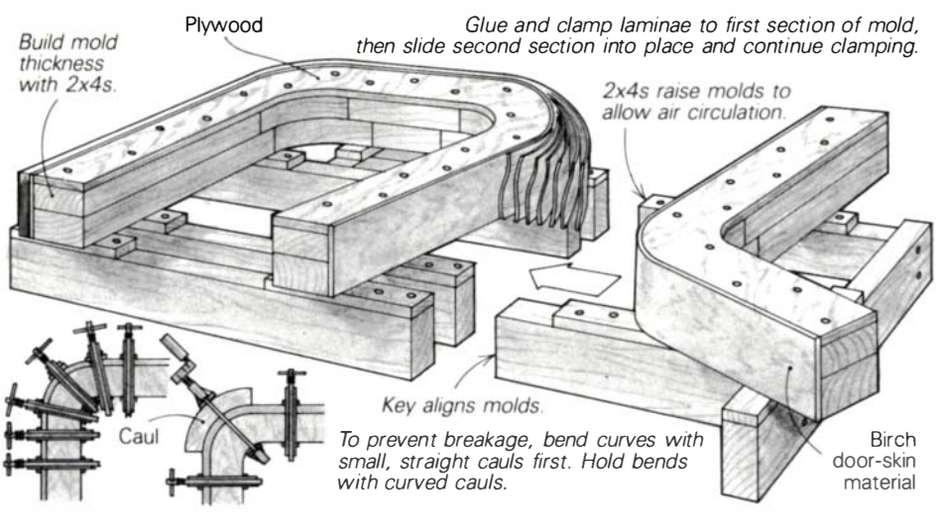
Follow-up: Form-laminating chair legs

I didn't quite line up with Tage Frid's thinking on making molds for a laminated chair as described in *FWW* #38 on p. 26. I spent seven years doing nothing but designing and building plywood strip-laminated chairs. During that time, I developed some quick mold methods. The drawing at right shows how I would approach Ettore Zuccarino's form lamination question.

I'd make an open mold raised up on a 2x4 rack. Since the underside of the glued-up parts will be exposed to air circulation, this speeds curing and it gives you room to tighten the clamp handles. Also, the two parts of the mold can be "keyed" so that they'll line up correctly for glue-up. A cheap way to build this mold is to draw the shape on any thickness of plywood you happen to have around, and then build it up to the desired thickness with 2x4 scraps. Glue and nail the whole mess together, then bandsaw the mold sections to the final shape. Be careful not to put nails where you'll be sawing. To smooth out roughness left by the bandsaw, line the molds with birch door-skin material.

Curved cauls at the corners distribute pressure unevenly and this can break the laminae. The solution is to progressively clamp small sections of the curve to the mold with small, straight cauls, fitting in as many as you can to make the bend. Once the bend has been made and a clamp placed at each end of it, you can clamp the curved caul in place.

—*Michael Graham, Santa Barbara, Calif.*



Drawings: David Dann

amounts, write Theodor Nagel G.M.B.H, Postfach 28 02 66, D2 Hamburg 28, Germany. Nagel (see *FWW* #38, p. 78) is an internationally known dealer in musical instrument woods, but will ship small quantities of any timber they happen to have on hand.

Planer cuts per inch—*In his book* Understanding Wood, *on p. 152, R. Bruce Hoadley says that planed lumber with the best surface has between 12 and 25 knife marks per inch, with 30 or more leading to gluing and finishing problems. My Inca thickness planer produces 87 knife cuts per inch at its slowest speed, and 60 at the fastest feed rate—figures that I think are comparable to other surface planers of this type. I seem to be getting a good, smooth surface, with none of the problems he mentioned. Is there an explanation? —Dennis Ciesielski, Humbird, Wis.*

R. BRUCE HOADLEY REPLIES: I can see how this statement might be confusing. Most of my experience with surface planers is with large, industrial machines rather than the smaller, home-shop variety. Because frequent resharpening of the knives in industrial planers is far more involved than it is for a small planer, the big machines are normally operated with the knives in varying degrees of sharpness—anywhere from just less than razor sharp to too dull to cut at all. Given this "constant" knife condition at the feed rates normally used in industty, 12 to 25 knife marks per inch produces the best surfaces.

If the feed rate is slowed down, producing more knife marks per inch, the machining action changes, particularly with dull edges. Instead of crisply cutting away a clean chip, the rounded knives skid over the wood, compressing the cell structure and leaving a glazed surface that can be chemically altered, if enough heat is generated by the battering of the knives. In the worst cases, the wood may even be scorched, as when a jammed feed burns a band across the width of the stock. Such a surface may be difficult to glue, or the grain will raise if it's left exposed and unsanded. A slow feed rate, one that produces 30 or more knife marks per inch, worsens the glazing.

I'm not familiar with the knife sharpness characteristics of small planers, but the same principles should apply. Obviously, surface quality is as much a function of sharpness as of feed rate, but you are better off with a higher feed rate as the knives become dull. If your knives are ideally sharp and can be kept that way long enough to produce a good surface at 87 marks per inch, congratulations and I stand corrected.

European electric current—*I'm a U.S. serviceman stationed in Belgium, where I can buy European woodworking machines at considerable savings. Unfortunately, they are designed to run on the 220-volt, 50-Hz current provided in Europe. I can rewire my shop at home for 220 volts, but it will be at 60 Hz. Will this be a problem? I don't want to spend my savings buying new motors and switches. —Charles L. Carpenter, APO New York*

MICHAEL REKOFF REPLIES: There's no reason to replace the motors and switches on European equipment that will be operated in the United States. In fact, a 50-Hz motor operated at 60 Hz will run cooler and more efficiently because its core has more iron than it really needs to run at the higher frequency. The European motors will turn 20% faster, but for most machines this should pose no problem. If it does, just change the pulley diameters to get the right speeds. See *FWW* #37, p. 93, for a pulley-speed formula. I'd buy the pulleys in Europe, where metric sizes are readily available. As for the switches and fuses, they couldn't care less what frequency flows through them. Just make sure that the voltage and current ratings are right. One caution: Don't try to run a 60-Hz motor on 50-Hz current. The motor won't have enough core iron, and will likely overheat and burn up.

Contact cement troubles—*I have been using plastic laminate for cabinets and desk tops, and have trouble every time I apply the contact cement. When I use a short-nap paint roller, the cement forms small ridges. I've tried flattening the ridges, but the roller just peels off the cement and I have to wait 15 minutes for the first coat to dry before I apply another. Is there a better way to spread contact cement? —John Ratliff, Mt. Prospect, Ill.*

JERE CARY REPLIES: You may be concerned about a problem that isn't as serious as you think. If the ridges or lumps of contact cement are not too large and if you're using $\frac{1}{16}$-in. laminate, they shouldn't cause any problem. Just be sure to roll the laminate thoroughly once you've laid it in place on the underlayment. If your roller is leaving large ridges or lumps, try a paintbrush or a rigid spreader. On smaller jobs (up to 6 sq. ft.), I use a 3-in. paintbrush. On larger surfaces, a spreader made from a scrap of plastic laminate about 6 in. square works well. To control the thickness of the contact cement film, adjust the angle of the spreader and vary the pressure you put on it. Work quickly and don't go back over previously coated surfaces until they're dry. Manufacturers of contact cement suggest a second coat after the first is dry, and I get good results by following this advice.

Readers want to know:

. . . I'd like to correspond with anyone conversant in construction techniques used for early-20th-century Art Nouveau furniture. *—Jim MacDonald, Fairfield, Conn.*

. . . I would like to hear from readers who have used a Bridgeport milling machine for woodworking.

—Fred Wildnauer, Durham, N.H.

Readers can't find:

. . . an operators' manual for a 6-in. Wards Jointer, #14FD616A. *—David Grant Willemain, Towson, Md.*

. . . information or an owners' manual for a Crescent Universal Woodworker. *—Bill Warren, Middlebourne, W.Va.*

. . . I've got a Red Fox, not the entertainer but a wood planer. Does anyone have information or manuals?

—Jim Linders, St. Louis, Mo.

Sources of supply:

—Steel bench dogs that fit into round mortises can be purchased from Flexible Furniture Division, 323 Acorn St., Plainwell, Mich. 49080.

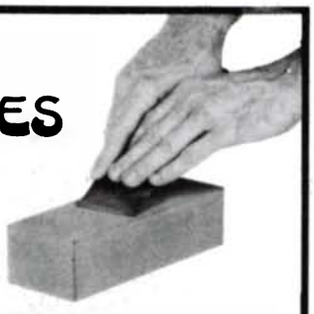
—Finishing chemicals, and hard-to-find stains, solvents and resins are sold by Wood Finishing Enterprises, Box 10117, Milwaukee, Wis. 53210.

About our answer people:

Tage Frid is a cabinetmaker, educator, and professor emeritus at the Rhode Island School of Design. **George Frank** is a European master wood finisher, now retired. **Jerry Glaser,** of Los Angeles, is a toolmaker and engineer. **James Krenov** teaches woodworking at the College of the Redwoods in Ft. Bragg, Calif. **R. Bruce Hoadley** teaches wood technology at the University of Massachusetts. **Michael Rekoff** is an electrical engineer at the University of Tennessee. **Jere Cary,** of Edmonds, Wash., is an author and teacher of cabinetmaking.

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

JAPANESE WATERSTONES



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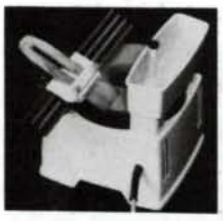

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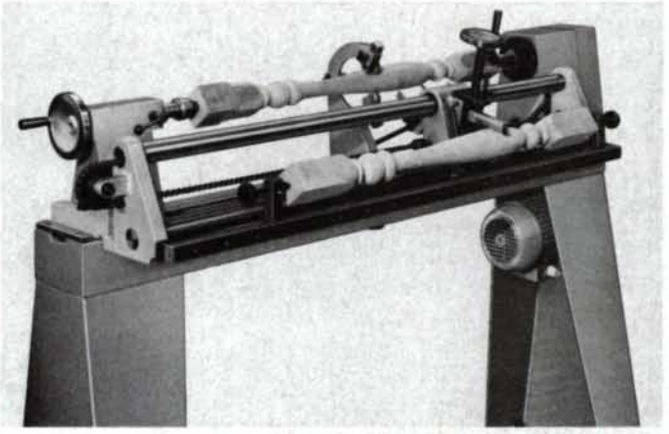

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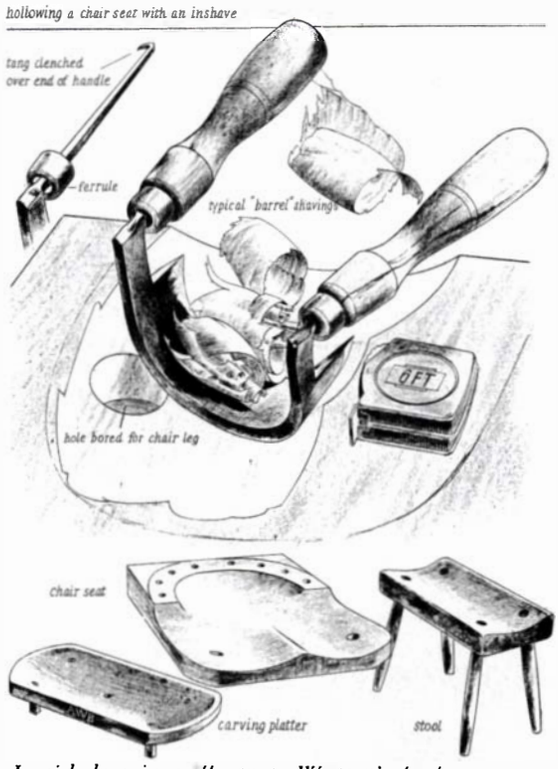
Hand Tools: Their Ways and Workings by Aldren A. Watson. *W.W. Norton & Company, 500 Fifth Ave., New York, N.Y. 10110, 1982. $29.95, hardcover; 416 pp.*

Like many, I am a self-taught woodworker. I have read about woodworking extensively, but have had little hands-on training. Besides keeping publishers prosperous, this read/trial/error process has imbalanced my skills: while I do some things with great sophistication, other attempts are primitive at best. I am constantly looking for information to fill in gaps.

That is why I was delighted to find Aldren A. Watson's *Hand Tools: Their Ways and Workings.* Watson explains both verbally and visually how the 29 basic tools work and how to sharpen them. He starts with the workbench and vise, and works through common bench tools in chapters that range from four pages (T-bevel) to nearly seventy pages (Planes). His 450 drawings illustrate the text handsomely and most show correct methods of work from the angle the worker is likely to see it. Watson also shows how and why some processes are nearly always done incorrectly.

The chapter on nailsets illustrates this perfectly. Although most of us take this tool for granted, Watson contends that we do not know everything about it. Grinding it to a point is the beginning of the better way to use it, as flat-bottomed or cupped nailsets are more likely to slip off the edge of the nail or to make the nail hole larger. I tried it, and he appears to be right.



Lucid drawings illustrate Watson's book.

In addition to thirty useful chapters, there are seven appendices which list toolmakers, tool catalogs and the inventory of a typical hand-tool shop, and which also show plans for two workbenches and various bench tools and equipment.

This is a large, handsome volume—and an expensive one. But reading it is like having a chat with an old master. To my mind, that's worth the price of admission. *—Hugh Foster*

The Windsor Style in America: A Pictorial Study (1730-1830) by Charles Santore, edited by Thomas M. Voss. *Running Press, 125 S. 22nd St., Philadelphia, Pa. 19103, 1981. $27.50, hardcover; 215 pp.*

Windsor chairs may be approached in two ways by serious students: clinically, scholarly, with an attitude of objectivity; or subjectively, almost emotionally, by one who is drawn to Windsors not merely for their historical significance but by the unique aesthetic qualities of a style and a construction method that are inextricably intertwined. I reveal my own prejudice when I say that the Windsor style comes as close as possible to reflecting the harmony between material, construction technique and finished useful form so sought after by furniture designers. The aesthetic is inherent, and decoration is added only when easy and natural, as when the leg is already in the lathe for its tenon-turning. Far from being superfluous, this decoration comes as a logical extension of the construction process for chair components that, for example, must be tapered into tenons or swelled in section to accept them. Thick, softwood seats carve to comfortable, beautiful shapes. Structural requirements of strength and flexibility suggest not only the woods but the shapes of backs. All parts and techniques complement one another to produce the quintessential seating form.

The Windsor Style in America is rich and fresh, exhibiting the passionate devotion to the subject that only a true Windsor lover could muster. A nationally known graphic artist, Charles Santore complements his excellent eye for detail with many years of research to produce a volume that, although not particularly deep or all-inclusive, ebulliently describes stylistic qualities that identify individual Windsor pedigrees in such a way that the uninitiated can understand why "modernized" Windsor chairs with laminated bows, missing structural members, or difficult-to-carve hardwood seats are inherently disharmonious and can bear no more than a superficial resemblance to the real thing.

Santore opens with a brief history, including the mandatory (and not necessarily conclusive) attempts to explain the origin of the name. He does, however, review all the theories, which makes for interesting reading. It is unfortunate that he finds it necessary to perform a heavy-handed "social" analysis of the Windsor in America, with references to a democratic furniture form. The Windsor is a sort of Volkswagen of chairs, but is so as a result of its natural simplicity of construction rather than as a political expression. Windsors were relatively cheap; in wealthy homes they were lawn furniture, and in more modest homes the good and cared-for furniture.

Santore goes on to break down the style into types, and covers each with excellent text and plenty of good photographs. He devotes a chapter to each type of chair, ample space to demonstrate historical and stylistic progression. When discussing finish, he supplies us with 17 beautiful color plates to show centuries-old painted surfaces. Also included are 11 of the author's own drawings, which admirably demonstrate the characteristics and construction details so often lost in photographs. His style is vigorous, and it is in these drawings that the reader can feel Santore's strong romantic involvement. Unfortunately, these drawings come grouped together in the beginning of the book rather than interspersed with and illustrating points made throughout. I suspect that the different quality paper on which they were printed, albeit adding greatly to their visual impact, required that they be bound together.

The furnituremaker will not find extensive construction description here, but the text and the fine drawings deliver many useful details and ideas. The historian will find newly uncovered ground as well as a checklist of 18th- and 19th-century Windsor makers. Everyone will enjoy learning Santore's techniques for identification, which he weaves into the text for the benefit of the craftsman seeking accuracy in reproduction, the collector examining a prospective purchase, or the devotee admiring a museum piece. *—Michael S. Podmaniczky*

Hugh Foster lives in Manitowoc, Wis. Michael Podmaniczky is a boatbuilder in Camden, Maine.

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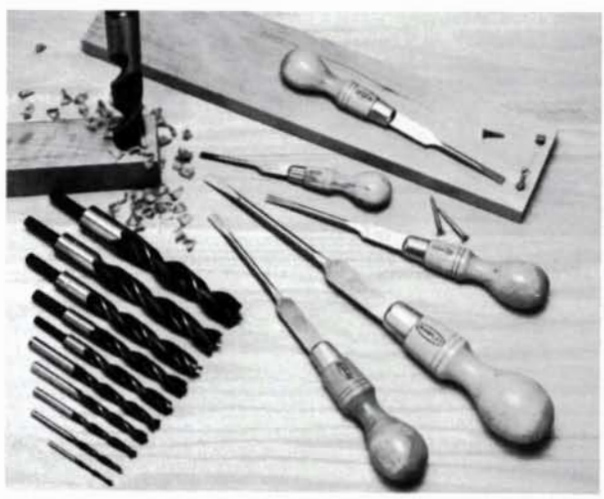

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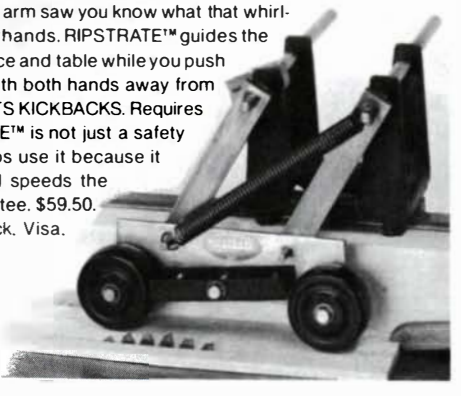

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Size	Grit	10	50
3"x21"	120	.100	.83 ea	75 ea
	80	.85 ea	.77 ea
	60	.90 ea	.82 ea
	50	.92 ea	84 ea
	40	.95 ea	86 ea
3"x24"	120	100	.89 ea	81 ea
	80	.91 ea	83 ea
	60	.95 ea	.86 ea
	50	1.09ea	99 ea
	40	1.12ea	1.03 ea
4"x24"	120	100	1.50 ea	1.36 ea
	80	1.55 ea	1.40 ea
	60	1.59 ea	1.44 ea
	50	1.65 ea	1.49 ea
	40	1.70 ea	1.54 ea

SUN GOLD SANDING SHEETS
9x11 Aluminum Oxide C Weight

Grit	Pk of 100
150.120.100	$20.95
80	22.65
60	27.50
50	30.95
40	36.45

9x11 Non-Loading Silicon Carbide

Grit	A Weight	Pack of 100
400. 360. 320. 280. 240 220.180. 150 120		$18.65

RYOBI TOOLS

B7075	3x21 Belt Sander	$118.95
B7100	3x24 Belt Sander	148.50
B7200A	4x24 Belt Sander	167.90
D-1010	3/8" Var. Sp. Drill	89.50
E-3700A	Drywall Screwdriver	77.95
JSE-60	Electronic Jigsaw	125.90
L-580	6-1/8" Planer	189.00
TR-30	Laminate Trimmer	74.90
R-150	1 H.P. Plunge Router	88.00
R-500	3 H.P. Plunge Router	165.00
S-500	3x5½ Finishing Sander	43.95

GREENLEE CABINET SCREWDRIVER

4"	$1.95
6"	2.95
8"	3.95
10"	4.95
Set of 4	12.95

SQUARE RECESS WOOD SCREWS

Size	100 per pk	1000 per pk
8x1	$2.25	$13.90
8x1¼	2.50	16.70
8x1½	2.70	18.15
8x2	2.95	23.40
8x2½	3.15	26.15
8x3	3.20	29.95

SQUARE RECESS SCREWDRIVERS $2.95

Square Recess Drill Bits	75¢ ea
Phillips Drill Bits	60¢ ea

WOOD SCREWS - Flathead Phillips
NEW Hardened Furniture Screws

Size	100 per pack	1000 per pk
6x1¼	$1.60	$ 9.95
8x1	2.05	12.70
8x1¼	2.30	15.40
8x1½	2.50	15.95
8x2	2.75	23.40
8x2½	2.95	25.10
8x3	3.15	29.25

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Danish Oil - Natural		
Medium, Dark & Black	5.70	16.55
Satin Oil	5.30	15.85
Satin Wax Dark	5.80	17.15
Satin Wax Nat'l	5.80	17.15

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Quarts	5.25
Gallons	11.50

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1/2"x2"	2.55
5/8"x2"	2.95
RH PLUGS 100/pack	1.65
BUTTONS 100/pack	1.65

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Carbide Tipped 5/8" Bore

No.	Size	Teeth	Use	Price
LU7210	10"	40	General	$39.00
LU7310	10"	60	Cut-off	45.50
LU7312	12"	72	Cut-off	67.00
LU7810	10"	80	Plastic	79.95
LU8210	10"	60	Cut-off	50.00
LU8212	12"	72	Cut-off	81.50
LU8410	10"	40	Comb.	42.50
LU8411	10"	50	Comb.	45.50
LU8510	10"	80	Cut-off	78.95
LM7210	10"	24	Ripping	45.00

WHISPER SAW BLADES

WS7210	10"	40	General	67.60
WS7310	10"	60	Cut-off	77.75
WS7810	10"	80	Plastic	115.70
WS8210	10"	60	Cut-off	83.95

All 5/8" Bore (LU7312 1")

MORE FREUD

TR100	3 blades & Dado set		264.95
DS306	6" Dado		109.50
DS308	8" Dado		136.00

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Ryobi $43.95
S-500 3" x 4-1/8" Orbital Sander

Ryobi $89.50
D-1010 3/8" Portable Drill

Ryobi $118.95
B-7075 3" Belt Sander

Ryobi $167.90
B-7200A 4" Belt Sander

Ryobi $165.00
R-500 1/2" 3 HP Plunge Router

Ryobi $88.00
R-150 1 HP 1/4" Plunge Router

Ryobi $189.00
L-580 6-1/8" Planer

Ryobi $74.90
TR-30 Laminate Trimmer

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E-3700A Drywall Screwdrivers
Variable Speed Reversible

Ryobi $125.90
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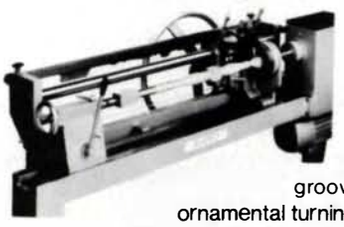

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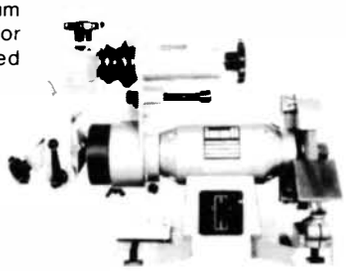

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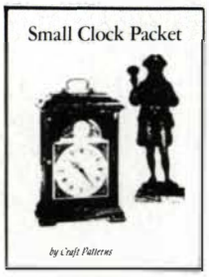

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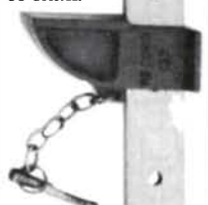

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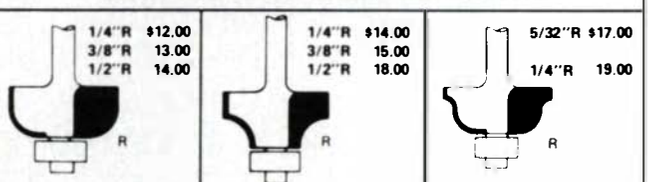

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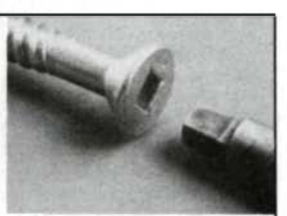

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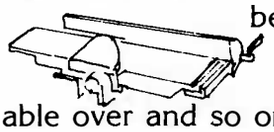
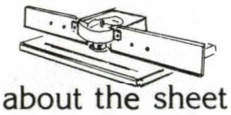
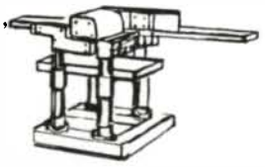
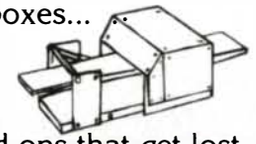
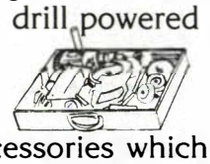
forget about those awkward inventions where...

"taking off this or that part, adding another piece... turning something over... the machine becomes a planer, which  becomes a moulder  and then you turn the table over and so on..." 

Forget about the sheet metal boxes...  the drill powered gadgets,  the add-ons that get lost... the special wrenches and the costly accessories which seem to never end.

LOOK AT THE ZINKEN MACHINES

one lever 6 operations

MIA 6 SIX OPERATIONS:
surfacing planer · thicknessing planer · circular saw · spindle moulder · mortiser-borer · tenoning saddle.
The smallest for your big work!
The MIA 6 (weight 48 Kg. · 106 pounds, 1 HP motor with overload protection) has been designed and built after years of study and experience and with the collaboration of do-it-yourself experts. This machine is very compact and complete; it is equipped with the latest devices which make it easy to use and guarantee precision work.
Its cast aluminium construction makes the MIA 6 light and sturdy. Since it occupies very little space and is easy to carry, this machine has been a success with hobbyists the world over.

ZINKEN COMPACT 21/S SIX OPERATIONS:
surfacing planer · thicknessing planer · circular saw · spindle moulder · mortiser-borer · tenoning saddle.
A solid machine (weight 110 Kg. · 243 pounds), with one-piece cast aluminium bed and stainless clad cast aluminium work tables. One solid unit which houses the motor, 1,5 HP with overload protection, single phase or three-phase, where all the moving parts are chromed; the rotating parts are mounted on prelubricated sealed-for-life ball bearings and all the vital parts are precision machined. There are more than 500 easily identified and interchangeable parts which were checked and assembled on a specially designed assembly line. The ZC 21/S's modern design makes this machine a technological masterpiece which is pleasing to the eye.

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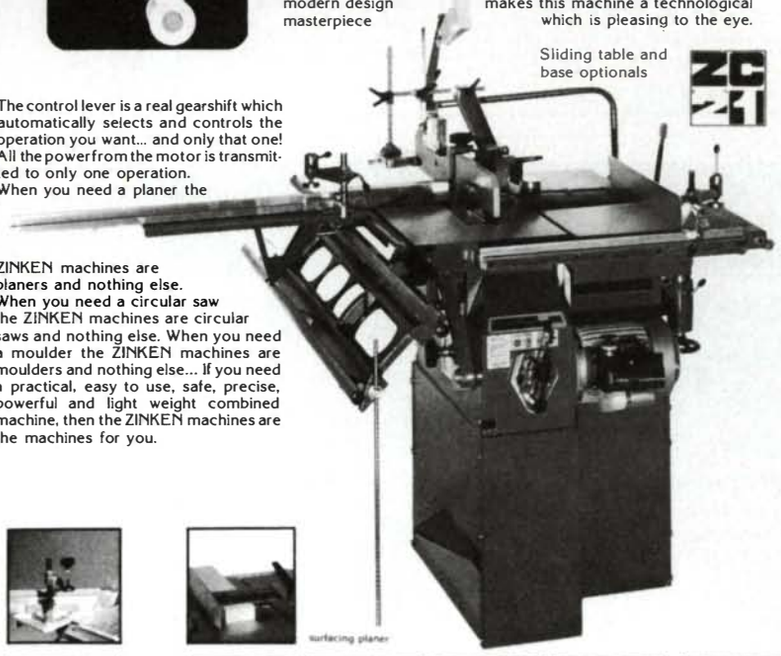

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tenoning saddle

surfacing planer


surfacing planer


thicknessing planer


circular saw


splindle moulder


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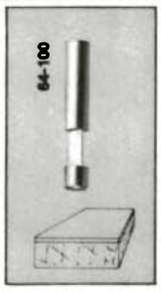

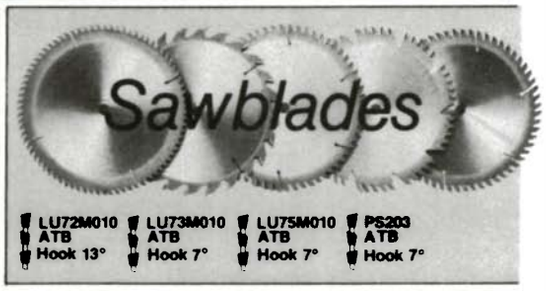

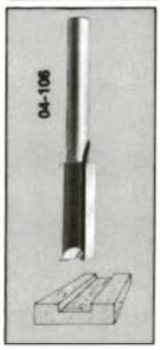

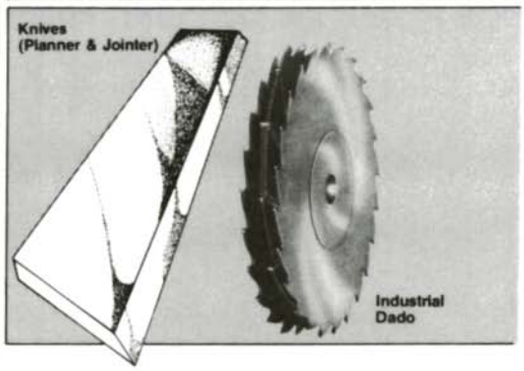

ROUTER AND BORING BITS, CARBIDE TIPPED

	Item	Cutting Length	Cutting Dia.	Large Dia.	Radius	Shank Dia.	Depth of Cut	List Price	Sale Price
1/4" Shank Dia. Double Flute Carbide Tipped	04-106	3/4	1/4			1/4		$11.05	$7.45
Mortising Bit Carbide Tipped	16-100	3/4	1/2			1/4		$12.73	$8.12
Cove Bits Carbide Tipped	30-106			1 3/8	1/2	1/4	5/8	$33.64	$21.48
Rabbeting Bits Carbide Tipped	32-100	1/2		1 1/4		1/4	3/8	$27.62	$17.64
Rounding Over Bits with Small Bearing Guide 2 Flutes Carbide Tipped	34-110			1	1/4	1/4		$27.62	$17.64
Solid Carbide Flush Trimmer 3/8" Cutting Edge	64-100	3/8				1/4		$7.64	$4.88
Solid Carbide Bevel Trimmer 1/4" Cutting Edge	66-100	1/4				1/4		$8.30	$5.29
BORING BIT For Concealed Hinges	3557R		35mm			10mm		$48.62	$26.80

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CARBIDE TIPPED SAWBLADES

	Item	Dia.	Teeth	Kerf	Standard Bore	List Price	Sale Price
SAWBLADES PROFESSIONAL Carbide Tipped General Purpose	PS203	7 1/4"	24	.125	univ.	$27.45	$18.30
INDUSTRIAL SAWBLADES General Purpose	LU72M010	10"	40	.126	5/8	$68.58	$39.00
Cut-Off Saws	LU73M010	10"	60	.126	5/8	$79.55	$45.00
Fine Cutting Saws	LU75M010	10"	80	.126	5/8	$105.89	$52.00

INDUSTRIAL DADO CARBIDE TIPPED

Item	Description	Dimensions	Max. Width of Groove	List Price	Sale Price
DS308	#3 Dado Set 8"	8" x 18 Teeth	13/16	$170.25	$136.00

HIGH SPEED STEEL JOINTER KNIVES

Item	Size	Knives Per Set	List Price	Sale Price
C350	6" x 5/8" x 1/8"	3	$27.45	$21.04
C441	8" x 5/8" x 1/8"	3	$36.58	$28.04

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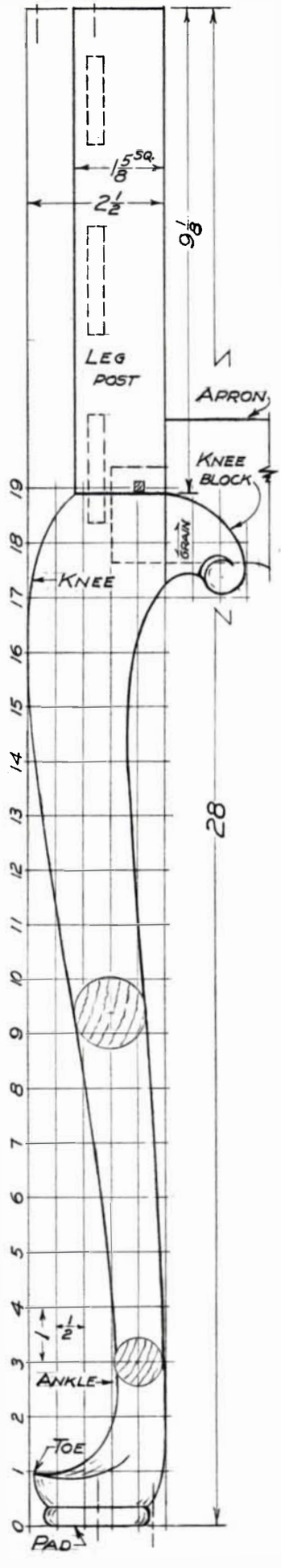


A Small Highboy

Plans for a Queen Anne charmer

by Carlyle Lynch

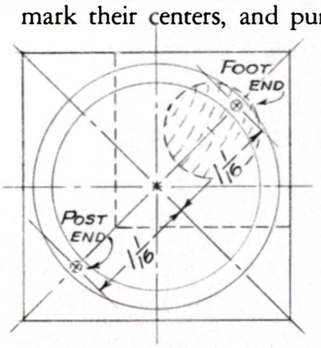
Author with his highboy of cherry, adapted from the mahogany original.

Photo: Hubert Gentry

The highboy is an imposing furniture form, too large for the spaces in which most of us live. But 18th-century cabinetmakers didn't always build grandly scaled furniture for stately halls. Shown here is a small, modestly proportioned highboy I found in the home of Mr. and Mrs. Richard P. Lewis in Augusta County, Va. Included in the drawings are a few adaptations—simpler moldings and a less arched front apron that accommodates one more drawer than the original. I built the piece to test these alterations. Here are the basic procedures; a bill of materials is given on p. 34.

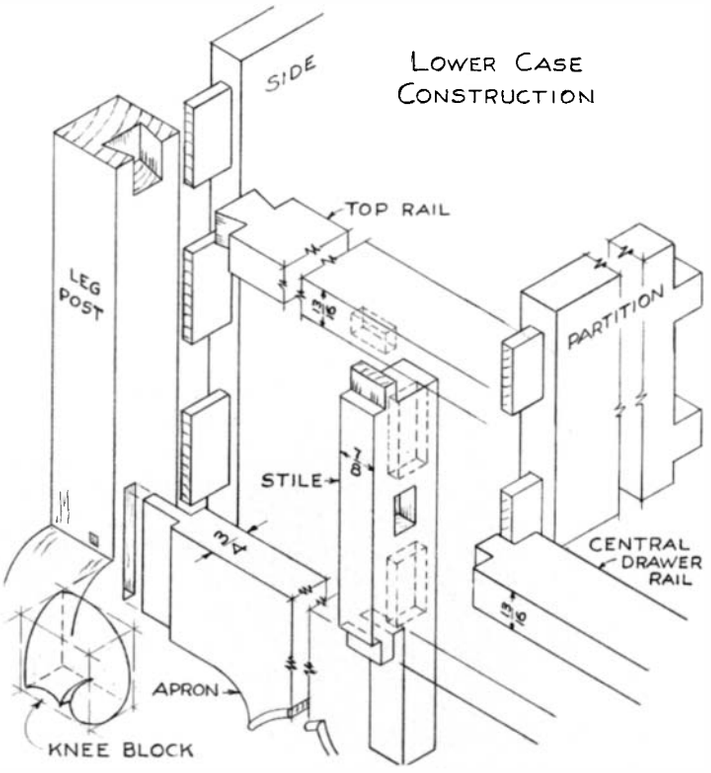
The legs—Begin by squaring the pieces for the legs. The article that follows on p. 36 gives a method for shaping cabriole legs with a bandsaw and hand tools. Here's how the lathe can be used, in addition to the tablesaw, bandsaw and hand tools, to shape the foot and ankle of these cabriole legs: Make a pattern from the drawing on the facing page, and lay out the leg on the two inside faces, so that the apron, sides and back will all fit flush with the post block. Cut the mortises in the post blocks while the leg blanks are still square.

To shape the legs, first draw diagonals on the leg ends to mark their centers, and punch a mark on each end 1 1/16 in. off-center, as shown in the drawing below. Mount each blank in the lathe on its true centers, with the foot end at the tailstock, and turn the foot. Shape it to the top of the pad, but don't finish turning the pad yet, or you will lose the offset center you need to turn the ankles. Remount the blank on the two opposing offset centers and turn the ankles. To someone not used to making cabriole legs, the setup looks forbidding. Use slow speed, and take light cuts with a sharp gouge or round-nose chisel held tight and fed slow. You can turn and sand 2 in. to 3 in. of the ankle, and sand to the top of the foot, before remounting the blank on its true centers to turn and sand the pads.



Take the blanks to the tablesaw, and with a smooth-cutting blade set for maximum height, cut the waste to form the post blocks. Set up a stop block to prevent going too far. In order to keep the post block flat on the table, cut two of the legs with the rip fence to the right of the blade, two with the fence to the left of it. Finish the cuts on the bandsaw and then rough out the rest of the leg. Bandsaw to the pattern line on one face, tape the scraps back in place, turn the leg 90° and saw again to the lines on the scraps. Final shaping is done with spokeshave, rasp and scraper.

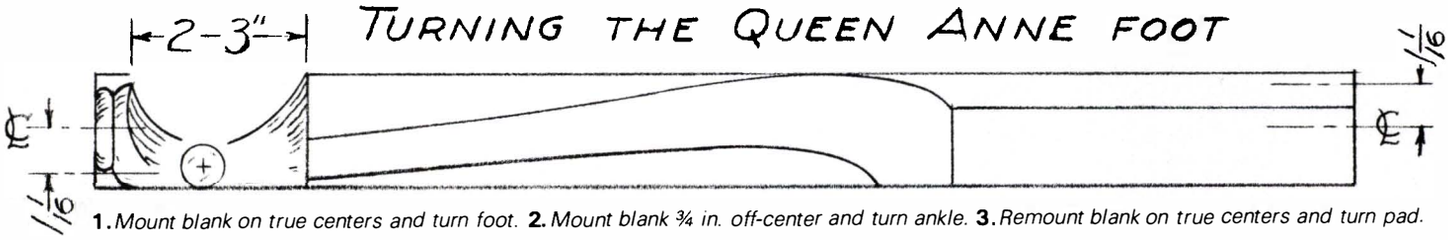
The lower case—Mill out the apron, sides and back, then cut the tenons to fit the mortises in the leg. Cut the bottom edge of the sides to shape, but wait to scroll-cut the apron until a gentle fit of its tenons poses no danger of breaking it. Dovetail the top rail into the top of the front legs, and test-assemble the frame (drawing, above). Disassemble, and cut the mortises in the apron and the top rail for the drawer stiles, and in the stiles for the central drawer rail. Tenons are 5/16 in. thick by 1 in. long, except the stile tenons, which are 1/2 in. long. Use poplar, pine or other secondary wood for the partitions that mortise into the back edge of the stiles and into the case back. Nail three drawer runners and a kicker strip to each of these partitions.



Now add the cock beading to the apron edge. Cut strips of mahogany 1/8 in. thick, 15/16 in. wide, and long enough to bend around the curves with enough to spare for cutting the miter joints. Round one edge with a small plane. Use a small gouge to make a groove in a sanding block for smoothing the round. You can use this same block later, to sand the cock beading for the drawers.

Bend the apron beading strips between pairs of plywood forms, shaped to accommodate clamps. Make the curves of the forms a little tighter than the apron radii shown, to allow for springback. Also, make sure the curves on the forms are smooth, as rough or flat places can show up in the bent strips. Boil the strips in a shallow pan of water for ten minutes or so and clamp them in the forms while hot. When they're dry, finish-sand the beading and the apron face, miter the strips, and attach them with glue and small brads. Then fit and attach the short, straight pieces of beading.

Before gluing up the lower case, dry-assemble it to check



1. *Mount blank on true centers and turn foot.* **2.** *Mount blank 3/4 in. off-center and turn ankle.* **3.** *Remount blank on true centers and turn pad.*

for fit and squareness. Disassemble, scrape and finish-sand all parts. Then glue the legs to the sides, clamping the two subassemblies together, if necessary, to make them lie flat. You can pin the tenons now, while these subassemblies are in clamps, or after the whole case is glued up. Drill 3/16-in. holes (four in each side) into the post blocks and through the tenons, coat the inside of the holes with glue, and hammer in 3/16-in. square pins. A small handsaw with set removed will trim off the pins that protrude, without marring the surrounding surface. Pare flush with a sharp chisel.

While the sides are drying, glue up the front frame, then glue the partitions between this and the back. When these are dry, finish gluing up the lower case, clamping and checking for squareness, and pin the two apron tenons and the four tenons at the corners of the back.

To shape the knee blocks, bandsaw the six blanks and glue each one to scrap wood with paper in the joint. Use the scrap to clamp in the vise while rough-carving the blocks. Match the shape of the blocks to the contour of the leg's knee. When they're shaped, pry the blocks from the scrap, scrape off the paper and glue, and glue the blocks in place. Now finish carving the blocks to fair smoothly into the leg.

The upper case—Begin the upper case by milling the stock and cutting it to length. Along the back edge of each side, cut the ½-in. rabbet for the backboards, and cut the grooves to receive the buttons that will hold down the case top (detail A, facing page). Mortise the sides to receive the drawer rails—three front and three back. Cut the ½-in. long tenons on the rails—twin tenons for the front, single tenons for the back. For the top and bottom rails, cut the half-sliding-dovetail slots in the top edge of the sides (detail B) and the dovetail mortises in the bottom edge. Fit the corresponding dovetail tenons in the top and bottom rails. Test-assemble the case, then take it apart and plow the slots in the inside edges of the drawer rails to receive the tenons of the drawer runners (detail C). The runners have ½-in. long tenons that fit these grooves, and they will be left unglued; the distance between shoulders is 1/8 in. short to allow the sides of the case to shrink. The inside edge of the top front rail is also mortised to receive the loose tenon of the top-drawer kicker strip. This does not connect to the back rail, but like the drawer runners will be attached to the side with a single screw. Test-assemble all parts, then take the case apart and glue it up.

The case sides are plain. The top that overlaps them is now molded on three edges and fastened with wood or metal tabletop buttons. Nail the molding strip under the top.

The drawers—All the drawers are constructed alike—dovetailed front and back, with the bottom slid into a groove in the sides and the front, and secured with nails to the bottom edge of the drawer back, as shown in detail D. (For a

BILL OF MATERIALS

Amt.	Description	Wood	Dimensions T x W x L
Lower case			
4	Legs	mahogany	2½ x 2½ x 28
1	Knee block (makes 3 pairs)	mahogany	¾ x 1½ x 15
2	Sides	mahogany	¾ x 10½ x 15½ s/s
1	Apron	mahogany	¾ x 4½ x 28¾ s/s
1	Top rail	mahogany	13/16 x 1⅝ x 28¾ s/s
1	Back	pine	¾ x 10½ x 28¾ s/s
2	Drawer runners	pine	¾ x 1½ x 17¼
2	Drawer guides	pine	¾ x ⅞ x 15½
2	Kicker strips	pine	¾ x 1⅜ x 16⅜
2	Drawer stiles	mahogany	⅞ x 1⅝ x 7 s/s
1	Central drawer rail	mahogany	13/16 x 1⅝ x 12 s/s
2	Partitions	pine	⅞ x 8½ x 16⅜ s/s
6	Drawer runners	pine	⅝ x ¾ x 17¼
2	Kicker strips	pine	¾ x 2 x 16⅜
1	Apron cock bead	mahogany	⅛ x 15/16 x 40
14	Joint pins	mahogany	3/16 x 3/16 x 2
1	Molding	mahogany	¾ x 2 x 32½*
2	Moldings	mahogany	¾ x 2 x 19*
1	Filler strip	pine	½ x 1⅝ x 28½
Upper case			
2	Sides	mahogany	13/16 x 17⅞ x 26¾
1	Top	mahogany	¾ x 19 9/16 x 33½
4	Drawer rails	mahogany	13/16 x 2¼ x 28½ s/s
1	Top rail	mahogany	¾ x 1¾ x 28½ s/s
4	Back rails	pine	13/16 x 1½ x 28½ s/s
1	Back top rail	pine	¾ x 1¾ x 28½ s/s
8	Drawer runners	pine	13/16 x ¾ x 13¼ s/s
2	Drawer kickers	pine	¾ x ¾ x 15¼ plus ½-in. long tenon, one end
	Backboards	pine	½ x 26¾ x 29½
1	Top molding	mahogany	½ x 1½ x 31¾*
2	Top moldings	mahogany	½ x 1½ x 18¾*
1	Molding backing strip	pine	½ x ½ x 76

Amt.	Description	Wood	Dimensions T x W x L
Drawers*			
2	Fronts	mahogany	¾ x 6⅝ x 7 7/16
2	Backs	pine	½ x 6 5/16 x 7 7/16
4	Sides	pine	½ x 6⅞ x 17½
2	Bottoms	plywood	¼ x 6 15/16 x 17¼
2	Fronts	mahogany	¾ x 2⅜ x 11 15/16
2	Backs	pine	½ x 2 1/16 x 11 15/16
4	Sides	pine	½ x 2⅝ x 17½
2	Bottoms	plywood	¼ x 11 7/16 x 17¼
1	Front	mahogany	¾ x 3⅝ x 28 7/16
1	Back	pine	½ x 3 5/16 x 28 7/16
2	Sides	pine	½ x 3⅞ x 16¾
1	Front	mahogany	¾ x 4⅝ x 28 7/16
1	Back	pine	½ x 4 5/16 x 28 7/16
2	Sides	pine	½ x 4⅞ x 16¾
1	Front	mahogany	¾ x 5⅜ x 28 7/16
1	Back	pine	½ x 5 1/16 x 28 7/16
2	Sides	pine	½ x 5⅝ x 16¾
1	Front	mahogany	¾ x 6⅝ x 28 7/16
1	Back	pine	½ x 6 5/16 x 28 7/16
2	Sides	pine	½ x 6⅞ x 16¾
4	Bottoms	plywood	¼ x 16½ x 27 15/16
11	Cock bead	mahogany	⅛ x ⅞ x 30
4	Cock bead	mahogany	⅛ x ⅜ x 30
	Stops	pine	from 1 x 2 stock

Hardware: Ten brass pulls, four ⅝-in. dia. brass knobs; available from Mason & Sullivan, 586 Higgins Crowell Rd., W. Yarmouth, Mass. 02673.

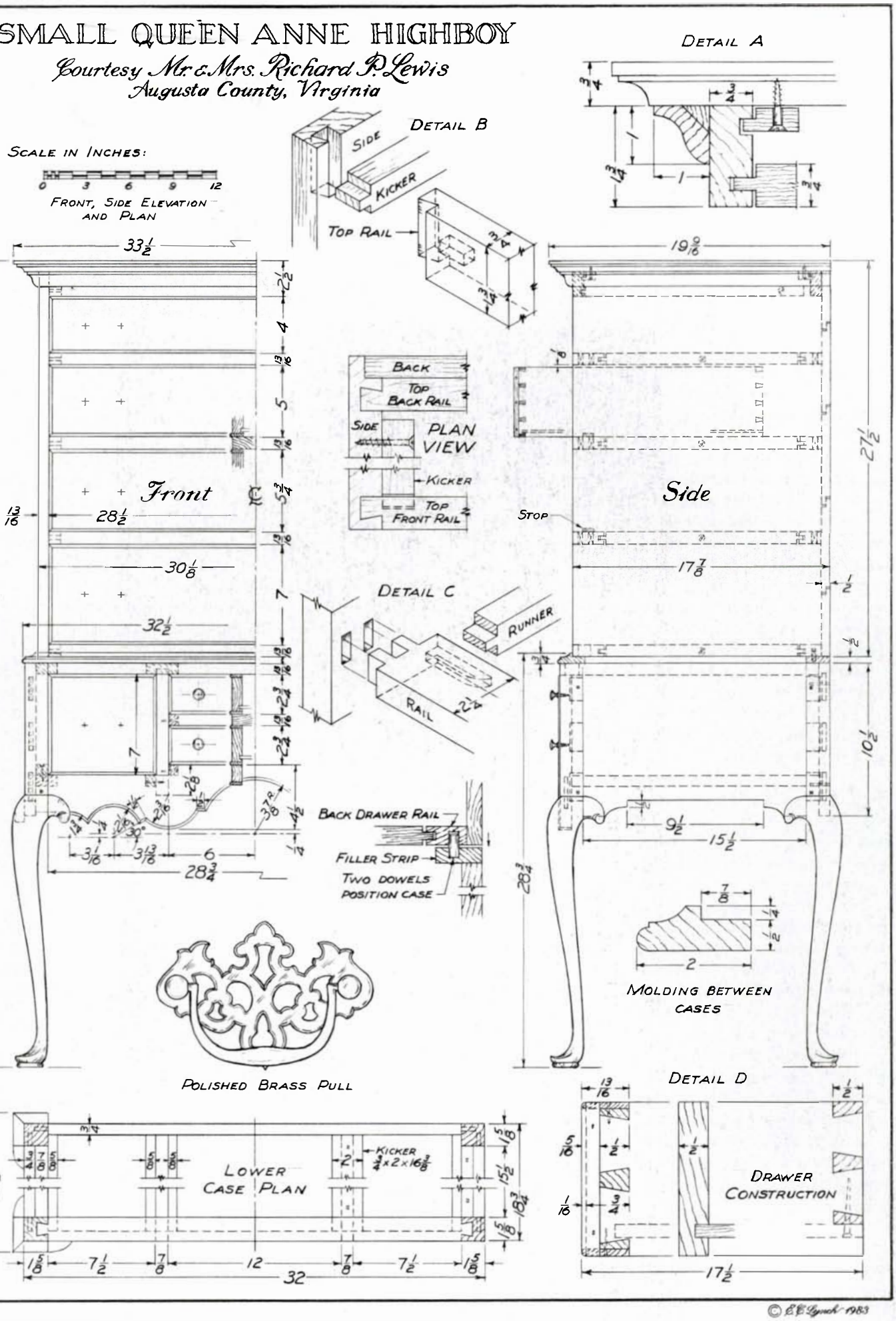
s/s = shoulder-to-shoulder. Allow ½ in. to 1 in. extra length for each tenon or dovetail.

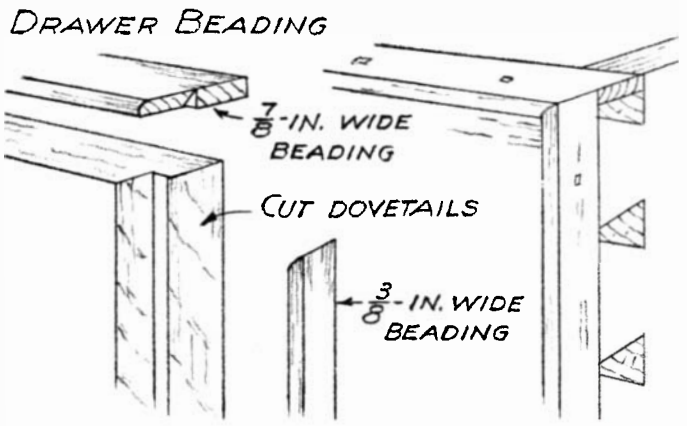
* Allow extra for final trimming.

** Dimensions include ⅛-in. vertical allowance for humidity changes.

SMALL QUEEN ANNE HIGHBOY

Courtesy Mr. & Mrs. Richard P. Lewis
Augusta County, Virginia





detailed discussion of standard drawer construction, see *FWW* #11, pp. 50-53.) The cock bead is ⅛ in. thick and either ⅞ in. or ⅜ in. wide, depending on whether it goes on the top and bottom edges of the drawers or on the sides (drawing, above). Either way, it should stand about 3/64 in. proud of the drawer face. Note that the drawer fronts should be at least ¼ in. shorter than their openings, to accommodate the beading, top and bottom, and to allow for possible swelling. When the drawers are glued up, but before the bottoms are slid in, rabbet the drawer sides for the ⅜-in. wide cock beading with a fine-tooth circular saw, guiding the drawer against both the miter fence and the rip fence. Do all final sanding of the fronts, and prepare the top and bottom beading. Cut these full-length and then miter the ends, actually only the front half of their width, to meet the narrower cock beading on the drawer sides. To miter, clamp the cock beading between a 45° angled block of wood and a backing board. Using the wood block as a guide, cut down with a sharp chisel. Apply the top and bottom beading with glue and nails, then miter and apply the beading in the rabbets along the drawer sides.

Finishing touches—Attach the drawer stops to the drawer rails in the upper case and to the drawer runners in the lower case. To ensure a close fit for the rabbeted moldings that provide transition between the upper and lower cases, position the moldings on the bottom of the upper case and miter them to length. Then, using a strap clamp, glue up the three molding pieces using the filler strip to complete the back of the rectangle. Attach this assembly to the top of the lower case. To key the two cases, drill two ⅜-in. holes in the top of the filler strip about 4 in. from each side of the case. Use dowel centers in the holes to mark the position of corresponding holes in the back rail of the upper case when the upper case is set in position on the lower case. Separate the cases, drill the holes, and then insert 1-in. long, ⅜-in. dowels for keys (detail E, p. 35).

Rabbet the white pine planks for shiplapping and lay them horizontally in the rabbets you've cut in the back edge of the upper case sides. Space the planks 1/16 in. apart, to allow for expansion, and secure them with small nails. □

Carlyle Lynch, a designer, cabinetmaker and retired teacher, lives in Broadway, Va. His plans for a Southern huntboard appeared in FWW *#39, and others of his drawings are available from Garrett Wade, Lee Valley Tools Ltd., or Woodcraft Supply.*

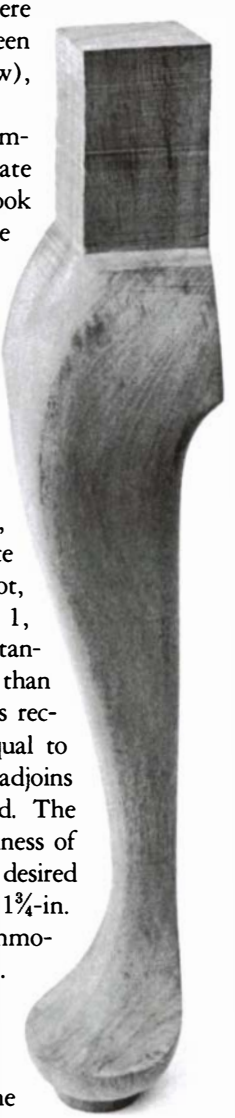
Cabriole Legs

Hand-shaped, without a lathe

by Philip C. Lowe

Cabriole legs, all characterized by the cyma or S-curve, have taken various styles. The cabriole seems to have evolved from the ancient practice of shaping the legs of furniture after those of beasts, and so in Egyptian furniture you see cabriole legs ending in rather literal animal feet. The Chinese favored more abstract renditions. Chippendale, who borrowed many of his ideas from the Chinese, popularized the ball-and-claw foot, along with carved acanthus leaves decorating the knee. To my eye, the sparest, most pleasing form of the cabriole is the Queen Anne, which terminates in a spoon foot, also called a club or dutch foot.

The leg involves methodical shaping with hand tools. Traditionally, slipper and trifid feet were also hand-shaped. The spoon foot, however, was usually lathe-turned. But there are those who don't have a lathe, and even for those who do, the lathe has a disadvantage: it necessitates carrying the circular perimeter of the foot all the way around, which interrupts the flow of the line down the back of the ankle. Here is how to design, lay out, cut and shape a Queen Anne cabriole, with bandsaw (or bowsaw), spokeshave, rasp and file.



Consider first the rough thickness of the lumber you will use. Solid lumber is best, as laminate lines will interrupt the wood's figure and look offensive when the leg is cut. The most suitable thicknesses for cabriole legs are 10/4, 12/4 and 16/4, depending on the length of the leg and the size of the piece of furniture it will support. I always figure the working thickness of rough stock, after it is planed, to be ¼ in. less than it is nominally. For a typical chair or low table, 12/4 stock, which will yield 2¾ in. of working thickness, is suitable.

You'll need a full-size drawing of the leg, including the post block, knee, transition piece (also called the knee block), ankle, and foot, which is made up of the toe and pad (figure 1, facing page). On a piece of paper, draw a rectangle the length of the leg and ¼ in. smaller than the rough thickness of your stock. Within this rectangle draw the post block first, its length equal to the width of the rail it will join, or, if the leg adjoins a case, the width of the front, back or end. The width of the post block depends on the thickness of the tenons it will receive, as well as on the desired curvature of the knee. For 12/4 stock, a 1¾-in. square post block is common, readily accommodating ¼-in. thick tenons in ¾-in. thick stock.

After laying out the post block, draw the pad and foot. The pad diameter should be about half the width of the blank. Its thickness, from ¼ in. to ⅜ in., depends partly on the

thickness of the carpet you expect your piece to stand on. The pad's function is to separate the lines of the leg from the floor. The height of the toe depends on the size of the leg, but on a chair or table leg it's usually ¾ in. to 1 in. from the floor. Sketch in the curves up to the ankle, whose diameter should be about two-fifths the thickness of the leg blank. This narrowest part of the leg should fall at about three times the height of the toe. Next develop the knee, sketching a curve that meets the bottom corner of the post block at about a 45° angle; if it is more horizontal than that, it creates an awkward shelf at the top of the knee. Aim for a tangency point with the outside of the blank a distance from the post block about three times the height of the toe.

Connect the knee to the ankle with a relatively straight line. It is important that you understate any curve here because your drawing is in only one plane, and when the blank is cut in two planes, the curve will be exaggerated. Draw the line of the back of the leg, leading all the way up into the transition piece. Keep this line relatively straight also, and see that the leg thickens gradually and proportionally to the toe, ankle and knee already drawn. The final curve into the transition piece should be relatively tight. If you regard the points of tangency at the knee, ankle and toe, you may be surprised at how much control you have in creating a pleasing shape. Keep in mind, however, that this is only a two-dimensional shape, and its final test will be in a solid piece of wood seen from eye level as part of a whole piece of furniture. Restraint at this stage promises a more pleasing leg in the end.

Next, make a permanent wooden pattern from your drawing. Tape the drawing onto a piece of ⅛-in. plywood, and with a large pin epoxied into a ¼-in. dowel, stipple the outline of the leg onto the plywood, poking through the drawing at ⅛-in. to ¼-in. intervals. Connect the markings on the plywood with a pencil. Repeat this procedure for the transition piece, then cut out both patterns and file their curves smooth.

Prepare the stock next, starting with pieces 2 in. longer than the sum of the two transition pieces (laid out above the post block) plus the leg. Usually the grain of the transition piece runs vertically, like that of the leg. Rip the stock to width at least the dimension of your rough thickness. Joint one face of the blank, either on the jointer or with a hand plane, and then joint an edge square to it. Thickness-plane the blank ⅛ in. larger than the finished dimension, and put the blank aside for a day or so, to give it time to warp in response to any stresses milling may have introduced.

When you have all the leg blanks milled, consider their grain orientation relative to one another. For visual compatibility, either the quarter grain or the flatsawn grain of each blank should face front. Mark the inside corner of each blank, and hand-plane the inside surfaces, removing mill marks and making sure that the surfaces are square to one another. Finish thickness-planing the blanks: plane the outside surfaces parallel to the inside. Crosscut the blanks to their finished length, saving the offcuts for the transition pieces.

To begin layout, set a marking gauge to the width of the post block, and scribe this width on the two inside surfaces (figure 2). Trace the outline of the leg below the post block. To keep the stock from rocking through the second bandsaw cuts, I include in the layout of the leg a pair of bridges—one at the top of the post, the other between the knee and toe. You could also tape the waste from the first cuts back on the stock before making the second cuts, but I find the bridges easier and more stable. Scribe the position of the mortises on the post block, and cut the mortises while the blank is still square; it's easier to hold square stock.

Now, using a ¼-in. blade, bandsaw the leg: Cut relief kerfs for the bridges first, then saw the post block, staying 1/16 in. away from the scribe line. The post will be planed later, after it is attached to the rail. Saw the curve from knee to ankle, leaving the bridge between. Sawing right on the line will minimize spokeshaving later. Next, define the pad, cutting straight in from the bottom of the blank first, then sawing the curves at the bottom of the foot to meet these relief cuts. Finish sawing the back curve, and save both back-curve scraps. These have the pattern lines for the cut on the adjacent face and should be tacked or taped back in place to saw

Fig. 1: Cabriole leg design

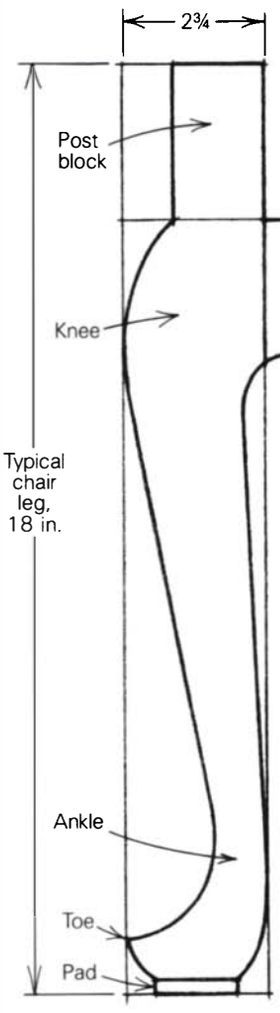
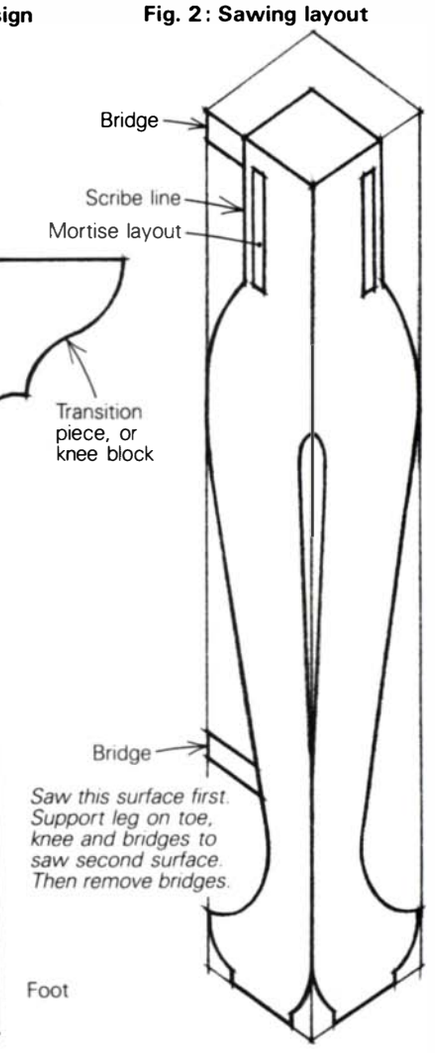
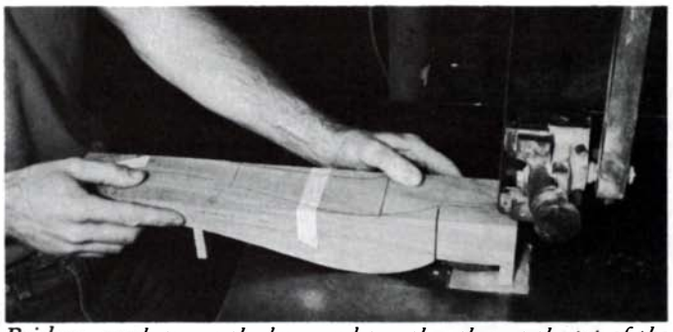


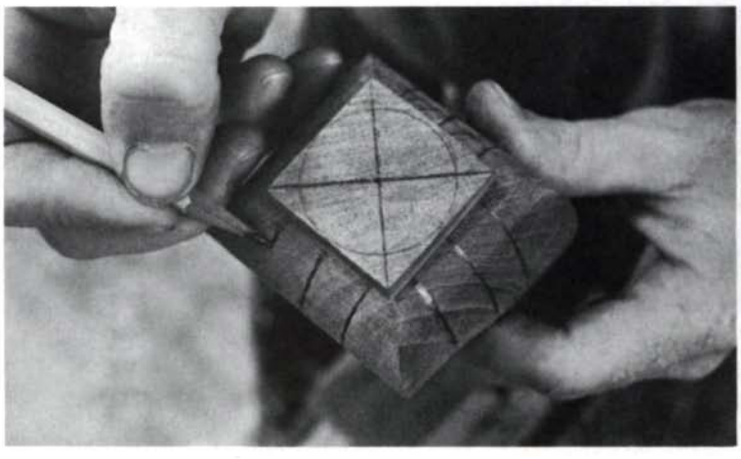
Fig. 2: Sawing layout

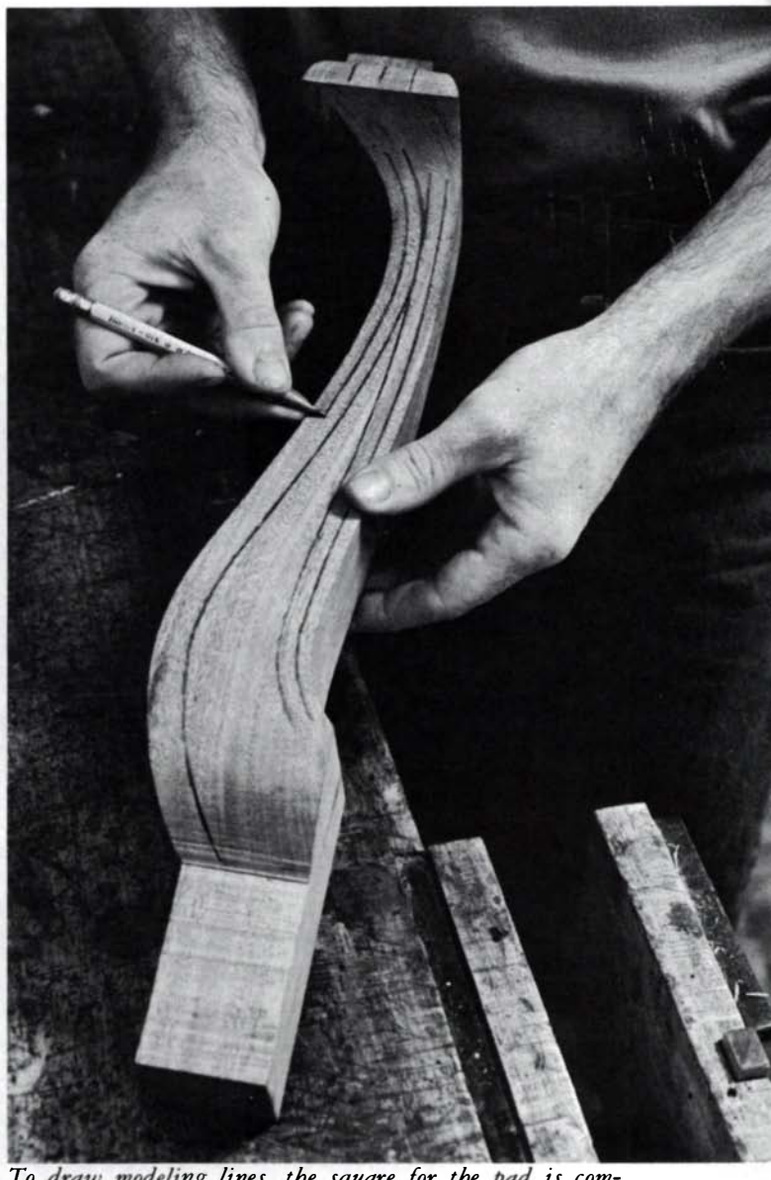




Bridges—one between the knee and toe, the other at the top of the post block—keep the stock from rocking through the second bandsaw cuts. Waste from the first cuts has been taped back in place, to provide layout lines for sawing on.

A pipe clamp mounted in the bench vise, above, makes an ideal holding arrangement for working the length of the leg. Here a spokeshave fairs the bandsawn curves, in preparation for the modeling layout.





To draw modeling lines, the square for the pad is compassed round, and the other four surfaces are divided into quarters, left. Then each leg surface is penciled with lines parallel to the leg edges, above: two inside lines begin at half the ankle thickness and two outside lines begin at one-quarter the ankle thickness.

it. After sawing this second surface, turn the blank back to the first sawing position and saw off the bridges.

The next job is to fair the leg with a spokeshave, removing all the bandsaw marks, bumps and hollows. It is important here that the leg be kept square in section; irregularities are more difficult to see and smooth once you begin rounding the leg. Where the curves are tight and the spokeshave will not reach, you can use a rasp or a file. The leg is now ready to be laid out for final shaping.

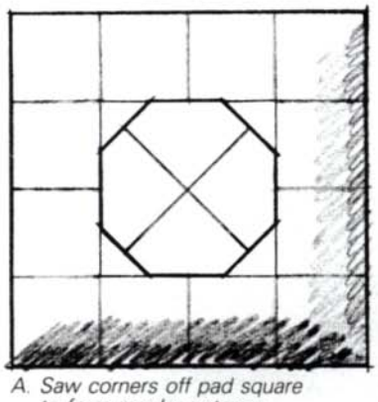
Begin laying out the bottom, locating the center of the pad by drawing two diagonal lines from the corners of the square that will contain the pad, and scribing with a compass the largest possible circle the square will contain. Divide each surface of the underside of the foot into four equal sections: first draw a line from the center of each side of the pad to the top edge of the foot, then halve the distance between these lines and the corners of the foot.

To lay out the guidelines for modeling the rest of the leg, position a pencil point at the center of the ankle, and using your middle finger as a depth gauge running on the stock edge, draw lines from ankle to post block parallel to each edge of the leg. There will be a total of eight lines, two on each face. Reposition the pencil point halfway between these lines and the edges, and draw eight more longitudinal lines. Now the leg is ready to model.

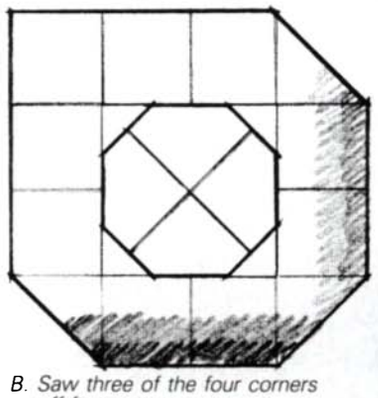
Mount the leg bottom up in a vise, and saw the waste away from the pad square to leave a regular octagonal shape (figure 3A, facing page). Similarly, cut the corners off the toe square, but leave the corner at the back of the leg, thus forming only three-quarters of an octagon (figure 3B). Now use a rasp to round the outline of the pad and the foot (figure 3C). Check the shape of the foot periodically by looking down from the knee to see that it is situated symmetrically in relation to the rest of the leg. When the outline is round, use the rasp to fair the underside of the foot, from its perimeter to the perimeter of the pad.

Modeling the rest of the leg requires attention to holding it. As the surfaces become more curved, a bench vise becomes

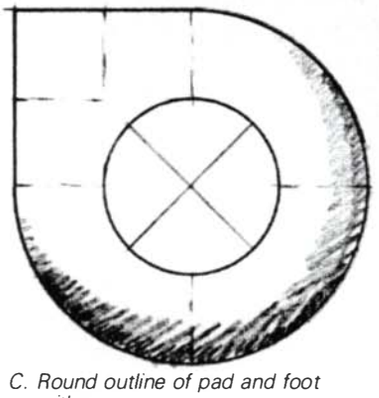
Fig. 3: Modeling the foot, bottom views



A. Saw corners off pad square to form regular octagon.



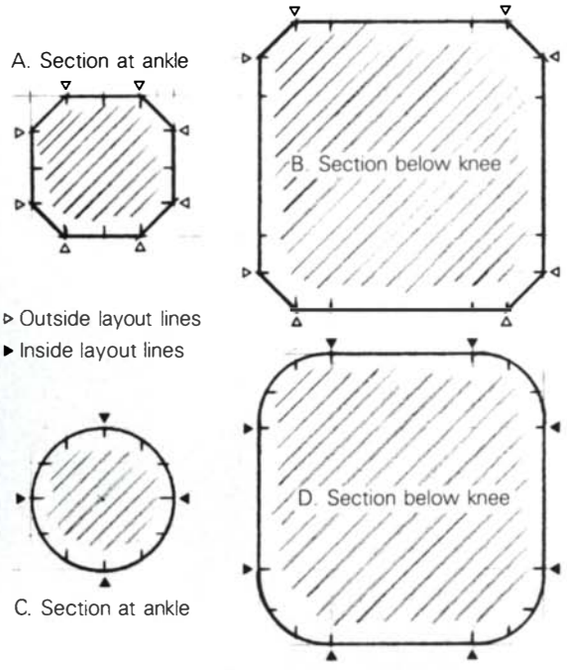
B. Saw three of the four corners off foot square.



C. Round outline of pad and foot with a rasp.

The steps for shaping the underside of the leg yield a round pad and a rounded foot.

Fig. 4: Stages in modeling the leg



A rasp chamfers the corners of the leg to the outside layout lines, then rounds the leg to the inside layout lines, as detailed in figure 4.

more frustrating. I clamp the blank lengthwise in a pipe or bar clamp and mount the clamp in my bench vise. This affords access to most of the leg's surfaces, and the blank is easy to reposition. Use a rasp to chamfer all four corners to the outside layout lines, from the ankle to the knee. This yields an irregularly octagonal section of varying proportion, depending on where it is along the length of the leg (figures 4A and 4B). The flat should taper to nothing at the foot and at the curve toward the transition piece. Next rasp the ankle round (figure 4C). Continue rounding the rest of the leg to the inside layout lines. The shape will become a square with rounded corners as you approach the knee (figure 4D). Flare the foot's top and back, to form a smooth-spreading curve.

When the leg is fair, remove the rasp marks with a file, followed by a cabinet scraper. Then sand the leg, except for the surfaces that will be blended into adjoining members.

The leg can now be joined to its aprons or case sides, after which the outside faces of the post block are planed flush, and the transition blocks are shaped and applied. Assuming the rest of the furniture piece is assembled, crosscut the transition block into the two blanks and orient each so that its grain (quarter or face) corresponds to the grain of the leg surface it will become part of. Plane the edge and end of the transition block for a close fit against the leg and the adjoining member (apron or case side). Position the pattern on the block and draw on it the shape of the transition piece. Bandsaw the piece, and glue it to the leg and adjoining member. A sharp, wide bench chisel then shapes the transition piece to the contour of the knee, and the areas that have not been sanded are sanded. □

Phil Lowe operates a cabinet shop in Beverly, Mass., and teaches cabinetmaking at North Bennet Street Industrial School in Boston. *For more on cabriole legs, their history and other techniques for making them, see* FWW *#10, pp. 55-59, and #18, pp. 76-83. If you're looking to buy already made cabriole legs, contact Fallsview Studios, 165 Fairview Ave., High Falls, N.Y. 12440.*

Sharp rubs a coat of linseed oil over the back of a nesting tern, who seems to be warning him to keep his distance.

An egret emerges from a cherry stump, showing tool marks from chainsaw, ax and gouge. Beak and head have been spokeshaved.

Natural Patterns

A patternmaker carves wildlife

by Jim Cummins

Ripples from a watersnake.

When John T. Sharp worked as a full-time patternmaker, he had to turn engineering drawings into three-dimensional wooden models, exact prototypes from which thousands of precisely mechanical copies could be cast. In a way, as a woodcarver now, he's working in reverse. In any flock of canvasback ducks, individual birds can differ, but each has the essential quality of its kind, a form and essence that distinguish a canvasback from any other bird. Sharp's carvings capture, and concentrate, this vital identity through abstraction and simplicity rather than by exactly imitating the lines of every feather.

Although his wildlife carvings are not the patternshop's literal copies, it was patternmaking that developed Sharp's ability to visualize three-dimensional shapes in wood. He says it was a necessary part of the job. Once, while working on a Pontiac grille, he spent a week studying the drawings before picking up a tool. But by the time he began to cut, he could see in his mind what he was aiming for.

Patternmaking is absorbing work, but Sharp says it never gave him much satisfaction, even though he could see the mass-produced results of his work all around him. So in his spare time he began carving log sections and tree stumps into birds, fish and water, combining the skills of his trade with his love for the outdoors. Every hunting or fishing trip through the country around his farm on the outskirts of Kent, Ohio, provided more data for his work. And most of the stumps were free for the asking—there's so much walnut and cherry in the neighborhood that Sharp burns it for heat.

When carving a bird, Sharp determines where it will be in the wood, usually leaving the pith to run through the bird's backbone. He roughs out the top view with one of his four chainsaws, and then he comes in from a side. He doesn't make many drawings, doesn't really even think in two dimensions, just cuts down toward the three-dimensional bird. After roughing out, he cuts as close as he can with a lightweight Stihl chainsaw, then finishes up with homemade knives, gouges and wooden spokeshaves, filling any objectionable radial checks with slivers of wood. He rubs in linseed oil, and patiently waits for the block to check some more. One green piece, on display last March in the dry air of the Cleveland Museum of Natural History, opened up a 1-in. crack clear through the water into the bird. Sharp, unperturbed, said he liked it that way.

Sharp balks at being called a wildlife artist, though his carvings exemplify why wildlife art has become so popular—

Canvasback ducks at sea, carved lifesize from a walnut stump.

animals and birds with every line and movement spare, efficient, and honed by the tough business of staying alive. But to Sharp, "wildlife art" includes sentimentality and caricature, not at all what he's aiming for.

He likes to figure on charging $100 a day for carving, and his sculptures range in price from $500 to $5,000. So a small one takes about a week, and—because he figures that $5,000 is about the top of his market—he can't afford to spend more than a month or two on a large one.

When somebody commissions a particular subject, Sharp has to be able to tell at a glance how long the work will take, in order to give an estimate. He's gotten good at this, partly because patternmaking estimates are made the same way. I asked him whether there is much other carryover from the patternmaking trade, whether he uses the same tools, for instance, and he said that mostly he does—more planes in patternmaking, because there are more flat surfaces, but spokeshaves too. He likes to cut, not grind away. He uses quite a few Oriental tools in both kinds of work—there was a Korean worker, Rak Suh Kim, in the patternmaking shop when Sharp was learning the trade, and the tools stuck.

Sharp doesn't do much patternmaking these days, but returns to it once in a while. He thinks the discipline is good for him. Patternmaking is exact, both in the amount of time a job can be allowed and in the work itself. The birds? Sharp says the birds aren't disciplined, the birds are free. □

Jim Cummins is assistant editor at Fine Woodworking.

Photos this page: Ralph Marshall

Designing Trestle Tables

Knockdown joinery challenges ingenuity and skill

by Kenneth Rower

Wide, wedged stretcher bridges the table's posts and stiffens the trestle. It also allows quick assembly and disassembly.

Trestle tables are bridges made of two or more standing frames and a top. If the frames are not individually stable they must be connected to one another or to the top. There are different ways to do this, most commonly by fitting a stretcher somewhere between floor level and the top. Most end-frames are T-form, but some are H-form or X-form, and these are sometimes braced on the diagonal to the top instead of being connected to one another. Many trestle tables are designed to knock down quickly. The simplest—indeed, the archetype—consists of a board on two horses, but most have a loose top and a detachable stretcher, which draw-wedged tenons join to the trestle posts.

A trestle table does not always require a knockdown frame; doorways, hallways and stairways are normally wide enough for maneuvering. The top alone can come off quickly, to reduce weight and bulk, and fixed joints can be made at the posts. But if flat storage is a requirement, or if the exercise is to build a rigid table that can be knocked down to elements with only a hammer, then the extra work is justified. Also, sizable draw-wedged tenons showing outside the posts are unsurpassed for strength, and an opportunity for expressive construction. But if flowing lines are planned for the frame, then it will be better to make fixed joints, without projections, at the posts.

Practical dimensions—A trestle table at standard dining height (29 in.) looks and works best when 6 ft. long or longer. At any length, the amount of top between the end-frames compared with the amount outside them is important. Putting about five-ninths between the supports and two-ninths out at each end balances the top against sagging, whatever its thickness (figure 1). But for tables much shorter than 6 ft., the resulting leg room at the ends becomes a problem—much less than 16 in. is uncomfortable. For elbow room, allow 24 in. per person along the sides. As to minimum dining width, around 30 in. is possible, 32 in. is better, and 36 in. provides space for serving dishes in the middle. The ratio between width and length is not critical, but as the plan approaches square, a leg-and-apron construction is more practical, for stability as well as comfort. A very long table may work better with another support in the middle, in which case the five-ninths/two-ninths rule is of course irrelevant.

The thickness of the top should be judged against the thickness of the posts. Probably the top should be thinner, but how much so will depend on the effect wanted. The width of the posts should be gauged against the width of the top. Two posts might be better than one under a very wide top, but twin stretchers could appear cumbersome. Flat stretchers placed at the floor and just under the top will give an airy effect (figure 2), but cannot do the stiffening work of a deep stretcher placed about halfway up a central post.

The trestle arms should stop about 3 in. short of the edges of the top, for knee room. The feet should be shorter yet, for toe space, but not so short as to allow the table to tip if someone were to sit on its edge. To clear minor irregularities in a floor, the lower edges of the feet can be relieved very slightly—$\frac{3}{32}$ in. is enough—starting 3 in. or 4 in. from each end. Careful beveling of the bearing parts will continue the thin dark line at the floor.

Stretcher depth and height off the floor determine the frame's lengthwise stiffness, as well as the apparent mass of the whole. In the standard knockdown design, the stretcher must

Fig. 1: Sizes of dining tables

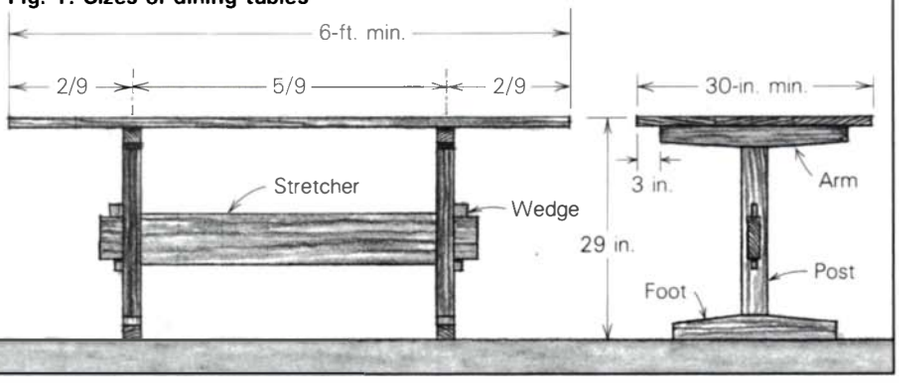
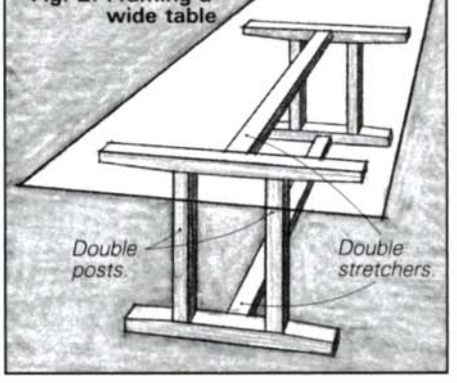


Fig. 2: Framing a wide table

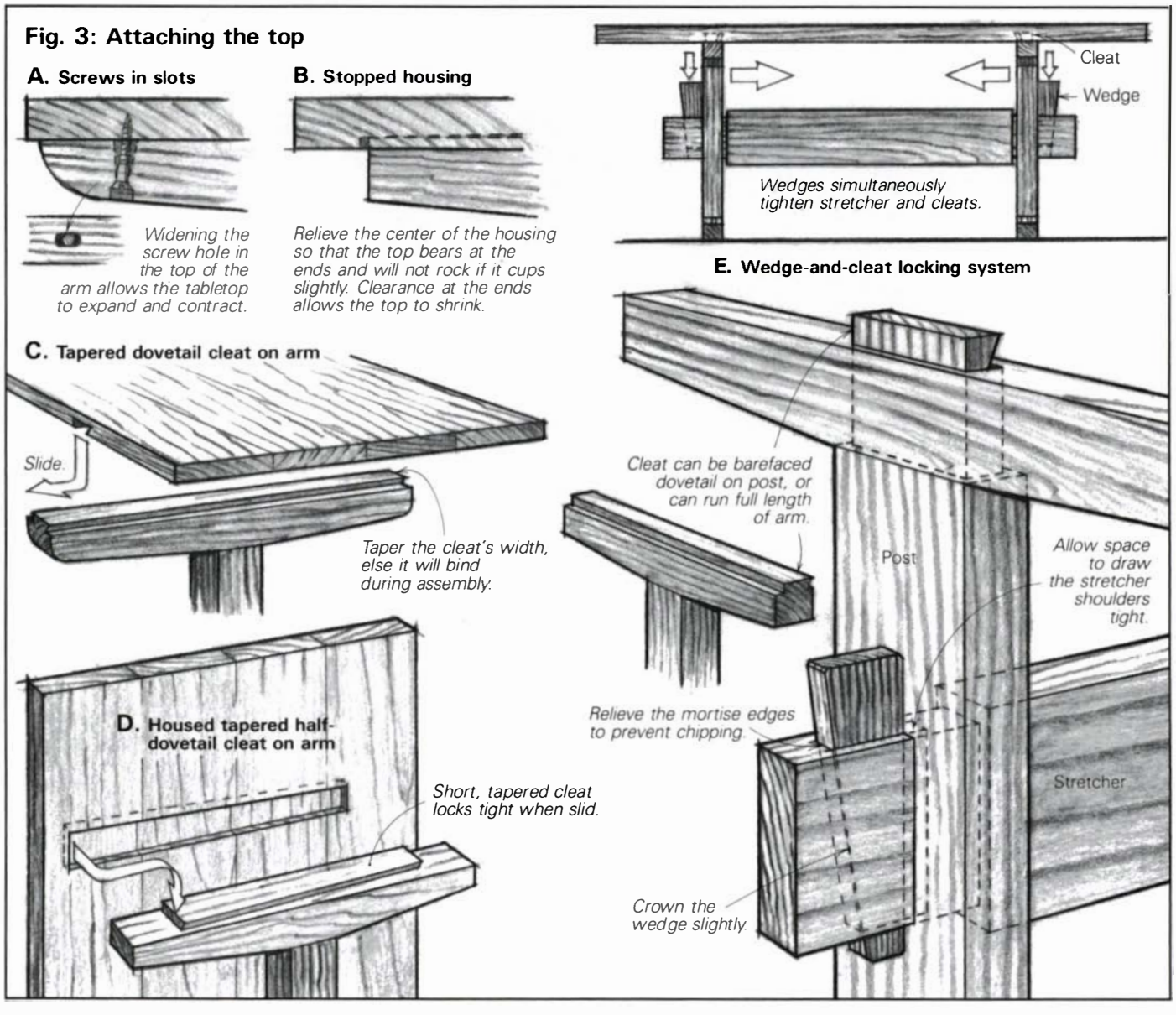


be thick enough to accept wedges that look right, and it is no bad thing to have plenty of weight down low in the frame.

Choices remain in the shaping of the frame parts and the treatment of edges, and different effects can be obtained for essentially the same table. For example, a frame trimmed with stopped chamfers on the posts and stretcher will look quite different from the same frame finished with through chamfers. The posts and the feet can be shaped to flow together at the joint, or they can be of different thicknesses to emphasize the change in direction. For wood of large section or uncertain seasoning, the latter arrangement has advantages.

Joinery—It is more complicated to plan and build a trestle frame than an apron frame. Instead of two sets of similar parts (legs and rails) and eight similar joints, there are four pairs of parts (posts, arms, feet and wedges) plus the stretcher, and three different sets of joints. The posts can be joined to the feet and arms by conventional mortise-and-tenon joints, or they can be bridle-joined by cutting open mortises at each end, with corresponding housings midway along each crosspiece. The latter is perhaps easier to do, and if cut with four shoulders is conceivably a stiffer joint in one direction, but it is particularly sensitive to shrinkage of the post. Certainly the bridle joint is appropriate when the post is thicker than the foot.

Figure 3 shows several ways of joining a trestle to its top. For a fully fixed design, effective joints can be made with stout wood screws through the trestle arms into the top, the top acting somewhat as a stretcher. This, of course, requires careful truing of the mating surfaces (**A**). For a removable top, or if a purely wooden construction is preferred, the simplest approach, if the top is heavy enough, is to cut shallow stopped housings in the underside to fit snugly over the breadth of the arms. Gravity will keep things together well enough, although the housings should be cut hollow in their length to allow for some cup in the top, and long as well to allow for shrinkage (**B**). Alternatively, each arm can be shaped to offer a slightly tapered dovetail cleat along its upper edge, and the top housed to receive it. This device can be found on Italian Renaissance tables (**C**). The joint can be stopped so as not to show and to allow setback of the arm, but the cleat must then be considerably tapered and shortened so the top can drop over it and engage by sliding across the frame (**D**). Another method, which exploits the force of the draw-wedges in the stretcher, requires cutting barefaced dovetail cleats in the upper post tenons where they emerge from the trestle arms. Matching housings in the top are then locat-



ed slightly farther apart than the cleats as measured when the frame is locked up. This method can instead use the full length of the trestle arm as the cleat. In either case, knocking home the stretcher wedges completes the joint by driving the end-frames toward one another (E).

When building end-frames, the post mortises can be chopped right through, ⅛ in. oversize in length, their ends squared, and the tenons later shimmed tightly with 5/32-in. slips, taken from the tenons themselves when the narrow shoulders are cut. Dowel pins secure the joints in the other direction.

Mortises through the posts for knockdown stretcher tenons are usually broad and exposed on one side, thus boring and paring is safer than chopping. The stretcher tenons should be a sliding fit in thickness and an easy fit in height, to prevent seizure if the wood swells.

Wedge mortises through the stretcher must be cut overlong to draw the stretcher shoulders tight against the posts. The slopes of the wedges should be slightly relieved toward the ends, and the extremities of the mortises chamfered, to prevent the wedges from catching when driven in or out. Wedge pitch is somewhat a matter of taste, but if it is too steep the wedge will bounce back when struck, and if too gentle the wedge may travel farther than anticipated. The wedges should be made first and used to lay out the mortises. A push fit is about right for the thickness. There is a temptation to make the wedges from harder wood than the rest of the frame, but such wedges may impress shallow grooves in the posts. It is better to use good pieces of the same stock, and to allow the slopes of the wedges to deform and lock against the harder end grain of their mortises.

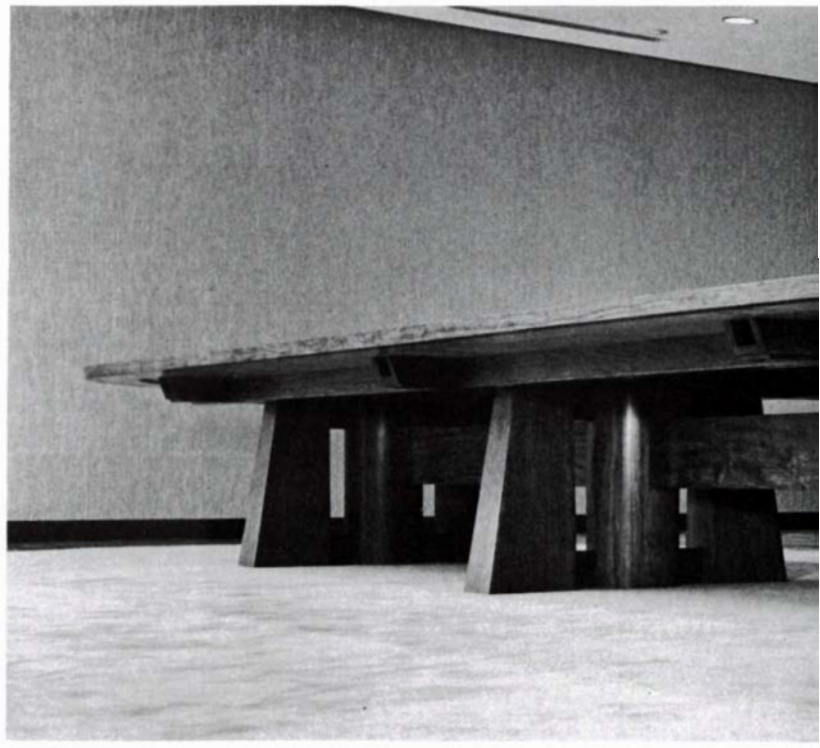
Pins should also be the same stock as the frame, but selected for straightness in both planes (look at the rays as well as the rings). Square and octagonal pins hold best, but can visibly crush the surrounding wood on the driving side. Where the pins emerge they will be round, and so for consistency drive all pins from the same side. Center the pin holes about 1½ diameters from the shoulders of the joint.

Making the top—In the absence of a single wide piece (not impossible in, say, mahogany), certain strategies remain. A board one-quarter the width required but twice the length and thickness can be crosscut, then resawn. Random stock can be studied for possibilities of unobtrusive joints and some balance in color and grain.

If edge-joining, allow ¼ in. of width for each joint and another ¼ in. for truing the edges of the completed top. Mark the face side at the joints and glue them up one at a time, each time truing the face side of the boards already joined as well as that of the one to be added, to keep the plane of the whole flat. If this work is done well, and all glue cleaned away each time, little final effort will be required to ready the top for finishing.

Any variations in the surface of the underside need to be dealt with only where they count. When the top is fitted to the frame, parallel flats can be planed across the grain where the top bears on the trestle arms. Differences in thickness showing at the edges and ends can be trimmed away on a short bevel, working to a line gauged from the show side. Sometimes this is done anyway, to make the top appear thinner. □

Kenneth Rower is a joiner living in Newbury, Vt. Photo by the author.



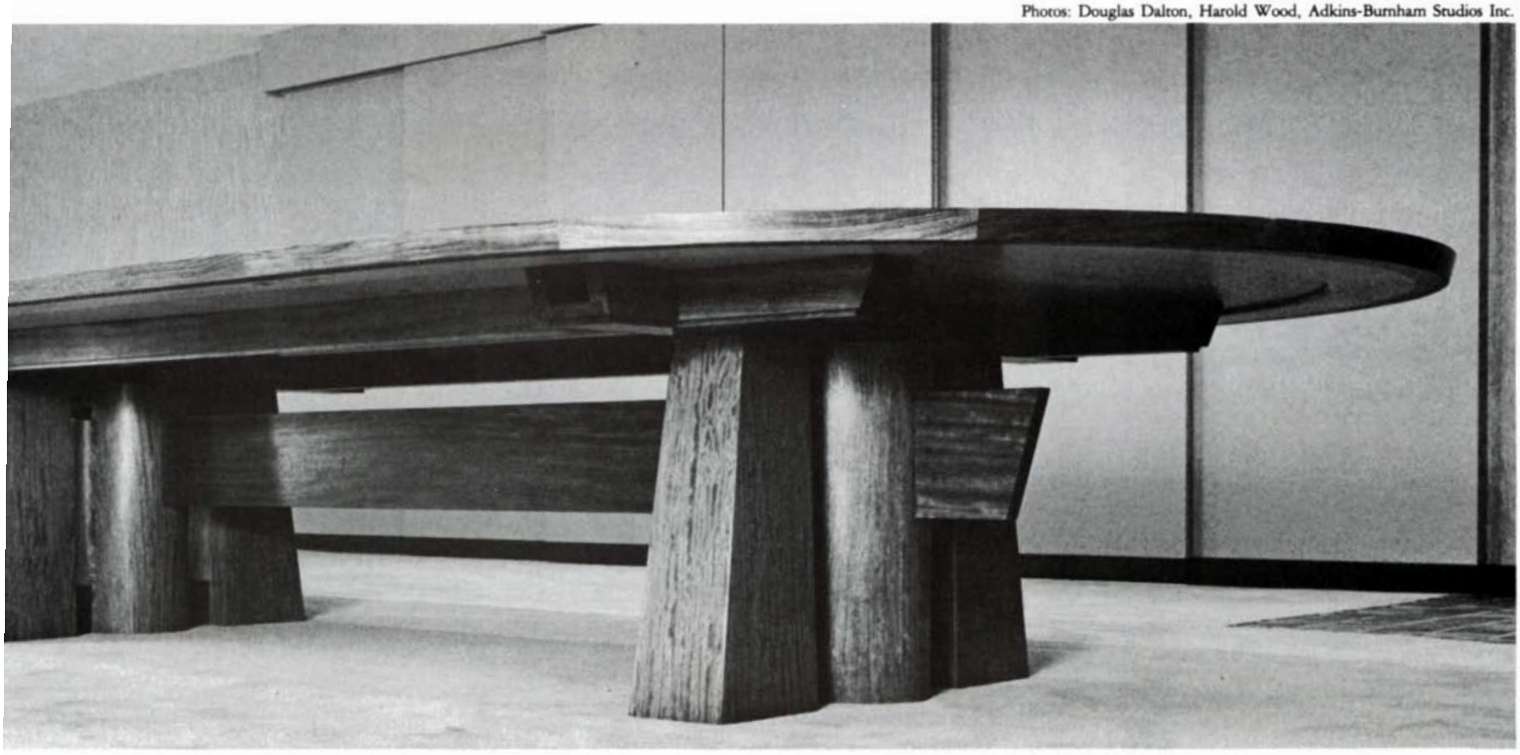
Altar table's carved lions, below, face the horizons and symbolize the passage of time. Gary Rogowski of Milwaukie, Ore., built the mahogany altar, 62 in. by 30 in. by 40 in. high, for the Lotus Temple of Hermetic Yoga.

Tricky Trestles

Three variations made by readers

These three tables illustrate the vast range of structural and decorative variations that can be developed on the fundamental theme of the trestle. Whether gargantuan or dainty, the trestle keeps the table sturdy. The stretcher's shape, and the way it locks into the upright posts, is part of the woodworker's fun. These are just three of the 515 photographs of contemporary furniture, tools, accessories and sculpture made by *Fine Woodworking* readers and published in *Design Book Three,* available soon from The Taunton Press. □

Photos: Douglas Dalton, Harold Wood, Adkins-Burnham Studios Inc.



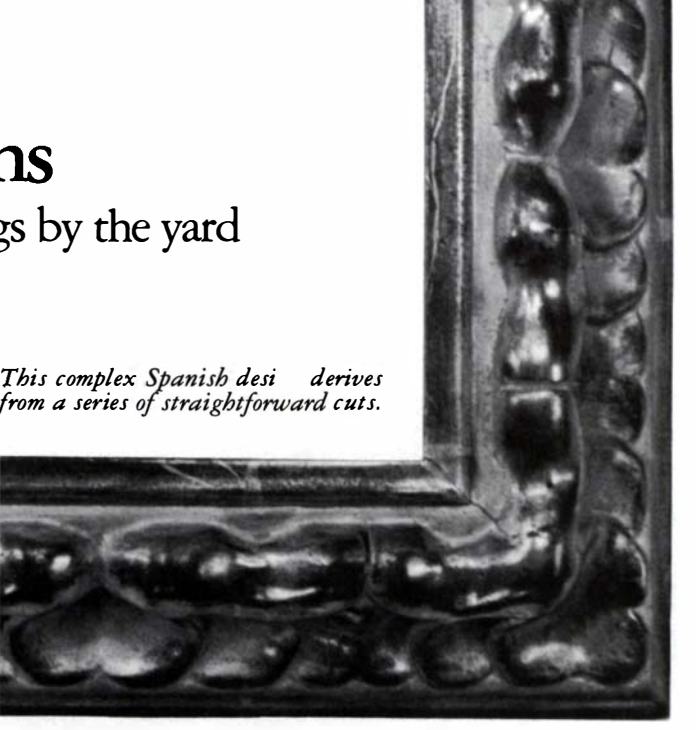
Conference table, 26 ft. long and 7 ft. wide, was designed and built of bubinga solid and veneer by Peter Allen of North Westport, Mass., for the National Fire Protection Association of Quincy, Mass.

The 'Bullet Train Desk' by Robert D. Sorrels of Brazil, Ind., made of spalted mahogany, elm and persimmon, is 60 in. long, 30 in. wide and 31 in. high.

Carving Running Patterns

How to chop out picture-frame moldings by the yard

by Miles Karpilow



This complex Spanish desi derives from a series of straightforward cuts.

The great picture frames, such as the richly carved portrait frames of the Louis XIV and Louis XV periods in France and those of 17th-century Spain, are carved with the whole frame in mind, so that the pattern is symmetrical, running from the center of each side to the corners. To make one of these, you have to know the size of the frame before you can begin to carve. But there is another way to make frames—you can carve a running pattern on a length of molding, and then cut it to whatever size is needed. By its nature, this is production work, and it goes quickly. Each cut may not look like much, but it sets the stage for the next, with no wasted motion and with far less fuss than one would imagine. There are fine examples of such continuous carved frames from virtually every historical period, from the Italian Renaissance through the end of the 18th century, when handcarving generally gave way to machine-made moldings with embossed patterns or cast ornamentation.

Like their more aristocratic cousins, running-pattern frames were usually finished with several layers of gesso followed by gold leaf. The patterns are similar to those found in furniture, but because the heavy gesso obscures the detail, the carving tends to be cruder. For a crisper look, some designs were reworked by carving the gesso. The scope of these carvings runs from simple beads, popular in the Renaissance and again in the Neoclassic period of Louis XVI, to the wide, flamboyant carvings of the Spanish and Italian Baroque. The origins of several patterns can be found in medieval manuscript decoration. One motif, peculiar to Spain, consists of spoon shapes and elephant ears. There are many versions of this, one of which I've described on pp. 48-49.

The word "bead" originally meant to pray—hence rosary beads, and eventually anything that looked like them, such as the beads on a necklace. Carved beads are actually a series of half-beads in high relief, as if a necklace were emerging from the wood. The molding is first planed into a sort of half-dowel shape running its length. The plane used is called a beading plane because it produces the shape that can be carved into beads. The shape on the molding is also called a bead, whether it is carved or not.

During my eight years as a carver and gilder, I developed a great respect for historical models. Robert Kulicke, the man I worked for and learned from, was very wary of what he called "inventing in the past tense." Chances are that our understanding of any period has been too much modified by our own, and that our attempts to work out new designs for a period will look inadequate and distorted to the next generation. But sometimes a carver has to take that risk. On one occasion I had to come up with something for an important 17th-century drawing, and nothing we had available would do. I decided to scale down and modify an existing model, and a short time later found an original frame virtually identical to my invention. Nearly every period frame we made, however, was copied from a specific model, and in most cases we owned the original, to which we continually referred in order to keep from straying. When possible, we'd scrub a section down to the bare wood to analyze the cuts. If you have a carved molding that you wish to duplicate, this is the route to take whenever possible. Examine the carving to figure out the minimum number of cuts and the most efficient order.

The carving technique is basically punch and shape. Each carving is a fixed number of strokes. When the chips fall away, you need to do very little secondary shaping. The interaction of the molding profile with the surface indentation creates an enormously rich texture, even though the execution is deceptively simple and satisfyingly quick. One traditional carver of my acquaintance, trained in Europe before World War II, was used to spending days on one delicate Louis XV panel and months on whole rooms of boiserie. He refused to believe me when I told him how quickly a particular frame could be carved, until I brought him into the shop to watch. He was convinced, but he walked away muttering "chip-chop," which, of course, is just what it is.

Any running pattern consists of a series of similar units strung together. The trick is to do the same cut of each unit all the way down the line, then turn around and do the next cut, and so on. I generally start out with pencil marks for the center of each unit and then do the rest by eye. If it's a carving I haven't done in a while, I'll carve one complete unit and use that as my guide. Sometimes it is necessary to do a few units before you get it just right, but one awkward unit—if it isn't *too* far off—will blend into the complete frame.

For this kind of carving, the molding profile is critical. If it isn't just right, the carving won't look right either. A bead on a molding has to be round, without a peak, and only slightly higher than its width. If hollows are too deep, they will interfere with your punch cuts. Steps have to be wide enough so that they don't break off, and rabbets have to have enough meat on top for the same reason. Once, when I was carving a Louis XVI molding, I found myself having to glue most of the beads back on, a tedious and costly process. I did a little research and discovered that the bead should not sit on top but go in at an angle, as shown in figure 1, so that you're carving toward the solid part of the frame instead of directly down on the rabbet. As a further precaution, you can place

a strip of wood in the rabbet to support the lip.

Most professional framemakers have moldings made to their specifications by a mill, but the part-time framer cannot have a stock of hundreds of feet of moldings in all the profiles he may want. There are many ways to deal with this. Shapers, routers, and even a tablesaw (*FWW* #35, pp. 65-67) can make moldings. I use block planes, molding planes and gouges. Back-bent gouges are particularly helpful. One caution, however: If you are going to carve the molding, remember not to sand the milled stock. Fine abrasive particles lodge in the wood and will quickly dull your tools.

My favorite wood for frames has always been basswood. It is the blandest wood I know of. It hardly ever asserts itself—just sits there and lets itself be carved. Jelutong, a southeastern Asian wood, is very similar in character. Neither of these woods looks particularly good with a natural finish, so they are best used when the frame will be gessoed and gold-leafed. Wormy chestnut finishes nicely, and is pre-antiqued in the bargain, but it isn't much fun to shape and can also be stubborn to carve. Honduras mahogany is an excellent choice for a natural finish. French frames were generally carved in oak, but the European variety of oak is finer and softer than our white oak. The Spanish carvers used a species of pine that is a little harder than those generally available in this country.

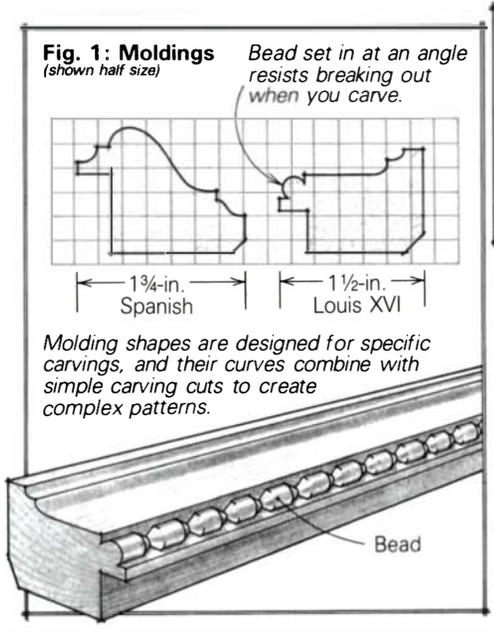
Bench—A carvers' "bench" is a work surface that can be set on top of a sturdy table or supported by a framework of 2x4s. My favorite is a 2x12 with a 2x6 fastened along the top to form a step. The molding will be nailed to this, so you'll want lumber with few knots, but good kiln-dried construction lumber is adequate. An 8-ft. bench is portable, and can be clamped on top of a regular woodworking bench. But if you're planning a production operation, 12 ft. or 16 ft. is better. The height should fit the individual. I like about 40 in., so I can rest my forearm on the work. The bracing should be about 2 ft. deep for stability, which leaves room for a 1x12 along the back, on which you can lay your tools.

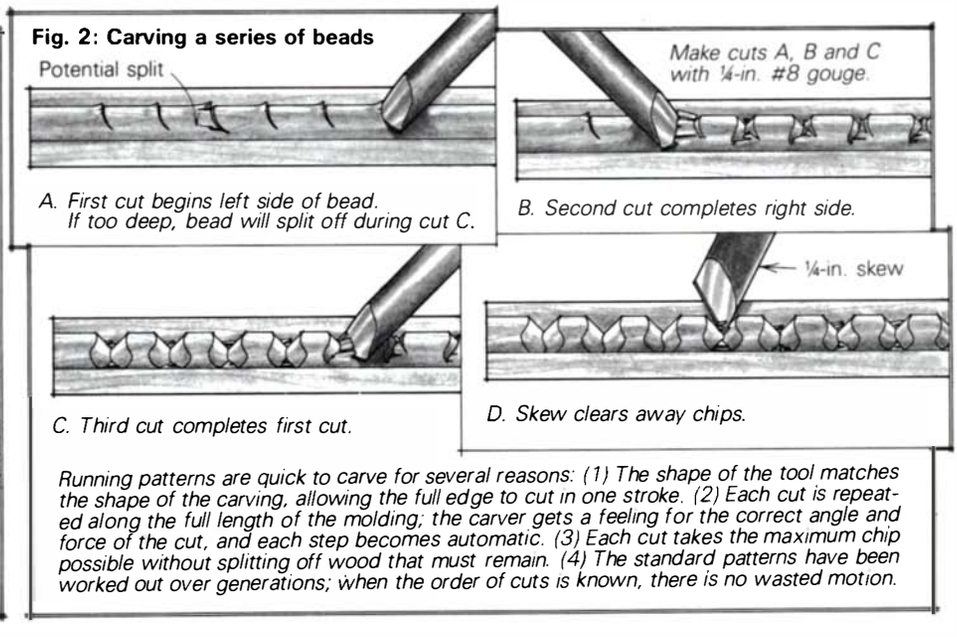
Nail the molding to the bench with 4d or 6d finish nails and set them, even if they don't go through an area to be carved. This not only holds the work more firmly, but protects the tool edge from an accidental brush with them. As an added precaution, when you know that a cut will be made directly over a nail, interrupt yourself and give the nailset an extra punch. Better time spent setting nails than regrinding chisels. When the work is finished, pry the molding from the bench. Remove any nails left in the bench with a claw hammer and pull the ones left in the molding out from the back with a pair of nippers. Never pull nails out from the front.

Tools—Because most cuts are made with one punch, the shape of the tool determines the shape of the carving, and you will eventually need a fair number of tools. When I was carving full-time, I got up to about 30, which served me for 12 or 15 different designs ranging from delicate to heavy moldings. The tools range in width from 1/16 in. to 1 in. Most frame carvers call all their tools chisels, including the gouges. This is less confusing than it might seem, because each tool is numbered according to its width and the shape of its curve. A ½-in. #8 and a 1-in. #8, for instance, have different widths but the same curve proportionally. A #7 has a slightly broader curve, and a #1 is a straight chisel. With a couple of exceptions, tools are ground straight across, with the bevel on the outside of the tool, opposite the cannel. For the carvings I'll discuss in this article you'll need the following: 5/8-in. #1, 7/8-in. #1 (ground to a ½-in. radius), ¼-in. #8, 5/8-in. #8, ¾-in. #8, ½-in. #7, ¼-in. skew, and a medium-weight mallet. In addition, you should also have a soft, long-bristle wire brush for clearing away chips, a hammer, a nailset, a flat bench chisel or a prybar for removing the molding from the work surface, and a compass/divider.

Carving beads—One of the most popular styles of the late-18th-century period of Neoclassicism was a simple row of beads, often used alone as trim on a number of moldings ranging from about 7/8 in. to about 2 in. wide.

Choose a chisel slightly wider than the diameter of the bead on the molding. For a molding bead of just under ¼ in., as shown in figure 2, start at the left-hand end of the piece, holding the ¼-in. #8 chisel in your left hand at a 45° angle toward you, so that it lines up with the angle of the bead, and 45° to your right, with the cannel down. There are three cuts plus cleanup. The first cut just breaks the surface. Beads have a way of splitting out, so don't strike too hard with the mallet. There are various adjustments to avoid split-out. One,





Drawings: David Dann

of course, is cutting lighter, but cutting down at a steeper angle can also help. The cuts should be 7/16 in. apart. In the beginning you may want to use a ruler or a divider to mark the spaces, but you should learn to space evenly by placing the tool so that the previous cut is centered in the space between the one before it and the one you are about to make. You are looking one space behind as you cut. Remember, you are not a machine, and a little unevenness is desirable.

The next cut is the mirror image, only deeper. Starting at the right-hand end, hold the tool in your right hand and the mallet in your left, and go back the other way. This time go all the way down, until the corners of the gouge reach the bottom of the beading. If your first cut was deep enough, there should be no splitting out. As you place the chisel, watch the bead you are forming. There should be a neat little ellipse, nearly round. There should also be no space between the beads. The third cut finishes the first, and the outside edge of this cut should touch cut number two. The final cut is with a skew, used as a knife to slice out the chips.

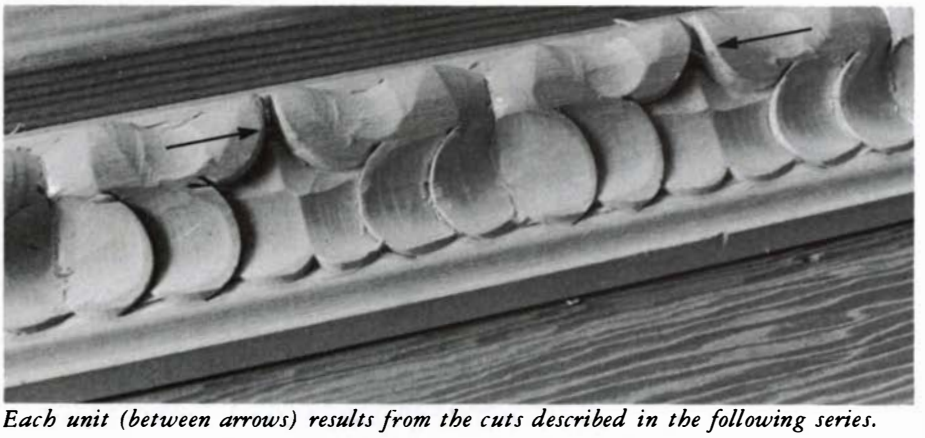
When you start out, it's a good idea to make eight or ten first cuts, then finish off a few of them. If they are all right, continue to the end. If not, practice a few more. A variation, generally used with other carvings such as ribbons, is the "pencil and pearl": three beads followed by a single long one that is about the length of three beads. The long bead is simply the half-round shape with rounded ends. □

Miles Karpilow makes furniture in Emeryville, Calif.

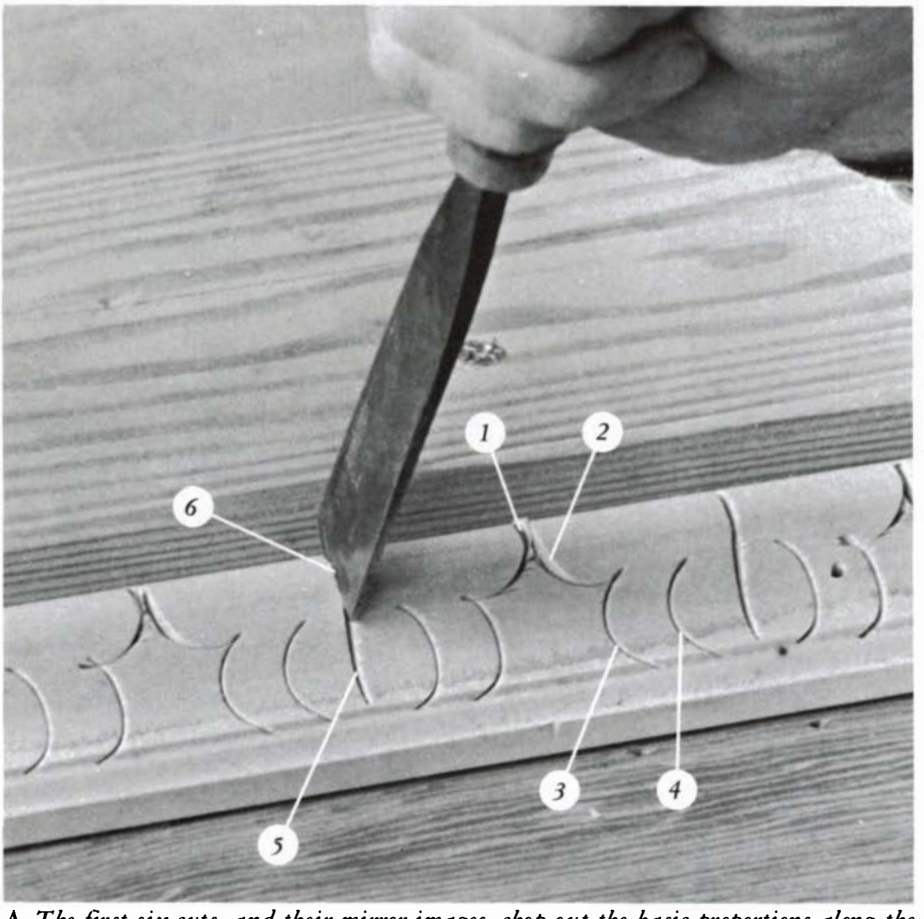
Carving a Spanish molding

This is a very popular carving that occurs in many different widths besides the 1¾-in. shown in figure 1 and in the photos. Start by marking off 3-in. divisions with the compass. If you want, you can also mark off the centers of these too. Photo A shows the carving after a series of cuts made by punching down with the mallet. These are numbered in the order they were made, but mirror-image cuts aren't numbered separately. You can vary the order of these cuts somewhat, but it's important to maintain the overall proportions. You will need most of the tools listed on p. 47. For a wider molding, select wider tools and wider divisions.

The first cut (*1*) is chopped straight down on each of the 3-in. divisions with the flat chisel (or the rounded one) at the very top of the molding. Now take the ¾-in. #8. With the top edge of the tool in the first cut, chop straight down (*2*), almost perpendicular to the face of the molding, fairly deeply, especially along the lower portion. Cut all these along the length of the molding, then turn the gouge around and cut the mirror images. The next cut (*3*), still with the ¾-in. #8, begins at the bottom end of the previous cut. Be sure to hold the gouge so that a line drawn through its corners would be at 90° to the molding length. Make the mirror-image cut in the opposite direction, keeping the shape symmetrical. The next cut (*4*) is similar. When you are more familiar with the carving, you can make cuts *3* and *4* as part of the same run. Then using the rounded #1 chisel, make a cut (*5*) halfway between the original 3-in. divisions. The cut should be right on the hollow of the molding and a little deeper at the top. Using the same tool or a straight-ground flat, continue the cut over the top of the molding (*6*), chopping fairly deeply.



Each unit (between arrows) results from the cuts described in the following series.



A. *The first six cuts, and their mirror images, chop out the basic proportions along the full length of the molding.*

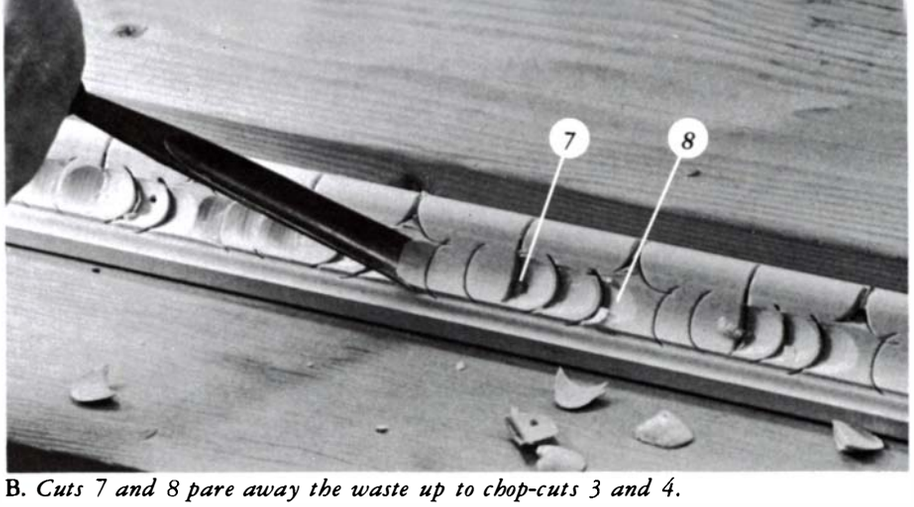
As shown in photo **B,** take the ⅝-in. #8, cannel up, and make a series of slicing cuts (7) starting from about 1/16 in. from the outside curve of the punch cuts *3* and *4,* aiming at about a 30° angle toward the base of punch cuts *4* and *5.* Cut *8* is similar, but at a shallower angle, starting from the original 3-in. divisions and aiming toward the base of cut *3.* The whole surface between the outside curves of cuts *3* will be lowered and left slightly crowned. When you get used to them, you can make cuts *7* and *8* in the same pass.

For *9* (photo **C**), turn the tool over, cannel down, and round into straight cut number *6* at the molding top. I find that two taps with the mallet, holding the tool a little higher for the second tap, gives just the right shape. Take the ½-in. #7, cannel up, and make cut number *10,* angling up toward cut *9.* This enlarges the hollow that you began with the innermost mirror-image cuts at *7.* When working soft wood, you may not need the mallet for these cuts.

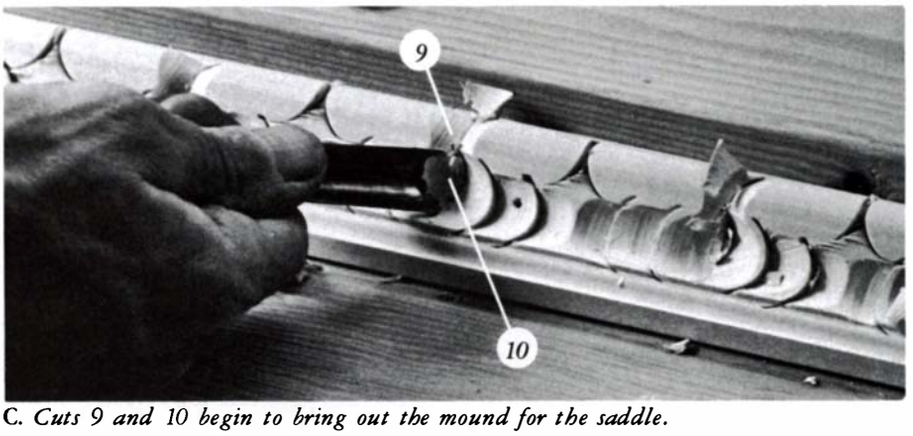
To make cut number *11,* use the same tool, cannel down, and tighten the curve begun by cut *9,* as shown in photo **D.** The "saddle" is next and is begun by cutting up (*12*) toward the base of cuts number *2.* Cut *13* comes around and over at the top of each saddle with the ⅝-in. #8, cannel up. At the top it should come in no more than ⅛ in. from the edge of the molding.

In photo **E,** cut *14* broadens cut number *13* with the same tool, but cannel down. The last cuts (*15*) are the scallop cuts along the bottom. These are chopped straight down with the ½-in. #7 and cleaned out with the skew.

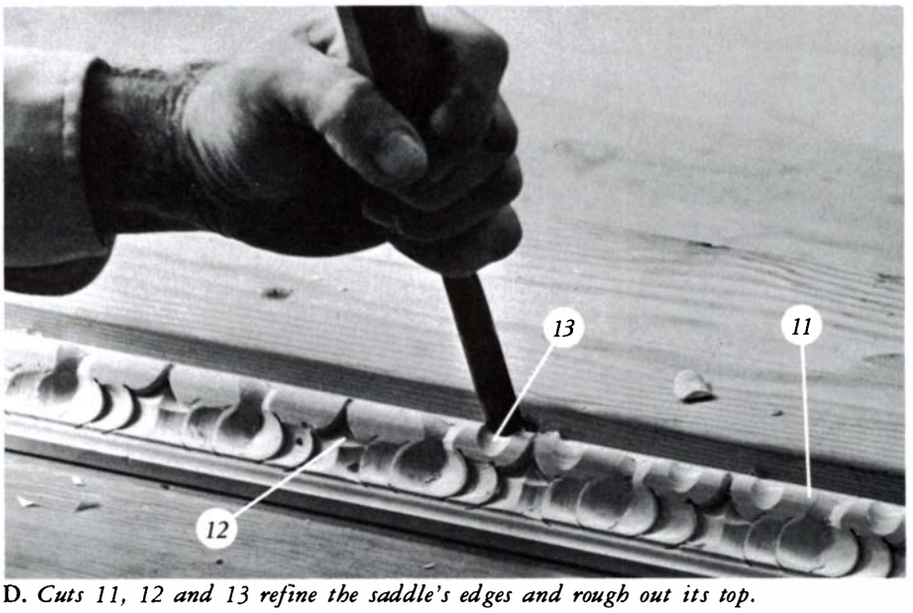
Mitering carved moldings—There is a technique that will ensure that at least three of the four corners of the frame will come out symmetrical. There is waste involved, but it must be weighed against the time saved by carving in the length. Start by cutting both miters on the first piece. Then trim the adjacent corner. Keep trimming until the carving on that side is a mirror image of the unit on the end of the first piece. When put together, there should be no protruding edges. Proceed this way with the next two pieces. You will then have three matching corners and you can only hope that the fourth will be close. It rarely will match, so after the frame is joined, take a small chisel and improvise. If done properly, it will take a very astute eye to see the difference. —*M.K.*



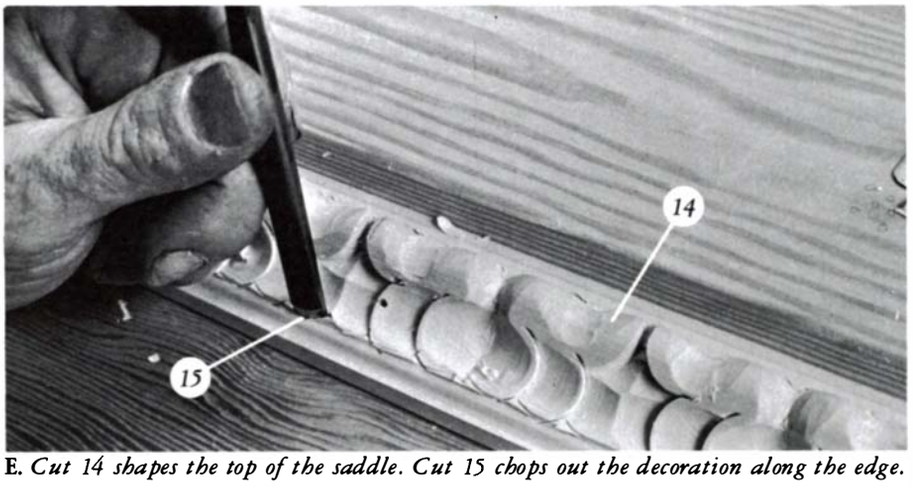
B. *Cuts 7 and 8 pare away the waste up to chop-cuts 3 and 4.*



C. *Cuts 9 and 10 begin to bring out the mound for the saddle.*



D. *Cuts 11, 12 and 13 refine the saddle's edges and rough out its top.*

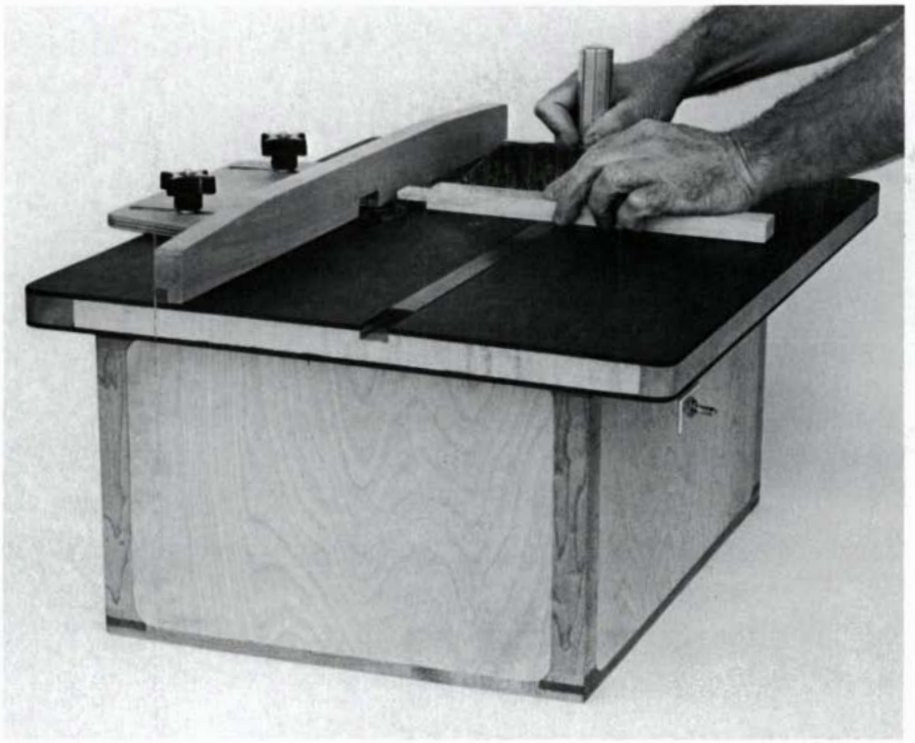


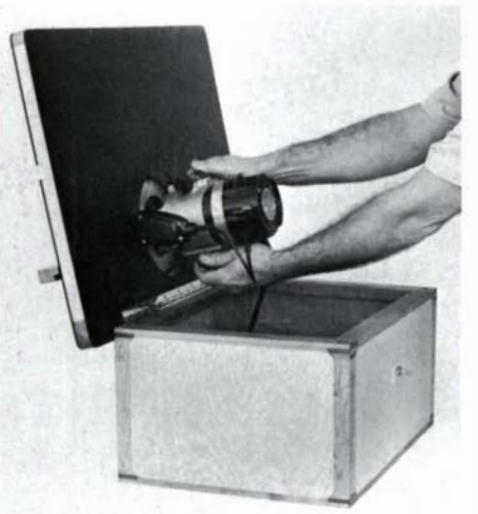
E. *Cut 14 shapes the top of the saddle. Cut 15 chops out the decoration along the edge.*

Making a Router Table

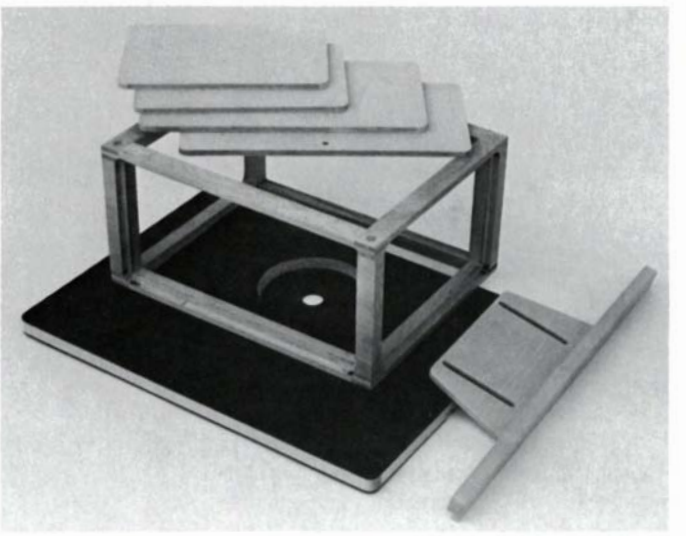
Poor man's shaper is a handy beginners' tool

by Donald Bjorkman





For both novice and experienced woodworkers, Bjorkman's router table is a versatile, easy-to-make tool that will perform many operations, including grooving, molding, and mortise-and-tenoning. It's constructed from the plywood and solid wood components pictured below, and the tabletop pivots on a continuous hinge, allowing access to the router for quick bit changes.



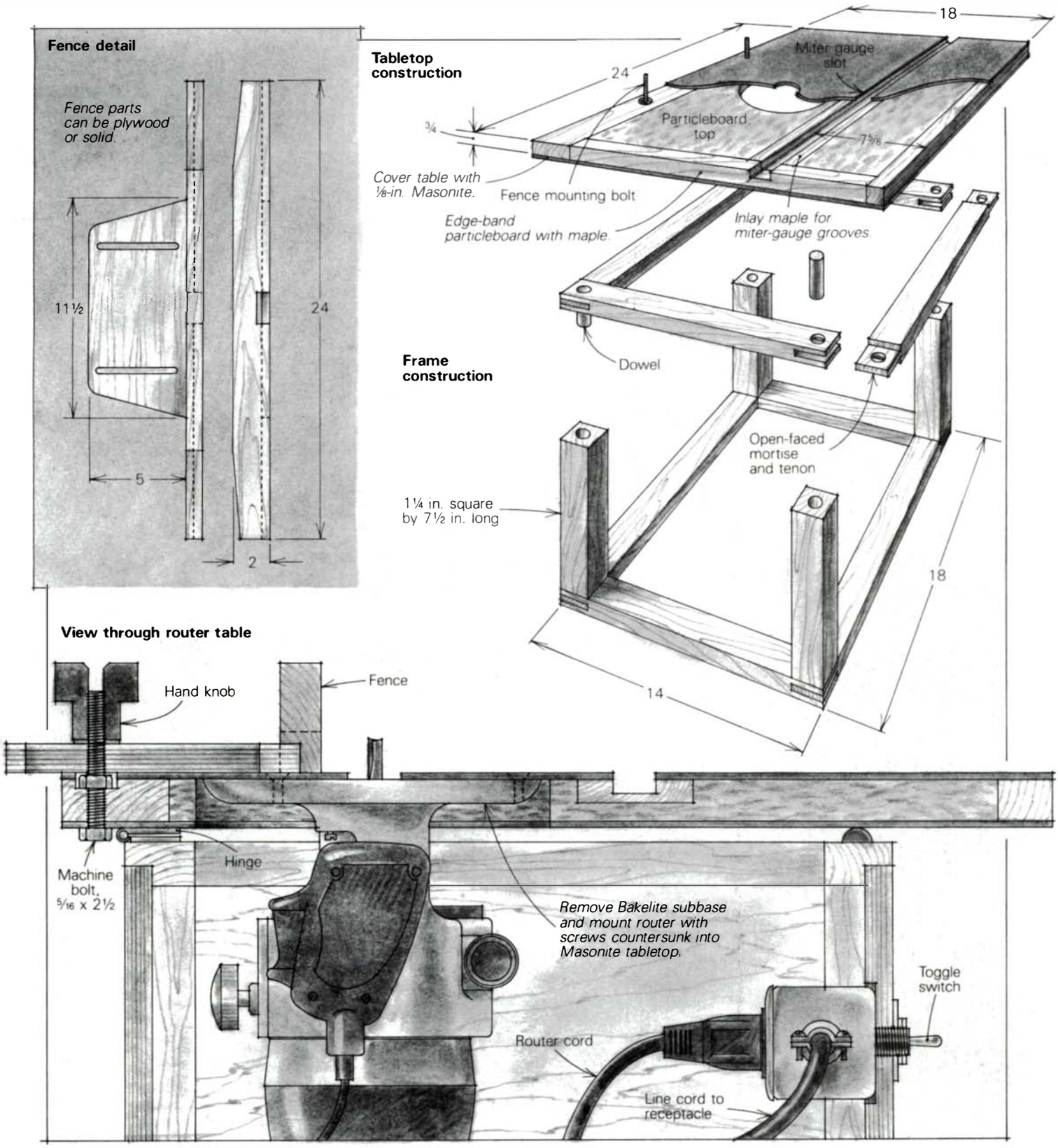
A router table is indispensable for shaping, molding and cutting joints, but the utility of many of the tables I've seen suffers for want of simple improvements, such as accurate, easy-to-adjust fences and a groove for a miter gauge. And the routers always seem tucked so far beneath the table surface that you have to be a contortionist to change bits or to make depth adjustments.

Using scraps left over from other projects, I designed and built this table to remedy those shortcomings. For rigidity and so it can be clamped to a convenient work surface, the table cabinet is of stress-panel construction—simple mortise-and-tenon frames with plywood solidly glued into a rabbet routed in the frames. I hinged the tabletop so that the router can be mounted with little fuss and the bits changed quickly. The router is positioned near the hinge so that its weight counterbalances the tabletop when the top is open, keeping undue stress from damaging the hinge.

As the drawing shows, the table consists of upper and lower frames, joined at the corners by doweled vertical posts. I made the frame parts out of maple, then used a ⅜-in. rabbeting bit in a router to mill the rabbets for the stress panels after the frames were glued up. To make the panels, I scribed the rabbet outline directly onto pieces of ⅜-in. Baltic birch, cut them to size and rounded the corners on my disc sander. If you prefer, you could sidestep the stress-panel construction and make the table base out of plywood panels joined at the corners by a rabbet-and-groove joint or by screws.

The top is a piece of ¾-in. particleboard edge-banded with hard maple. For a longer-wearing miter gauge groove, I let a strip of maple into the particleboard where the groove is dadoed. I sized the groove to fit my tablesaw miter gauge, but you could just as easily make your own wooden gauge. For a smoother, more attractive working surface than particleboard, I glued ⅛-in. tempered Masonite to the top. It's important to cover the back side of the top, too; otherwise, differential moisture absorption will warp the particleboard.

The Sears router I used is constructed in such a way that



the motor can't be easily removed from the base. If you have only one router and it's of this type, you'll have to remove the tool's Bakelite base and fish the three mounting screws through the hardboard top each time you use the table. A router with a removable base (such as a Milwaukee or a Porter Cable) is more convenient: you can just buy an extra base and leave it permanently mounted in the table.

The router's power cord can be snaked out through the bottom of the table to be plugged in for each use, but I think it's safer to connect it to a switched receptacle mounted inside the cabinet. I wired mine to a toggle switch passed through one of the knockout plugs in the electric box and out the front of the cabinet.

To use the router table, I clamp the ledge formed by the lower frame to a pair of sawhorses. I've found that with a good selection of sharp bits, this little machine can do nearly as much as a shaper can, and for a lot less money. □

Donald Bjorkman teaches interior design at Northern Arizona State University in Flagstaff. Photos by the author.

Drawing: David Dann

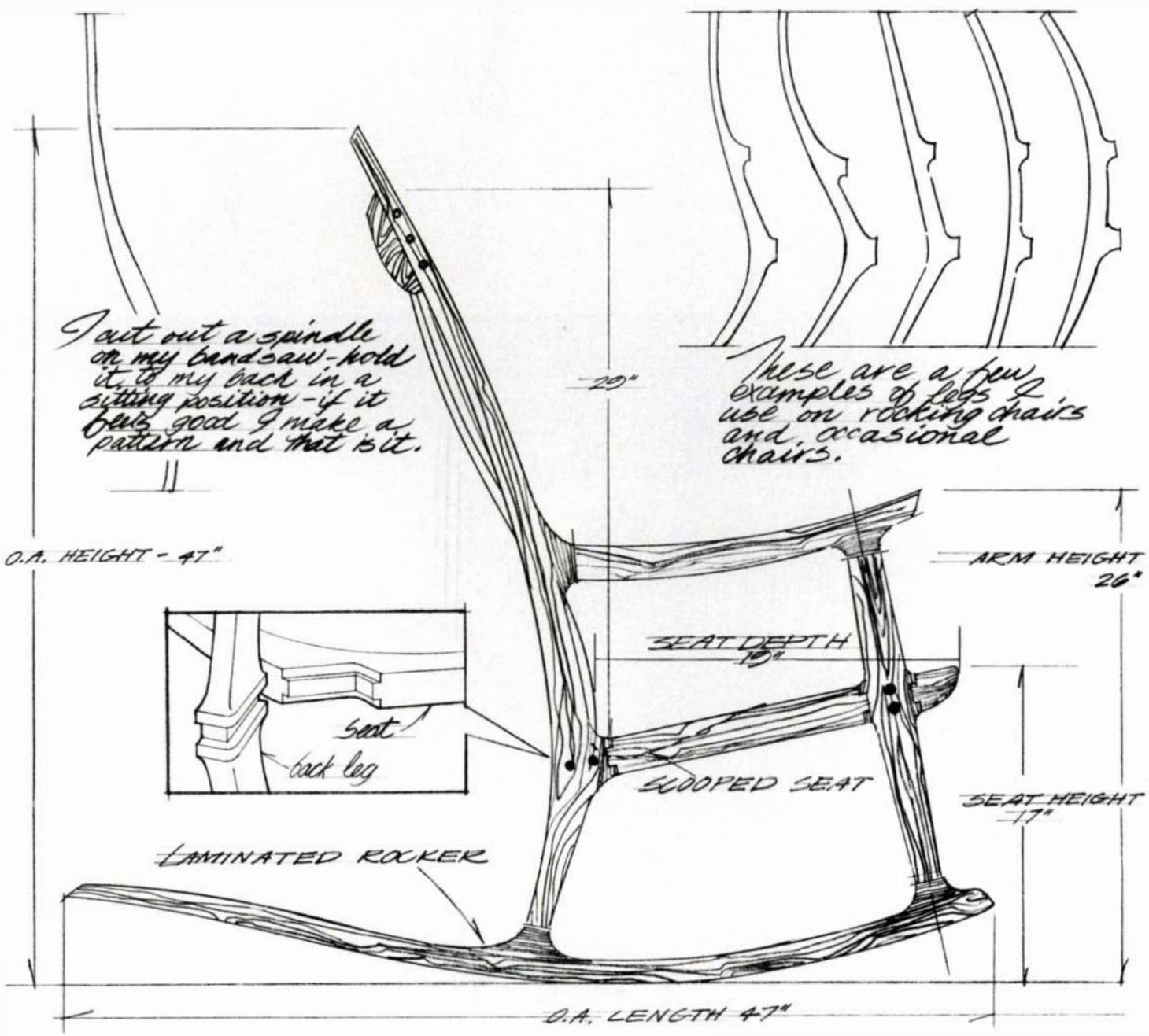
How I Make a Rocker

A master craftsman reveals the details

by Sam Maloof

Of the twelve different basic rocker designs I make, the model with solid wood seat and flat spindles is the most popular, and the most imitated. I don't believe in copying, but if knowing the way I work will help other serious woodworkers develop their own ideas, I'm happy to share my methods. I don't have a formula that I follow, nor do I work out mathematically the way my rocker rocks. Each rocking chair differs somewhat in dimension and also somewhat in the density of its parts, so I just work out its balance along the way. I aim for a rocker that doesn't throw you back or tip you out, and somehow I'm usually right on.

I begin with the seat, cutting from 8/4 stock usually five boards at least 22 in. long and 3 in. to 7 in. wide—enough to add up to a 20-in. width after glue-up. I buy random width and length, common #1 or #2 walnut because its figure is more interesting than that of firsts and seconds. After milling the wood to size, I arrange the boards for the nicest figure match, regardless of whether this happens to be bark-side up or down. I then take the middle board and draw on its long edge the contour of a dished seat, a gentle curve whose maxi-



Drawings: Sam Maloof

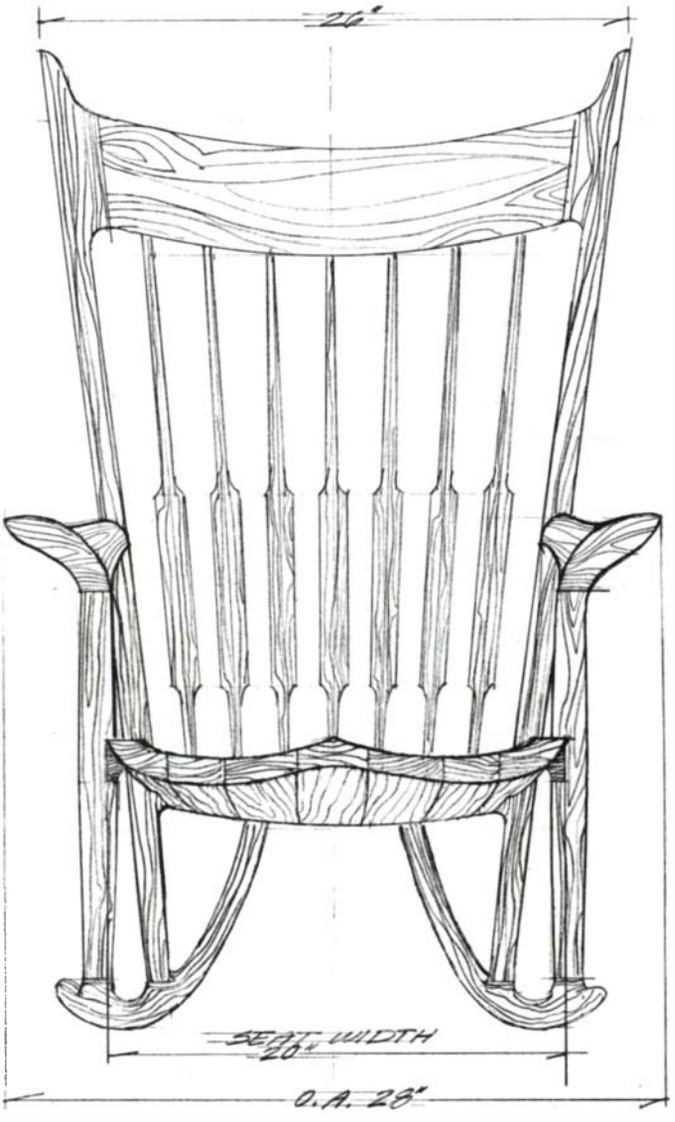
mum depth leaves ½ in. of thickness about three-quarters of the way back from the front of the seat. I bandsaw this curve, holding the board on edge, then I angle the board through the blade and saw the top of the seat toward the front, to leave a ridge in the middle. I put this middle board back between the two seat boards to which it will be glued, and mark the contour I've just sawn on the edge of each. I bandsaw this contour, and transfer it to the edge of each outer board of the seat. I angle the boards to saw this contour, so that when joined together the five boards form a hollowed-out seat. Before gluing up, I mark and drill for 3-in. long, ½-in. dia. dowels, staggering them about 2 in. apart for ease of assembly, and for strength.

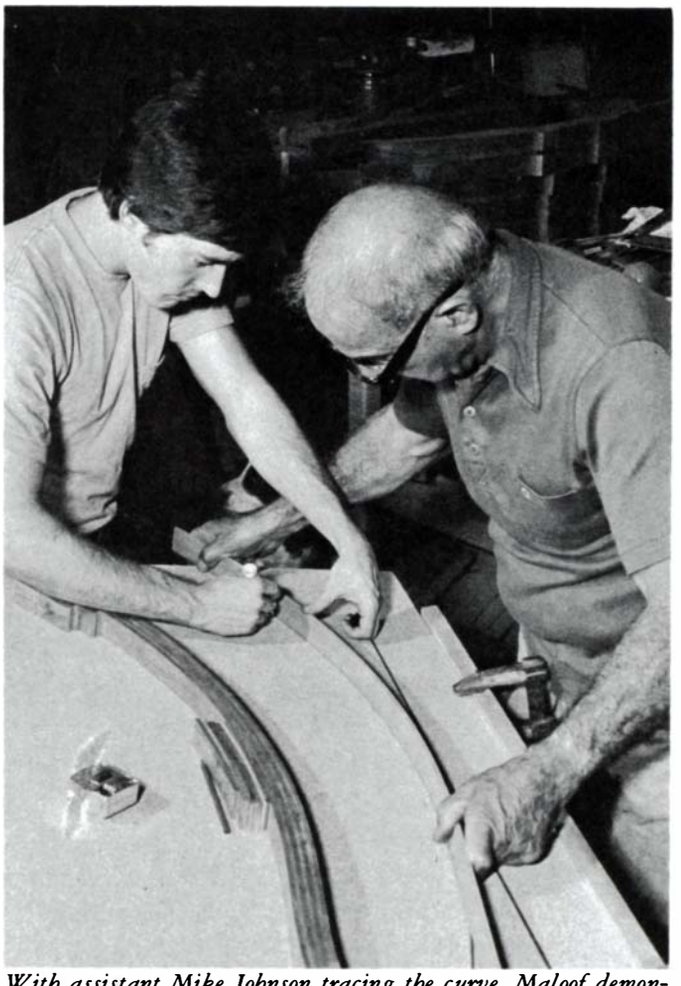
While the seat blank is in the clamps, I lay out both back legs, nesting them on a roughsawn 8/4 board about 7 in. wide and 48 in. long. I look for a curve in the grain to match the curve in the legs. I bandsaw the legs before jointing and thickness-planing them, because flattening the wide blank might result in a leg that is too thin. I get both legs to be the same shape with a 2¼-in. long straight cutter on the spindle shaper, using a template. When I've decided which is the right leg and which the left—by how the grain looks from the back and the front—I saw off the bottom of each leg at a 5° angle. Canted to this degree, each leg will join its rocker properly, giving the chair back a nice splay.

Now I take the clamps off the chair seat and I square up the edges so that the blank is 20 in. wide by 21 in. long. With a 7-in., 16-grit disc on my Milwaukee body grinder, I rough out the bandsawn hollow in the chair seat. I continue shaping and smoothing with 5-in. and then 2-in. discs, up to 150-grit. The top of the seat thus shaped, I cut the notches in the seat to receive the legs. For the back legs, I tablesaw a notch in each rear corner of the seat blank, 3 in. in from the back and 2½ in. in from the side. For the cuts with the back edge of the seat on the table, I set the miter gauge at 85°, first in one direction, then the other, so that the leg posts will cant outward at their 5° angle. On some chairs I also angle the cuts on the sides, to cant the legs backward or forward, but on the rocker design shown here I make the side cuts at 90°. Now using a router with rabbeting bits—a regular 90° one for the front edges, and custom-made 85° and 95° bits for the side edges—I rabbet the top and bottom edges of these notches, as in the detail of the drawing on the facing page.

The notches for the front legs are less complicated: they're simply dadoed out at 90° and rabbeted, top and bottom, with a regular 90° rabbeting bit. (For a similar joint, see *FWW* #25, p. 54.) Having cut the leg joints in the seat, I bandsaw its outline. Then I round over the underedge of the seat along the back and the two sides, using a 5-in. dia., 2-wing router bit that tapers the seat to about a 1-in. thick-

Maloof's most popular rocker design, in walnut.





With assistant Mike Johnson tracing the curve, Maloof demonstrates how he casts the shape of a rocker on the piece of particleboard that will be its gluing form. Also shown is the glued-up blank, with platforms for smoothing the transitions between legs and rocker, ready for shaping.

ness. I leave the area around the joints unshaped, for fairing later. Before fitting the legs, I finish-sand the seat.

With backsaw and chisel I cut the dadoes in the back legs that fit the rabbeted grooves in the seat. I suppose I could jig up and cut these on the tablesaw, but because the back legs are irregularly shaped and because I vary the angles of the back legs in different chair styles, I find the backsaw easier. Next I bandsaw the thickness of the back legs to 1⅜ in., leaving the full 2-in. thickness in the area of the seat joint and the crest-rail joint, for fairing. With the leg still basically rectangular in section, I drill a ½-in. hole in the bottom of the leg to receive the dowel that will connect it to the rocker. To shape the edges of the leg, including the corner that will fit the seat joint, I use a ½-in. roundover bit, but I leave unshaped the area where the arms will attach, and also the outside edges of the leg, because these will be hard-edged. Now I glue the back legs on, clamping across the width of the seat and from back to front.

I make each front leg out of 8/4 stock, 2¾ in. wide and 18 in. long. First I dado it on the tablesaw on three sides to fit the rabbeted notch in the sides of the seat. I then lathe-turn the leg, offsetting the center to the outside of the leg, so that the joint area will be thick enough for fairing into the seat. To complete the leg, I drill a ½-in. hole at each end for attaching the arm and the rocker. I then round over the corners that will fit the rabbet around the seat notch. Now I glue the front legs on. When the glue is dry, I secure all the leg joints, front and back, to the seat with 4-in. drywall screws, countersunk and plugged with ebony.

At this stage, the chair looks like a seat board with a leg at each corner: no back, no arms, no rockers. I fair the leg joints now, sanding to 150-grit before attaching the arms, so that I have room to work. Each arm requires a piece of 8/4 stock, 6 in. wide and 19 in. long, although I usually cradle two arms on a longer piece. I lay out the arm, locating the dowel hole to attach the arm to the front leg, and saw the flat at the end of the arm to abut the flat on the back leg; this latter joint will be screwed from the back and plugged. Then I freehand-bandsaw the arm, shape it using a Surform, attach it, and fair the joints.

I make the back spindles, seven of them for this rocker, from pieces of 6/4 stock at least 29 in. long. I also use the waste from the back legs, thicknessed to 1⅜ in. I lay out the side profile on the face of the board, being careful to avoid areas where the grain will cross the width or the thickness of the spindle, and bandsaw. I also bandsaw and then spindle-sand the contour of the spindles as seen from the front. I used to shape the spindles, but one day I had two shatter on me, and I said phooey, there must be a safer way. They're just too slender to feed into the shaper, and it doesn't take that much longer to bandsaw them. I round over the back edges of each spindle with a ½-in. roundover bit, and then shape both ends

with a rasp. The end that goes into the seat is ½ in. in diameter; the end that goes into the crest rail is ⅜ in. These dimensions are all eyeballed. I shape the slender parts by hand with a patternmakers' file, leaving hard edges along the front. Most of the front of the spindles remains flat.

Next I make the crest rail out of 10/4 stock, 7 in. wide and 26 in. long. I cut the ends to the 5° angle that will accommodate the splay of the back leg posts, then bandsaw the curve of the front and back faces. This gives me an accurate thickness in which to lay out the spindle holes. I space the hole centers evenly across the length of the crest rail, and then do the same across the width of the back of the seat, which will evenly splay the spindles. I use a yardstick now, aligned between corresponding hole centers in the crest rail and seat, to set my bevel gauge for positioning my drill-press table. I bore the crest-rail spindle holes on the drill press, but the seat spindle holes by eye. All holes drilled, I bandsaw the bottom edge of the crest rail and shape it with a Surform. I glue the spindles into the seat, fit the crest rail on the spindles and glue the rail in place between the back leg posts. When the glue is dry, I screw from the leg posts into the crest rail, countersinking and plugging the 2½-in. screws. I then fair the joint and finish-sand.

I laminate the rockers, beginning with 6/4 stock, thicknessing it to 1⅜ in. and then sawing it into ⅛-in. plies. I use a carbide-tipped blade on the tablesaw, and I don't joint the stock between passes—I find the sawn surface smooth enough for laminating. The rocker consists of seven plies about 48 in. long. To make the form for gluing them up, I bend a strip of wood to a shape that looks right, and have a helper trace this curve on a piece of ¾-in. particleboard. I bandsaw three pieces of particleboard along this line and face-glue them into a clamping form. I add seven more short plies to form two platforms for fairing the rocker into the legs. Then I glue up, using white glue. To ensure flatness, I clean up one edge of the rocker blank on my jointer, the other in the thickness planer. I round over the outside corners with a ½-in. bit, except in the area where the legs will connect. The rockers rough-sanded to shape, I put them on the flattest surface in my shop, my tablesaw, and mount the chair on top. The platforms allow for up to 2 in. of adjustment, forward or back, in the placement of the chair. I shift the chair back and forth until the rockers come to rest contacting the ground at about 2 in. in front of the rear legs. I find this looks best, and rocks best. I mount the chair to the rockers with ½-in. dowels, 4 in. long in the back, 3 in. long in the front. Then I fair the joint with a rasp.

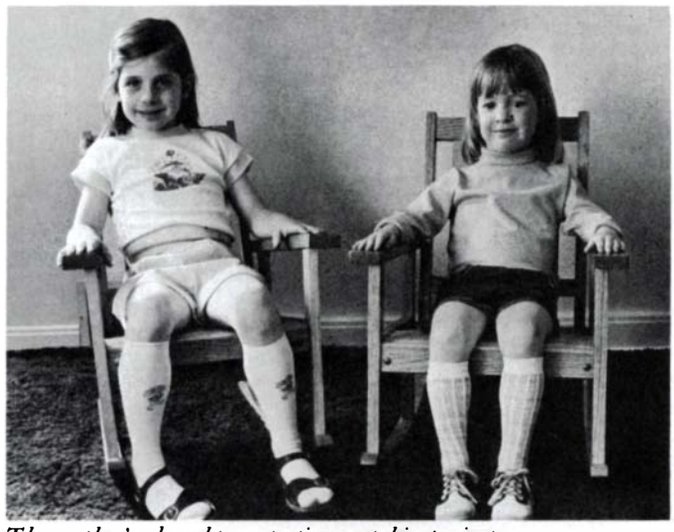
I finish-sand the whole chair to 400-grit and apply three coats (at two-day intervals) of a three-part finish: equal parts of polyurethane varnish, raw tung oil and boiled linseed oil, removing all excess oil after each application. I then apply a final coat of a mixture I mix up on a double boiler: a half-gallon each of tung oil and boiled linseed oil, with a couple of handfuls of beeswax grated in. Do this outdoors and be careful—linseed has a low boiling point. The mixture has a long shelf life (stir before using), and leaves a beautiful sheen when buffed with a soft cloth. □

Sam Maloof has been making furniture for more than 35 years in Alta Loma, Calif. He is author of the book Sam Maloof: Woodworker, *published this year by Kodansha International. For more on his work, see* FWW #25.

A Child's Rocker

It's small and straightforward

by William Lavin



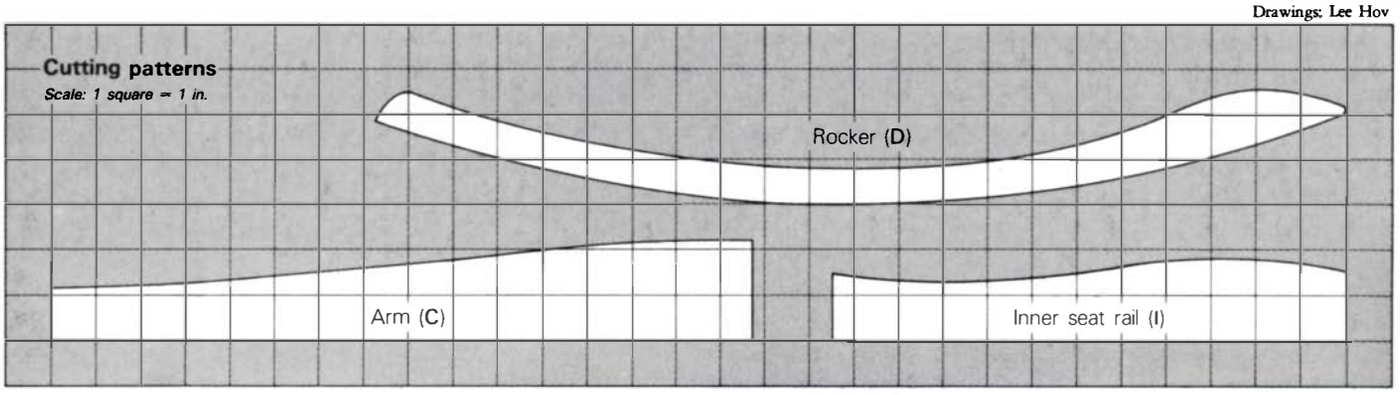
The author's daughters, testing out his project.

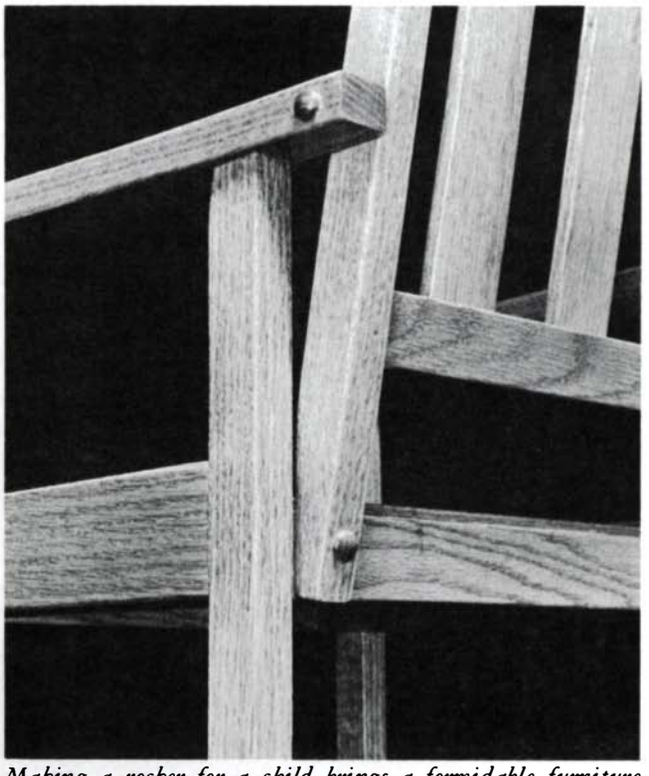
Picture an elderly woman knitting, or an old-timer chewing tobacco while playing checkers or whittling, and invariably both are sitting in rocking chairs. The rocking chair stereotypes this age. At the other extreme is the youngster full of unbridled energy that only a rocker can vent. We've all seen it: the elder rocking with gentle, smooth movement in a full-size chair, next to which the child rocks as vigorously as can be in a smaller version. For the average woodworker, a full-size rocker is intimidating to build—too many expectations to fulfill. A child-size chair, however, can inspire freer energies: simple, basic joints and modest proportions demand something reasonable from our abilities.

The idea for this particular chair came from one built more than 50 years ago for my father-in-law by his great uncle, John McCarthy. Originally handcrafted in white oak by a skilled woodworker for an energetic little farm lad, the design yields to simple power tools and a few hand tools. I've toyed with the idea of a short production run, so readily does this design lend itself to a simple router jig for the mortises (compare *FWW* #30, pp. 90-92, and #35, p. 52).

Construction is divided into three subassemblies: the sides, the backrest and the seat. The sides and backrest are joined similarly: horizontals mortised into verticals, except for the arms, which are mortised to receive the tenons on the front posts. Cut this stock, and lay out and cut the joints. Leave the legs a few inches longer than needed so that you can trace the curve of the rocker and then saw the legs later to fit. Note also that for maximum strength the rockers ought to be bandsawn from stock whose grain follows the rocker curve. Dry-assemble, and when everything fits right, take the assemblies apart and sand, finishing up those surfaces that would otherwise be difficult after assembly. All corners should be chamfered. Drill the holes for the screws that will fasten the

Drawings: Lee Hov





Making a rocker for a child brings a formidable furniture project down to size. Detail, above, shows where backrest is screwed to seat frame and arms.

arms to the backrest posts and the backrest posts to the seat. The backrest assembly is completed in a like manner. Glue, clamp and allow to set overnight. When the side assemblies have cured, center the legs on the rockers, drill and fasten with 2-in. screws.

The seat assembly is a butt-glued and screwed frame with the slats tacked on top. The top edge of the inner seat rails is sawn to a contour that dishes the seat. The seat frame is tapered in plan, and I find it helpful to draw the full-size plan view, showing the thickness of the seat rails and front and rear crosspieces. Then I cut the pieces oversize, and place them directly on the view for final cutting (at an angle of 3°) and assembly. The front crosspiece is assembled directly with glue and screws (countersunk and plugged), while the rear crosspiece is fastened only temporarily by a couple of pins—I use large cotter pins, because their rounded ends make them easy to remove. The pins keep the seat rails in position while the slats are attached. At final assembly, screws attaching the backrest to the seat will replace the pins.

The seat slats are ripped from a wide piece of ¾-in. thick stock. I shape the edge first using a Stanley #45 fitted with a Record 12H nosing attachment. Another way would be to scribe guidelines about $\frac{3}{32}$ in. from the edge and block-plane a rounded edge. And, of course, there's always the router with a roundover bit, although you'd only approximate the nosing drawn. Rip a slat (I actually rip two at once, because I use 30-in. long stock and chop the ripping in half), then shape and rip the next slat. Make a couple of extras in case you make a mistake when cutting to the exact length later. I find it easier to finish each strip before assembly, so that finishing material will not fill in the crevices between the slats.

Cut the finished slat lengths individually, scribing directly from the seat frame, and drill a small hole in each end using a jig to ensure that all the holes will be equidistant and aligned. Fasten the slats with glue and brass nails.

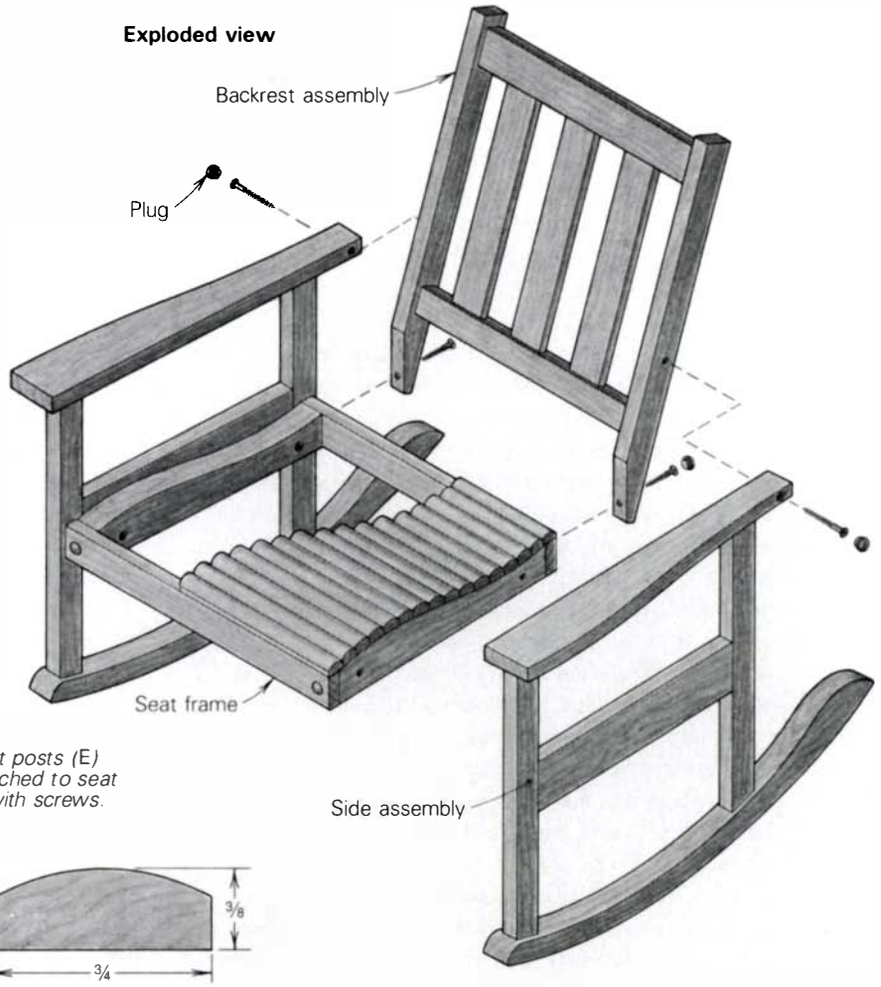
Complete the assembly by first gluing and screwing (from the inside) the seat frame to the side crosspieces. Then attach the backrest, screwing from the backrest posts into the seat frame, and through the arm extensions into the backrest posts. Countersink these screws and plug with buttons for a tactile detail. A durable varnish will finish your heirloom chair. □

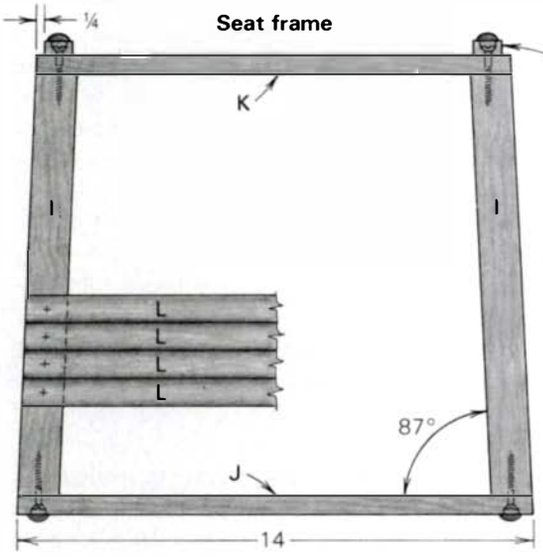
William Lavin teaches junior high school industrial arts in Camillius, N.Y. Photos by the author.

CUTTING LIST

Part	Amt.	Description	Dimensions T x W x L
A	4	Posts	¾ x 1⅛ x 13 s/s
B	2	Side crosspieces	¾ x 2¼ x 10¾ s/s
C	2	Arms, from one piece	¾ x 4 x 15¾
D	2	Rockers, from one piece	1⅛ x 4 x 22
E	2	Backrest posts	¾ x 1⅛ x 18
F	1	Crest rail	¾ x 1¾ x 10¾ s/s
G	1	Lower backrest rail	¾ x 1¼ x 10¾ s/s
H	3	Back slats	⅜ x 1½ x 11⅜
I	2	Inner seat rails, from one piece	1⅛ x 4 x 11½
J	1	Seat crosspiece, front	½ x 1½ x 14
K	1	Seat crosspiece, rear	½ x 1½ x 13
L	15	Seat slats, from one piece	¾ x 5 x 16

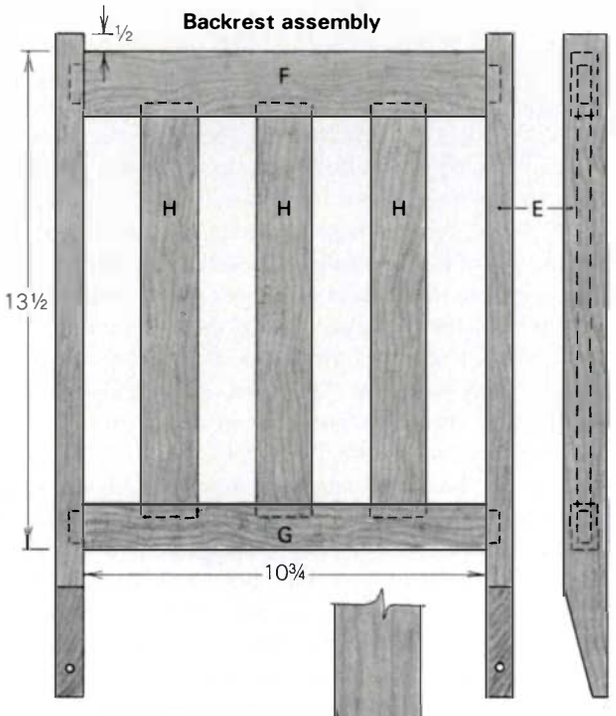
s/s = shoulder-to-shoulder. Add at least ⅜ in. to length for each tenon.

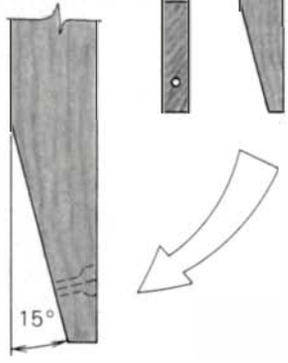




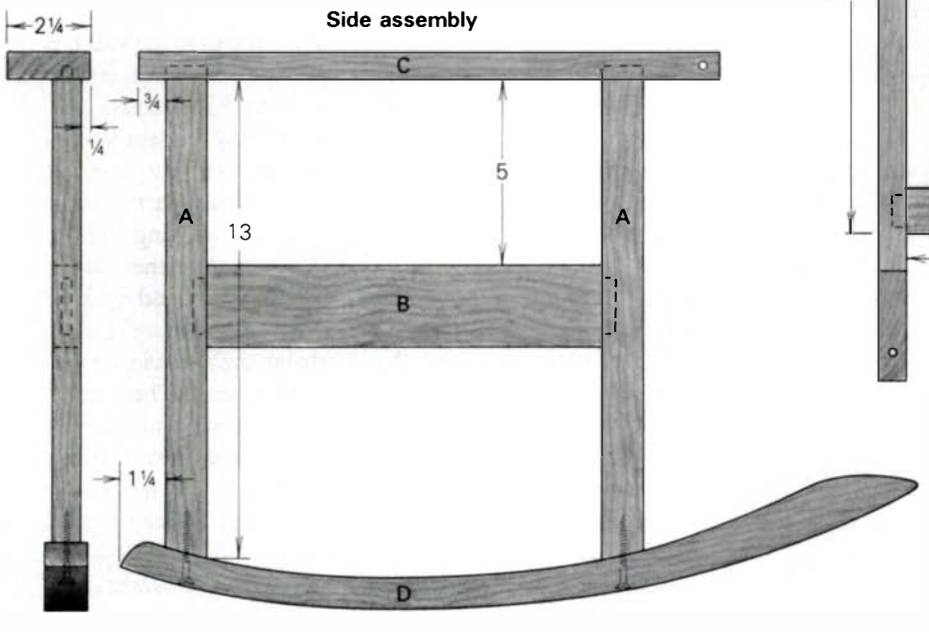
Backrest posts (E) are attached to seat frame with screws.

Seat slat (L)





A child's rocking chair



Tools Are Where You Find Them

Luthier borrows lots of help from other trades and crafts

by Michael Dresdner

My shop, where I repair and restore musical instruments, is filled with paraphernalia that you won't find in the average woodworking catalog. Over the years I've confronted innumerable jobs that required some special tool that didn't seem to exist in my field, and often I've had to invent a tool to do the job. But it's easy to forget that what may be a rare and unlikely job for one craftsman is another's bread and butter. I am reminded of a luthier who painstakingly made a small aluminum riser for a guitar repair job. Upon showing off his invention, he was told that he had made a piano string jack, a 3-in. high tool readily available in piano repair shops. I've had enough similar experiences that I now check out other trades' tool catalogs before I set about to reinvent the wheel.

Local specialty stores, such as jewelry suppliers and medical and dental suppliers, are often very helpful. They not only have access to scores of wholesale outlets and manufacturers who don't want to bother with small retail sales, but they also have a good idea of the range of tools and possibilities, and they give good, pithy advice. Look in the Yellow Pages, and scan the ads in specialty magazines. The Tool Works, 111 Eighth Ave., New York, N.Y. 10011, has a good catalog, but the place is even more valuable for the tools the catalog has no room to list. Owner Bart Slutsky has steered me in the right direction more than once. Among other things, he turned me on to a set of machinists' round-edged joint files, such as those drawn below. If you ever need to make round-bottomed grooves of specific widths, such as for guitar strings, these are just perfect.

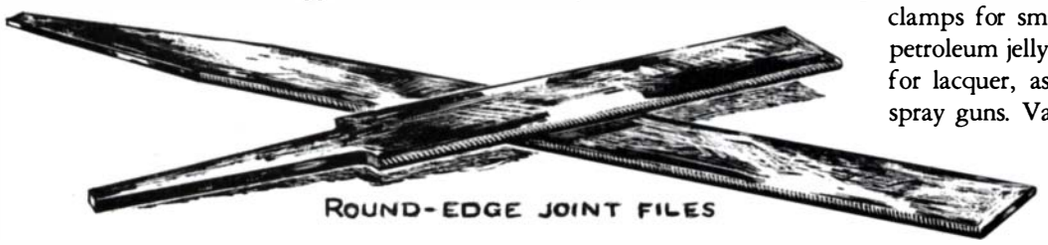
Catalogs I rely on because of their broad range include Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, Pa. 19462; William Dixon Company, Division of Grobet File Co. of America, Carlstadt, N.J. 07072; and Brownells, Inc., Rt. 2, Box 1, Montezuma, Iowa 50171 (gunsmithing). Also, affiliated local hardware stores usually have a monster catalog of things they can't stock but will order. My neighborhood store isn't very big, but their catalog has almost 2,000 pages, lists over 30 manufacturers, and has illustrations—a great help if you don't know what something is called, but have a good idea of what it should look like.

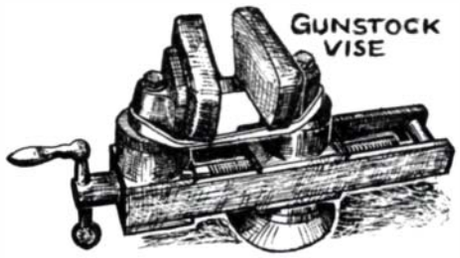
The cleverest suggestions, however, always seem to come from mechanics. I had been complaining to my friend Barry about the inadequacy of the available turntable mechanisms to provide me with a portable, heavy-duty, spray-booth turntable. A few days later, he handed me a 20-lb. chunk of metal that turned out to be a transmission bearing from a junked Pontiac. It consisted of two plates, already drilled with four evenly spaced holes, connected by a *very* heavy-duty bearing. It took only minutes to attach a board on the top plate and set the mechanism on a base, and I was spraying with a smooth, sure turntable that is, so far, impervious (due to the protected, greased bearing) to clogging by spray dust.

Here's another tip from the automotive field: Sometimes I have to steam open old glue joints, and one of my favorite aids is a small cappucino maker, a steam generator that produces very hot, dry steam under a good deal of pressure. It has a built-in safety valve and a cut-off valve. To get into tight spots, I extended the output stem by adding a length of surgical tubing, with a basketball air-fill pin as the tip, and secured both with hose clamps. As I was using it one day, I watched in horror as the tubing suddenly ballooned out. As I made a grab for the cut-off valve, the bubble burst, spewing steam and pieces of rubber all over me and the shop. The oven mitts on my hands prevented injury, but the incident shook me up. I set out to the nearest auto supply store, and came back with some reinforced heat-resistant fuel line hose. It's been holding like a trooper for more than two years now.

Although surgical tubing was a "bust" as a steam hose, it's still indispensable. It's no secret that random lengths make fine tie-offs for holding things, and that this tubing can act as a rubber-band clamp. But it has other uses as well. I keep a split length handy to protect the soundhole of a guitar from being marred by metal clamps, and I usually slip a strip onto a bar clamp to protect the wood from the bar. The hose comes in various diameters and, because it's latex, it will not mar or react with lacquer finishes. Strips of tubing can be slipped over metal hangers that are to hold finished wood, and the larger diameters attached to the fingers of a drying rack make a cushiony support. A loop thrown onto a rough tabletop will allow you to float a finished board on it while the other side is being worked on.

Don't walk out of the medical equipment store yet. Surgical gloves are more sensitive and less clumsy than grocery store rubber gloves, especially for aniline staining and French polishing, when you need to feel the pad. Various surgical clamps and hemostats make fine extra hands and mini-clamps for small or delicate parts. Even the humble petroleum jelly (Vaseline) is handy as tapeless masking for lacquer, as well as being a must for lubricating spray guns. Vaseline won't mess up a finish if a drop of it migrates, as will some oils. Surgical jelly has similar properties and is water-soluble as well.


ROUND-EDGE JOINT FILES



There is a versatile gunstock vise, such as shown at right, on just about every luthier's workbench. It rotates 360° and its jaws pivot to grip non-parallel stock. Most luthiers pad the jaws with leather or suede, and a rubber band draped between the jaws will protect the stock from dropping onto the metal guides. While you are checking out gunstock vises, take a look at checkering tools too. They make a whole range of handy little chisels of odd shapes and sizes, great for getting into tiny spots to clean up intricate carvings. And for the backgrounds of those carvings, remember that leather stamps work just as well on wood. Leather punches are also very handy. They'll make clean circular holes in veneer or plastic, or else cleanly cut-out dots, whichever you happen to need. Don't overlook leather workers' files and rasps either. They work superbly on wood, are generally finer-cutting than woodworking ones, and often come in different, handy profiles. Machinists' files add to the arsenal. Many of them cut on the pull stroke rather than the push stroke, which is great for tight spots. Speaking of fine cutting and versatility, dental bits and burs can't be beat. The burs will fit a Dremel, and come in an astonishing array of sizes and shapes—far more than the motor tool companies offer. Catalogs of jewelers' tools usually list them.

For pearl inlay work, you need something that draws a constant, narrow line, unlike a regular pencil whose point gets thicker and thicker as it dulls. I used to curse my way through six or seven pencil points while drawing on pearl, and one day I finally stomped out and steamed my way over to the local art supply store. There I saw a heartwarming display of mechanical drafting pencils. They take leads of a dozen different diameters and all degrees of hardness. I chose a 0.3mm pencil and a medium-hard lead, and I now use it for all marking and drawing where scribing is impossible or the scratch line undesirable. On my way out of the store, I asked for a thinner masking tape than was on display, and got accidentally introduced to another worksaver. They sold me a paper tape used in drafting, and I soon found that while it masks every bit as well, it doesn't lift off old, checked finishes the way masking tape invariably does.

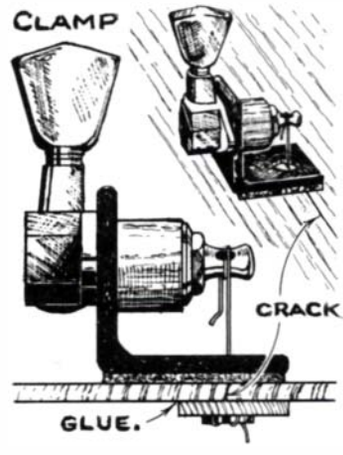
Spray adhesive, also from the art supply store, has simplified many temporary holding jobs. It makes working with pearl or other small inlays much easier. I spray-glue the back of the inlay and stick it on the surface where it will go. Then I spray the surrounding area with a contrasting color of tinting lacquer—a mixture of almost pure pigment and solvent that has virtually no binder. After I lift off the inlay, I can rout out the wood within the crisp, colored outline. Mineral spirits loosens the adhesive without affecting the lacquer. Lacquer thinner removes both adhesive and color.

Years ago, I went out to buy a $\frac{3}{32}$-in. router bit, for cutting bridge slots. The salesman looked at me as if I were crazy, and sold me an end mill instead. I took it home, set it up in my slower drill press (rigged up like an overarm router), and found that its spiral cutting edges made a clean, burn-free cut. It works especially well in hard woods such as ebony and rosewood, causes less chipping, and, because it's made to cut metal, has outlasted every router bit in my shop.

My friend Barry, the bearer of clutch bearings, has been my main guide to metalworking tools. One frequent job I'm asked to do, installing a larger set of guitar tuners, involves enlarging all or part of a hole already drilled. My old method had me plugging the hole, finding the center, and drilling a new hole. It was time-consuming and inaccurate. Then Barry introduced me to the counterbore, shown at right, a metal bit with a removable pilot in its center. Any size pilot (with a standard shaft) will fit in any size bit, so you can enlarge or partially bore any hole from any other one, and the pilot ensures that the hole center remains the same. In addition, the bit makes a clean, uniform hole, with no chipping.

Don't overlook the trash can. I make a regular practice of raiding the local glass cutter's rubbish for scraps of clear plastic sheet. It shows up in several thicknesses, and I tote them all back to my shop. As clamping cauls, they let you see how the seam underneath is lining up, saving many repeat jobs, and wood glue will not stick to them. But it is the larger pieces that are really indispensable—they become my instrumentmaking templates. The plastic lets you see through to line up the grain the way you want it, or to include the prettiest figure.

Having borrowed so much from other trades, perhaps I can give something back. We've all learned that lining a jig with face-up sandpaper stops things from sliding around, but a common item from my own trade, violin rosin, works just as well and does less damage to the piece. It crushes into a fine, sticky powder which will cling to the jig and provide just the right tack. Mineral spirits cleans away any residue. Also from my workbench is a small clamp, shown at left, used for repairing cracks in soundboards. The objective is to glue a tapered cleat beneath the crack. The clamp, made from a guitar tuner and angle iron, works by pulling up on the cleat, leveling the crack at the same time. When the glue is dry, the guitar string is simply clipped off and pulled out, leaving a tiny hole.



One final word of warning when accumulating what seems to be free for the taking. I have several sandbags in my shop that I use for bedding curved or rounded objects on the drill-press table. One day I asked my wife to fill one for me, as she was on her way to the beach—living on the Jersey shore, with its over 100 miles of beachfront, I assumed there would be ample sand to spare for my small bag. But the bag came back empty. After mutely watching my wife fill the bag and lug it to the car, a policeman had stepped up and ordered her to take it back and dump it on the beach. Apparently, in New Jersey, you can take home only as much sand as you can unwittingly carry in your shoes and bathing suit. □

Michael Dresdner, of Red Bank, N.J., came to instrument repair via an apprenticeship in antique restoration.

Working Locks Made of Wood

Though their security is symbolic, they're fun to make

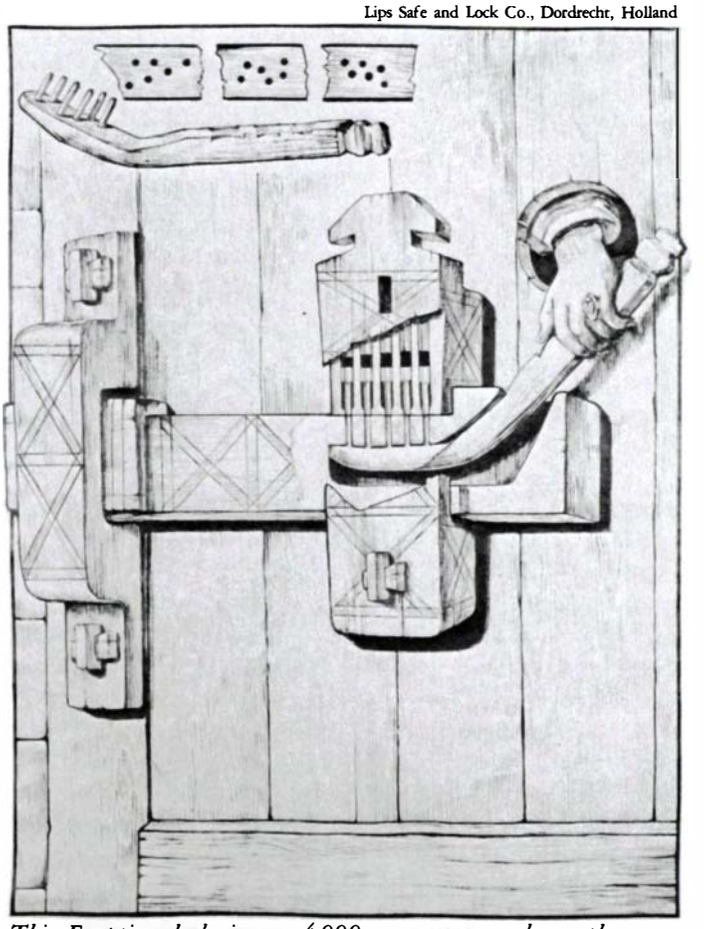
by Roger Schroeder

Perhaps it is not so surprising that the first key-operated locks we know of, in use four thousand years ago, were made of wood. What is remarkable is that they operated on the principle of pins (called tumblers), the basic mechanisms of nearly all the locks we use today.

The notion of some kind of security device surely predates written or pictorial history. Lock experts surmise that the stone rolled in front of the cave was the first lock. It seems to me that this wouldn't have been much protection against an enemy stronger than the "locksmith." I suspect that the first lock was the wedge. Strategically placed, a wedge would have prevented the movement of a larger object, a tree trunk perhaps, that sheltered a small group of early men against their formidable, though less clever, enemies.

Many materials have been used for locks throughout history. The Gordian knot was a lock made from a single length of rope woven into an intricate pattern. Only those who knew its secret could pass through the gate and then retie the rope. As legend has it, Alexander the Great was confronted with the knot as a symbolic barrier to his invading army. He contemptuously slashed through it with a single blow from his sword, which of course anyone else could have done just as easily had they not been intimidated by the knot's implications. In the series that follows, locks 6, 8 and 9 historically were made of metal, but the wooden models illustrate the principles and would be just as functional as their metal prototypes in applications where their larger scale would be suitable. Any lock, even today, provides security that is more symbolic than real, for no lock can survive a concerted effort to break it. The presence of a lock has substantially the same effect as a sign saying "keep out." It is a barrier that, once crossed, brands the interloper as a criminal.

Lips Safe and Lock Co., Dordrecht, Holland



This Egyptian lock, in use 4,000 years ago, works on the same principles as the modern Moroccan lock (#1) shown on the facing page. Pegs on the key lift pins inside the lock to free the bolt.

Locks on the Nile—It seems likely that as man became more social and agricultural, he invented devices for establishing barriers around his possessions, his family and his livestock. The first extensive use of wooden locks came at about the time the Egyptians entrenched themselves along the Nile, and the basic principles are still in use in Africa today, as shown in the photos of lock number 1 on the facing page. The typical Egyptian lock (above right) was made from teak. Massive in size, it had a bolt that measured 2 ft. to 3 ft. in length. This slid lengthwise through the lock to engage a staple (a U-shaped device attached to another door or to the door jamb).

Inside the lock were a number of slots arranged in an irregular pattern. Each slot contained a single pin-tumbler that could slide up and down freely. An enlarged head kept each pin from falling through. When the bolt slid into the staple, the wooden pins dropped into a matching set of holes in the upper face of the bolt, locking it in place.

To unlock the door, a curved key with a pattern of pegs that exactly matched the pattern of the tumbler holes was inserted into an opening in the bolt. When the key was raised, it pushed up the pin-tumblers until they cleared the bolt, which could then be slid sideways by pulling the key.

With as many as seven tumblers, the possible patterns would have numbered in the tens of thousands, but the thief of ancient Egypt, if he had the courage to stick his arm through the hole in the door, could coat a blank key with wax and raise it in the bolt. An impression would be left by the tumbler holes, showing him where to put pegs on his blank.

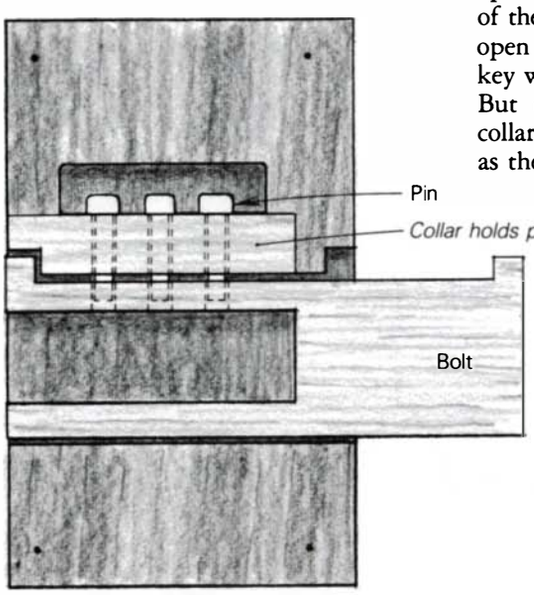
That this wooden lock should have originated in Egypt and not somewhere else does not surprise me. The pyramid builders had invented or made good use of many wooden devices, including the wedged mortise-and-tenon, the very means used for attaching their locks to doors.

This type of lock did not die with the ancient Egyptians. It was used in pre-Christian times by the Celts of Great Britain, who probably got it from the adventurous Phoenicians. Wooden locks of oak and yew were common in the Scottish Highlands well into the 19th century.

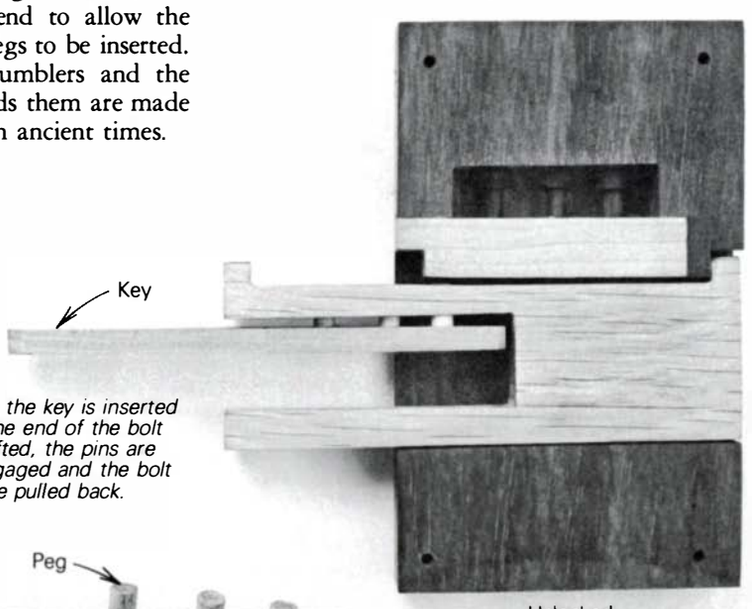
1. Key-lifting today

The first lock I built, shown here, was modeled after one bought not long ago in a Moroccan market. It was sold as an operable hardware item. Instead of the bolt being hollowed, it is open at one end to allow the key with its pegs to be inserted. But the pin-tumblers and the collar that holds them are made as they were in ancient times.

Peg holes in bolt

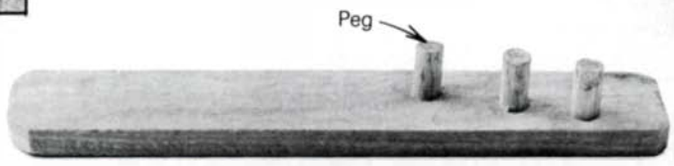


Locked



When the key is inserted into the end of the bolt and lifted, the pins are disengaged and the bolt can be pulled back.

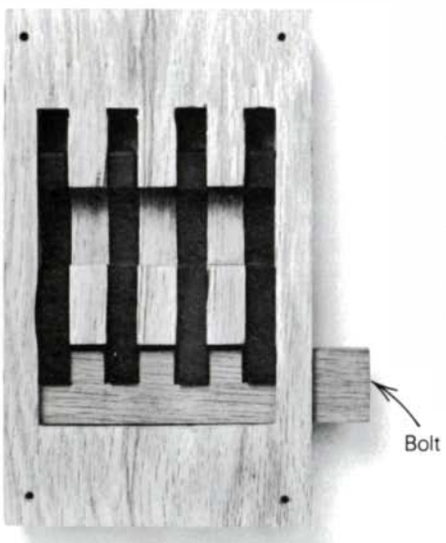
Unlocked



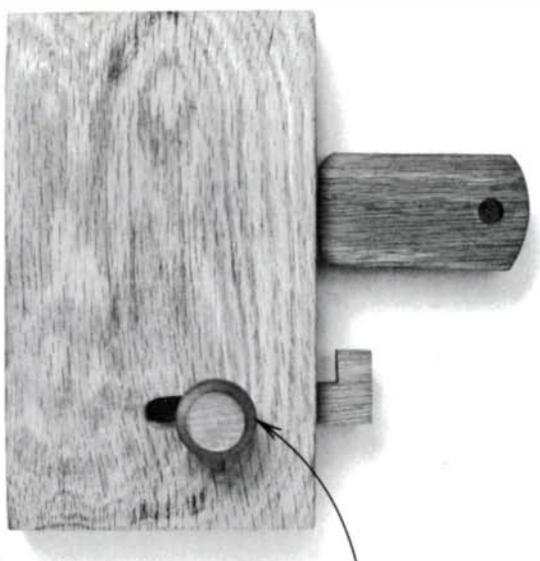
Pattern of pegs matches holes in bolt.

2. The Roman bit

Instead of pegs, the Roman key has bits, teeth-like projections that extend from its shank. When the key is raised, the bits lift the tumblers, which frees the bolt. Then the bolt can be slid back by means of a knob. Again, this type of wooden lock has not been relegated to ancient history; similar ones can be found in use today in parts of China, Egypt, Germany and the southern United States.

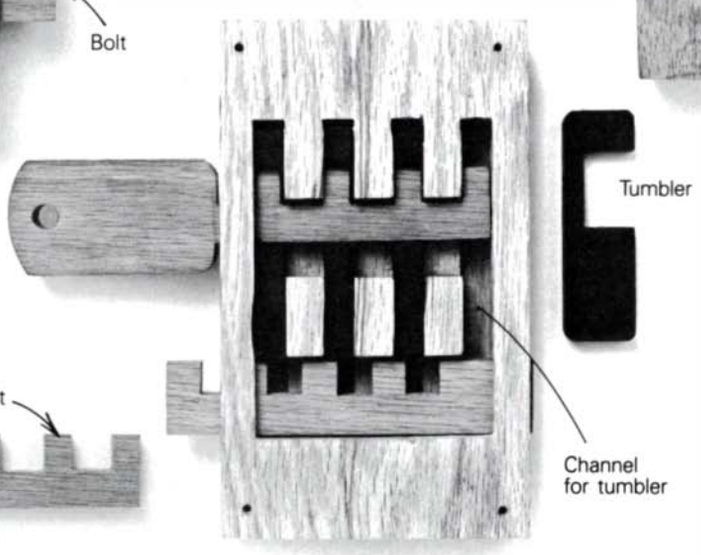


Locked:
tumblers drop into bolt

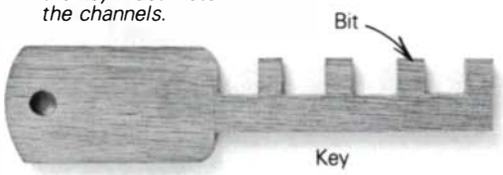


Thumbknob moves bolt.

Unlocked:
key lifts tumblers

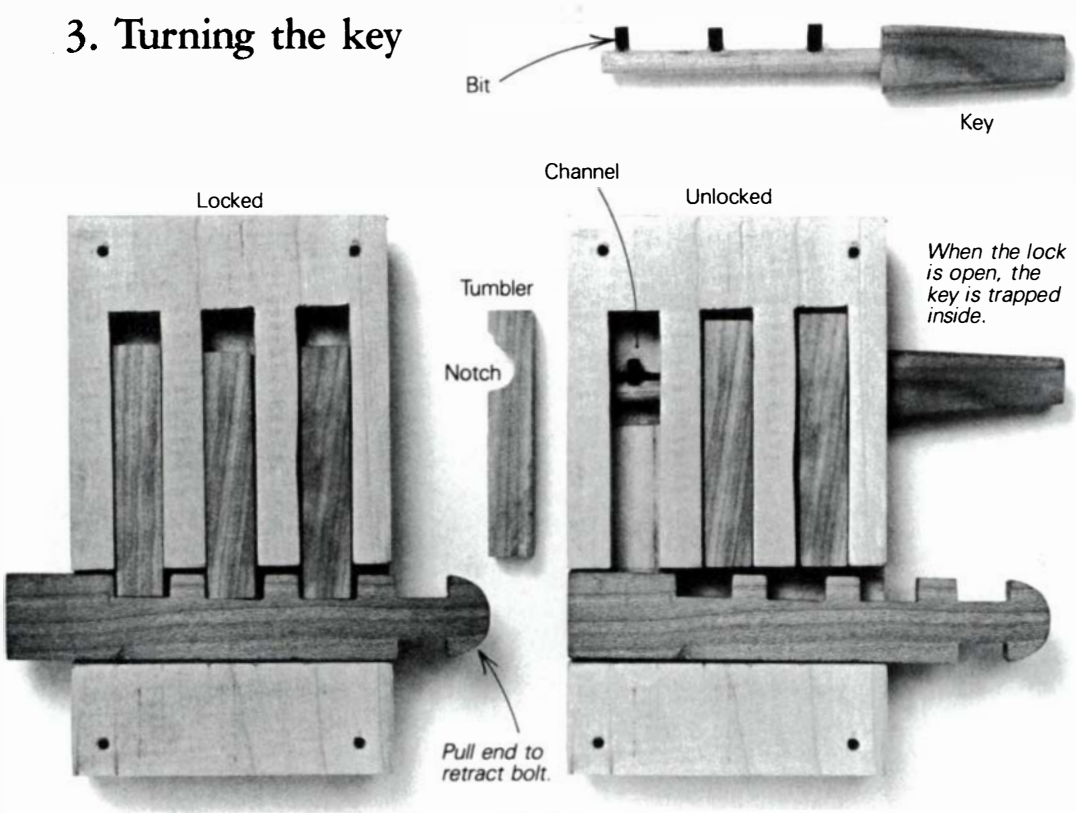


The pattern of bits on the key must match the channels.



Like their predecessors, Roman locks are not foolproof, nor is much effort required to make a duplicate key. A blank coated with wax or lampblack can be inserted and pressed upward to pick up the outline and position of the tumblers and channel walls. Notches can then be cut into the blank.

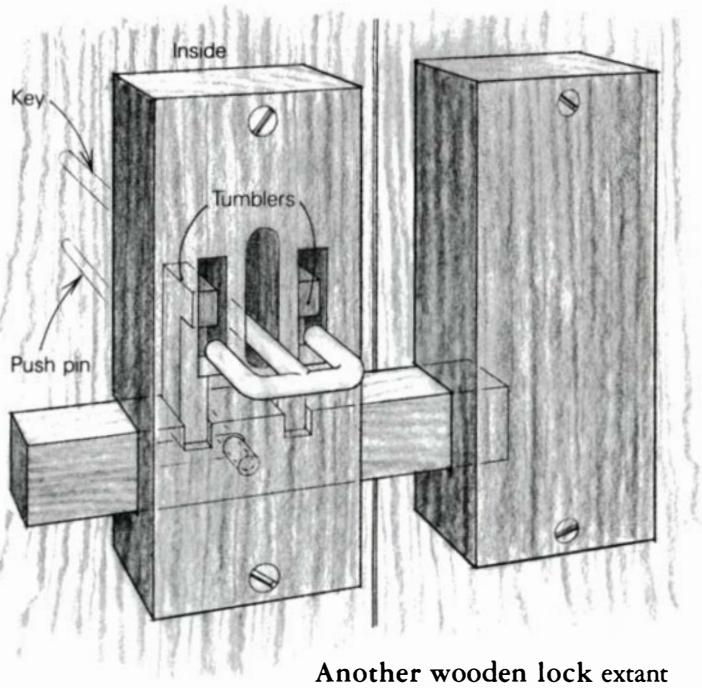
3. Turning the key

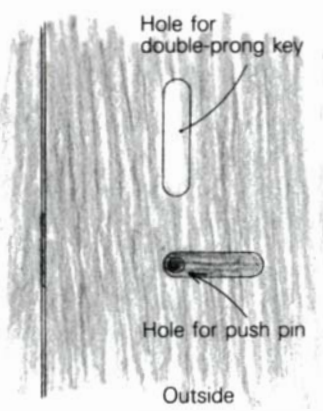


I built this model of a wooden lock found in an Egyptian ruin. This lock has a feature familiar to us—it requires a key that turns instead of lifts. When making the lock, care must be taken in cutting the notches in the tumblers so that the bits on the stem of the key can lift the tumblers smoothly upward without binding. To make the lock more difficult to pick, the bit sizes and their corresponding notches can be varied. Not visible in the photos is a device that keeps the bolt from being removed from the lock: a pin in a channel on the other side of the bolt.

A slight variation of this lock can be found today in China. The key is below the tumblers. When it is rotated, the bits push the tumblers upward, disengaging them from their notches in the bolt.

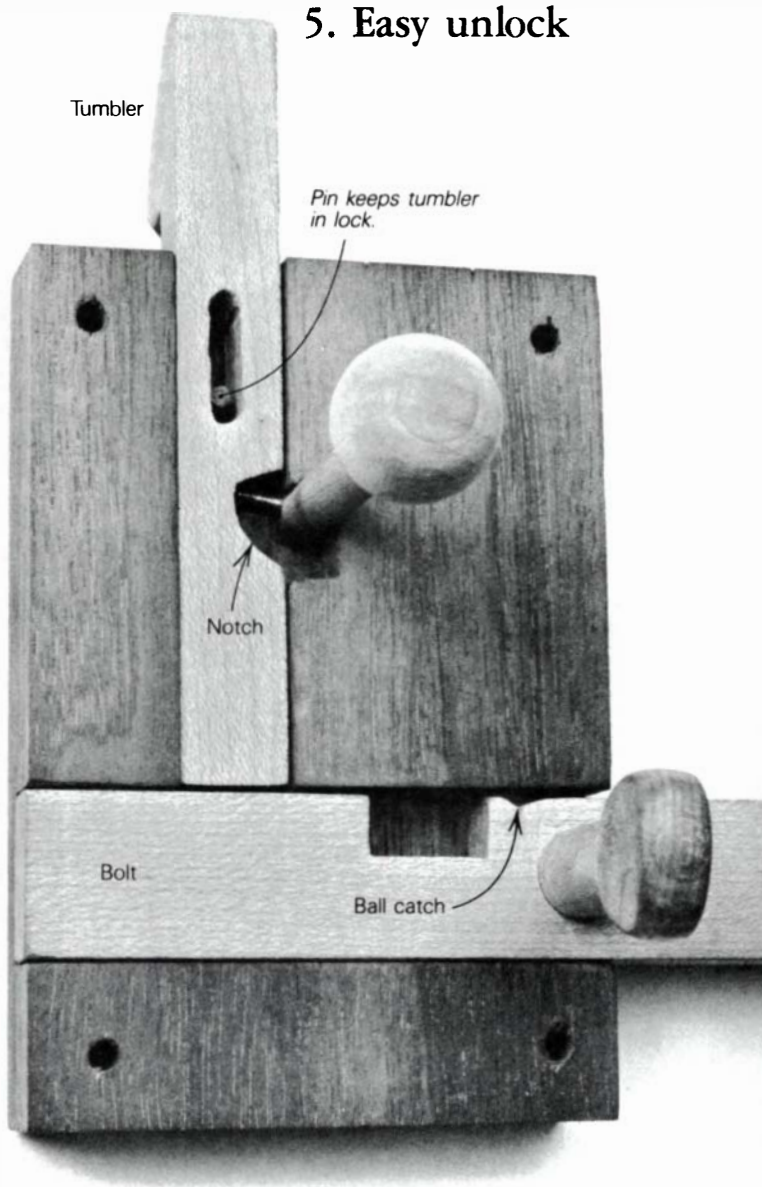
4. Behind the Great Wall



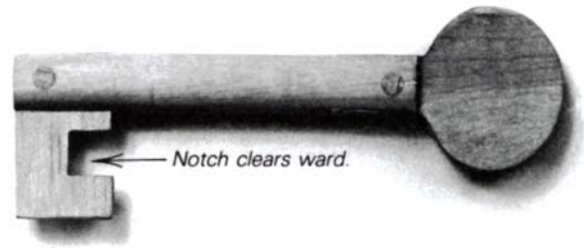


Another wooden lock extant in China uses a double-pronged iron key and pin, allowing the lock to be on the inside of the door, which makes the back of the lock inaccessible to intruders. The key is pushed through a vertical slot in the outside of the door, rotated 90°, and pulled forward so that the prongs engage the tumblers. When the key is lifted, the tumblers are raised from the bolt. A push pin rather than a thumbknob is used to slide the bolt to one side.

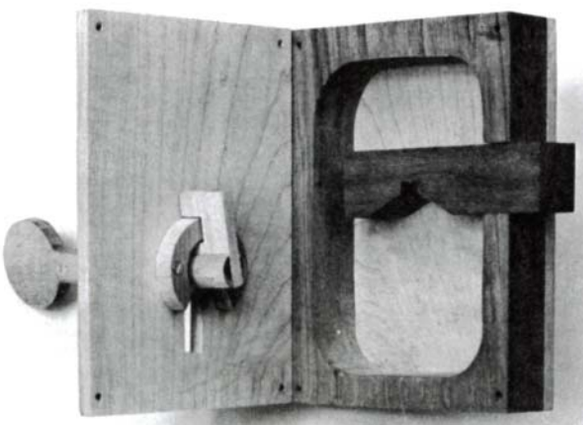
5. Easy unlock



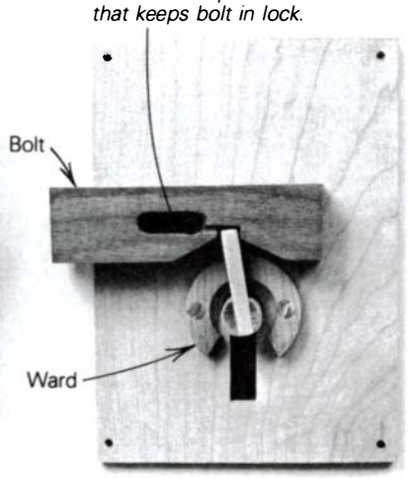
6. The warded lock



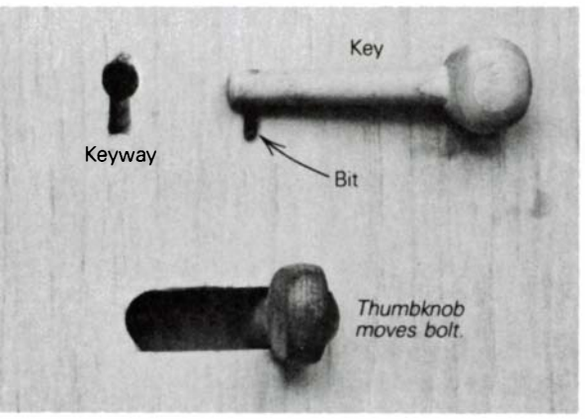
This lock is one-sided, but most warded locks are symmetrical, so that the key works from either side of the door.



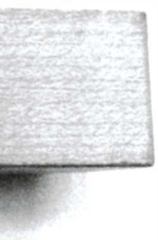
Slot rides on pin that keeps bolt in lock.



Another Roman invention that remains in use after nearly two thousand years is the warded lock. Still found in older homes in the United States, this type of lock has an obstruction, called a ward, that prevents an alien key from turning in it. But a key that has the bit notched out so that it can pass the ward encounters the bolt and moves it. The shape of the keyhole can also act as a ward, as with our modern zigzag keys. But like the Egyptian lock and others, a warded lock is not very secure. A lockpicker can insert a blank covered with lampblack and turn it until it encounters a ward, which will leave a spot on the soot. The key can then be filed to shape. In locks with more than one ward, the lockpicker repeats the process until his bootleg key clears all the wards, opening the lock.



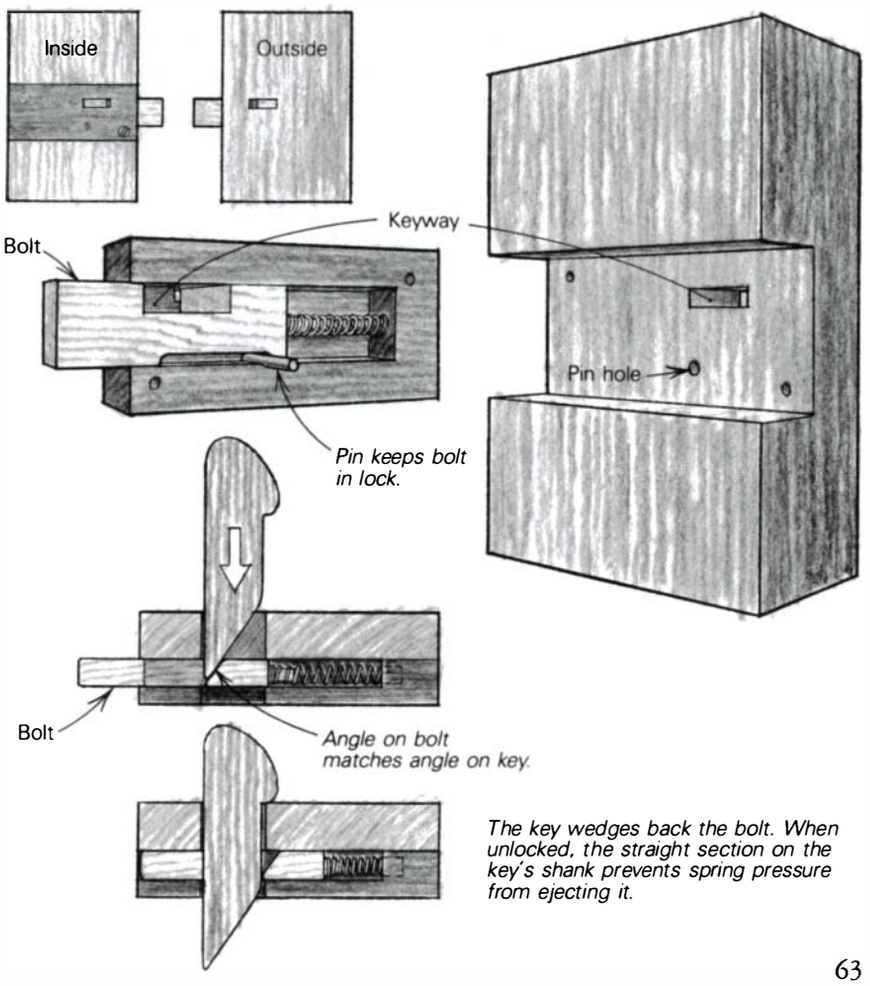
A slight variation of these tumbler designs also puts the keyhole on the outside of the door. When the key (with a brass bit) is turned, a single tumbler is lifted and the bolt can be slid side-to-side with the aid of a thumbknob. This adaptation includes another improvement. The tumbler extends through the top of the lock, thereby making it possible to lock and unlock the door from the inside without the key. We take this for granted today, but this is the first lock design we have seen in this series that allows such an advantage.



When unlocked, a ball catch resists the bolt's movement, protecting it from being broken accidentally when the door is swung closed.

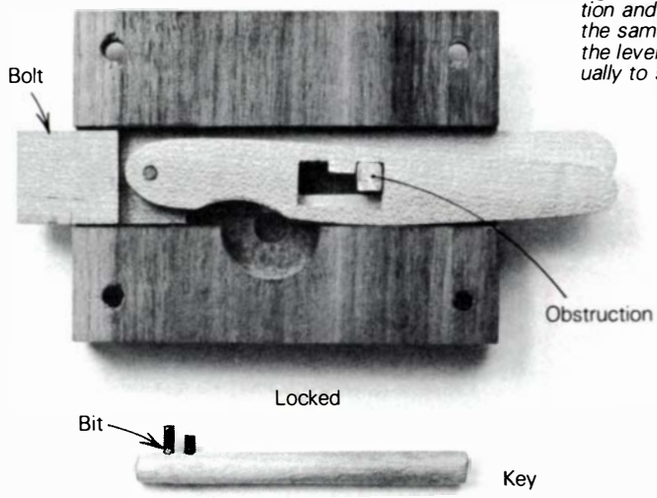
7. The spring lock

The Romans were the first to use another feature we take for granted today: springs. In keeping with the tradition of wooden locks, this simple one requires only a wedge-shaped wooden key to disengage the bolt. When the key is removed, the spring behind the bolt pushes it closed.

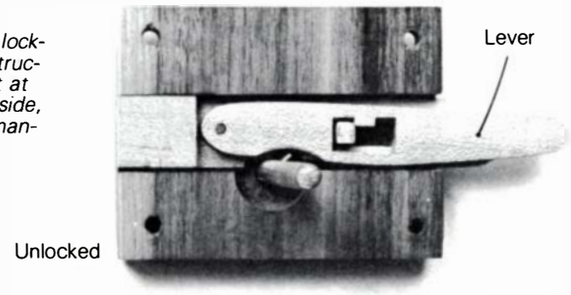


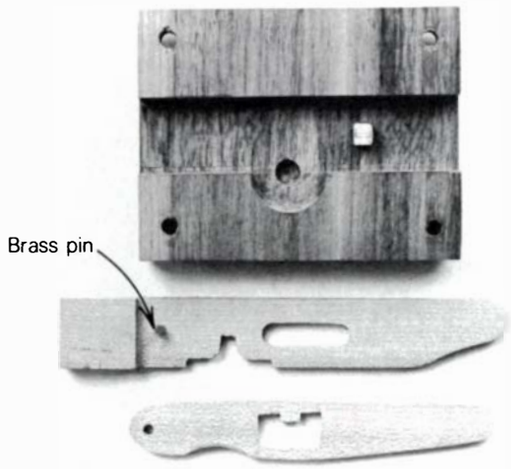
The key wedges back the bolt. When unlocked, the straight section on the key's shank prevents spring pressure from ejecting it.

8. The lever-tumbler



Turning the key lifts the locking lever above the obstruction and moves the bolt at the same time. From inside, the lever can be lifted manually to shift the bolt.

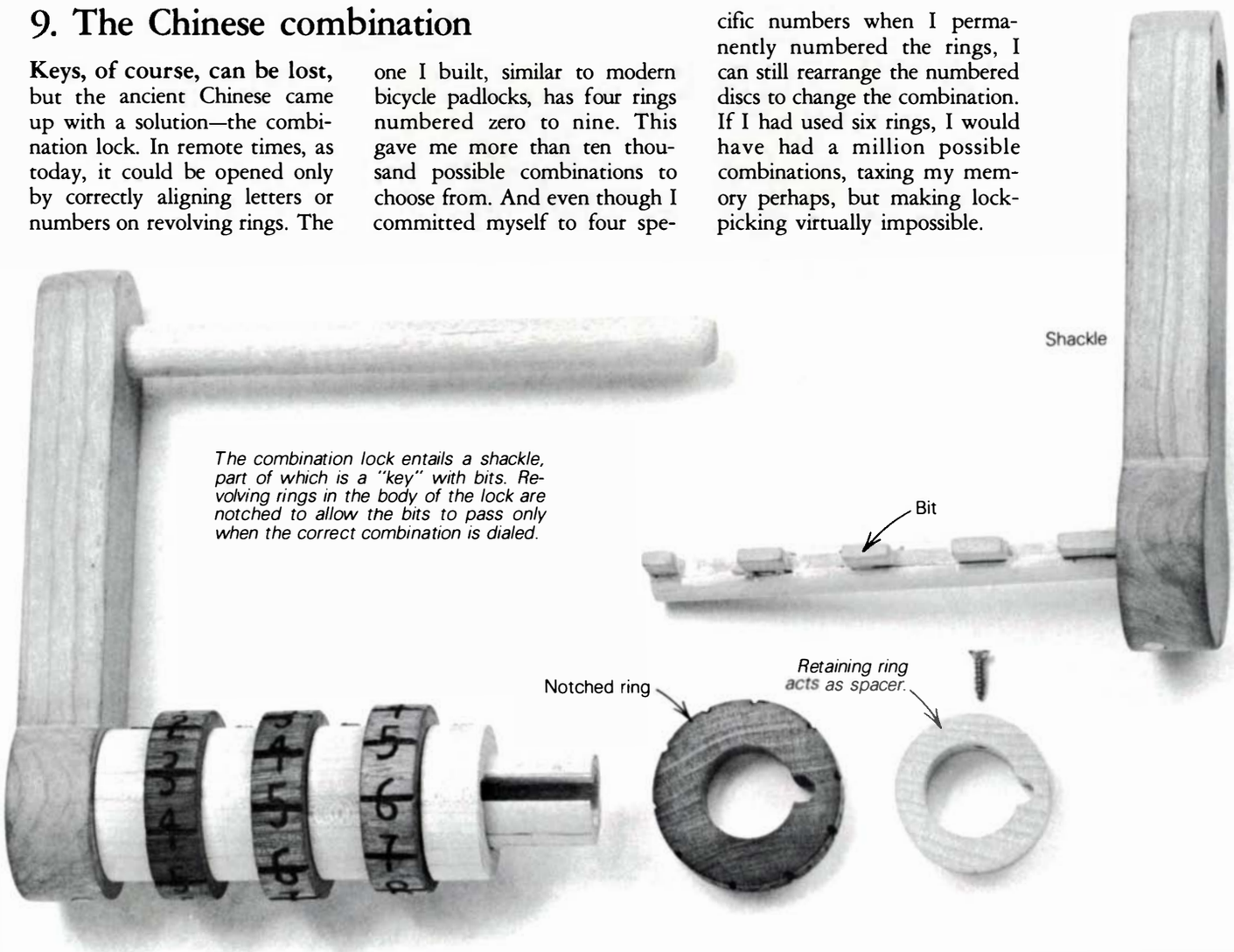




The logical improvement of the warded lock, the lever-tumbler, is still in use today. Although it has a key with bits, it utilizes levers instead of pin-tumblers. One bit moves the bolt while another bit lifts a lever to free it. The security of this lock is in the number of levers used (sometimes ten) and in the size of the bits, which can be altered minutely, making it a more difficult lock to pick. This particular lock has two levers and operates with a key that has two brass pins for bits.

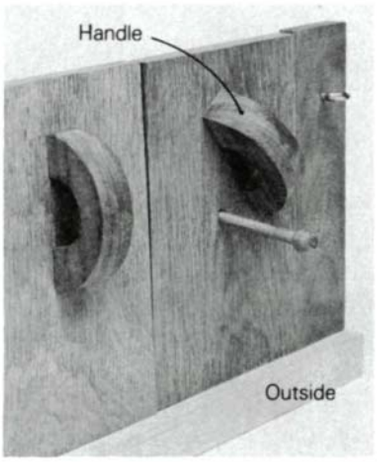
9. The Chinese combination

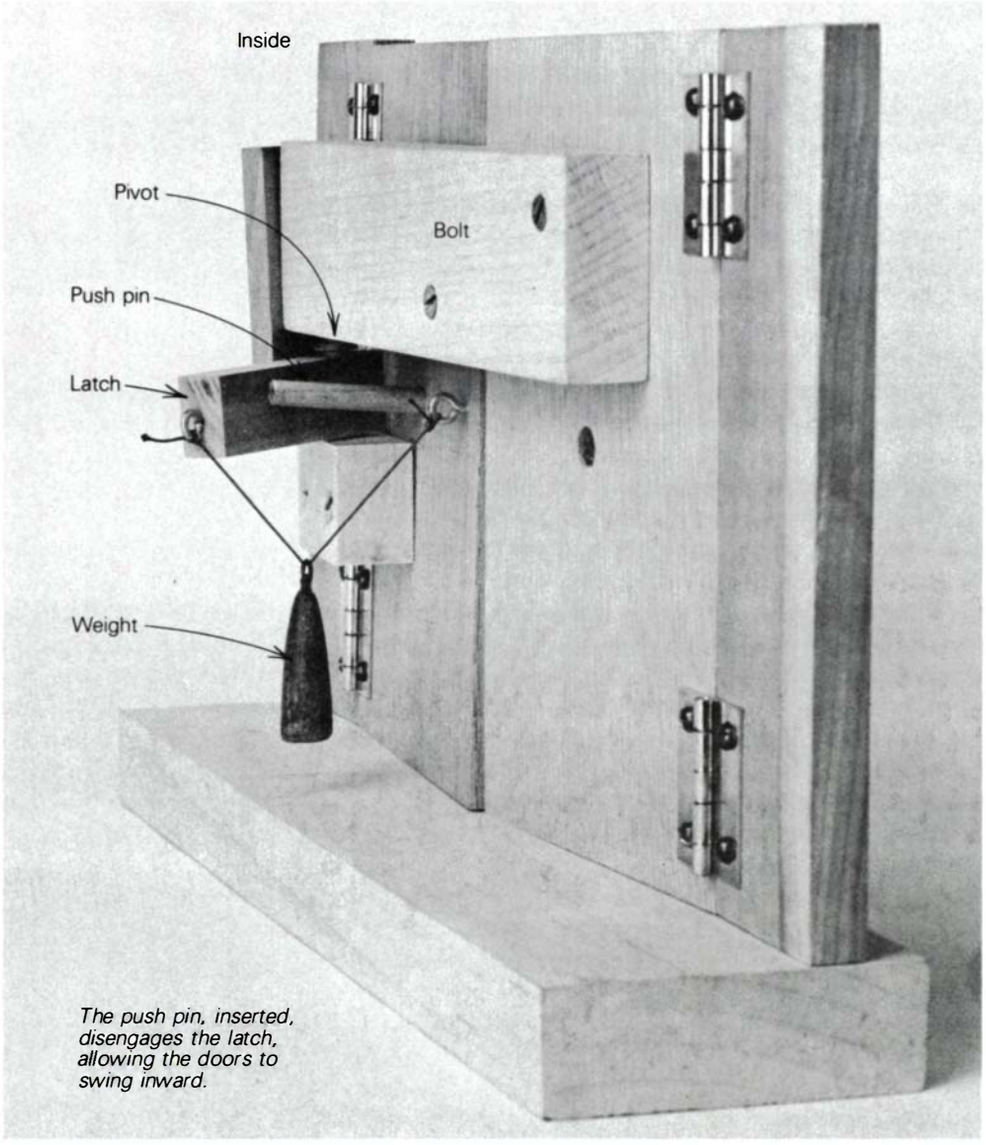
Keys, of course, can be lost, but the ancient Chinese came up with a solution—the combination lock. In remote times, as today, it could be opened only by correctly aligning letters or numbers on revolving rings. The one I built, similar to modern bicycle padlocks, has four rings numbered zero to nine. This gave me more than ten thousand possible combinations to choose from. And even though I committed myself to four specific numbers when I permanently numbered the rings, I can still rearrange the numbered discs to change the combination. If I had used six rings, I would have had a million possible combinations, taxing my memory perhaps, but making lock-picking virtually impossible.



The combination lock entails a shackle, part of which is a "key" with bits. Revolving rings in the body of the lock are notched to allow the bits to pass only when the correct combination is dialed.

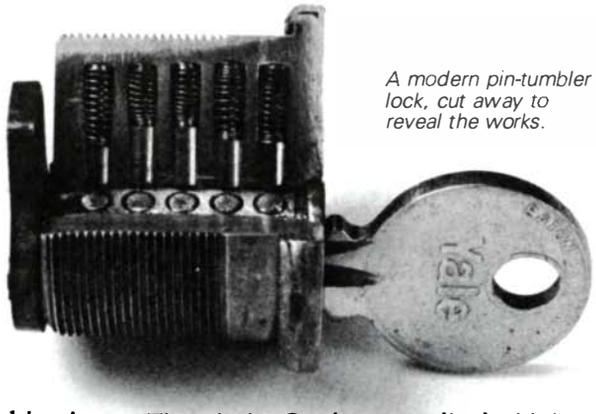
10. Keyhole latch





The push pin, inserted, disengages the latch, allowing the doors to swing inward.

I built this wooden lock to scale from one found in Australia. Called a concealed lock, it has a bolt fastened to the inside of one door and held to the other by a wooden latch. The latch, which can pivot on a securely fastened base, has to be opened to release the bolt. The question is, how can the latch be pivoted from the outside? The secret of the lock is revealed by twisting the handle, which uncovers a hidden hole through which a push pin can be inserted. The string and weight are added so that when the doors are closed and the push pin removed, the latch will automatically close.



A modern pin-tumbler lock, cut away to reveal the works.

Locking it up—Though the Greeks are credited with inventing the all-important keyhole that eliminated the need to poke an arm through a hole in the door, their keys were large, shaped like sickles with wooden handles. The keys' security lay in the fact that they were metal, and individuals poor enough to want to steal did not have the price of the metal necessary for the key. It was the ingenious Romans, the first to use metal to make their locks, who made their keys small enough to be easily carried around.

Convenience seems to have been as important in the evolution of locks as any security they actually provided. The earliest wooden examples were bulky, clumsy, and (as we have seen) not too secure. Nevertheless, the designs are found in use today in such far-reaching places as the Congo, the East Indies, and the Alps, where huts are fitted with them. Wooden locks have survived despite their limitations because they have one advantage over iron and steel: in damp regions iron and steel rust tight, preventing the lock from functioning.

Yet the strength of metal has made the small contemporary lock possible. An interesting footnote is that one of our modern locks, patented just over a hundred years ago by Linus Yale, Jr., is a pin-tumbler lock much like the first Egyptian lock four millenia ago. Its major advantage over the Egyptian lock is the metal it is made from, pioneered by the Romans, who also introduced the other features that make it noteworthy—springs that hold its tumblers in position and the warded keyhole. With the Industrial Revolution in full swing, Mr. Yale was in the right milieu for innovation, but I wonder if he really thought he'd invented something new. □

Roger Schroeder, of Amityville, N.Y., is a woodworker and co-author of Woodcarving Illustrated. *He and Methods of Work editor Jim Richey made most of the locks shown here. Yes, they all work.*

Outdoor Wood Finishes

Varnish is pretty, but paint's tougher

by William C. Feist

If properly protected and sheltered from the elements, wood is a remarkably durable material. Even when buried or submerged in water, it can retain its strength for many years. Unfinished wood exposed to the harsh effects of wind, rain and sun, however, coupled with the decaying action of fungi, may become useless within a year or two.

Water is the worst enemy of wood left outdoors. Rain and heavy dew are readily absorbed by unprotected wood. At first this causes differential swelling between earlywood and latewood, raising the grain so the wood looks—and is—weathered. Eventually moisture cycling creates enough stress to warp boards, straining fastenings and often cracking the wood. Sunlight, too, takes a toll. Ultraviolet radiation rapidly breaks down the lignin that binds wood fiber together. Sunlight initially affects the top layers of wood, bleaching some species while darkening others. Continued exposure causes slow disintegration.

Sometimes people prefer the look of weathered wood. Usually, though, we want to protect wood that must be left outside, by applying some sort of finish. There are basically two kinds of finish: those that form a film on the wood surface—paints and varnishes—and those that penetrate the wood—water-repellent preservatives and pigmented or semi-transparent stains.

Of all the finishes, paint provides the most protection. A properly applied paint film limits checking and warping by keeping water out, and its pigments (depending on amount and type) filter ultraviolet rays. Paints are classified by their solvents as either solvent-borne or waterborne. Solvent-borne paints are suspensions of inorganic pigments in an appropriate vehicle that binds the pigment particles to each other and to the wood surface. For practical purposes, alkyd-resin paints are the same as oil paints, since alkyds are synthetic substitutes for natural linseed and tung oils. Waterborne, or latex, paints are suspensions of inorganic pigments and latex resins in water. These resins can be any of a number of plastic compounds, including polyvinyl acetate, polyvinyl chloride and acrylic, the same basic resins used to make white glue, garbage bags and Plexiglas, respectively.

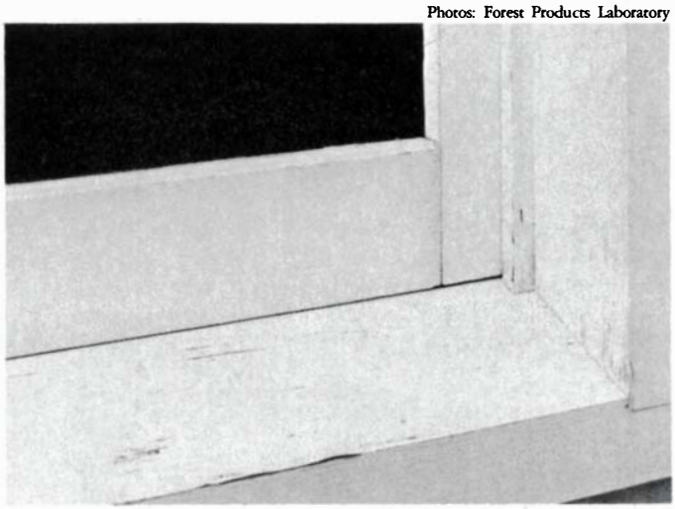
Although the impervious film of an oil paint provides the best shield from liquid and vaporous water, it's not necessarily the most durable. No matter how well sealed, wood still moves with seasonal humidity, stressing and eventually cracking the paint. Latex paints, particularly the acrylics, remain more flexible, and even though they pass more water vapor, they hold up better by stretching and shrinking with the wood. Our test fences at the Forest Products Lab show that the all-acrylic latexes, applied in two coats over an oil-based or stain-blocking latex primer, last longest.

Most paint complaints involve cheaper products, leading me to believe that high-priced paints are probably worth the extra money. Better paints usually contain 50% solids by weight. Paints with less than 50% solids may be cheaper by the gallon, but they will cost more per pound of solids, and you'll have to apply more or heavier coats to get equal coverage. At FPL we evaluate paints by generic type. *Consumer's Report* (256 Washington St., Mount Vernon, N.Y. 10550), however, does extensive weather-testing by brand.

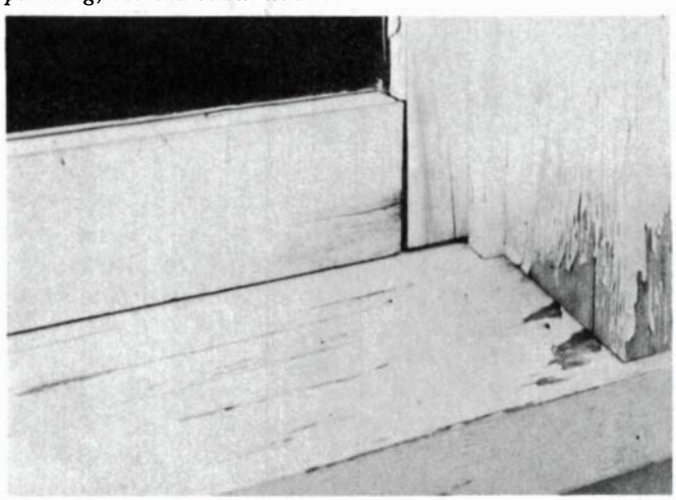
A coat of a water-repellent preservative before priming and painting greatly prolongs the life of the paint. Film finishes usually fail first at joints, so give these points, particularly any exposed end grain, an extra coat of water-repellent.

Whether oil or latex, two coats of paint should follow the primer. Our research shows that a single coat over a primer may last four or five years, but two coats can last up to ten. The optimum thickness of primer and paint is 0.004 in. to 0.006 in., about the same as newsprint. Thicker films are liable to fail prematurely, creating a rough, cracked surface

Photos: Forest Products Laboratory



Paint is wood's best defense against the elements, and a water-repellent is paint's strongest ally. Five years ago, the window above was treated with a water-repellent preservative before painting; the one below wasn't.



that can be made smooth again only by a laborious stripping back to bare wood.

Oil paints may adhere better to weathered paint surfaces than latex paints do. If you're in doubt, try this test: Clean and paint an inconspicuous spot with latex and let it dry overnight. Press a bandaid onto the paint, then briskly snap it off. If the bandage lifts a chip of paint, you'll have to clean the surface and try again, or switch to an oil-based paint. Never paint over mildew, for it will just grow through. Instead, clean off the mildew with a solution of ⅓ cup liquid detergent mixed with 1 quart household bleach and 3 quarts warm water. Never mix bleach with detergents containing ammonia; the combination releases a lethal gas.

If you want to show off the lavish joinery of your picnic table through clear varnish, be prepared to refinish often. Even the toughest varnishes have only a fraction of the durability of paints, often breaking down in a year or less. This is because ultraviolet light penetrates the film and attacks the wood, whose breakdown cracks the varnish, which then sloughs off. Hardwoods, with their lower lignin content, may be a better choice for varnish, but you'll still need to maintain the finish regularly. Some varnishes contain ultraviolet-inhibitors, which protect the film itself but not the wood underneath.

Marine spar varnishes, made from tung and linseed oils with driers added, have been the traditional clear outdoor finishes. Phenolic-based varnishes and polyurethanes, essentially liquids that cure into plastic films, are more resistant to moisture and abrasion than oil varnishes are, but all types weather about equally. Two-part polyurethanes are tougher and perhaps more ultraviolet-resistant, but they are expensive and difficult to use, and have a short pot-life.

Varnish built up in many thin coats instead of two or three thick ones will usually perform best. As many as six coats may be needed, with a sanding and a fresh coat once a year. To prolong a varnish finish, shade it from the sun. If you hide varnished outdoor furniture under trees, however, rinse it occasionally to remove bird and leaf excretions, which can also attack the film.

The best compromise between opaque, grain-obscuring paints and short-lived varnishes may be clear water-repellent preservatives or colored semi-transparent stains. These products protect by partially sealing out moisture and light, and by penetrating the wood, leaving it slightly exposed and working in concert with the elements to weather the surface without degradation. These materials are easy to apply and durable, and are particularly effective on roughsawn wood.

Water-repellent preservatives are mixtures of petroleum solvents, paraffin, resins or drying oils, and preservatives (mildewcides) such as pentachlorophenol and copper naphthenate. They don't form a film and therefore don't protect the wood against water vapor or ultraviolet light. They do, however, exclude liquid water, thus inhibiting the growth of mildew and other fungi, making them suitable for any outdoor woodwork that will benefit from some weathering. Semi-transparent stains are water-repellents plus pigments that impart some ultraviolet-shielding. These stains are made in many colors, and since no film is formed, they won't crack or blister. Don't confuse these stains with opaque stains—specially formulated thin paints best used when you want the wood's texture but not its grain to show. An important caution: Pentachlorophenol is toxic and a skin irritant. Stains and water-repellents containing it shouldn't be used on outdoor furniture, playground equipment, or decks around swimming pools. Also, penta can kill plants. Newer waterborne water-repellent preservatives may be less hazardous to use.

Stains and water-repellents are more versatile than paints or varnishes. They can be applied over hardwood or softwood, rough lumber, smooth boards or plywood. Water-repellent preservatives are best dipped, but a liberal brush coat to the point of refusal is fine. The treatment should last one or two years, and should be repeated when water soaks in instead of beading and running off, or when the wood looks dry and gray. To refinish, simply clean the surface with a bristle brush and then brush on more.

Depending on the color and the amount of grain you want to show through, one coat of stain might do. But as with paints, two coats are better. Brush on the second coat before the first has dried. An hour or so later, wipe off any excess to keep glossy spots from forming. Two coats of stain may last ten years, and a recoating then should last even longer because the stain will soak into surface checks that opened up as the wood weathered. □

William Feist is a wood-finishes research chemist at the USDA's Forest Products Laboratory. This article was adapted from research and consumer publications produced by FPL and by Purdue University. For more information, write to FPL at PO Box 5130, Madison, Wis. 53705.

Add oil, color, and stir

If I were shopping for an outdoor wood finish, I'd probably pick a semi-transparent stain. I would want it to be oil-based, for penetration and durability. It should contain a water-repellent. And I'd want it to have some sort of preservative, particularly if I lived in the South or along a humid coast, where mildew is likely to be a constant problem.

Paint stores usually have these stains in great variety, but if they're too expensive for you or the wrong color, you can mix your own from this formula we developed at FPL about 25 years ago. The amounts listed will make 5 gallons. You can scale down the recipe for a smaller amount.

Boiled linseed oil	3 gal.
40% pentachlorophenol solution	½ gal.
Paraffin (melted)	1 lb.
Burnt sienna (brown iron-oxide) tinting color	1 pt.
Raw umber tinting color	1 pt.
Mineral spirits	1 gal.

Melt the paraffin in a double boiler, taking care not to get it too hot. Add the linseed-oil/mineral-spirits solution, and when the mixture has cooled to about 70°, add the penta and blend it with the other ingredients. Don't breathe the fumes from any of these materials, particularly the penta. Work outside, and wear gloves, goggles and an organic-vapor respirator.

One nice thing about this finish is that you can modify it in many ways. The tints listed make cedar-brown, but you can try any combination of the universal tints sold by paint stores. If mildew is a problem, use half as much linseed oil, making up the volume with mineral spirits. —*W.C.F.*

Wendell Castle Tries Elegance

. . . and pushes toward the limits of craftsmanship

by Urbane Chapman

Castle perches atop his limited-edition Atlantis table, a foray into Post-Modernism.

For the two decades of the 1960s and 1970s, Wendell Castle worked in and became famous for a furniture style that turned its back on the idea of furniture as an arrangement of sticks and boards, joined more or less at right angles, to form boxes and supporting surfaces. Instead of the forms most wooden furniture has taken for the past four thousand years, Castle made furniture carved from solid masses, the shapes derived from such natural forms as trees, flowers, leaves and shells. By the late 1970s, some of Castle's designs had begun to suggest a new and growing interest in stick-and-board construction. Then in 1978 Castle began building and carving pieces that combined commonplace furniture forms with commonplace objects: a chair with a coat, realistically carved in wood, hanging from its back; a Jacobean-style table whose top includes books and a pair of glasses carved into it (facing page). These works are not furniture, for all that they incorporate some of its more banal forms, but sculpture.

Castle, at this point in his career, seems to have been casting around for a new direction. Evidently the jokey sculptural pieces were not it, for in 1981 he showed in New York a lady's writing desk and two chairs in a style closely modeled on French designs of the 1920s. This suite (shown on the back cover of *FWW* #31) was unambiguously furniture of the traditional stick-and-board variety, albeit most elegant. The April 1983 exhibition that I attended at the Milliken Gallery in New York showed that Castle has not returned to the stacked furniture for which he became famous, but has continued to make furniture by joining sticks and boards. He has also stayed away from "organic" forms, to recreate an Art Deco period style on the one hand, and to explore Post-Modern ideas on the other.

The origins of Castle's carved furniture can be found in the works of such European sculptors as Gaudi, Brancusi, Arp and Moore, who, during the 1910s, '20s and '30s, analyzed natural forms and abstracted from them shapes, typically rounded and undulating, which, while suggesting the natural, depicted nothing readily recognizable. In 1939 the American sculptor Isamu Noguchi placed a sheet of plate glass, its outline shaped like an overstuffed surreal sausage, on two abstract rosewood carvings, and created a table. Over the next couple of years, Noguchi made several tables that consisted, top and pedestal, of a single stack lamination (below right). In 1945 the Herman Miller company, a major manufacturer of high-end furniture, marketed a Noguchi coffee table whose plate-glass top rested on a two-piece sculptural base of laminated walnut, as well as other Noguchi pieces that presaged much of what characterized 1950s popular design: "free-form" tabletops, "organic" chair forms on wire legs, kidney-shaped swimming pools.

The popularity of organic furniture was brief, and sculpture also changed. By the early 1960s, when Wendell Castle graduated from art school and began making furniture, his style of carving was, as sculpture, already dated: the leading sculptors had abandoned the idea of sculpture as an exploration of volume, and were constructing angular works of steel plate, rods and wires; they were also vociferous in denying the

Stacked tables: 1976 organic Castle, left; 1941 ancestor by Noguchi, of laminated avodire, 30 in. high.

Museum of Modern Art, New York, Philip L. Goodwin Collection

value of craftsmanship. Also during the 1960s, the tubular steel furniture designed by European architects in the late 1920s and early 1930s, as well as more recently designed American metal, plastic and molded-plywood furniture, began to be manufactured in quantity, and became familiar in the office and at the airport, if not at home. Against this background of sculpture and furniture styles that emphasized industrial technology and denied craftsmanship, the natural carved forms, oiled woods and careful craftsmanship of Castle's 1960s work should be seen as a reaction, a form of protest in tune with the social climate of that decade. This timeliness perhaps accounts for the ready response to Castle's early work, and for its widespread influence on woodworkers. Noguchi's biomorphic furniture forms in the 1940s had been merely novel; Castle's, in the 1960s, were relevant.

Times change and so do styles. . . but in what direction? The history of furniture fashion shows that the basic choices are remarkably limited. Straight lines can predominate, or curved can; planes can be flat or undulating; line can be stressed or volume can be; surface can be either plain or decorated; wooden furniture, as Castle has showed us, can be either made of sticks and boards or carved from the solid. Castle's earlier furniture undulated, was carved out, was undecorated. His recent work is more or less rectilinear, is traditionally joined, and is highly decorated. A revolution is complete, but, as we shall see, evolution continues.

Before about 1976, Castle made pedestal tables in which the top flowed into the base. During the late '70s, however, he began to make three- and four-legged desks and tables with clearly differentiated tops and legs, the separation between these elements being emphasized by joining the legs to the outside edges of the tops, and in some examples by having the legs rise above the tops. An often repeated design was a games table with a square top, its shape accentuated by a central area of veneered contrasting wood (below right). The games table's legs (mounted tangentially, pinwheel fashion) are joined to the top with large, showy dovetails, which further emphasize their separateness; their shape is reminiscent of the traditional cabriole, although Castle also devised several more fanciful variations. This witty and urbane design turns its back on Castle's earlier work, announces his interest in traditional furniture forms and methods of construction, and looks forward to Castle's current period, during which, indeed, the games table has been born again in an even more elegant form (p. 72).

Last spring's show included nearly all of the furniture Castle and his three assistants had produced in the past two and a half years—eighteen pieces ranging in size from a jewelry box to a large hall table. Prices ranged from $7,000 to $75,000. Since a dealer's markup might typically be 80% to 100%, Castle's return might be $15,000 for an item that required six man-months to produce. This suggests that Castle can stay in business, if he can establish a market for furniture made in this way and sold at these prices, but he's not likely to make more than a living doing so. In fact, gallery owner Alexander Milliken told me, the plan is to raise prices so that Castle will be able to pursue his design ideas unfettered by the necessity of accepting commissions. The idea of Castle pushing craftsmanship, and with it prices, to the outer limit was hatched, reported Milliken, in discussions about just what could be accomplished in woodworking if all the stops were pulled out. When Castle quoted a price of $75,000 for the lady's desk and two chairs, Milliken replied that he could probably get it—which, it happened, he did.

These pieces are closely modeled on the work of Jacques-Emile Ruhlmann (p. 70), the most decorous of the interior designers who exhibited at the *Arts Decoratifs* exhibition in Paris in 1925. That Castle should have chosen Ruhlmann as the point of departure for his new work is logical enough. He must have looked back for the most recent period in which the techniques of cabinetmaking had been pushed to their limits, and found it in the work of the Art Deco leaders and, most particularly, of Ruhlmann, who in turn had sought to rival the 18th-century furnituremakers to the French royal court. Castle also affirms admiration for the exemplary construction, if not the visual style, of some Arts and Crafts movement pieces made in Britain early in this century, in particular the work of Sidney Barnsley and of Ernest Gimson.

Castle's 1981 and early 1982 pieces are very much in the

The art world accepted Castle's 1978 trompe l'oeil sculpture (left) only when its carved embellishments prevented use. Earlier games table (right) foretold his current interest in stick-and-board construction.

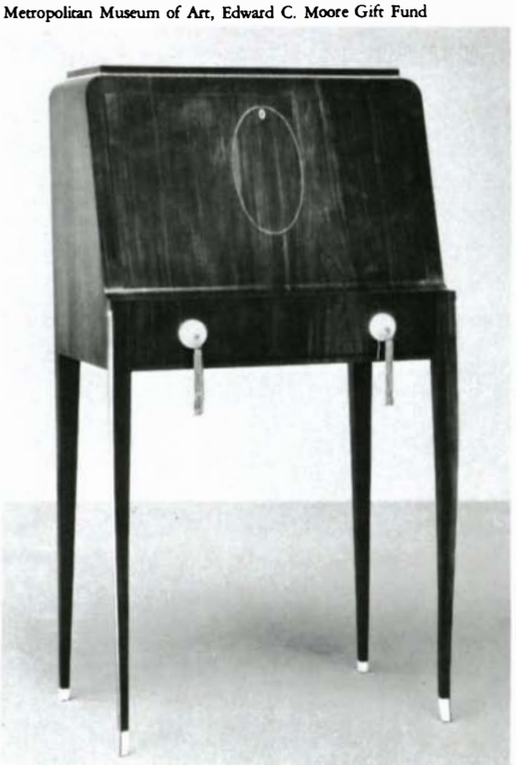
Ruhlmann, boudoir manner: light, feminine, gracious. The first essay in this period style, the aforementioned lady's desk with two chairs, does not get back quite to 1925. Compared with Ruhlmann's work, the desk legs are a little heavy at the top and all the rails assertively bulge. If Ruhlmann's work reflects the look of the lanky flapper, Castle's suggests a more robust conception of feminine beauty. The interior of the desk, with its unadorned, shocking-purple drawers of amaranth, made me think of American Crafts Revival rather than of Ruhlmann, and the blondness of the suite's sycamore wood, which may account for some of its visual weightiness, of Hollywood rather than of Paris. This appealing brashness has disappeared in the two demi-lune (half-moon) tables Castle made later in 1982. These are of identical design, but—a witty idea, this—one, of sycamore with ebony decoration, is like the photographic negative of the other, of rosewood decorated with ivory (below right). In these pieces Castle has caught the essence of Paris, 1925. They are refined, elegant and feminine, although a bit fussy in detail: the rail, which is semicircular in section, is surmounted by a top with a multiple stepped edge, which is itself embellished with a row of inlaid dots. It does not read clearly.

The stand of the "Fountain Cabinet" of 1982 (facing page) also has Ruhlmann-style legs, unadorned except for silver slippers, but the cabinet itself is starkly rectangular. It is made of English walnut of a particularly beautiful figure and color. In this piece, more than in any other in the Milliken show, Castle is allowing the wood to speak for itself—a paradox because the cabinet is inlaid overall with the silver lines and dots of the fountain pattern, a favorite motif of the 1930s. Castle has achieved here a brilliant stroke: the prismatic lights of the walnut and the metallic glow of the silver inlay are wonderfully complementary. With the "Fountain Cabinet" a new style begins to emerge: Castle's original elements begin to outweigh his imitations of the Art Deco period.

The 1982 games table (p. 72) is a reworking of the 1974 piece that foretold the abandonment of Castle's sculptural style. The newer table is strikingly successful and the piece, I am told, that most gallery visitors made for first. The veneered inner square is now stepped above the edges of the table, and these, like the legs which are still mounted pinwheel fashion, are faceted, in contrasting ebony and maple stripes. The legs, their joinery now concealed, terminate in small silver spheres. I was reminded of the cap and bells of a court jester. This festive table owes little to any Art Deco original; it's pure, born-again Castle. I would love to play poker at it, though I fear the stakes would be too high for me!

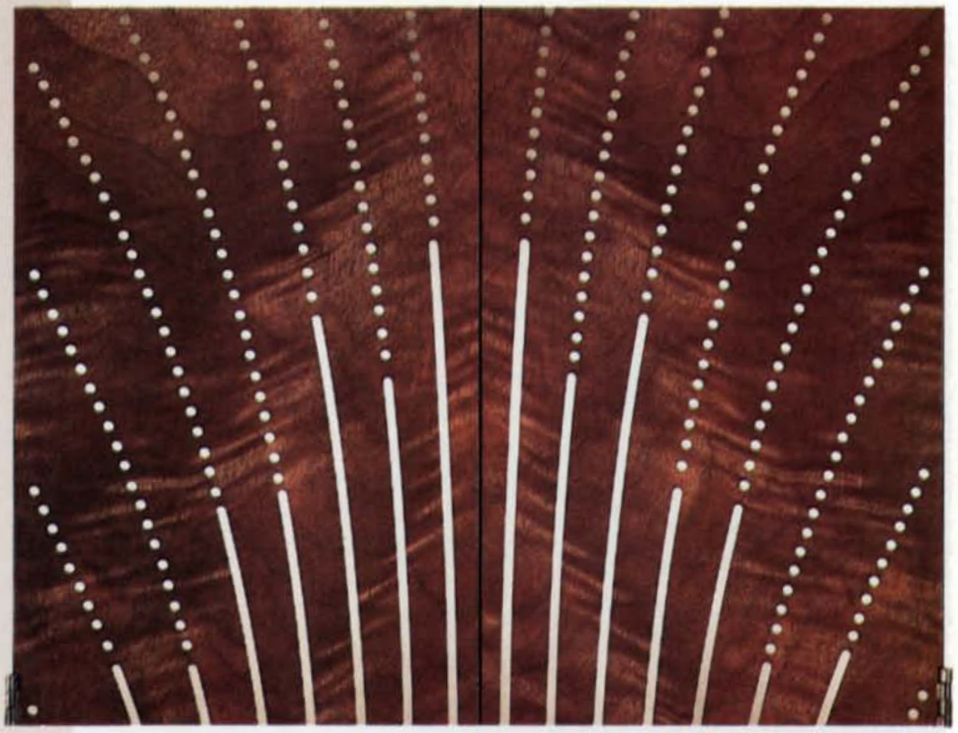
Having worked into, through, and out of 1920s Art Deco, Castle now begins a new and altogether different exploration of furniture forms. His "Late Proposal for the Rochester Convention Center in the Form of a Jewelry Box" (1982) announces an interest in the relationship between contemporary architecture and furniture design (p. 72). The jewelry box is decidedly architectural in conception and obviously connected to the style of architecture known as Post-Modern—a contradictory name which identifies the style in revolt against the glass-box idiom of the Modern (or International) style. Two of the more often repeated elements in Post-Modernism are classical architectural features, such as columns, and color. Castle's simple, cubic box of drawers faced in Carpathian elm burl is supported by four violently colored columns in drastic perspective. The shafts of the columns are conical, their upper ends coming almost to a point and terminating in small gold-plated spheres, and they incline inward; their bases are the shape of oversized doughnuts. This piece, hardly a practical jewelry box, seems to be both a joke, like its title,

Metropolitan Museum of Art, Edward C. Moore Gift Fund



Color photos: Steven Sloman

Revisiting Art Deco: Lady's writing desk, above, designed by Ruhlmann, 1923, is made of Macassar ebony with ivory feet and details. Castle's 1982 demi-lune table is Brazilian rosewood solid and veneer, with ivory feet, caps and dots.



Castle's 'Fountain Cabinet' (1982) brilliantly re-examines a favorite Art Deco motif. Its fountain pattern is sterling silver set into walnut veneer; the slipper feet, pulls, hinges and catches are solid silver. Besides the ten visible drawers, there's an eleventh hidden away somewhere.

Breaking away from Art Deco, Castle replays his 1974 games table in a lavishly fanciful way. The underside is veneered as sleekly as the top.

Castle inked a flock of ducks under the lacquer on his six-legged desk-table, above. Cones-and-doughnuts jewelry box, below, bears the formal title of 'Late Proposal for the Rochester Convention Center.'

and a manifesto proclaiming its designer's intention to explore both applied color and architectural, specifically Post-Modernist, forms.

Several other pieces showed Castle pursuing this latest direction. A remarkable liquor cabinet with a base of four great wedges resting on their points seemed, like the jewelry box, less a practical storage cabinet than an experiment in form. Most notably there was a highly architectural hall table, which I will discuss later. Other recent pieces, however, suggest that Castle has not yet arrived at a definitive new style. The combination of zebrawood, gilding and mirrors in the design of a vanity and stool produces such chaotic glitter that the form of the piece is obscured. The three maple panels that compose the top of a table with six Ruhlmannesque legs are decorated with the naturalistic silhouettes of a flight of ducks, an unfortunate excursion into kitsch (above right).

Castle's great hall table of 1983 (facing page) was the most imposing piece in the show. The tabletop is 7 ft. long, 2 ft. wide, and 1 ft. thick—the thickness containing eight drawers stacked in pairs. This austere, massive block is supported by two decorative pedestals, each composed of a pyramid which itself is supported on a groin vault, the architectural form that results when two tunnels intersect at right angles. The lacewood top is made to seem the more massive, monolithic even, by the chamfering of its top and bottom edges, faced in amaranth, and by the overall decoration: diagonal rows of inlaid ebony dots which deny the flush drawers any separateness. This *2001* object floats on the points of the pyramids—a nice structural problem Castle has neatly solved with steel rods that fit sockets hidden in the drawer dividers. The table's pedestals are the most purely architectural objects Castle has produced. Each is an aedicule, a miniature house, the kind of building-within-a-building that is another feature of Post-Modern architecture. The decorative details of these pedestals are enchanting. Each pyramid sits on an ebony platform which is the roof above the groin vault. The arches of the vault are outlined in ebony and have ebony keystones inlaid with ivory ovals. The soffits, the undersides of the arches, are of turquoise lacquer, and raised bands of turquoise continue around the tops of the abutments, which support the arches. The bases of the abutments are in turn outlined in ebony. From top to bottom, the pedestals' main surfaces alternate between lacewood and amaranth. The design and execution of these pedestals is of the greatest refinement and delicacy, yet they are visually strong enough to provide the visual support needed by the mass of the tabletop. Architectural details have always been applied to furniture, but I think we would have to go back to the early 17th century to find furniture that uses architectural structures in as thoroughgoing a way as Castle does here. This hall table is a most unusual and successful design.

Ruhlmann is said to have taken pride in making furniture only for the very rich, a stance opposed to the principles, if not the practice, of his contemporaries in the Arts and Crafts Movement and, later, the Modern Movement, who sought to bring good design to the masses. In the past, some, at least, of Castle's customers were not rich, but instead professional people whose investment in art furniture was something of an event in their lives. The owner of Castle's $75,000 lady's desk and two chairs, however, is described as "a Swiss investor" who's apparently in no hurry to take delivery. All of

Hall table's drawer slab lifts off its architectural pedestals, revealing two stout steel rods that slide into robust metal sockets.

which is to say that designers and craftsmen who sell what they make do not exist in a social vacuum.

Pushing furnituremaking to the limits of craftsmanship, as Castle is doing, has seldom been attempted before, and when it has, the one-of-a-kind product has been aimed at the aristocrat or the plutocrat: Ruhlmann's predecessors were cabinetmakers to the French court, his clients the newly rich manufacturers in post World War I France. Ruhlmann's furniture was remarkable for having some hidden surfaces not only finished but also designed with as much skill and attention to detail as exposed surfaces, a feature Castle imitates. The underside of the 1982 games table, for example, curves complexly in two planes, shows no joinery, and has an inlaid border—features that can be appreciated only from the floor. No doubt the impulse to design and finish exquisitely what will not normally be seen arises from the craftsman's desire to make a perfect object—a desire which itself could be condemned as precious. But this expensive practice also, I fear, appeals to the kind of buyer who wishes to show off his furniture to his friends in such a way that it is quite clear just how much he paid for it. It may be that the unavoidable result of pushing a decorative art to the limit is ostentation.

Historically, the costly, one-of-a-kind piece of furniture spawned simpler adaptations that were less expensive to make and could be bought by a wider public. For example, Louis XV court furniture, much simplified, became French Provincial. Castle's furniture may, in fact, reach more users through a scheme he has worked out with a major furniture manufacturer. For the Gunlocke Company he is designing, and his workshops will build, three groups of "executive" office furniture. The first group to be announced, named "Atlantis" (p. 68), is based on the 1982 jewelry box, somewhat toned down. A second group is to be based on the pinwheel games table. This marketing strategy parallels one employed by the master designers of Art Deco who, after 1925, went on designing one-of-a-kind pieces while supervising the production of limited runs of less expensive variations. Eventually, of course, the mass market was saturated with cheaply manufactured copies—Art Deco twice removed.

Just as a designer cannot escape the political implications of his designs, so also he cannot work in a stylistic vacuum; he will usually find himself going either with or against the tide of fashion. Castle's biomorphic, sculptural wooden furniture of the '60s and '70s opposed the then-fashionable Pop and High-Tech styles—all bright colors, plastic and metal. His Art Deco period furniture puts him, stylistically, more in harmony with current ideas of interior decoration, although his pieces far surpass in quality anything else available. His latest work is right in tune with leaders in international design and decoration. Post-Modernist architect Michael Graves, for example, is designing ornate furniture for Sunar, another major manufacturer, as well as what I take to be parodies of 1930s debased Art Deco for an anything-goes international design group called, cryptically, Memphis.

If, when he began making stick-and-board furniture, Wendell Castle had adopted the approach that is the Arts and Crafts Movement's legacy—natural finish, solid wood only, exposed joinery, honesty to materials—he would no doubt have out-Krenoved Krenov. Instead he has chosen to set out along a more difficult but more interesting route. There are many furnituremakers making 18th-century period pieces; Castle is among the few who have had the idea of trying to beat the masters of Art Deco at their own game. There are plenty of designers and manufacturers producing cheap furniture in a Post-Modernist mode; Castle has attempted applying the finest materials and craftsmanship to the style. He is a designer who is consciously influenced by fashion, but his best work is strikingly original. There is some kind of absolute value in his pursuit of the most highly regulated workmanship, and there may be an economic lesson to be learned from his finding a market (who knows how small or how large?) for very expensive, handmade furniture. Without a doubt, Wendell Castle is a leader, which raises the question who, if anyone, will follow? □

Urbane Chapman makes furniture in Northfield, Mass.

Tips on Veneering

How to avoid coming unstuck

by Tage Frid

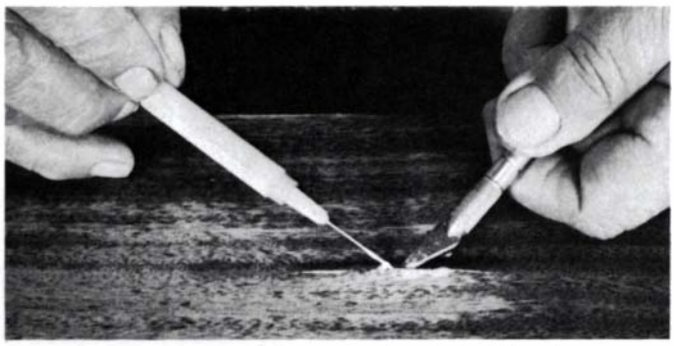
A poor veneer job will show up any mistakes in the most unforgiving way. Veneer can crack, bubble, curl up, or fall right off. This usually happens after the work has been delivered, which doesn't do your reputation any good. And repairing things often means refinishing the piece, a costly task. Everybody makes a mistake once in a while, but if you live long enough, like me, your mistakes can teach you how to correct some blunders before they happen.

In the first place, when you veneer over solid wood, make sure the grain in the veneer follows the grain of the board. Otherwise, as the board shrinks and expands, the veneer will loosen. When veneering plywood, run the grain of the veneer at right angles to the face grain. Don't try to veneer the end of any board thicker than ¾ in.—the veneer will eventually come loose. When veneering plywood edges, special care is needed. On veneer-core plywood, the core may telegraph through the edges as the wood moves. I double-layer edges where this will be noticeable, with the grain of the under layer of veneer running at 90° to the top layer.

In all cases, you must veneer both sides of a board, whether it's solid wood or plywood. Granted, some veneer is rare and expensive, and it seems a shame to veneer the back side when you know that it will never be seen. Yet if you don't, the piece will warp. It is possible to veneer the back with a cheaper veneer than the front, but only if the two veneers are of similar density and will expand and contract at the same rate. I would never put maple on one side and poplar on the other, for instance, but I often put ordinary mahogany on the back side of expensive walnut. If in doubt, consult a table of expansion rates, such as that found in Bruce Hoadley's book, *Understanding Wood,* or the USDA's *Wood Handbook.*

The type of veneer should not make any difference in the procedure, except that both burl veneer and crotch veneer have to be flattened first to remove the bumps. I used to soak the veneer in a mixture of 2 parts Cascamite powder, 1 part flour, 3 parts water, 1½ parts glycerine and 1 part isopropyl alcohol. I can't get Cascamite anymore, so now I substitute Weldwood plastic resin. After soaking the veneer, I let it stand on end until it's dry to the touch, put layers of newsprint on both sides, and press out the bumps between two boards with a heavy weight on top. I change the paper after two hours and again after four hours, and then I allow the veneer to dry under a lighter weight for a day. It will be flat and ready to use when it comes out from between the boards. Leave it pressed flat until you need it. If it has dried out too much and become bumpy again, just moisten it with water and reflatten it.

Despite the flattening, burl and crotch veneer will eventually crack because the grain is going in all directions. This might take as long as 25 or 30 years, and as far as I know there is no way to prevent it from happening, but one trick to prolong the life of the job is to glue-size the veneer.



Even the best veneering job can develop air bubbles, from uneven adhesion. Simply slice the bubble, inject glue and reclamp.

Sizing tricks—Glue sizing is a very thin, hot, animal glue applied to the wood in order to seal and stabilize it. The glue should always be heated in a double boiler, because if it boils it will lose its strength. It's impossible to give exact measurements for the amount of dry glue to mix in the water, as hot glue constantly changes as the water evaporates. But here is a way to tell if it's right: The glue should drop from the brush like heavy maple syrup, and by putting a drop between your fingers and rubbing them together with some pressure, you should be able to squeeze out all the excess glue easily. After about a minute, if the room is at 60°F, your fingers should start sticking together. With the glue in that condition, mix about 1 part hot glue to 2 parts hot water to make the glue size. Glue sometimes dries out. With luck, all you need to do is add water and reheat. But glue can go bad if it's too old. If it smells bad or turns liquid when it is cold, make a new batch.

Scrape the veneer and sand it with 80-grit sandpaper. Then apply the hot glue size to the surface and rub it in with the palm of your hand, wiping off any excess. When the glue is completely dry, usually after about 24 hours, scrape the veneer again lightly if necessary, then sand it. The glue sizing will not discolor the veneer or interfere with the finish. The process is worth the effort on all doubtful veneers, but glue sizing doesn't always work—rosewood will eventually crack whatever you do to it.

When veneering over end grain, apply one coat of glue size to seal the pores. Let it dry completely and then apply the veneer using hot glue, either hammer-veneering (*FWW* #10, pp. 52-54) or clamping it. If the wood is soft, such as poplar or basswood, it's a good idea to size the ends twice.

Glue sizing is also a good way to repair cracked veneer when you're doing refinishing. Here the glue size should be thicker, about 1 part glue to 1 part hot water. Before you remove the old finish, force the glue size into the cracks with your fingers and the palm of your hand, rubbing hard. As the glue dries, it will pull down and reglue the veneer. When the glue is completely dry, remove the old finish with a cabinet scraper. Don't use any finish remover—it might dissolve the glue.

Gluing the veneer—There are many different glues on the market, all claiming they can glue everything except broken hearts. Some of them might work fine for veneering, if anybody wants to experiment. As for me, I wouldn't try a new glue on a real job without testing it first for a couple of years. I was put to the test recently when Cascamite, one of my favorite glues, disappeared from the market. In its place I

now use Weldwood plastic resin, which had given me some trouble when I first tried it years ago. Now it seems fine. I never use contact cement on wood veneer. It doesn't really dry hard, so the veneer is liable to move and crack at any time. And the solvents in some finishes, such as lacquer or Watco, may cause the glue to loosen. Also, on large surfaces you will get air bubbles, and with contact cement, they are just about impossible to repair. I hope I've made all my gluing mistakes already, and learned something from them. My three standbys, depending on the type of job, are hot glue, Titebond and Weldwood.

I use hot glue for hammer-veneering. In this operation, pressure is applied by stroking the surface with a hammer shaped like a small squeegee. As the glue is squeezed out and cools, the veneer sticks flat. Then it can dry without clamping. This is a good technique for veneering the edges of panels, and will work even if you have used a different glue on the panel itself.

Even a dedicated clamper will find that hot glue has one feature that makes it ideal for certain jobs—it can be reactivated by heating. If you apply the veneer over glue that has cooled and then heat the job while it is in the press, the veneer won't absorb much moisture until the glue is reactivated. Thus it will not try to expand until after it has been firmly clamped down. This makes for a stabler job, because veneer that has been allowed to expand too much before clamping will always be under stress after it has dried, and will be more prone to cracking. Of course, you must have a way to heat the job in the press. Bags of sand can be heated and clamped with the work, a good trick for veneering curved panels, as the sandbag will conform to the curve and even out the pressure. For flat-press veneering, I heat ¼-in. plywood sheets and put them top and bottom—and between separate panels if I am doing a stack all at once. I also use ⅛-in. aluminum sheets for this; they hold the heat very well. To heat the sheets, I used to put them on the school radiators, which were always very hot. You could put them near a woodstove just as well.

Another advantage with hot glue is that the piece can be taken out of the press as soon as it has cooled enough, perhaps after a couple of hours. It won't have full strength for 24 hours, but it will be all right until then. Hot glue has one drawback, however. Because it reactivates, it is not good for humid and hot climates.

I use Titebond only when the work can be clamped up before the glue starts setting. The advantages of Titebond are that it is always ready, you don't have to mix it, it has a long shelf life, the brushes and rollers are easy to clean, and it is resistant to water and heat.

Weldwood plastic resin is my choice if there are a lot of pieces to be veneered or if the piece is big; its set-up time is longer, so I have more time to get the clamps on. It resists water and heat, but it has to be mixed, and then is usable for only a few hours. So don't mix a lot more than you need. When buying powdered glue, don't buy too large a can, because every time you open it moisture from the air gets in, and after a while the glue goes bad.

No matter which glue you're using, be sure that you put enough on and that it is evenly spread. But don't put so much on that it runs all over the work, the bench, you and the floor. You need just enough to allow a little to squeeze out along the edges. A good tool for spreading glue is a paint roller. Always leave a little extra glue along the edges, to be sure that they will stick down. Spread glue only on the surface of the piece to be veneered, never, never on the veneer. If glue is put on the veneer, the veneer will expand too much, and might crack later. Also, the wet side will expand more than the dry, causing the veneer to roll up like a scroll before you can press it.

Pressing—Before the job goes into the press, tack down the veneer so that it won't slide around under the pressure. Secure it in the center of each short-grain end. This will hold the sheet in place while still allowing it to expand. Tacked at the corners, the sheet would be trapped and it would wrinkle. After the first side is tacked down, cover the veneer with paper, so that if the glue comes through, the veneer won't stick to the press. Then glue and tack the other side.

If more than one piece of the same size is going to be veneered at the same time, put larger pieces of plywood between them. Never put the pieces to be veneered directly on top of each other. The surface would come out of the press very uneven, and if the pieces were not stacked exactly on top of each other, the edges would not be glued down.

When clamping, either with clamps or a veneer press, always tighten the center clamp first, then the others in the row that lines up with the grain of the veneer. Up to this point, from the time you started to apply glue, you should have been working as fast as possible. Now slow down. Give the glue a couple of minutes to squeeze out from the center toward the edges. Keep tightening the center row of clamps a little at a time until they are tight. Don't overdo it. Slowly follow up with the outer clamps, still starting from the center, then tighten everything down evenly. If you tighten the outside clamps too soon, the glue will be trapped and the veneer will buckle, and be likely to crack later.

As soon as the pieces come out of the press, clean their edges with a chisel while the glue is still flexible. When cleaning the end grain, use the back of a chisel to break the veneer over the edge, so it won't tear, then clean it.

After the edges are clean, stand the pieces on edge so that air can circulate all around them. If the pieces are left flat on the top of the bench, the sides exposed to the air will dry first, and the pieces will warp.

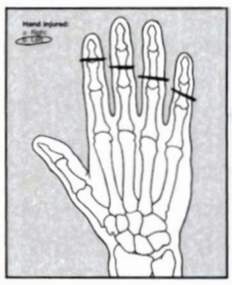
Testing for air bubbles—When the veneer is completely dry, tap the surface lightly with your finger and listen for hollow spots. It is very important to locate them and get them glued down, or else they will show up when the finish is put on and eventually they will crack. If you can't find the air bubbles by tapping with your finger, a sure test is to scrape and sand the surface, then dampen it with hot water, keeping it moist for a while. The veneer will absorb the moisture and expand, showing a bump wherever there is an air bubble. Mark the spot and let the veneer dry.

When the panel is thoroughly dry, slice open the air bubble with a sharp knife, cutting in line with the grain. I use a hypodermic needle to squeeze in some glue. Then I put paper and a block on, and clamp the repair. With hot glue, of course, you don't have to go through all this. To reactivate the glue, it's usually enough just to dampen the surface and iron down the bubble. □

Tage Frid is professor emeritus at Rhode Island School of Design in Providence.

Keeping Ten Fingers

Injury survey pinpoints hazards in the shop



by Paul Bertorelli

A year ago (*FWW* #36, pp. 84-87), we asked readers to tell us about the injuries they had suffered while woodworking. We collected 1,002 survey forms describing all manner of bloody run-ins with power and hand tools, from gruesome, multiple-finger amputations to the cuts and nicks that seem to scar even the most safety-minded. We punched all this data into a microcomputer. What emerged is a clearer picture of which tools pose the highest injury risk and why.

By far and away, the **tablesaw** is involved in more serious hand injuries than any other woodworking tool or machine. It was responsible for 42% of all the injuries reported, followed by the jointer at 18%, the radial-arm saw at 7% and the bandsaw at 6%. Although several other power tools—the shaper, chainsaw and circular saw, for instance—seem more hazardous, all figured in fewer accidents than even the hand chisel, which accounted for 4% of the total.

> ***"...there was a lot of sawdust on the floor, my eyes saw it, but my mind didn't, until my foot slipped and I lost my balance, and I put my hand on the table to break my fall—but unfortunately my hand landed on the sawblade. I gained an incredible amount of respect for the machine that day..."***
>
> *—Mike Andrews, Martinez, Calif.*

As several readers correctly noted, the tablesaw may not be inherently the most dangerous machine, but rather the one that's owned and used by more woodworkers more of the time. When I checked with a power-tool trade association, I learned that tablesaws do indeed outnumber radial-arm saws by about five to one, a ratio that nearly matches the injury statistics. But other research by manufacturers and the government also tends to single out the tablesaw. A 1980 study by the National Electronic Injury Surveillance System, for instance, found that tablesaws were involved in more than seven times as many injuries as were radial-arm saws. While our survey indicated that the tablesaw accidents overwhelmingly occurred while ripping, the radial-arm saw can be vicious whether ripping or cross-cutting. The radial-arm saw was also responsible for the goriest multiple amputations.

> ***"...I was trying to finish, I was tired, the machine vibrations had dulled my senses, and I must have just slipped or dragged my finger. I was not using the guard, which I usually do. This time I felt I needed to be able to hold the shutter tight to the fence, and didn't take the time to construct a jig. In my nightmares the last few weeks, I've made jig after jig, and cut off numerous fingers and hands. From another person who thought she was careful, and who never thought it would happen—I was wrong..."***
>
> *—Linda Faulkner, San Angelo, Tex.*

Our survey confirmed what experienced woodworkers might suspect, that attempting to rip a short, narrow or thin piece of wood on the tablesaw invites an accident. With too little surface to guide against the fence, the stock is liable to twist and bind, resulting in a kickback which pulls the hand that is holding the wood (the left, more often) into the blade. Ripping knotty, warped or checked lumber also increases the chance of a violent kickback, as does plunge- or groove-ripping: lowering the work onto the blade to start a blind cut.

Accessories such as **molding, dado and planer attachments** for both the tablesaw and the radial-arm saw were mentioned again and again as being involved in serious injuries, particularly when milling short or narrow stock, say, less than 12 in. long or 3 in. wide. The resultant kickbacks are impossible to control and often forceful enough to injure even without blade contact. Bevan Lavoy of Hornby Island, B.C., told of one such experience: "I was making window trim on my Unisaw with a three-knife molding head... the piece came back, jarring my left hand in such a way that it broke my little finger twice, nearly severing it. I'm sure it happened in less than a millisecond." Lavoy said that he's developed new respect for his tablesaw since the accident, and added, "I abhor molding cutters of any kind... to me, they seem itching to pare my fingernails."

Time and time again, readers confessed to having taken the guards off their tablesaws at the time of their accident. Some said that they now use tablesaw guards, but others continued to maintain that existing guards impair visibility and cause more problems than they solve. Hardly anybody, however, reported a serious tablesaw accident that occurred with a blade cover, kickback pawls and splitter all in place.

From my work with the survey questionnaires I draw several tablesaw lessons. First and most obvious, make guards and push sticks a habit, and train yourself to never put either hand in line with the saw's blade, no matter how safe it seems. Second, plan your work so that you don't need to rip little pieces into littler ones, but can rip them off of big, easy-to-manage chunks of wood. Third, do not attempt to tablesaw-rip warped, checked or knotty pieces. Take them to the bandsaw instead. In fact, one of my colleagues now does all ripping on the bandsaw, although I still prefer the tablesaw. Finally, think twice about those molding heads. Circular saws are designed and equipped for ripping and cross-cutting, not for doing double duty as a shaper or a planer.

Jointer accidents were fewer in number and generally less severe than those associated with the tablesaw, but they occurred for the same reason: trying to mill stock that was too small. Removing the cutterhead guard so that the small, thin stock won't jam under it is a favorite trick that makes this operation all the more hazardous. For some reason, the jointer seems more benign than it actually is, lulling otherwise safety-conscious craftsmen into

lapses in judgment that they regret. "I tried to joint a piece shorter than the 12-in. minimum," wrote Bruce Lancaster of Friendship, Md., describing the paring of ⅜ in. from his ring finger. "I was aware of this safety rule, but I tried to shortcut what would otherwise be a tiresome manual operation."

> ***"...I was ripping a pine board in which there was a loose knot. All went well until the blade passed through the knot, then the up side of the blade picked up the remaining part of the knot, sending it whisking past my ear..."*** *—Joel B. Johnson, Hendersonville, N.C.*

The lesson here is to joint your stock *before* you cut it into little pieces, not afterward. Use a hand plane for short pieces. It may be slower, but it's more pleasant and certainly safer. None of our readers reported being bitten by a hand plane.

As basic stationary power tools go, the **bandsaw** seems like a safe tool, and our survey suggests that it is. It was involved in the fewest, least serious injuries. Two-thirds of the reported bandsaw wounds were bad cuts, often requiring surgery, but this tool was involved in only one amputation. Most of the bandsaw cuts were the direct result of having the pushing hand or thumb in line with the blade when resistance suddenly disappeared due to a check or soft spot in the wood. On the other hand, the **shaper,** with its exposed cutterhead, is one of the scariest tools. That, combined with the fact that fewer woodworkers have one, may explain why it was involved in only 2.3% of the injuries we surveyed, less even than the portable circular saw at 3.7%, the router at 3%, and the chainsaw at 0.7%. Surface planers, sanders and drill presses were each associated with fewer than 2% of the injuries reported.

Before the data from the questionnaires was keyed into the computer, I sorted the survey forms into six categories of injury, with amputations as the most serious, and cuts and tears as the least. I've had no medical training, so my sorting was subjective. But I found that fully a quarter of the injuries reported were described as **permanently impairing,** involving the amputation of one or more fingers, or having done enough bone, nerve and/or tendon damage to never heal right. One-third of the injuries entailed the loss of one or more fingertips, and another third consisted of bad cuts and tears. Likely as not, many of the injuries in this second group were more serious than the descriptions indicated. About 75% of the injuries reported required a visit to a doctor or an emergency room.

Minced by a machine, a finger can take months to heal, and when it does, disfigurement, stiffness, and pain, particularly in cold weather, may persist for years. Amputations or injuries needing tendon or nerve repair almost always require a hospital stay for at least a day or two, sometimes longer, during which the services of hand, orthopedic or plastic sur-

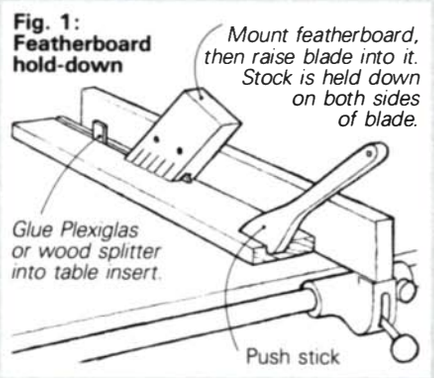
Ripping, grooving and molding safely

by Michael Sandor Podmaniczky

An oldtimer in the model shop where I worked had us take all the guards off the saws. "I want to see the blade that gets me," he used to joke. While I wouldn't go so far as to agree with him, arguments about the effectiveness of guards are pointless if dadoing or ripping of small stock prevents their use.

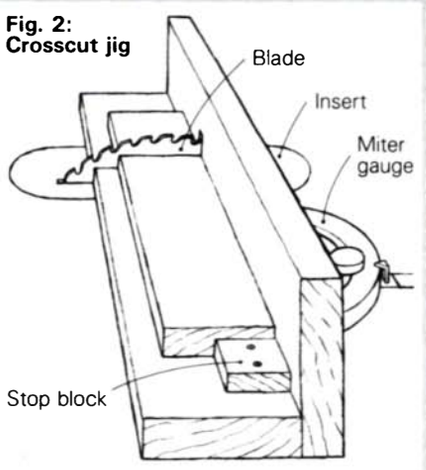
Modelmakers have many techniques for safely cutting small pieces. For ripping, I prefer the setup shown below (figure 1). Junk the saw's metal throat insert, then make a new one out of Plexiglas or wood. If you raise the blade up through a fresh insert, the resulting slot will hug the blade, leaving no room for small pieces to hang up. For splitters, small scraps of Plexiglas or wood can be glued into the throat slot. For fastening jigs and hold-downs, wide, double-sided tape is a good alternative to clamps.

Fig. 1: Featherboard hold-down



Tablesaw cross-cutting isn't as hazardous as ripping, but the fixture shown in figure 2 makes it safer. The stock doesn't touch the table as it slides, so there's almost no chance of a bind and kickback. Stop blocks can be set for repetitive cuts to the same length.

Fig. 2: Crosscut jig



Dado and molding heads hog lots of material, and so are prone to nasty kickbacks. The fixture shown in figure 3 will hold the work down. Stop-grooving is most safely done on a router table, as shown in figure 4. Remember two things when performing any kind of rip: always stand to one side, out of the kickback path, and *never, ever* feed with the blade rotation to correct a miscut. Better to scrap the piece and start over. □

Fig. 3: Dado, molding-head hold-down

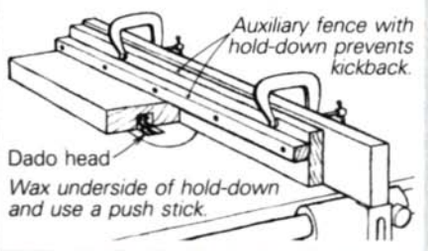
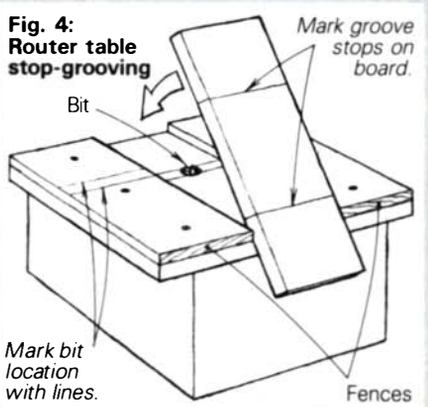


Fig. 4: Router table stop-grooving



Michael Podmaniczky builds boats in Camden, Maine.

Drawings: Lee Hov

geons will be needed. The cost of treatment can be staggering. Ted Walls of Uniontown, Ohio, an amateur woodworker, spent $3800 mending three fingertips lost to a shaper. Though he spent no time in the hospital, Walls' injury kept him from woodworking for two months.

The long-term medical and psychological consequences of losing fingers may be even worse than the initial damage. Reattachment surgery is an onerous, painful procedure whose outcome is always in doubt. The psychic trauma can last longer and cut more deeply than the physical. Andrew McGillivray, a cabinetmaker working in Germany, related a vividly dark tale:

> ***"Since the time of my accident, I have talked with many people about working injuries, not necessarily exclusive to woodworking. One thing that stood out with many people was that they had 'a feeling' about what they were about to do that had a sense of danger. In other words, they knew that what they were about to do was less safe than it could have been, but they went ahead anyway. After losing both my thumb and forefinger to the tablesaw, I have a rule about those feelings—I act on them immediately."***
>
> *—Ron Callari, Rochester, N.Y.*

"I *was* a musician; both woodworking and music have been equally important to my enjoyment of life. A year and a half ago, I found two fingers lying on the floor at my feet, as well as having my thumb and other fingers badly cut by a tablesaw." McGillivray's fingers were reattached and his wounds bandaged, but his doctor was reluctant to advise counseling. "His attitude was 'You're broken up by two fingers? I'll show you people with no hands.' With that, he sent me home, where I virtually went crazy for two months. Music was intolerable, I couldn't work . . . I eventually lost my house and my wife."

> ***"My glasses were loose on my head, and during an operation on the tablesaw they fell off. By reflex I reached for them. By reflex I also reacted to my own reflex, otherwise I believe I might have lost my whole hand, or thereabouts."*** *—Faz Fazahas, New York, N.Y.*

McGillivray went on to say, "Now I have strength in my hand and I am working again. I am remarried and have put my life back in order. My point is this: the talk about 'limited flexibility' and 'occupational hazards' skims over the emotional side. No amount of therapy will make it more comfortable for me to put on a glove or make me feel less uncomfortable when I make love to my wife. The effects were more far-reaching than I could have imagined."

I had always thought that **fatigue** after a long day in the shop would lead to most accidents, but our survey suggests that a **heavy lunch** is a more likely cause. The largest number of accidents, 34%, happened right after noon but before 3 PM. Equal numbers of injuries occurred between 6 AM and noon, from 3 PM to 7 PM and from 7 PM to midnight. Experience doesn't seem to be much help either. Seasoned hands with 20 years in the shop were as likely to maim themselves as novices, and amateurs (65% of the sample) were hurt as often and as badly as professionals and teachers. Beginners with less than a year of experience had slightly fewer and less serious accidents than other groups, perhaps because they own fewer power tools and are more afraid of the ones they do have.

> ***"While I was replacing freshly sharpened knives in my 6-in. jointer, the wrench spread and slipped off the gib screw . . . my hand hit the edge of the knife, causing a delightfully clean laceration. . . . I have since changed my procedure for changing knives. I put a heavy leather cover on the blade while in the process and I wear gloves. Interestingly enough, I had a premonition that the accident was going to happen just a split second before it did, and couldn't respond quickly enough. I wonder if your research will show any more of this."***
>
> *—Bill Hoffman, Coventry, Conn.*

As a **left-hander,** I've at times felt frustrated in a world equipped with tools and equipment designed for right-handers. Many machines are arranged so that the left hand holds the work against the fence, usually near the cutter, while the right does the driving. Our survey suggests that while left-handers don't suffer a disproportionate number of accidents, they are more liable to injure their favored hand. Only 40% of the right-handers reported injury to their favored hand, versus 47% of the lefties. The difference suggests that right-handed fences, controls and handles keep the lefties off balance.

The data collected and analyzed, the question remains: how can you best protect yourself from a woodworking injury? Our survey asked for safety advice, and readers obliged with dozens of suggestions. Some woodworkers swore by guards and splitters, some swore at them. A few sent drawings of their favorite push sticks or hold-down jigs, others thought tool manufacturers ought to bear the onus of designing safer machines. Helpful as they are, none of these ideas breaks any new ground.

The truth is, there's no universal, foolproof gizmo that you can bolt on to every tool in the shop, thereafter ceasing to worry about your fingers. Our survey does indicate, however, that the risk of serious injury can be diminished by *not* ripping, dadoing or molding on the tablesaw, or any circular saw for that matter. Consider using the bandsaw for ripping. With the right blade, it will do it just as fast and it's much safer. For grooving and molding, a router is less risky. Schedule your workday so you can do demanding, hazardous machine operations in the morning, when you're most alert, and not after a full lunch. Don't be a cowboy about guards, hold-downs and push sticks. Use them.

The real safety solution is **attitude.** This point was driven home for me recently when I visited a tool factory where an enormous banner that declared "Safety is a good habit" hung from the rafters. I had seen such banners before and had always considered them a cheap sop for safety hardware. The carnage described in the survey questionnaires made me realize that no amount of money invested in safety equipment will offset a lack of alertness and common sense. The trick is to develop the habit of *always* stopping to get a push stick or a hold-down fixture, or of waiting until the next day when you're fresher. Constant, habitual vigilance is far preferable to a painful, disabling lesson. Time and time again, readers told of being hurt after hurriedly attempting machine operations that they knew to be hazardous. Some even said that they had had premonitions of injury. The point is obvious: if something *feels* dangerous, it probably is. □

Paul Bertorelli is an associate editor at Fine Woodworking.

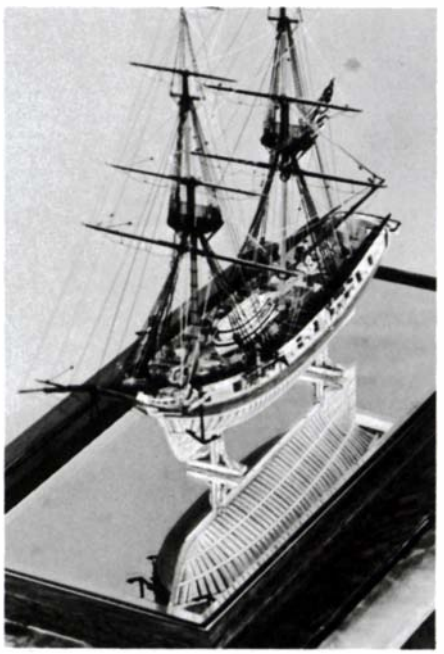
The Miniature Shipwright

After a while, you *feel* 3/8 inch tall

by Lloyd McCaffery

When people ask me where I get the patience to build model ships, I tell them that no job was ever more exciting or so full of challenges. A good model is an exact replica, in miniature, of a specific ship on a particular day in its history, and the modelmaker must cope with the same sorts of problems the original builders contended with. Scale to them meant that each part of the ship had to be strong enough to do its job without being overbuilt. This economy of material, a sort of "form follows function," generates a beauty that gives ships a universal appeal. The modelmaker must recapture this essential rightness in the taper of each mast and spar, in the run of each plank, and even in the way each piece of rigging responds to gravity. Absolute fidelity to visual scale is the key. No piece of thread, for instance, will hang in the

Newsboy, *10½ in. long, as she would have looked just before sailing in June 1854.*



McCaffery showcases his miniatures on a mirrored base.

same curve as a full-size rope on the actual vessel, so rigging must not only be the right thickness, it must be twisted from wire, so that its curve can be precisely shaped. That job is, however, one of the easy ones—you simply attach some strands to a lathe, then allow them to twist up, just as workers did in the old, quarter-mile-long ropewalks.

As much as possible, I build a ship the same way that it was constructed in the shipyard. In plank-on-frame construction, the keel is laid, ribs (called frames) are attached to it, and the framework is planked, with each plank pinned down by wooden spikes called treenails. I research the original plans, scale them down photographically, then seek ways to match each part.

A modelmaker's main tool is ingenuity, and with each model new challenges arise. Some of my early models had solid hulls, but I wanted to recreate the hull's actual construction. I came across a trick for making the frames. All you do is lay up the blank for the hull as a stack of thin pieces of wood, so that it resembles a sliced loaf of bread. After the exterior of the hull has been shaped, every other slice becomes the blank for a frame, and the rest of them are thrown away. The inside curve can be easily cut with a knife.

I recently returned from a trip to some European maritime museums, where I had the opportunity to search out original drawings and to see many fine old models. In my own models, 1/16 in. usually equals 1 ft. The old models were made to a much larger scale, and some 100-gun ships-of-the-line are almost 6 ft. long. They were made for the Admiralty in advance of construction, so that politicians—who couldn't understand construction drawings—could pre-judge the ship's lines and accommodations. In those days it wasn't necessary to show the masts and rigging, because they were standardized. Models today have a different purpose. They recapture, in jewel-like form, the nostalgia of bygone beauty, and as educational tools they serve to put us in touch with the past. A tour through an exhibition hall in Mystic Seaport, Conn.—where models, artifacts, paintings and dioramas make the past almost palpable—leaves one so entranced that, on emerging, daylight and the 20th century seem remote.

Modelmaking captures the spirit in the same way. On my European tour I had the good fortune to be allowed to take the measurements of a full-size English Royal Barge built in the early 18th century. As I climbed aboard and started measuring oars and planks, I had the feeling that I had done all this before. Then I recognized the sensation—it was the way I feel when working on a model. After a few hours of miniature work, parts no longer seem small, a sixteenth of an inch actually *becomes* a foot, and you yourself end up less than 3/8 in. tall.

Scale applies to wood grain as well as to surface textures. The best wood I've found for masts and spars is South American lancewood, which is also called lemonwood and degame. It can be planed and sanded down to a needle point, and is a pleasant, yellow color, with no objectionable figure. For planking and carving, boxwood is an excellent choice, if you can find some that is really slow-grown. Holly is superb for its workability and clear, light color. Aromatic red cedar is somewhat perverse—much too soft and brittle—but it holds a crisp edge and its color is incomparable. Fruitwoods in general are good for miniatures, being diffuse-porous and hard enough to not dent easily. They offer a nice range of darker woods for visual contrast. Ring-porous woods such as oak and ash are out of the question, of course, due to the large, open-grain patterns. And many otherwise beautiful woods, for example mahogany, are just not tight-grained enough. For some applications, such as cutting intricate parts that will have areas of fragile end grain, I make up miniature sheets of plywood from plane shavings. These are easy to work without splitting.

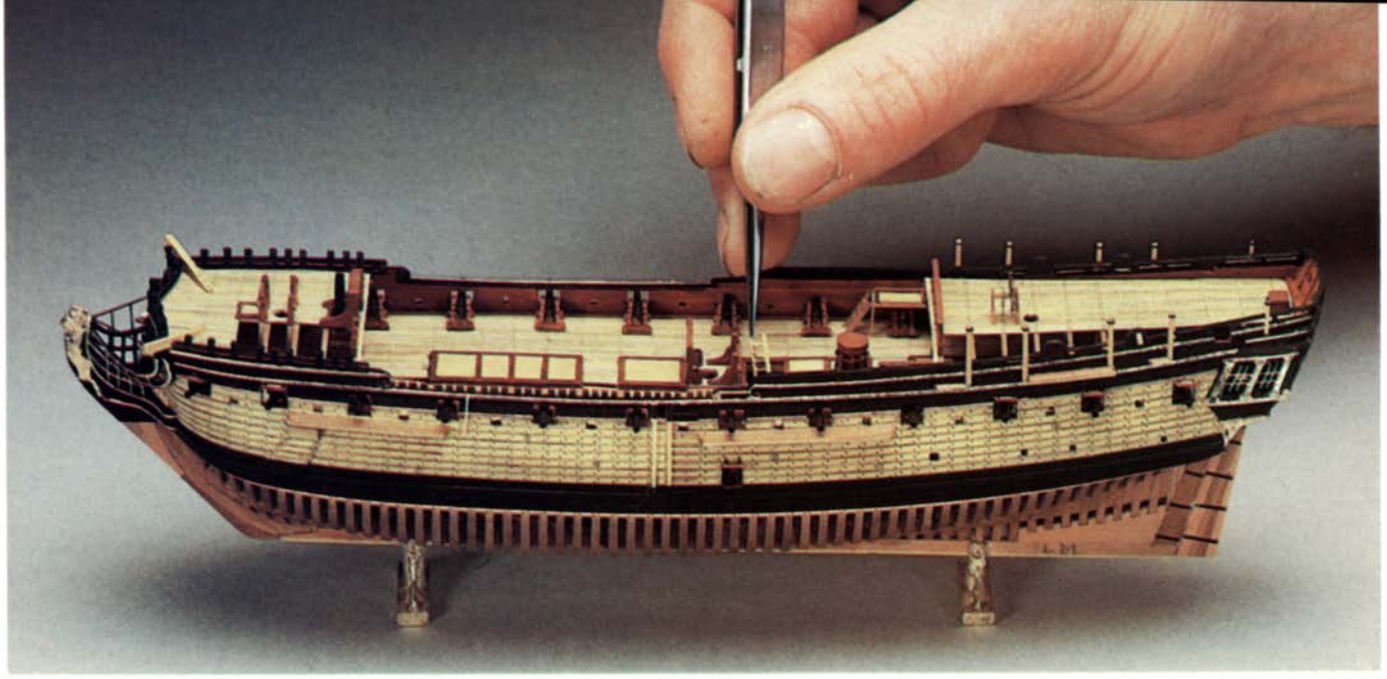
Glue can be troublesome because it is not to scale, and anything not to scale is noticed by the eye and destroys the magic. White and yellow glues are good for large wood joints. These must fit tight, and any squeeze-out must be pared away. I use cyanoacrylate for small, detailed fittings, such as a 1/8-in. dia. ships' wheel, built up from wire.

Scrapers and planes leave a better surface than sandpaper. My favorite cutting tool is a single-edge razor blade, but used dental probes can be honed into a full line of tools that will rival any woodcarver's. I do most of my milling on the tablesaw attachment for a Unimat lathe, and the jointer attachment comes in handy, too. Otherwise, hand tools work best for most jobs. One exception is power-carving small details. For this, dental burs provide a wide range of shapes. I find it best to use them in an old-style dentists' drilling machine rather than a flexible-shaft machine or a hand-held motor tool. The dental engine is powered by belts, and its handpiece doesn't whip.

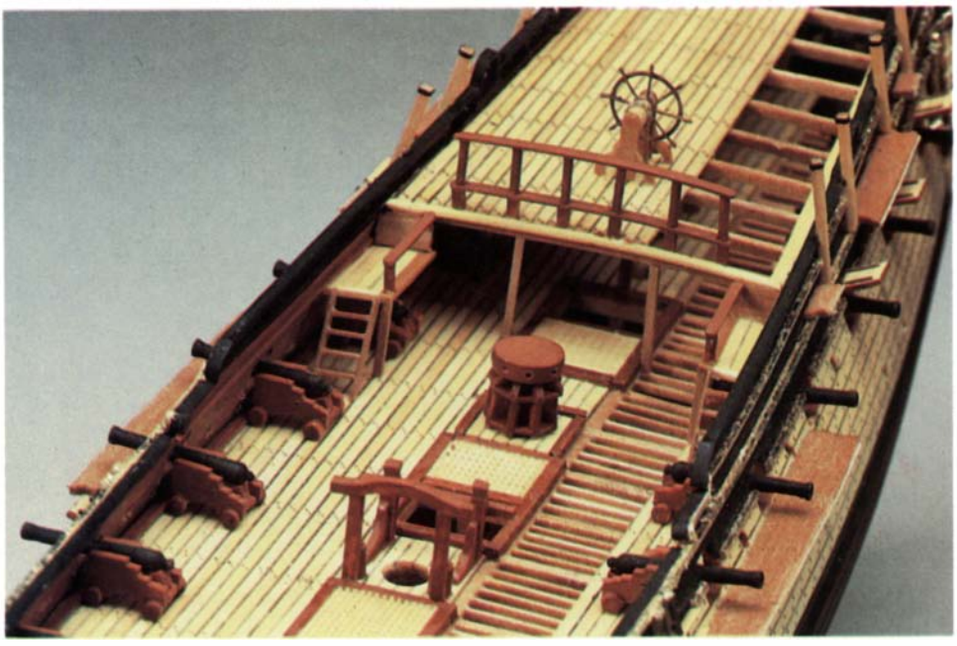
In making a model, precision and attention to detail are a must. But these factors must be considered in relation to the whole work, including the case. The model must be a unified whole. It serves nothing to master one part of the job at the expense of another, and artistic impact must take precedence over mere fussiness. A model is a sculpture. A successful sculpture can have any degree of finish, but if it lacks unity, it will be a failure as a work of art.

I've seen many models that I consider failures because they don't hang together. Some fail because of scale, some because of workmanship. Some are simply doomed from the start—a lovely model can hardly be inspired by an ugly ship. Historical inaccuracy is another major flaw. Some modelmakers seem to believe that their imagination can take the place of research. Yet a single historical flaw can undo all their effort. The design problems were worked out by seamen long ago, and their solutions have a beauty tested by use. No old ship ever sailed on whimsy, and sooner or later, truth will out. □

Lloyd McCaffery, 34, has been making miniature ship models for the past 25 years. He lives in Madison, Conn.



Miniature ships can be as challenging as the modelmaker dares. Above is a hull model of Boston, *a 24-gun frigate launched in 1747. McCaffery uses tweezers to put the ladder to the hold in place. The boxwood deck planks, right, are individually fastened to the cherry timbers with treenails (wooden pegs, here made from toothpick points). Cannons are turned and bored, then painted.*



In the photo below, painting is well under way on the port quarter of the brigantine Newsboy. *McCaffery often leaves one side of his miniature ships open to show the interior framing.* Newsboy's *copper-plated bottom, sheathed with 0.002-in. foil, is shown on p. 79. Her deck is holly.*

Photos: White Light

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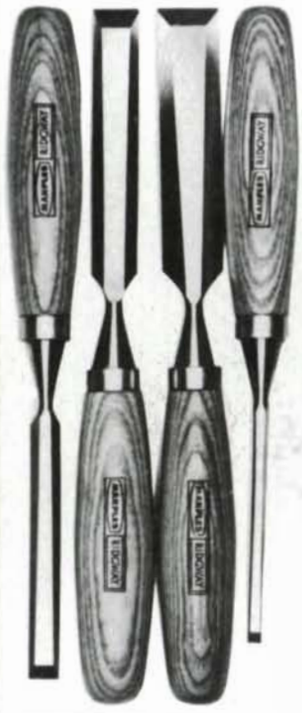

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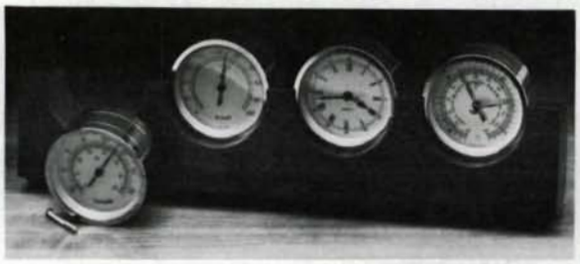

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Books for woodworkers

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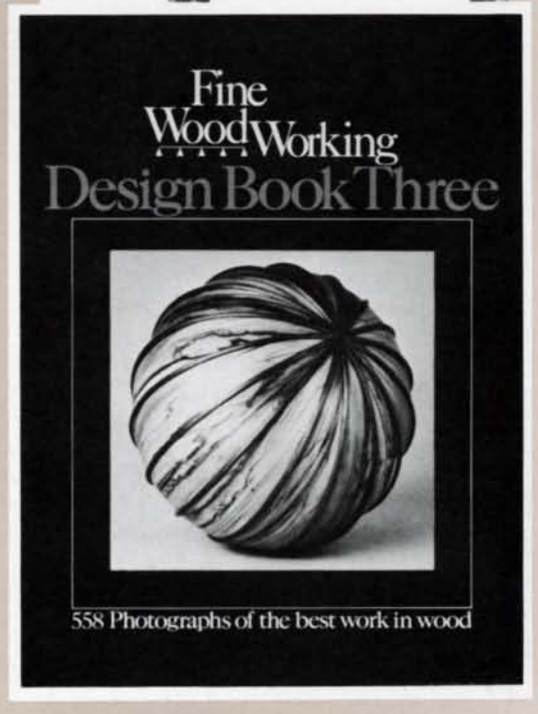
Last September, *Fine Woodworking* carried a full-page call for entries for *Design Book Three* (216 pages, soft-cover, $14.00). By the time the entry deadline arrived the following January, more than 20,000 photographs had been received, some from as far away as New Zealand and Japan. A number of entries obviously came from busy shops accustomed to sending out pictures to juries and prospective clients. Others were sent in with long letters full of hope. Some were close to anonymous. Almost all revealed a quiet pride in accomplishment.

The book's editors were delighted, and amazed, by the quality of the entries. As *Fine Woodworking* editor John Kelsey writes in his introduction, "Faced with that mountain of envelopes, we could only feel respect for the people whose work it represented. A random peek anywhere in the collection was likely to uncover awesomely good woodworking."

Of course, all that fine work made the final selection process all the more difficult. But eventually the editors did select 558 photographs, representing the best work by today's artist-craftsmen. The finished book contains china cabinets, writing desks, beds, stools, chairs, toys, musical instruments and carvings, done in both traditional and contemporary styles. There are also a few whimsical and far-out pieces that make any kind of classification difficult.

Everyone who submitted work for *Design Book Three* was also offered the opportunity to be listed in a special directory of professional and non-professional woodworkers. Thousands accepted, and we ended up with a 24-page listing by town and state in the back of the book—certainly the most complete directory of woodworkers to be found anywhere.

We think that *Design Book Three* will find a wide and enthusiastic audience among those who do work in wood and those who like to admire it. And that includes just about all of us.



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The idea behind Richard Starr's woodworking classes is simple: help children make what they want, and they'll learn to love the craft. Starr's book shows you how to put this idea to work with your youngster. There are projects for all age groups—all presented with detailed instructions and illustrations.

216 pages, Hardcover, $19

Make a Chair from a Tree: An Introduction to Working Green Wood

by John D. Alexander

John Alexander spent years exploring the most effective ways to "bust a chair out of a tree." His book is a fully illustrated, wonderfully readable demonstration of what he learned. Starting with the felling of a tree, he takes you through the entire process of building a post-and-rung chair. Along the way, he shares some intriguing lore and describes the tools and techniques involved in working "tree-wet" wood.

128 pages, Softcover, $9

Chainsaw Lumbermaking

by Will Malloff

This book puts lumbermaking within reach of anyone with a chainsaw. Veteran logger Will Malloff describes the chainsaw lumbermaking system he spent 20 years developing and refining. Malloff shows you how to select and fell the tree you want, and how to saw it into a stack of custom-milled lumber. He also tells you how to modify and maintain the necessary equipment. Instructions are number-keyed to hundreds of helpful photographs.

224 pages, Hardcover, $23

Tage Frid Teaches Woodworking

The dean of American woodworking instructors uses detailed, step-by-step instructions and photographs to demonstrate the essentials of his craft. In *Joinery: Tools and Techniques*, he shows you how to prepare wood and make the joints used by cabinetmakers. In *Shaping, Veneering, Finishing*, Frid explains bending, turning, inlaying and finishing.

224 pages, Hardcover, $18 each

KEEPING UP WITH FRID

Tage Frid's busy lecture schedule has taken him to Alaska, Southern California and Maine in the past few months. Now, however, Frid is home in Rhode Island working on the third and final volume in his Taunton Press series, *Tage Frid Teaches Woodworking*. The new book will show how to build furniture using the techniques Frid has demonstrated in his first two volumes, *Joinery: Tools and Techniques* and *Shaping, Veneering, Finishing*.

The book will feature complete working drawings as well as the kind of step-by-step photographs that helped make Frid's first two books so popular with woodworkers of all skill levels. Frid says the new book will cover quite a few of his own designs, including tables, chairs, rockers, stools and cabinets.

No release date has been set for the book because there's still plenty of work to be done. "This book is taking longer than the others, because I have to build every piece," he says. "I work only two or three steps at a time so that photos can be taken of as many phases of construction as possible."

As for his traveling, Frid says he will continue to be available for lectures and demonstrations around the country. "I enjoy working and talking with people, and helping them out," he says. "I think I do it for the enjoyment of it more than anything else."

To order: Use the insert, or call 1-800-243-7252, and use your credit card (CT residents, call 1-426-8171).

Techniques 5 Is Here

The latest addition to our *Fine Woodworking Techniques* series is now available. *Techniques 5* (232 pages, $17.00) reprints in their entirety 84 technical articles from the 1981 issues of *Fine Woodworking* magazine (issues 26-31).

The articles are grouped into categories on Machines, Handtools, Turning, Finishing and Specialties. There's detailed information about everything from the basics of the bandsaw to making curved dovetails, plus some absorbing pieces on specialty techniques, such as inlaying mother-of-pearl and guitar binding and purfling. There's also a special Projects section with plans for 15 challenging projects, including cross-country skis, a single bed and a pillar-and-claw table. To a few of the articles we've also ammended relevant information from the *Q&A, Letters,* and *Methods of Work* sections.

It took *Fine Woodworking* a full year to present the material found in *Techniques 5.* The ideas and information it contains will last a lifetime.

Earlier volumes in the series are:
Techniques 1 (issues 1 through 7);
Techniques 2 (issues 8 through 13);
Techniques 3 (issues 14 through 19);
Techniques 4 (issues 20 through 25).
Hardcover, $17.00 each

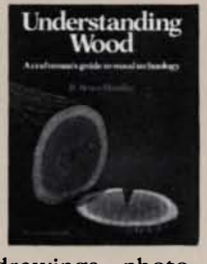
Adventures in Wood Finishing

by George Frank

George Frank knows wood finishing as few others know it. His book is filled with colorful stories and the secrets of a lifetime in the trade. It's all here, from the old timers' ingenious recipes for dyes and stains to the culmination of Frank's own search for the perfect wax.

128 pages, Hardcover, $10

Understanding Wood: A Craftsman's Guide to Wood Technology



by R. Bruce Hoadley

This is the woodworker's book about wood, written by a man who's been a wood scientist for over 25 years and a wood carver even longer. Hoadley uses drawings, photographs and clear, lively writing to explain the nature of wood and why it behaves as it does.

272 pages, Hardcover, $20

Fine Woodworking Design Books

These books show the outstanding creativity and variety found in today's woodworking. Each volume includes some traditional work, but most of what is shown is contemporary. There are chairs, beds, tables, toys, cabinets, sculptures, musical instruments and more. *Biennial Design Book* includes 600 photos of work submitted by readers of *Fine Woodworking* in 1977. The 1,150 photos in *Design Book Two* were submitted in 1979.

Fine Woodworking Biennial Design Book:
176 pages, Softcover, $10
Fine Woodworking Design Book Two:
288 pages, Hardcover, $16; Softcover, $12

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Eight Years of Shop Talk

For eight years now, woodworkers have been using the pages of *Fine Woodworking* to trade ideas, share techniques, give advice and ask each other questions. That kind of shop talk is hard to come by and timeless. And it's all still available in the back issues of *Fine Woodworking.*

Combined, these issues offer a wealth of information about joinery, turning, carving, marquetry and more. To find exactly the information you're looking for, send for our *Cumulative Index* (44 pages, softcover, $2.50). It lists every article, method of work, question and answer, letter and photo of finished work included in the first 39 issues of the magazine. For a less detailed look at the contents of each issue (through *FWW* #39), send or call for our *Mini Catalog.*

A Look Inside *Fine Homebuilding*

If you want to keep up with the latest and best in home-building techniques, tools, materials and designs, the current issue of *Fine Homebuilding* is a good place to start. It includes articles on reciprocating saws, repairing and replacing 19th-century ironwork, stripping paint off interior woodwork and building a helical stair. There's also a pair of articles on grade-beam foundations for steep lots. And you'll find detailed information on a solar house that combines active and passive systems, a small earth-sheltered house in Vermont and a seemingly wall-less house built by architect Paul Schweikher. The issue also lists the articles in the previous 15 issues.

To order this issue, circle #16 in the *Fine Homebuilding Back Issues* section of the insert, or call our toll-free number. (Keep in mind that if you subscribe now, you will receive this issue as part of your subscription.)

To order subscriptions or back issues of either magazine, use the insert, or call toll-free, 1-800-243-7252.

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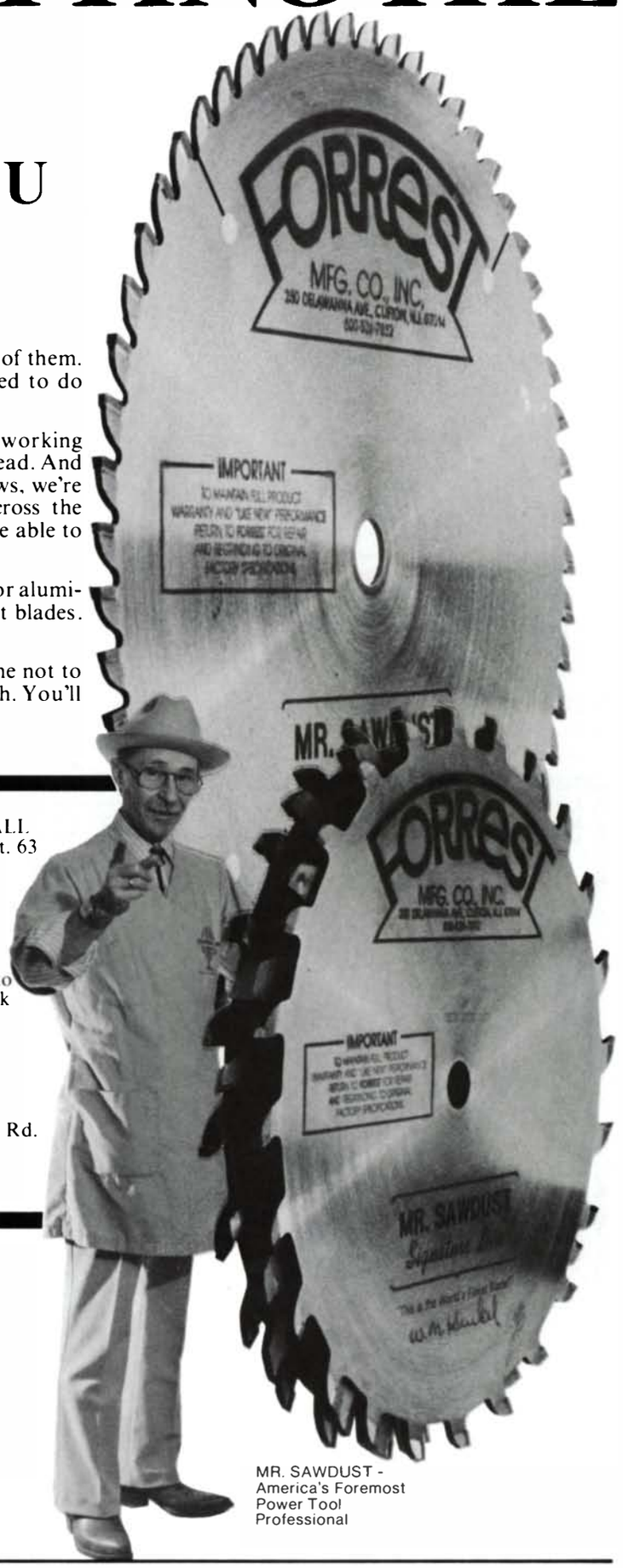

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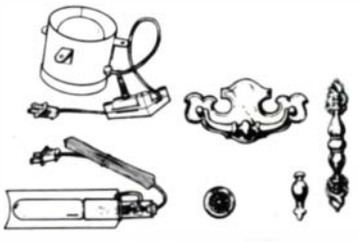

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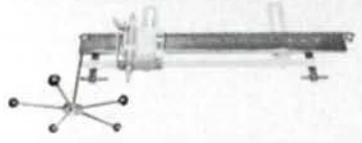

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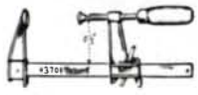

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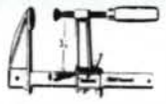

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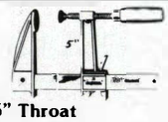

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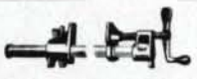
#4530	30"	28.06	21.95	118.50
#4536	36"	29.54	22.95	123.95



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0224-1	3/8" Magnum Hole Shooter	144	99
0244-1	1/2" 4.5A H/Shooter 0-600	155	109
0234-1	I/2" Magnum Hole Shooter	155	109
6507	TSC SawzAll w/case	179	120
6511	2 Sp Sawzall w/case	167	117
6365	7-1/4" Circular Saw 13A	149	99
6405	8-1/4" Circular Saw 13A	167	117
6245	3.8 Amp Single Spd Jig Saw	129	91
5900	3" x 24" Belt Sander	311	218
5910	4" x 24" Belt Sander	330	229
5620	1 H.P. 8 AMP Router	215	145
5660	I.50 H.P. 10 AMP Router	239	165
5680	2.00 H.P. 12 AMP Router	299	209
5397	T.S.C. 3/8" Hammer Drill Kit	203	145
5399	½" 6.2A HD Hammer Drill Kit	239	169
6750-1	HD Dry/W Shooter 0-4000rpm	136	95

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1100	3 1/4" Planer Kit	261	178
1805B	6 1/8" Planer Kit	416	285
9900B	3"x21" Dustless Belt Sander	191	127
9924DB	3"x24" Dustless Belt Sander	208	139
9401	4"x24" Dustless Belt Sander	273	179
B04510	Finish Sander, Square Base	79	49
B04520	Finish Sander, 5" Round Base	79	51
9045N	4½x9¼" Finish Sand., Dustless	160	110
3608B	1 H.P. Router	118	82
3601B	1 1/4 H.P. Router	196	130
3600B	2 H.P Plunge Router	299	190
6510LVR	3/8" Rev. Var. Speed Drill	109	68
DP4700	1/2" V.S.R. Drill 4.8 AMP	142	95
2400B	10" Mitre Box	333	255
6010DWK	3/8" Cordless Drill w/case	142	84
4200N	4 3/8" Circular Saw	138	92
4300BV	Var. Speed Jig Saw	192	121

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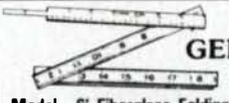
Model		List	Sale
90900	650° - 900°F H.D. Heat Gun	$ 89	$ 62
1578	Jig Saw Var/Sp Orbital Action	219	129
1577	Jig Saw Single/Speed 3000	199	119



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9607BL	Makita 7" Grinder-6.000 rpm 15A	229	149
9609B	Makita 9" Grinder-6.000 rpm 15A	236	154
7715	9" Dewalt Power Mitre Box	198	145
2401B	10" Makita Mitre Box w/blade	306	225
77	Skill 7¼" Worm Drive Saw	240	139
552	Skill 6½" 10A 2¼ H.P. Saw	148	109
553	Skill 7¼" 12A 2⅓ H.P. Saw	152	96
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Much Talk About Perfect Craftsmanship

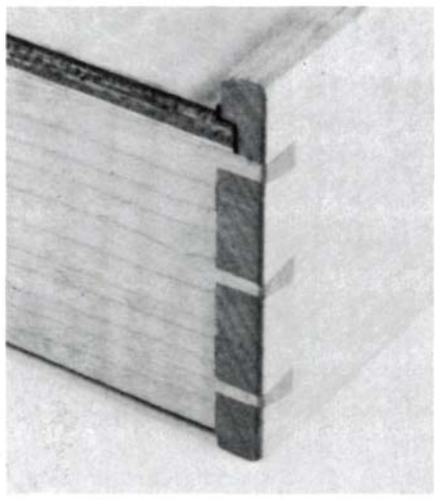
Furnituremaker Wendell Castle, in his recent foray into the New York art market (see article beginning on p. 68), has been asking and getting prices up to $30,000. In our era this is unprecedented for single pieces built on speculation by a living artisan. To earn this payoff, Castle has gambled hugely in time and materials, and has taken enormous risks of workmanship. His success should help pry open an upper market where other talented craftspeople may prosper.

The promotion of Castle's work, however, has included claims not only of extraordinary craftsmanship, but also of veritable perfection in wood. Faultless workmanship ought be presumed at this level. Perfection, on the other hand, ought leave us speechless. So how good is the workmanship of Castle and his shop crew?

This furniture is as excellently made as anything I've seen in museums, and better than most antiques selling for similar or higher prices. It is as good as anything being made anywhere else today. But it's not perfect, and nobody should expect it to be.

Shown above is the back corner of a drawer from Castle's walnut-and-silver "Fountain Cabinet." The construction is a hybrid that's common these days, a veneered plywood bottom slid into grooves in the way that evolved for solid-wood bottoms. Should the bottom have been solid wood? Should the drawer have been assembled around its bottom, to contain the plywood in four grooves instead of three? Would the

Bad chair from Michael Graves/Sunar.



A nice drawer from Castle's cabinet.

drawer have been more refined if its bottom were held by glued-on drawer slips? As done, something is a tad out of square, a fact that wouldn't have been detectable had Castle not chosen to run a rabbet around the drawer bottom to make it fit its groove. In all, the job is clean and workmanlike, as good as it has to be and nowhere badly done, but still with plenty of points which craftspeople may discuss and dispute.

Furthermore, the veneer on the outside of the cabinet in places is dangerously thin, a consequence of Castle's struggle to level all those inlaid silver dots, before he rediscovered the old-time scraper plane. Ideally, he might have begun by sawing his own thick veneers, might even have known how to level inlaid silver. But this is the real world, where Castle and his shop crew are woodworkers like the rest of us, more skillful than most, but like most of us forced to rediscover a broken tradition we could not inherit. They are unusually lucky to be situated where they're allowed to make such fine objects, and sometimes their results are awesome. But they also make mistakes, do jobs over, figure things out as they go along. The trained eye sees the traces of their struggle, which adds texture to our enjoyment. There's no need to adjectivally jack the work onto a higher plane than the one it honestly occupies.

Somewhat less can be said for another prizewinner that also comes with high claims to craftsmanship, the chairs designed by Post-Modern architect Michael Graves which are manufactured and marketed by Sunar. The side chair recently won an award in *Progressive Architecture* magazine's international furniture competition, so I went to New York for a sit. Oops. The seat is slick and level, and the hollow-core back slopes, the combination shoving me forward. When I pushed backward to regain my equilibrium, the seat slab's razor edge slashed the tendons in back of my knees. All this squirming made the leg-to-seat joint seem perilously wiggly. "Obviously crafted very carefully," and "not a hair out of place," said *P/A*'s jury of architects. I guess they didn't notice the bumps showing through the veneered surfaces, the core material and fastener heads telegraphing through the veneered edges, the oversanded corners, and the spotty finish. —*John Kelsey*

Laser Engraving Gets Simpler, Cheaper

by Phil McCafferty

If you've marveled at the intricate, laser-engraved woodcarvings hawked by gift and novelty shops (*FWW* #28), and longed to apply this fascinating technology to your own woodwork, a Wisconsin firm may have what you need. Laser Machining Inc. builds lasers that can burn designs into wood and other materials directly from photos, type or drawings, bypassing the fabrication of brass stencils and making the process cheap enough to be offered as a one-of-a-kind, per-job service.

Two connected developments make LMI's "Laser Graver" possible. First was the invention of carbon-dioxide lasers that can be switched on and off instantaneously. The beams of first-generation laser engravers are always "on," so the artwork must first be photoetched into a thin sheet of brass that acts as a mask, intercepting the beam and thus selectively vaporizing wood to form the design. Second, LMI devised copy-scanning photosensors that read the artwork in order to switch the laser on and off while the work moves beneath the beam.

The machine, which looks like a radial-arm saw, takes its guidance directly from almost any black-and-white copy that can fit under its scanner. It goes from engraving when it sees white to not engraving when it sees black, or vice versa, depending on whether positive or negative relief is wanted. The gray tones of photographs confuse the scanner, so it must be adjusted to choose the middle gray and read black on one side, white on the other. For this reason, photos reproduce best if they're first converted into half-tones. The standard machine reads flat copy as large as 24 in. square, and burns the design on flat workpieces up to about 4 in. thick, zapping a kerf 0.004 in. to 0.006 in. wide and as deep as ⅛ in. A version that accepts cylindrical work up to about 10 in. long and

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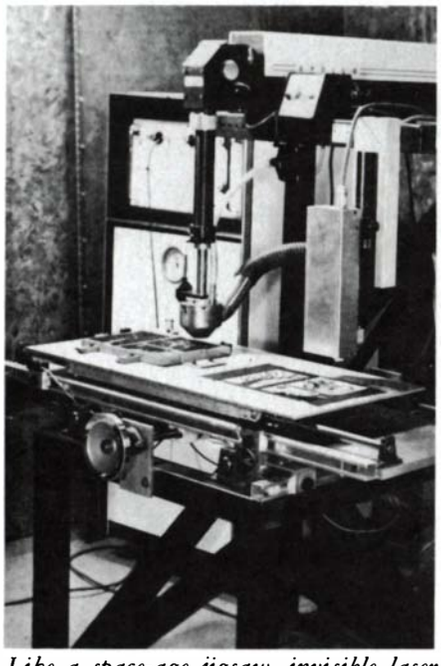
The wood and the full-size artwork are mounted side by side on an oscillating table, under the laser lens tube. As the table moves, the infra-red laser beam is switched on and off, according to what the scanner sees. At the end of each stroke, the table infeeds a few thousandths of an inch. The engraving rate varies with material. It takes a minute, for instance, to engrave 2.6 sq. in. of walnut to a depth of 1/25 in. It's best if the wood is finished before engraving. The process works on other materials too, including glass, ivory, stone, leather, plastics and ceramics.

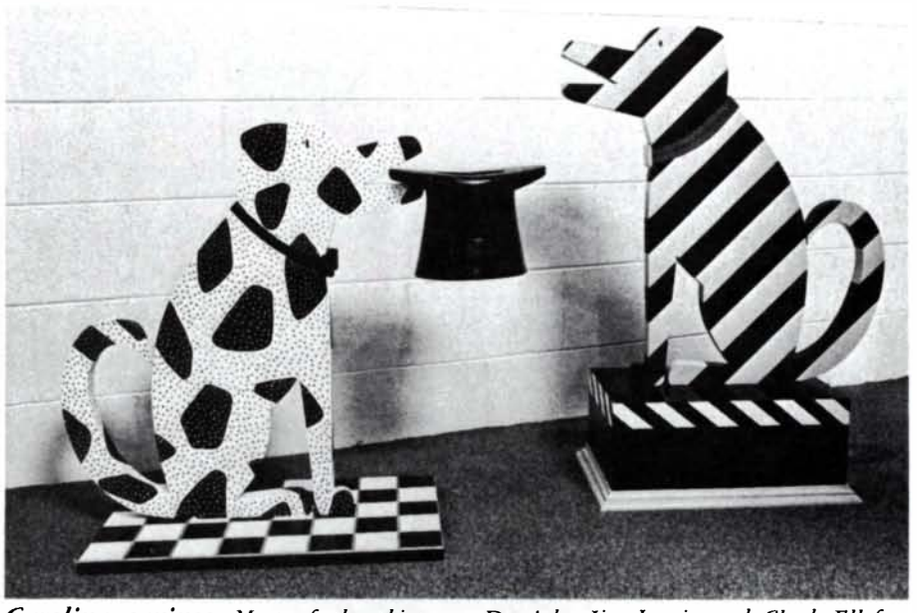
The basic Laser Graver costs about $50,000, making it accessible to small manufacturers and craftworkers. If you've got only a piece or two you want engraved, the company will do the work on one of its machines for a $35 set-up charge and a per-square-inch fee.

The versatility of these new laser machines invites tasks more challenging than the mere decoration of knick-knacks. LMI has engraved furniture components for a customer, and the machine will neatly cut veneer, so by mounting different species on an adhesive-coated table, one might cut out marquetry pieces. Intricate dollhouse and miniature furniture components have also been laser-cut. For more information, write Laser Machining Inc., Box 211C, Rt. 1, Somerset, Wis. 54025. □

Phil McCafferty, an amateur woodworker, lives in Cedar Rapids, Iowa.



Like a space-age jigsaw, invisible laser light emerging from a chuck-like head vaporizes the wood in its path. The flexible hose ducts smoke away. The scanner box at right reads the artwork and turns the beam on and off.



***Carolina canines**—Most of the thirty pieces shown in Rock Hill this spring by members of the Guild of South Carolina Woodworkers were traditional, reflecting the dominant tastes of the region. The best-in-show prize, however, went to this whimsical painted-poplar sculpture, titled 'Dapper Dog Meets Danger Dog,' by Jim Lewis and Clark Ellefson of Columbia. The guild has about one hundred active members, sponsors weekend technical workshops, meets quarterly, and publishes a monthly newsletter. For more information, write Ben Covington, PO Box 7631, Columbia, S.C. 29202.*

—Richard E. Preiss

JAPANESE TOOLS: MARKETPLACE CONFUSION

by Henry K. Lanz

Japanese tools are taking on more importance in the marketplace and in the woodworker's shop, but little advice has been offered about how to buy them. While a few knowledgeable professionals such as Toshio Odate are giving good information, there is a great deal of confusion and downright misinformation being dispensed both knowingly and unknowingly by self-styled experts, misguided individuals and a few less-than-honest merchants.

Part of the problem is that there are more than 4,000 toolmakers in Miki, the Japanese center for the industry, and there are no equivalents to the major European suppliers such as Record, Ulmia and Sorby. The person choosing tools for export is on his own, and the worst confusion originates with buyers who may be any of the following: (1) The American in Japan studying ceramics, or on some other business assignment. He is automatically an expert because he is on the scene. (2) The Japanese agent who knows nothing about tools, but has friends in the business who assure him that they produce nothing but top-quality items. (3) The Japanese hardware wholesaler who handles hundreds of different makers' wares. (4) The U.S. company that knowingly buys cheap tools of inferior steel and dresses them up in fancy labels and presentation boxes. As a result, price is not necessarily a reflection of tool quality.

I'd like to offer a few comments and observations on Japanese tools, which I hope may start a discussion of some of the problems. My biased opinions are based on 20 years of work experience, including development engineering and manufacturing engineering, tempered by what I have learned in the woodworking tool business, where my job has included visits to toolmakers and craftsmen across the United States, in Europe and in Japan.

Nomenclature: There is no reason for the average user of Japanese tools to have to learn Japanese. Generic tools from other countries are sold under their English names unless the item is unique and has no equivalent name. A plane isn't a *hobel* (German), *rabot* (French), *cepillo* (Spanish) or *kanna* (Japanese), and chisels aren't *beitels, ceseaux, formones* or *nomi*. For such unique items as the *ryoba* (two-sided saw), I agree, no suitable equivalent is available.

Sharpening stones: Waterstones are the most widely accepted Japanese woodworking product, but even in Japan there is a lot of controversy. Asking craftsmen what is the correct combination of stones, I have been told: only natural stones, only artificial stones, artificial stones followed by natural stones (with and without *nagura* stones), and several other variants supplemented by

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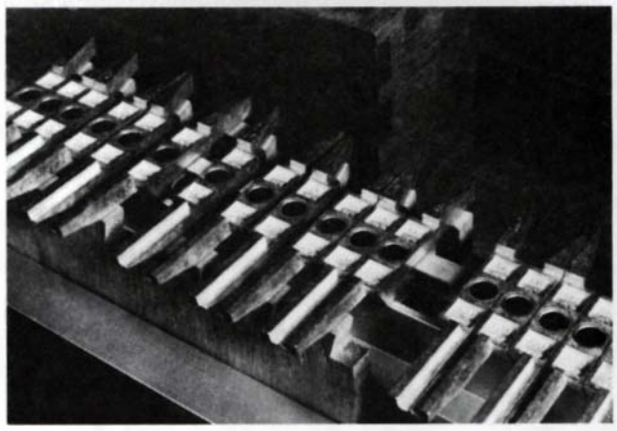

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lapping plates. Until recent times only natural stones were available. They can be had in an infinite variery—hard, soft, cheap, expensive, fast- or slow-cutting, any color. A single mine can produce many different stones, and only because the site has been worked for centuries can the workers begin to grade them. The normal practice is for the artisan to select according to his own prior experience. Ideally, he should have two similar stones so that he can resurface them by rubbing them face to face. With the advent of synthetic materials, uniform stones are available in all grades, from very coarse to very fine, at reasonable prices. Even here, however, not all brands are the same. The cheaper makes lack uniformity.

Plane blades and chisels: Here the buyer is taking the greatest risk because romance has overwhelmed reality. The laminated steel-to-iron blade is not unique to Japan. In the past century, when good steel was scarce, American and European blacksmiths used similar techniques. With today's high-purity steels and uniformly soft, ductile irons, it doesn't take exceptional skills to select the proper material or the right color of heat at which to temper the steel. Alas for the purist, it can be done as well or at least more consistently with modern materials and, most importantly, with modern, electronically controlled heat-treating processes. To judge temperatures within 50°F by eye, under changing light conditions and changes in personal energy levels, is not humanly possible. To add to the confusion, the edge on an extremely hard blade is liable to crumble away the first few times it is used. Without a few hours of use, only the maker of the blade, and perhaps the seller, truly know its quality.

Saws: Today most saws are blanked from coils of steel, ground, the teeth cut on diamond saws, and then machine-set. It is no more possible to assess quality by looking at the finished product than it is with a Western saw. Color means nothing. But, since Japanese saws are hardened to a higher Rockwell number than Western saws, it is very easy to break a tooth. If a saw is pushed and buckles when pinched in the cut, it may snap into pieces. Because most Japanese work with softwoods, the normal tooth patterns tend to be on the long side, making the teeth even more susceptible to breakage. It is now possible to buy Japanese saws with teeth modified for hardwoods, or flame-hardened for plywood or laminates. It's also still possible to buy the thin, laminated-steel Japanese saw that has been hand-forged, tempered, scraped and tensioned. These saws are very easily damaged and should be used only by a person who has had extensive experience with Japanese saws and whose natural tendency is not to push when sawing. Considering that the cheap, disposable-blade saw can be made with a kerf under 0.020 in., there is little to be gained from the handmade jewel.

In my visits to Japan I have inspected many shops—large, small, modern, primitive, good and bad. And I have found that it is usually impossible to judge quality differences in their products by examination alone. Although a few shops consistently make a quality product at a reasonable price, there is no "world's best" made by any one shop. Quality can be judged only by using the tool for some time, and many of the costly differences are so subtle that only the well-trained Japanese professional can tell. □

Henry K. Lanz is vice president of Garrett Wade Co. Inc., a major importer of Japanese and European tools.

What to Do with Wood From the Paw-Paw Tree

by Gordon Henderson

I finally got around to satisfying my curiosity about the papaw or paw-paw (*Asimina triloba*) by cutting one from my patch in the Missouri Ozarks.

The wood is dead soft and carves like butter when green, but toughens up some as it dries, which it does quickly without checking. It remains brittle, with little strength across the grain, but planes cleanly. It sands nicely without fuzzing up. When thoroughly dry it seems as light as balsa. Being close-grained (about twenty rings to the inch), it accepts small detail in carving.

When first cut, paw-paw wood is white, but it turns a startling green almost immediately, with a banana-yellow undertone. The flat and rift figures aren't much, but a radial cut shows small, bright ray mirrors, like cherry.

The paw-paw is very small, averaging 2 in. in diameter around here. I've never seen one bigger than 4 in. I don't

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Gregory Clark, a student at Staples High School in Westport, Conn., won the grand prize, a $2,000 scholarship, in the Stanley Tools national furniture-making competition. Clark built his Federal-style tambour desk using old wood scoured up from the back rooms of various antique shops. □

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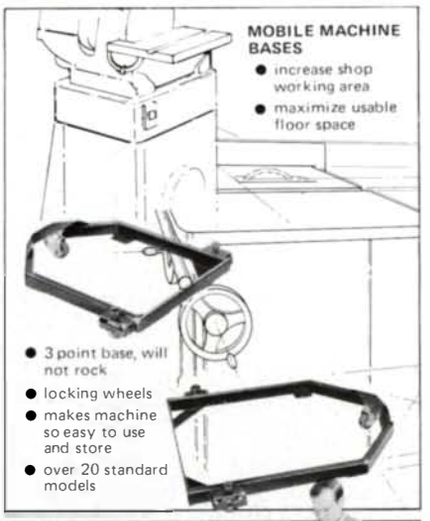

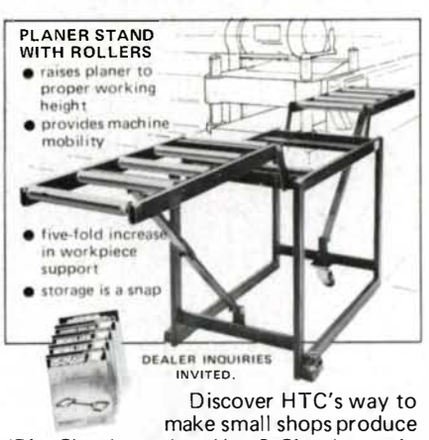

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know what it might be good for, something small that requires no strength or surface hardness, maybe ornamental boxes. As a tree it makes cool shade in the hot bottoms, adding an exotic touch to the Midwestern scenery. It also has pretty flowers, and produces delicious fruit for people and wildlife. So perhaps it is more of an asset in the woods than in the lumber pile. □

Gordon Henderson lives in Kirkwood, Mo.

AXE HANDLES

by Gary Snyder

One afternoon the last week in April
Showing Kai how to throw a hatchet
One-half turn and it sticks in a stump.
And he recalls the hatchet-head
Without a handle, in the shop
And go gets it, and wants it for his own.
A broken-off axe handle behind the door
Is long enough for a hatchet,
We cut it to length and take it
With the hatchet head
And working hatchet, to the wood block.
There I begin to shape the old handle
with the hatchet, and the phrase
First learned from Pound
Rings in my ears:
"When making an axe handle
the pattern is not far off."
And I say this to Kai
"Look: We'll shape the handle
By checking the handle
Of the axe we cut with—"
And he sees. And I hear it again,
It's in Lu Ji's *Wen Fu,* fourth century
A.D. "Essay on Literature"—in the
Preface: "In making the handle
Of an axe
By cutting wood with an axe
The model is indeed near at hand."
My teacher Shih-hsiang Chen
Translated that and taught it years ago
And I see: Pound was an axe,
Chen was an axe, I am an axe
And my son a handle, soon
To be shaping again, model
And tool, craft of culture,
How we go on.

Notes and Comment

So there's a terrific exhibition of woodworking going on in your town? Just finishing some unusual project? Got a theory you'd like to try on the woodworking world, a beef you want to air, some news to share? Send text and photographs (preferably with negatives) to Notes and Comment, Fine Woodworking, *Box 355, Newtown, CT 06470.*

THE NEW SOUND OF ANCIENT HORNS

Early music, by which is meant anything written before the time of the modern orchestra, is undergoing a renaissance. Every two years, musicians and instrumentmakers from around the world travel to Boston for a state-of-the-art festival, and what happens in Boston sets the musical standards for the next two years. Concerts, seminars and a feast punctuate the proceedings, but the steady focus is on the rows of instruments and on the makers. Their subtle job is to revive a sound that died out in another age, a sound that can be guessed at, but that no living ear has ever heard.

An increasing number of musicians these days have realized that if we are to be fair to composers, we must recreate their music as they meant it, played on instruments that are made like, and sound like, the instruments of their time. Features that we might have regarded as primitive a few years ago—such as the reedy voice of the viol, for instance, so unlike the rich bloom of the modern cello—we now know are best suited to bring out the old music.

Makers copying museum instruments used to skillfully duplicate each external detail, yet, when it came to the bore of a flute for example, they would eliminate what seemed to be irrelevant lumps and bumps, thinking they were merely distortions caused by age, or the fault of crude tools and primitive workmanship. Those lumps and bumps have proven to be crucial to intonation, particularly in the upper octaves. To compound the problem, makers would usually have to scale an instrument down to shorten it, so that it would play at modern pitch. Such replicas were almost impossible to play in tune. A giant step toward tuneful harmony was the return to the old pitch—when instruments began to be made actual size, the old music suddenly sounded better.

An instrumentmaker's job isn't made any easier by the fact that most instruments *are* warped a little, and that not every old instrument is a great one. Perfect copies may not even be the ultimate answer. The best original makers, luthiers especially, knew their craft so well that they would deliberately vary thicknesses to get the best out of any particular piece of wood. Modern makers are beginning to achieve that kind of understanding, with astonishing results. When instruments are fairly made, not only does each instrument sound well on its own, but in consort they team up with a vigor that has brought several composers out of the music-history books and into the concert hall. Although Bach and Handel have proven able to endure whatever is done to them, composers such as Frescobaldi, Gibbons and Rameau are less forgiving. Yet, heard on original instruments, the "lesser names" begin to gleam.

Makers and players of early instruments next convene in 1985. To find out more, write Boston Early Music Festival Inc., 25 Huntington Ave., Boston, Mass. 02116. *—Jim Cummins*

REALLY BIG SHOWS

The year's best chance to see and buy every kind of woodworking machinery and shop supply occurs Sept. 22-25 at the Los Angeles Convention Center. This annual West Coast show has been steadily growing in size and scope, and this year (for the first time) it will include an exhibition of work by 25 California designers and craftspeople. There will also be a seminar series on such topics as robots and computers in the furniture industry, machinery for the small cabinet shop, and cutting wood with diamonds or with lasers. For more information, write exhibit coordinator Ellen Sandler at 1516 South Pontius Ave., Los Angeles, Calif. 90025, or call (213) 477-8521.

There's no comparable show on the eastern half of the continent this year, but in 1984 the International Woodworking Machinery and Furniture Supply Fair reopens in Atlanta, Ga. This biennial industry-wide show used to called the Louisville Fair, until in 1982 it split into two competing events. Nobody, neither exhibitors nor attendees, liked that. The uproar forced the various trade associations to get their act back together and to move the whole thing from Louisville to Atlanta's larger and better facilities. The show dates are Aug. 25-28, 1984; you can get more information and register in advance through the fair office at 8931 Shady Grove Ct., Gaithersburg, Md. 20877.

Also on the move is the nation's largest wholesale/retail crafts fair, the American Craft Enterprises extravaganza held each June in Rhinebeck, N.Y. It's become one of the best places for seeing a lot of woodwork as well as every other kind of contemporary craft object, but it has outgrown the Dutchess County fairgrounds, so in 1984 it will move to the Eastern States Exposition Center in West Springfield, Mass. For information, write ACE, PO Box 10, New Paltz, N.Y. 12561. □

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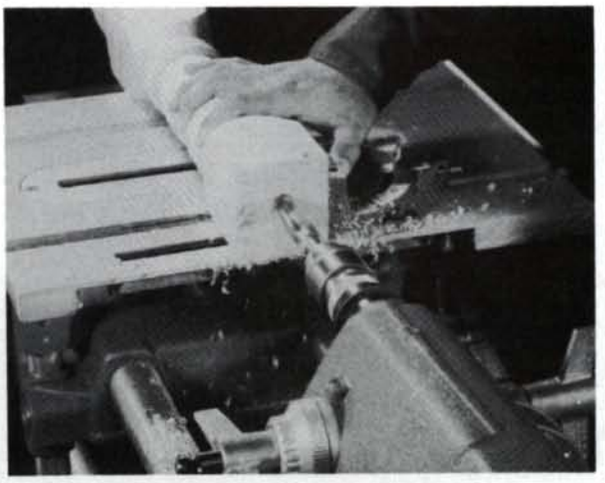

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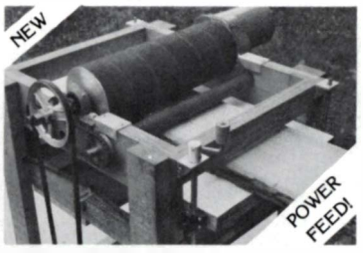

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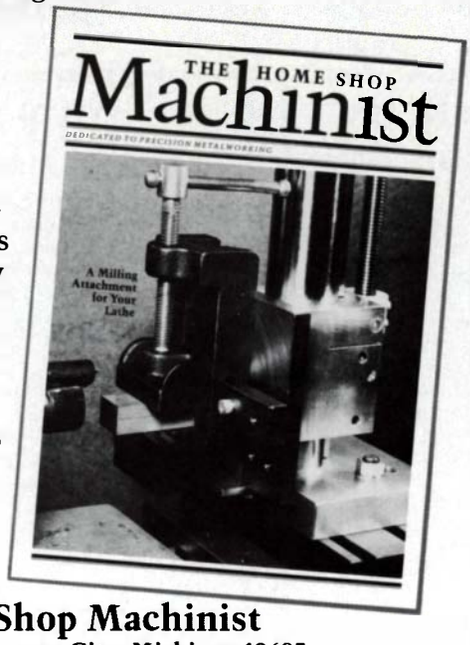

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Events

Listings are free but restricted to events of direct interest to woodworkers. The Nov. issue will list Oct. 15–Jan. 15, deadline Sept. 1; the Jan. issue will list Dec. 15–March 15, deadline Nov. 1.

CALIFORNIA: Workshops—Lumber drying, Aug. 22–26; circular and band saws, Sept. 12–16. By Univ. of Calif. Coop. Ext. and FPL, 47th & Hoffman Blvd., Richmond, 94804. Contact Dr. R. Szymani, (415) 231-9582, or Janice Montano, (415) 231-9404.
Show—Second Invitational Fine Furniture Show, Sept. 17–Oct. 30. Deadline for entries Aug. 31. Strictly juried, all pieces must be for sale. Artisans Guild Store, Box 1515, Mendocino, 95460. (707) 937-5300.
Workshops—Berkeley: decoy carving, Aug. 20; making carving tools, Aug. 27; Los Angeles: free Sat. tool and woodworking demos through Sept. 10; build a piece of furniture, Aug. 22–26, Aug. 29–Sept. 2, Simon Watts and Joseph Bavaro; Sam Maloof at his workshop, Sept. 17. Windsor chair making, Michael Dunbar, one week in Sept. and Oct. at each store. The Cutting Edge, Los Angeles: (213) 390-9723; San Diego: (619) 695-3990; Berkeley: (415) 548-6011.
Show—Woodcarving, Sept. 11, Concannon Winery, 4590 Tesla Rd., Livermore. Free. Call Liz Finigan, (415) 447-3186.
State fair—Sacramento, Aug. 19–Sept. 5. Write Calif. State Fair, Calif. Works, Box 15649, Sacramento, 95852. (916) 924-2015.
Seminars/workshops—Joinery, Aug. 15–Sept. 3. College of the Redwoods, 440 Alger St., Ft. Bragg, 95437. (707) 964-7056.
Show—Wood Invitational, Sept. 10–Oct. 8. Contact Bill Zimmer, Gallery Fair, Box 263, Mendocino, 95460. (707) 937-5121.
Workshop—Aug. 21–Sept. 3. One- or two-week sessions with The Cutting Edge. Contact USC-Idyllwild, Box 38, Idyllwild, 92389. (714) 659-2171.
Show—Made With Wood III, through Sept. 24. Write Humboldt Cultural Center, 422 First St., Eureka, 95501. (707) 442-2611.

COLORADO: Workshops—Ian Kirby, Aug. 15–19; Peter Korn, Aug. 22–26. Anderson Ranch Arts Center, Box 2410, Aspen, 81612. (303) 923-3181.

CONNECTICUT: Exhibit/workshops—"Tools of the Woodworker," through Sept. 18; shore bird carving, Sept. 17–18; non-traditional joinery, Oct. 1–2; history of woodworking, Oct. 8; making tables, Oct. 15–16; sculptural woodcarving, Oct. 22–23; toolmaking, Oct. 29–30; Windsor chairmaking, Nov. 11–12. Brookfield Craft Center, Box 122, Brookfield, 06804. (203) 775-4526.
Crafts show—Nov. 11–Dec. 23. Creative Arts Workshop, 80 Audubon St., New Haven, 06511. (203) 562-4927.
Crafts show—Conn. craftsmen, August, Guilford Hand Crafts Center. Contact Peter M. Petrochko, 370 Quaker Farms Rd., Oxford, 06483. (203) 888-9835.

WASHINGTON, D.C.: Exhibit—"The Art of Louis Paul Jonas," 75 wildlife miniatures, through Aug. 28. Smithsonian Inst., Public Affairs, Washington, 20560. (202) 357-2627.
Craft show—April '84, application deadline Oct. 10, 1983. Write Women's Committee of the Smithsonian Assoc., Room 3101, Arts & Industrial Bldg., Smithsonian Institution, Washington, 20560. (202) 357-4000.

FLORIDA: Juried exhibition—Masks, Oct. 5–31, Netsky Gallery, 5759 Sunset Dr., South Miami. (305) 662-2453.

ILLINOIS: Arts and crafts show—At American Legion Area, Roanoke, Sept. 24–25. Contact Harold Sauder, RBA, Roanoke, 61561.

INDIANA: Course—Hardwood lumber grading, Nov. 7–11, 4-H Center, Paoli. Write Galen Wright, S. Indiana Purdue Ag. Ctr., R.R. #1, Dubois, 47527. (812) 678-3401.

IOWA: Crafts exposition—Sept. 1–4, Pottawattamie County fairgrounds, Avoca. Contact Bob Everhart, 106 Navajo, Council Bluffs, 51501. (712) 366-1136.
Juried exhibition/sale—Nov. 25–27, Old Brick Meeting Hall, Iowa City. Write Wood Artisan's Guild, Box 2896, Iowa City, 52244.

KANSAS: Demonstrations—woodcarving, antique tools and planes, Sept. Woodworkers' Tool Cabinet, 843 S. Poplar, Wichita, 67211.

KENTUCKY: Exhibition—Kentucky Woodworkers Assoc., Sept. 15–17. Lexington Civic Center, Lexington, 40508.

MAINE: Exhibition—"Practical Woodwork," Common Ground Country Fair, Windsor Fairgrounds, near Augusta, Sept. 23–25.

MARYLAND: Juried exhibition—Maryland Crafts Council members, Sept. 26–Oct. 14. Receiving entries Sept. 16–17. Contact Jan Maddox, 4514 Highland Ave., Bethesda, 20814. (301) 986-8739.
Craft fair—Baltimore Convention Ctr. Trade: Feb. 15–16, 1984; public: Feb. 17–19. Slide deadline Oct. 1, 1983. Contact American Craft Enterprises, Inc., Box 10, New Paltz, N.Y. 12561. (914) 255-0039.
Exhibition—Peter Korn, Oct. 2–Nov. 30. Appalachiana, 10400 Old Georgetown Rd., Bethesda, 20814. (301) 530-6770.

MASSACHUSETTS: Craft fair—Nov. 5–6. Contact Frank G. White, Old Sturbridge Village, Sturbridge, 01566. (617) 347-3362.
Exhibition—Sept. 1–Oct. 15. Don Muller Contemporary Crafts Gallery, 16 Main St., Northampton, 01060. Contact Jill Singer, (413) 586-1119.
Exhibition—Through Aug. 30. Society of Arts and Crafts, 175 Newbury St., Boston, 02116. (617) 266-1810.

MINNESOTA: Juried exhibition—Furniture, carving and accessories. Minneapolis, fall of '83. Write Minnesota Woodworkers' Guild, Box 8372, Minneapolis, 55408.

NEVADA: Craft fair—KNPR Craftworks Market, Oct. 28–30. Craftworks, 5151 Boulder Hwy., Las Vegas, 89122. (702) 456-6695.
Exhibition—Woodworking '83, through Aug. 26. Main Gallery, Flamingo Library, 1401 E. Flamingo Rd., Las Vegas, 89109. Contact Paul Haines, (702) 878-5037.

NEW HAMPSHIRE: Demonstration—Sept. 10, New Hampshire Farm Museum, Milton; hands-on workshop, Sept. 11–14, Lee. Contact Charles Cox, Tuckaway Farm, Box 57, Lee Rd., Dover, 03820. (603) 868-1822.

NEW JERSEY: Workshops—Windsor chairmaking, building Shaker furniture, marketing your product, Thomas Moser, Oct. 29. Contact Dr. G. Longo, Brookdale Community College, Lincroft, 07738. (201) 842-1900, ext. 586.

NEW MEXICO: Show—Contemporary Craftsman Gallery, Aug. 14–27. 100 W. San Francisco St., Santa Fe, 87501. (505) 988-1001.

NEW YORK: Workshops—Working with green wood, John D. Alexander, Aug. 22–26. Contact Lanham Deal, 18 Maple St., Box 36, Scottsville, 14546. (716) 889-2378.
Fair—Fairgrounds, New Paltz, Sept. 2–5.
Exhibit—Carvings and decoys, Sept. 17–18, American Civic Assoc., Binghamton. Contact R. Fischer, 3520 Vestal Rd., Vestal, 13850.
Demonstration—Professional woodworking techniques, Mr. Sawdust, Oct. 12–16. Nanuet Mall, Nanuet.
Exhibition—"Carved Images: African Art from the Permanent Collection," continuing, Neuberger Museum, State Univ. of N.Y., College at Purchase, 10577. (914) 253-5087.
Craft fair—9th Annual, Sept. 24–25, Croton Point Park, Croton-on-Hudson.
Courses—Craft Student League begins Sept. 19; free demonstration, laminate bending, Sept. 15. Maurice Frazer, YWCA, 610 Lexington Ave. (at 53rd St.), New York, 10022. (212) 755-2700.

NORTH CAROLINA: Workshops—Through Aug. 26, John McNaughton, Wendy Maruyama, Hunter Kariher, Simon Watts, Seth Stem, David Ellsworth, David Anhalt, Dan Rodriguez. Penland School of Crafts, Penland, 28765. (704) 765-2359.
Country Workshops—Knife, ax and adze, Aug. 15–19, cooperage, Aug. 29–Sept. 2, Drew Langsner. Country Workshops, Rt. 3, Box 262, Marshall, 28753.
Fair—Mostly glass, some wood. Asheville Civic Center, Haywood St., Oct. 20–22. Contact James Gentry, S. Highland Handicraft Guild, Box 9545, Asheville, 28805. (704) 298-7928.
Workshops—Woodcarving, Helen Gibson, woodworking, Dana Hatheway, Sept. 4–7. Write the John C. Campbell Folk School, Brasstown, 28902. (704) 837-2775.
Workshop—Varnish making, Aug. 20–21. Robert Meadow, The Luthierie, 2449 West Saugerties Rd., Saugerties, N.Y. 12477.

OHIO: Demonstration—Woodworking techniques, Mr. Sawdust, Nov. 1–6. Randall Park Mall, I-480, Cleveland.

OKLAHOMA: Seminars—Drawing and design, Rosalind Kirby, Sept. 23–25; fundamentals of woodworking, Ian Kirby, Oct. 21–23. Fine Tool and Wood Store, 7923 N. May Ave., Oklahoma City, 73120. (405) 842-6828, (800) 255-9800.

PENNSYLVANIA: Exposition—Nov. 25–27. David Lawrence Convention Ctr., Pittsburgh.
Juried craft festival—Sept. 3–5, Longs Park Amphitheatre, Lancaster.
Wholesale/retail exhibition—"The Woodworker," at Phila. Armory. Trade: Sept. 22–23; public: Sept. 24–25. Contact R. Rothbard, Craft Market America, Box 30, Sugarloaf, N.Y. 10981. (914) 469-2248.
Symposium—Aug. 27–28, Bucks County Community College. Write Amy Orr, BCCC, Newtown, 18940. (215) 968-8424.
Show—Woodcarving and decoys, Oct. 1–2. York College of Pa. campus.
Demonstration—Woodworking techniques, Mr. Sawdust, Oct. 18–23. Willow Grove Mall, Exit 27, Pa. Turnpike, Willow Grove.
Workshop—Hardwood lumber grading, State College, Sept. 12–16. Write Agricultural Conference Coordinator, 410 J.O. Keller Conference Center, The Pa. State University, Univ. Park, 16802. (814) 865-9547.

RHODE ISLAND: Exhibition—Contemporary art, through Sept. 25. Museum of Art, Rhode Island School of Design, 224 Benefit St., Providence, 02903.

SOUTH CAROLINA: Wood expo—Magnolia Park Woodcarvers and woodcrafting, Oct. 29–30. Magnolia Park, Hwy. 17 By-Pass,

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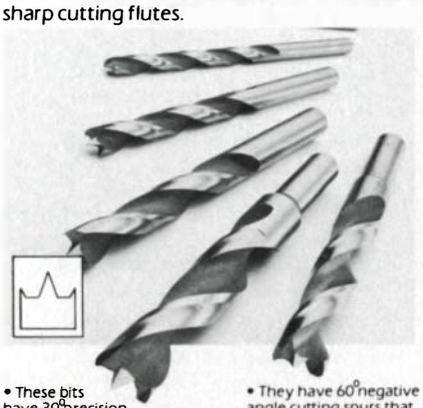

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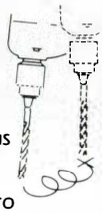

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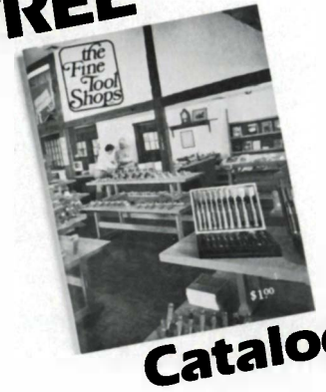

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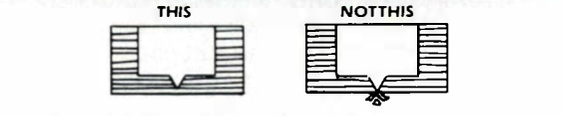

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TENNESSEE: Juried exhibition/workshops—"Figure," Nov. 5–Jan. 7, 1984. Competition, cash awards and purchase prizes. Slide deadline Sept. 10; Surface Design '83: The Artist in Focus, Sept. 26–Oct. 1. Arrowmont School of Arts and Crafts, Box 567, Gatlinburg, 37738. (615) 436-5860.
Industrial Wood Forum '83—Sept. 19–21. Opryland Hotel, Nashville, 37214. Contact Susan Rutter, Forest Products Research Society, 2801 Marshall Ct., Madison, Wis. 53705.

TEXAS: Show—Austin Area Woodworkers Guild, Nov. 11–20. For location, call (512) 282-0493.
Craft fair—Market Hall, Dallas Market Center. Trade: April 4–5; public: April 6–8. Slide deadline Oct. 20. Write American Craft Enterprises, Inc., Box 10, New Paltz, N.Y. 12561. (914) 255-0039.

VERMONT: Workshop—Building the traditional wood/canvas canoe, Sept. 24–Oct. 2. Co-sponsored by Sterling College and Strong's Canoe Yard, Craftbury Common, 05827. (802) 586-2561.

VIRGINIA: Craft fair—The Hand Workshop, Richmond Arena, Nov. 10–13.
Conference—International Trade in Forest Products, Nov. 7–9, Crystal Gateway Marriott Hotel, Arlington. Write FPRSZ, 2801 Marshall Ct., Madison, Wis. 53705. (608) 231-1361.
Show—Artistry in Wood, Nov. 26–27. Marymount College Student Center, 2807 N. Glebe Rd., Arlington, 22033.

WASHINGTON: Exhibition—"Vignettes: Northwest Interiors," through Sept. 4. Contact N.W. Gallery, 202 1st Ave. S., Seattle, 98104. (206) 625-0542.
Seminars—Lofting, Aug. 22–26; small boat construction and maintenance, Aug. 29–Sept. 2; planking, carvel and lapstrake, Sept. 10; repair and maintenance, Sept. 24; dinghy and lapstrake, Oct. 8; steambending, Oct. 22. Northwest School of Wooden Boatbuilding, Glen Cove Indus. Park, 251 Otto St., Port Townsend, 98368. (206) 385-4948.

WISCONSIN: Seminars—Summer and fall sessions, woodworking, chainsaw lumbermaking. In private studio, downtown historic Cedarburg. Write Mike Hanley, Autumn Woods Studio, W-63, N-653 Washington Ave., Cedarburg, 53012. (414) 375-1912.

NOVA SCOTIA: Course—Wooden boatbuilding, small boat lofting. Late Sept. Contact Richard Tyner, 32 Edmonds Grounds, Halifax, Canada, B3N 1M6. (902) 477-3008.

ONTARIO: Exhibition—Furniture by Paul Epp, Michael Fortune, Stephen Harris and Donald McKinley, Sept. 16–Oct. 9. Macdonald Gallery, 900 Bay St. at Wellesley, Toronto. (416) 965-1215.

QUEBEC: Show—Canada Wood '83, Oct. 27–30. Write Cahners Expo Group, 12233 W. Olympic Blvd., Suite 236, Los Angeles, Calif. 90064. (213) 826-6070.

AUSTRALIA: Seminar—Turning, Sept. 17–18. J. Stick, 12 Oxley Terrace, Corinda Q. 4075. (07) 379-6114.

ENGLAND: Summer courses—One week each, start Aug. 7. Alan Peters, Aller Studios, Kentisbeare, Cullompton, Devon, EX15 2BU.

Connections

In Connections we'll publish membership calls for guilds, queries from authors, and appeals from readers who want to share special interests.

I am researching the metallic framed brace more commonly known as the Ultimatum type brace, with a view to publication. I'd be delighted to hear from anyone with unusual examples and especially any with engraved dates. Reg Eaton, 35 High St., Heacham, King's Lynn, Norfolk, PE31 7DB, England.

Vancouver Island Woodworkers Guild (Victoria Chapter) for professionals and amateurs. Write the Guild at Box 6584, Station C, Victoria, British Columbia, Canada V8P 5N7.

North Texas Woodworkers' Guild is seeking new members. Meetings are first Monday of each month; all invited. Contact Mickey Simon, (214) 446-9104.

Alabama Woodworkers Guild welcomes new members. Box 327, Pelham, 35214.

Wood furniture store opening in LaConner, Wash., seeking reliable local woodworkers to display their work on consignment. Quality work only. Come by 104 E. Commercial in La Conner, or call (206) 466-3048 eves.

American Custom Gunmakers Guild: for membership information, write Earl Mastsuoka, Box 61129, Honolulu, Hawaii 96822.

A new guild is forming in Conn. Write William T. Young, Woodworkers, Box 344, W. Simsbury, Conn. 06092.

Woodworking school survey update:
Milwaukee Area Technical College, 1015 N. Sixth St., Milwaukee, Wis. 53203.
Lansing Community College, 419 N. Capitol Ave., Box 40010, Lansing, Mich. 48901.

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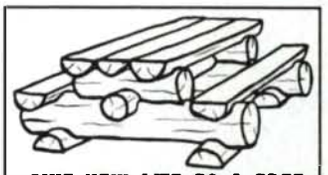

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THE MYSTERY OF THE 25 CENTIMES

BY GEORGE FRANK

In 1943 a Royal Prince and Princess lived in a very elegant penthouse apartment in New York's most exclusive neighborhood, Sutton Place. Of their former fabulous wealth, they had salvaged enough to match the living standard of the most affluent Americans.

The lady had at least half a dozen Christian names, but the one she preferred was Princess Xinthia. She was in charge of everything that happened in the penthouse, including its decoration and furnishings, the finest-quality antiques tastefully arranged on priceless Persian rugs. Paintings, art objects and accessories were selected with the help of the best experts and interior decorators. Although no one would ever guess, the job of decorating the place was never finished: the Princess was forever ready to trade any item in her home for the one that would better fit a given spot.

The bedroom was large and furnished with a huge bed of the Louis XV period, surrounded by exquisite commodes, armoires, a bonheur de jour (lady's writing desk), poudriers and such. It was a room out of a textbook. Still, the Princess was not satisfied. There was a wall, about 5 ft. wide, between two windows, and she had been hunting for months for a tall, narrow secretary-desk to fit that one spot. All decorators were alerted to try to find this exceptional piece. It had to be a genuine antique, of the Louis XVI period.

The winner of this search was my best customer, a French dealer, Martin Charrier. Charrier did not belong to our generation. He was unhealthily honest, straight and unbending. When he uncovered a secretary-desk, he first made sure it would rightly fit the wall where it was to stand. Next he investigated the piece itself and its pedigree. Satisfied on all accounts, he inquired about the price. It matched the uniqueness of the piece. In that same year, 1943, I bought a very decent four-story building in one of New York's good neighborhoods for $28,000. The Princess paid just $500 less for the secretary-desk.

The deal made, Charrier called me to meet Princess Xinthia. The secretary-desk needed repairs and Charrier thought I was the man for the job. We agreed to bring the precious piece to my shop. I gave my word of honor that no one but me would work on it, and I agreed to carry additional insurance for the two weeks that it would be in my custody. Next day, the secretary-desk arrived. Early Saturday, alone in my shop, I faced it and its problems. No doctor examined his patient with more care than I lavished on this fine antique.

The brunt of the repairs would be in the central working section of the piece, the writing area. The leather on the door was worn beyond repair, it had to be replaced. The complicated pigeonholes, with their tiny, refined drawers, needed much work. Charrier showed me the tricky way to open two "secret" drawers. Neither of them worked properly, and he pointed out a series of minor imperfections to be corrected.

I decided to remove the entire pigeonhole unit from the piece. But how? I removed all the hidden screws holding this unit in place, admiring the fine craftsmanship of the handmade screws. But still it would not budge. Further investigation disclosed a clever locking device, located in a narrow compartment where it could be reached only with a pencil-like stick. Pushed sideways, this trigger released a decorative keystone which was actually the front of a minuscule drawer. To my great excitement, the drawer slowly inched open, pushed by a coil spring. Gently I pulled, and soon I held the small drawer in the palm of my hand.

It was obvious the drawer had not been opened for a long, long time. It was loaded with money. But there was more excitement in store for me. With the drawer removed, two screws became visible—the screws that held the pigeonhole unit in place. I twisted them out and was amazed to discover two modern machine-made screws, coming from the very guts of a 200-year-old antique.

The message came to me loud and clear. I dumped the coins on my bench and examined the drawer. A small piece of sheepskin was glued to its bottom, on which was written in neat calligraphy: "Fabrique en 1903 dans les ateliers de Florimond Hyer in Orleans." Any doubt I may have had about this being other than a masterful copy vanished when I examined the coins. There were forty 25-centime pieces, all unused and all minted the same year, 1903. Who put them there and why, I still don't know. Furthermore, the piece was built in 1903, the money was minted the same year, and strangely enough that was the year I was born. Later I learned that these particular coins were minted *only* in 1903, not before and not after.

What was I to do? To fool such an expert as Martin Charrier the fake had to be near perfect, and it was, including its pedigree. If I told Charrier of my discovery, he would kill the dealer who sold him the piece or, worse yet, himself. If the Princess learned of the ruse, she would be unhappy beyond belief. I could not sleep for days, until I made the decision: I spoke to no one. I scraped the sheepskin off the drawer. I removed any traces I could find that would reveal the *true* age of the piece. When I was done, only scientific instruments could prove the fraud, never human eyes.

On September the 16th, I invited Charrier and the Princess to my shop to inspect the perfectly restored piece. They came late in the afternoon and I proudly pointed out the finest restoration work I had ever done. Charrier tried the two secret drawers he knew about. By now they worked faultlessly. The three of us were in the happy mood of work well done when I asked: "Would you care to watch me?" They would. With a theatrical flourish, I produced a pencil, pushed the hidden trigger with it, and the keystone drawer smoothly slid out, loaded with the 40 pieces of money.

I do not know how to describe the pleasing sounds of my audience. They were delighted by my demonstration. Finally the Princess spoke: "But, Monsieur Frank, how can we compensate you for all you did for us?" I replied: "Simple. Let me keep the forty pieces of money. You see, it is not for what they are worth, but they were all minted the year I was born, 1903. In fact, today is my fortieth birthday."

Spontaneously, she hugged me and kissed me on both cheeks. "Happy birthday to you, darling, and of course the money, all the money, is yours." Then she asked: "Can you two gentlemen keep a secret?" We nodded expectantly as she continued. "A lady never tells her age, but this is the exception. I too was born in 1903 and today is also my birthday." I asked for and received permission to kiss her, and offered her half of my loot. She accepted.

I still have twenty 25-centimes. □

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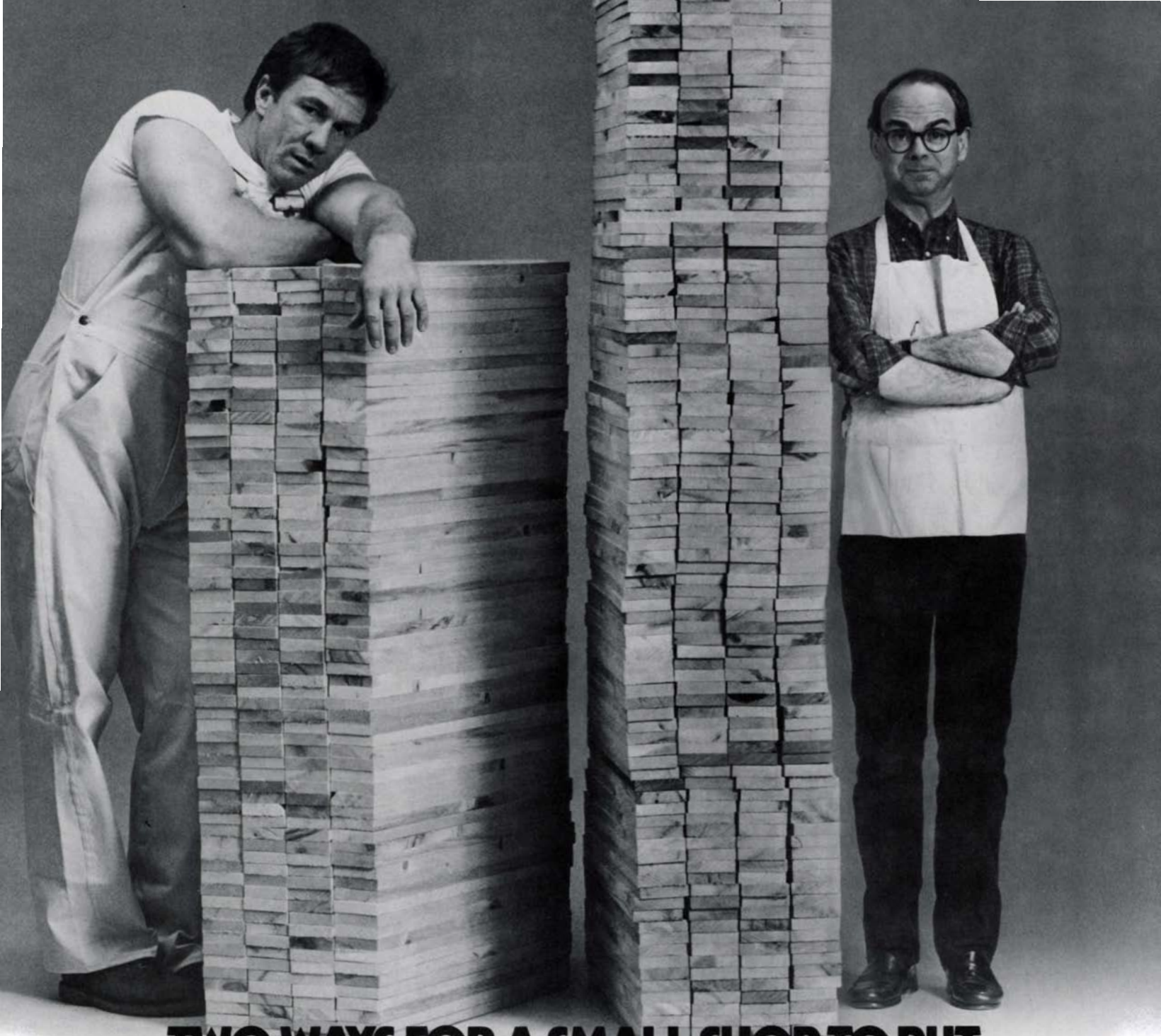
*George Frank, master wood finisher, author (*Adventures in Wood Finishing, *Taunton Press) and raconteur par excellence, claims that he will be 80 years old this Sept. 16.* Fine Woodworking *buys readers' adventures. Suitable length is 1500 words or less. Please include negatives with photos.*



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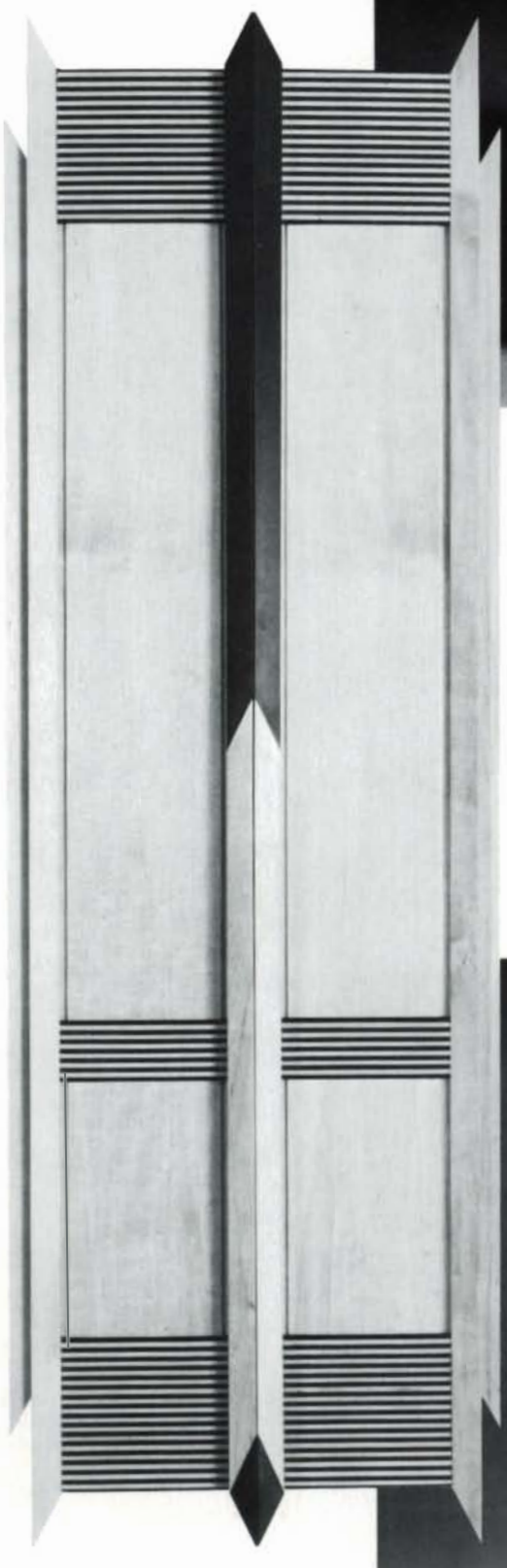

As the nation's earliest economic and cultural hub, Philadelphia has long been a city of discerning patrons who were willing to pay for quality. In Colonial times, cabinetmakers flourished here, raising their craft to a zenith which yet sets the standard for traditional furniture.

In its first show last May, the Society of Philadelphia Woodworkers proved that support for the artisan is no less evident today. Held at the city's spacious Port of History Museum, the show was a phenomenal success, drawing more than 750 people on opening night.

They viewed some 53 pieces by 35 makers, including the three accessories shown here. With a fanciful serpent as its frame, Tony Chickillo's sensuously carved tiger maple mirror, above, won best of show for one-of-a-kind woodwork. Wendy Stayman's tie cabinet, left, and a desk lamp by Kevin Kirwan were also show favorites. Stayman detailed her maple cabinet with gaboon ebony and black lacquer. Kirwan's desk lamp pivots on thrust bearings let into the walnut base and can be swung out of the way when not needed. Shining through the crisply latticed pine shade, the bulb casts a woven glow.

Photos: Art Matters, Rick Echelmeyer, Michael Slack