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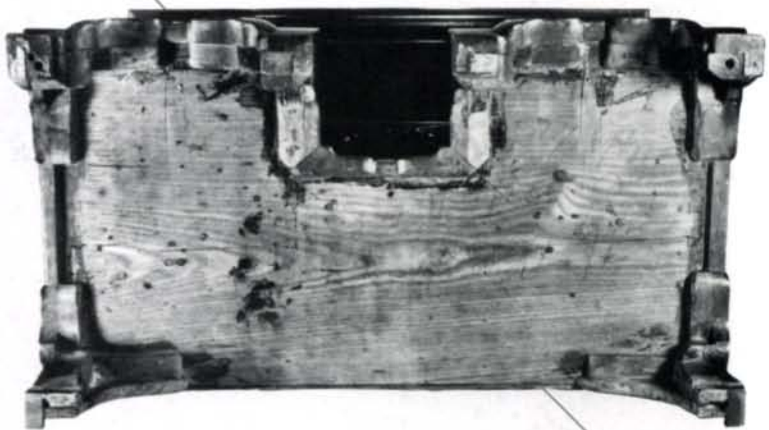
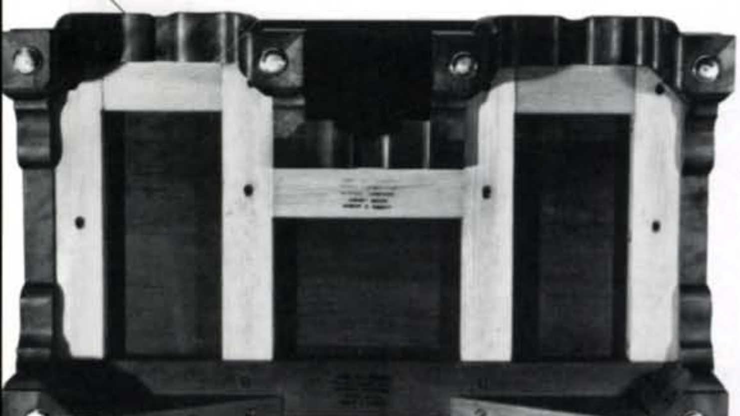
Fine WoodWorking





Making Period Furniture

Cover: On first glance Robert Emmett's reproduction of a Newport kneehole bureau looks like the c. 1780 original, which is the one on top. The views from below, however, hint at how differently they are made. Emmett believes the old designs can't be improved, whereas the old constructions must be—here he shows how he proportions dovetails to make a stronger drawer. More about these two pieces and about how other reproduction cabinetmakers see the question of whether to improve or to reproduce precisely, on p. 32. (Newport bureau courtesy Yale University Art Gallery, Garvan collection; photo Joseph Kugielsky.)

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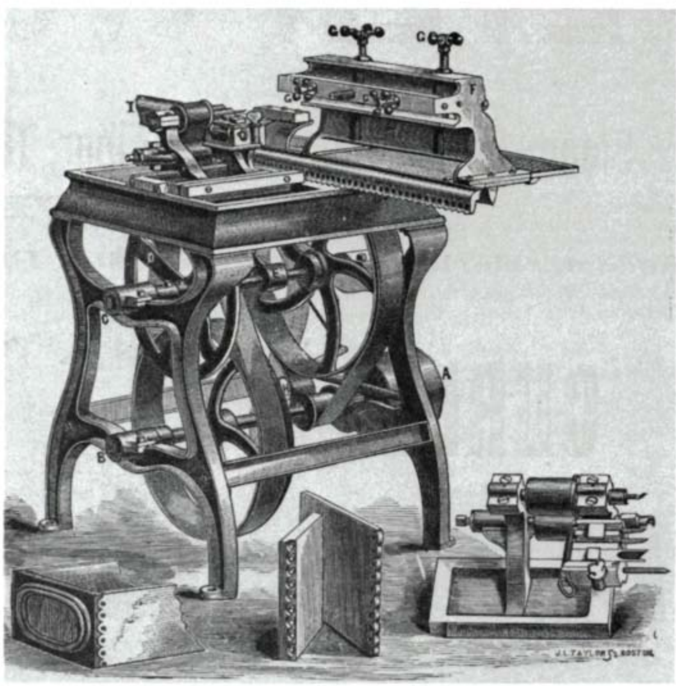
Letters

I was happy to see your continued treatment of the expanding field of wood-drying technology (*FWW* #22, May '80). My own interest comes from a desire to produce predictably high-quality hardwoods economically. Your beginning focus on solar is in the right direction as an energy-conservative technology available to the small wood business. One of the proper uses of solar in the drying process is heating the warehousing area after the wood reaches 6% and before it is used. The sporadic availability of solar is of little consequence because the goal is maintenance of a long-term relative humidity of about 30%, which equates roughly to 15° to 20° above the average outdoor ambient. The days you get nothing are compensated by the good days, and in an insulated building the wood acts as the thermal mass. Cyro, a double-wall acrylic glazing, is easy to install and a good insulator.

So far the solar kilns you have described exist as detached temporary structures. I think there is a strong argument for including the kiln as part of the storage and use building. Lumber handling can be more efficient, and insulation and weatherproofing requirements are simplified. Some interesting heat and moisture exchange possibilities are available. For example, the heat released from condensation can be fed into the work or storage area during cooler months or at night by selectively uninsulating a metallic portion of the kiln walls at the right time in the drying cycle. If the kiln is part of the work area, the conductive heat loss through kiln walls can be comforting during the winter....

There are three important mainstays of air-drying: location, high-quality foundations and stickering, and techniques for controlling drying during unfavorable weather. Proper air-drying produces a high-quality product ready for quick kiln-drying. Air-drying is cheap warehousing and it suits the rhythms of a typical windfall lumber acquisition encountered by most small-scale woodworking operations. The technical requirements for a kiln suitable for drying 16% and lower MC wood are substantially simpler than a high-humidity kiln. For example, the attic of a house works well. My observation of the typical air-drying circumstances is a monument on how not to do it. The amount of degrade possible in a halfway good air-drying installation is heart-rending. As far as the issue of speed goes in the drying process, isn't slow and easy one of the tenets of a craftsman's philosophy?...

Builders of high-temperature kilns, even solar, should use fan motors specifically designed to operate at high temperatures, like crop dryer motors, and each motor should be protected by fuses with a current rating of 125% of the full load motor current. Motors run at elevated temperatures require frequent lubrication. —*Paul Fuge, Oxford, Conn.*



Drawers in Victorian-era factory furniture were often held together with a pin-and-scallop joint (lower left), in those days called the Knapp joint. This engraving shows the Clement machine, one of several models that made the joint, from an 1889 advertisement in the weekly trade paper American Cabinetmaker and Upholsterer, *sent in by reader George von Wahlde of Adrian, Mich.*

Please tell R. Bruce Hoadley, who wrote about his troubles with a new C.O.M.B. Co. drill press in Letters (*FWW* #22, May '80), that I bought a probably similar machine several months ago, and had serious chuck runout, as he describes. The problem was very simple. The Morse taper adapter for the chuck did not solidly seat because of interference at the tang end of the adapter—a bright and slightly battered contact area. A quick touch to the grinder at that point, and voila! no runout. —*Woody McPheeters, Berkeley, Calif.*

...After I read about Hoadley's problems, I rechecked my machine. I have no misalignment, no wobble, and do not keep losing the chuck. The Morse taper works fine. Some of the milling is sloppy, and the drill does not mate exactly with the center of the hole in the table, but these things don't seem to be much of a problem. The one objection that I do have is that the speed range jumps from 790 RPM to 1,500 RPM. The tool is a valuable addition to my workshop. I guess I was lucky. —*Morton Raphelson, Cinnaminson, N.J.*

Every person making or repairing furniture should think of the next person who may be faced with repairs because it may be you. I am referring to Gerry Michaud's use of aliphatic glue to secure cane splines (*FWW* #20, Jan '80, p. 50). It seems to me that hide glue is more appropriate since in the event of repairs it can be removed with a hot knife or boiling water and a toothbrush. It is true that one has only about four minutes working time and in cold weather one must warm the wood well and perhaps work in increments, but the advantages of hide glue sometimes far outweigh the disadvantages; ask any musical-instrument maker or repairer.
—*John W. Wood, Tyler, Tex.*

Re Gerry Michaud's article on wedged woven or "press" cane: I have been doing this type of seat bottom for a number of years and would like to add my own observations. First, while I have used glycerine in my soaking pail, I have found that it is unnecessary unless you are trying to drive the cane into a very narrow groove (⅛ in. or less), especially if you are soaking the cane for as much as an hour. Of course, if the cane has been hanging around a warehouse or hobby shop for some time, it may need the glycerine.

As for wedging cane into place, I use a plastic-bladed screen spline roller with any sharp edges rounded off. I place the untrimmed cane on the seat, lining it up so it is straight. Then, holding the front edge of the cane to the seat, I roll about 3 in. of the cane into the groove in the back, then the front and sides. I then finish rolling the cane all the way around the seat, making sure it is sitting all the way down in the groove. The only problem with the roller is the corners of the seat. Here I do use a small wedge. Using a utility or mat knife I cut off the excess cane about ⅛ in. below the surface of the outside groove. I squirt in some Elmer's white glue (horrors!) and put the spline in. If the seat is round or doesn't have

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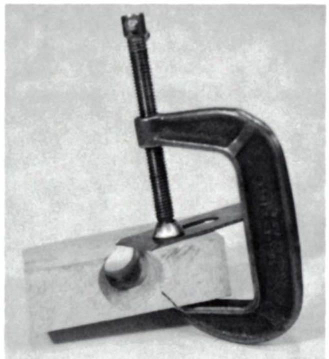
sharp corners, I cut one end of the spline at a 45° angle and, starting at the middle of the back of the seat, drive the spline down. If the seat has corners I miter to match the corners. I learned this method from a gentleman who had used it for over 20 years. He claims he's never had a seat come back because of the installation. I've used it for the past six years and haven't had one returned yet.

Also, many of the press cane seats we see in our shop have been glued down. I pour warm vinegar in the groove to soften the glue and then, using a screwdriver I've filed down to fit the groove, I can pry the old spline and cane out. Clean the groove well. Test the vinegar on the finish before using it in the groove. —*Scott McDiarmid, Charlottesville, Va.*

I recently spent a frustrating day trying to duplicate the dowelmaker described by Trevor Robinson (*FWW* #8, Fall '77). Although I couldn't make it work, I discovered a far simpler and easier technique with which I turn out dowels of any size. Proceed as follows: (1) Bore a hole the size of the desired dowel through a block of hardwood about 2 in. thick. (2) Enlarge one end of the hole conically with a reamer, lathe, rasp, etc. The shape and finish are not important because the dowel blank will not touch the core. (3) Slice the top off the block with a saw or plane until the top of the hole where it joins the core just shows. (4) Lay a plane blade or similar sharp blade over the hole with the cutting edge just forward of the conjunction of the hole with the cone, bevel up, and clamp the blade in place. (5) Whittle down the two ends of a squared dowel blank, chuck one end in an electric drill, and run the blank at high RPM but slow forward speed into the cutter. A bit of experimentation should result in perfect dowels. Some notes: the blade must be sharp, and smooth on the bottom, or else the dowel will be spirally marked. If the dowel is slightly undersized because too much wood was removed from the top of the block and too much of the hole is exposed, shim the blade higher with paper or tape. Wax the hole. For dowels larger than about ½ in. in diameter, I cut the head off a wood screw, chuck it in the drill, and insert it into a pilot hole drilled in the end of a dowel blank. A better method is to make a blank holder, square in cross section and tapered to take any blank size, with a shank for use with the drill. By adjusting the blade height, dowels can be made slightly oversize for a tight fit. Unlike ordinary dowels, which often do not match the hole bored with the worker's bit, these dowels can exactly match the hole.



—*Harold "Buster" Welch, Winnipeg, Man.*

My solution to the band-saw problem is two saws. One is a cheap, older 12-in. Craftsman, with modified blade guides. It is fine for light scrollwork and most small jobs. I picked it up for $100 with a ½-HP motor at a used-tool shop a few years ago. The other saw is a heavy cast-iron 14-in. meat-cutting saw. It weighs around 300 lb. The depth of cut is 14½ in., and with its 1-HP motor it doesn't even slow down when resawing 12 in. of walnut. It has a stainless-steel sliding table

(which can be covered when the sliding feature isn't wanted) and a sturdy, accurate rip guide. I found it for $200, and again I had to rebuild the blade guides. It's too much saw for most of the bandsawing I do, and the table doesn't tilt, but for resawing it works fine. There are many of these old saws around because thousands of small butcher shops have closed in the past 10 years. I also bought a meat-cutting blade, and find it works fine for its original purpose, too.

—*George Pilling, Springville, Calif.*

Like Ted Sittler (*FWW* #21, March '80, p. 6), the first band saw I ever owned was an 18-in. model I built from the Gilliom kit. I had some of the same problems. . . and I have gained a good deal of experience since, so here are my suggestions.

Gilliom's design can be beefed up a bit in several ways. I added an extra 2x4 to the left support column and used glue blocks in strategic places throughout the body of the saw. I also used nails and glue, and extra screws and bolts. I built my saw from ⅝-in. construction plywood and yellow pine. If I were to build another, I would use rock maple and veneer-core birch plywood. Perhaps some angle iron, also.

There are several possible causes for the blade to belly out on thicker cuts. The main reason I found was that the upper frame, being wood, did not have the necessary rigidity. Therefore the blade could not maintain its tension. My solution was to add a detachable support column at the right of the blade—from the upper frame to the lower body of the machine. For most resawing it did not get in the way, and for curve and panel cutting it could be removed. I had to modify the table, however, making a part of the right-hand section removable to allow for the extra piece. Most important, I had to add a strong spring to the blade-tensioning mechanism to keep the blade from breaking. An old automotive valve spring worked very nicely. . . .

If the saw is built fairly well, the speed can safely be increased. I ran mine at 3,600 blade feet per minute instead of the 2,000 specified. Three thousand would be optimum and probably easier on the wood frame, especially if the tires or wheels haven't been dressed true. I simply substituted a slightly smaller motor pulley. . . .

Resawing takes a bit of patience and skill. Use a slow, firm, even feed speed. Let the machine do the work. Make sure the fence and the blade guides are adjusted properly and that the tires are in good shape and clean. Use enough tension. It doesn't go as fast as you might think, but it's still faster than a 10-in. table saw and infinitely less nerve-wracking.

—*James L. Wheeler, Houston, Tex.*

William Woodcock mentioned using propane to reduce the gelling of polyurethane varnish (Letters, *FWW* #22, May '80, p. 4). I have an easier technique. I simply cut a circle of Saran Wrap the size of the inside of the can, then spread the cut circle atop the remaining varnish and reset the can lid.

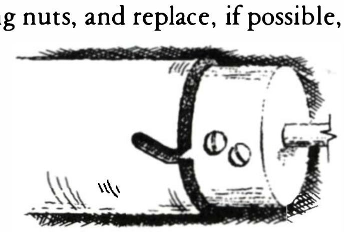
—*Henry Turner, Sterling, Colo.*

Propane gas is highly flammable in the presence of air. Even a spark, as might occur when prying open a can with a screwdriver, might set off an explosion. Propane is best left to torches and gas stoves. —*Michael McCann, New York, N.Y.*

We very much appreciated the recent article about Japanese saws (*FWW* #21, March '80). However, the editor's note implies that the firms mentioned all offer the same Japanese saw at different prices. As you are aware, there is a wide range in prices of Japanese tools. We currently offer *ryoba* saws ranging in price from $13.50 to $48.10. As an indicator of quality, the following note was received from Thomas Hucker, a student in the program in artisanry at Boston University: "I met some Japanese carpenters doing restoration work in the Boston Museum a few weeks ago, and with the help of an interpreter, we showed them your tools and their response was not only were they very good tools, but the same brand that they themselves use."

—*Fred Damsen, President*
Woodline/The Japan Woodworker
1004 Central Ave., Alameda, Calif. 94501

Re T. R. Warbey's sander (*FWW* #21, March '80, p. 50), the following suggestions: Replace the pillow blocks with self-aligning ball bearings. Replace the hex-nuts of the left-hand side hold-down bolts with wing nuts, and replace, if possible, the wooden drum with a steel one that has the same outside diameter as the inside diameter of standard PVC 6-in. gas or drainage or sewer pipe with walls about ¼ in. thick. Cut three or four slots about ½ in. long and ⅜ in. wide in the right-hand end of the tube, so they will fit over keys mounted on the drum, for example, two wood screws side by side in a wooden drum or some ¼-in. key bar welded or bolted to a steel drum. Various sleeves of PVC tube can be kept with different grits glued to them.



I might add that I don't use wood in machine tools. The pillow blocks in the low-tech thickness sander are presumably fixed with wood screws in end grain. As the drum is not dynamically balanced, sooner or later Warbey will have a close encounter of the unpleasant kind with it. The cost of a small electric welder and the little effort necessary to acquire some skills are quickly repaid by the tools and structures that can be made for a song out of scrap iron and discarded machine parts. —*H. I. Gosses, Leiden, The Netherlands*

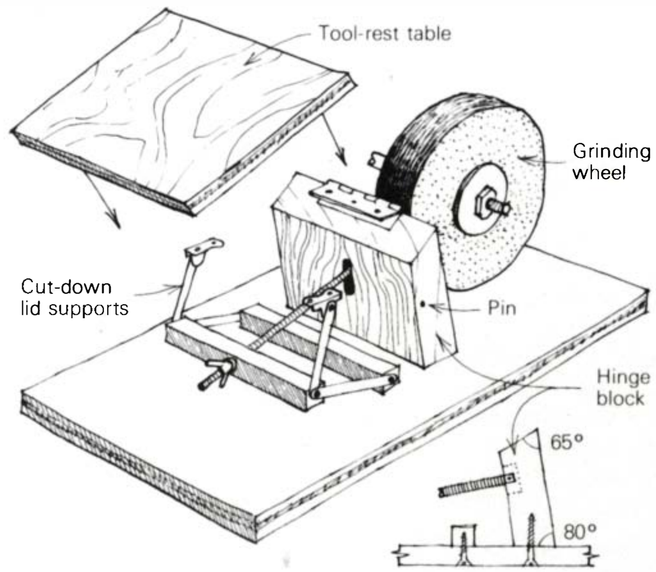
In reply to Peter Kemmer's letter (*FWW* #20, Jan. '80) on hand work vs. machine work, I would like to make the following observations. I am a clinical psychologist and a sometime woodworker bent on rapidly increasing both skills. I do not believe it is possible to become too philosophical about our crafts, nor do I believe that sanitizing emotionality out of the practice of our crafts will improve the product.

First, there is the fact that most of our time is spent in exercising the process. If the process is subordinated to the product, we run the danger of becoming bored with the activities that occupy our time. The product occupies no time at all; only the process consumes time. Boredom will most certainly lead to a degradation of the quality of the product, and that will be noticed by the consumer. The issue isn't whether we should work by hand or by machine. Do whatever turns you on. But to attempt to desensitize yourselves to any of the pleasures involved in exercising our crafts will, as surely as night follows day, produce pieces that lack sensitivity, grace and craftsmanship. . . .

In short, the beauty that Kemmer seeks is the end result of a process. Ignoring that process cannot but detract from the product. —*Harry J. Coffey, Lewisburg, W. Va.*

Adjustable tool rest

Here is an adjustable bench-grinder tool rest that's accurate, easy to use and cheap to build. Cut a 1½-in. thick pine hinge-block at the angles shown and mount it to the base with screws from underneath. Cut down two Stanley 10-in. lid supports to make the table-adjusting hardware. Drill out the center rivets and replace with screws into the 1x1 hardwood block. Pin the ⅜-in. threaded rod in a mortise in the pine hinge-block. Now mount the plywood or Formica-covered, composition-board table as close to the grinding wheel as possible. Recess the hinge into the bottom of the table if necessary. —*Mike Perrin, Knoxville, Tenn.*



Sanding block for lathe work

For years my woodworking students invariably burned their fingers sanding bowls and other lathe work. Then I hit upon the solution—sanding blocks cut from sheets of ½-in. thick rubbing felt. The felt sanding block shapes itself to shallow curves and can be deliberately shaped to match any contour of a compound curve.

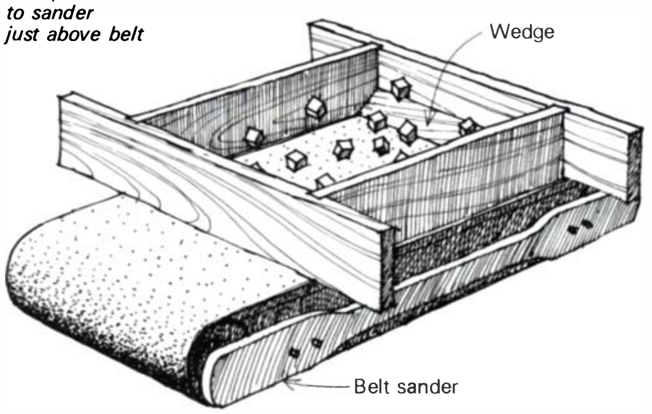
Rubbing felt is available in 1-ft. squares from H. Behlen & Bros. (Box 698, Amsterdam, N.Y. 12110) and other suppliers. A similar material, used for typewriter cushions, is available from office-machine suppliers. Cut the pad with a razor knife and rule. One block lasts indefinitely.

—*Russell Anderson, Torrington, Conn.*

Making little wooden balls

Faced with having to reproduce a number of ½-in. diameter wooden balls (to replace missing ornamentation on an old fireplace), I discovered a virtually painless procedure using a large belt sander. Build a box frame, open on the bottom, and clamp it to the stationary part of the sander so it sits just off the belt. For ½-in. diameter balls, cut ½-in. cubes and toss them in the box frame. Put a cover on the box (Plexiglas is best) and turn on the sander. The sanding belt will throw the cubes around in the frame like dice on a game table, knocking off their corners and edges until they're perfect spheres.

If the cubes don't tumble about but rather line up neatly against the far wall of the frame, glue a wedge there. If this doesn't work, you could vary the number of cubes, presand



the corners or throw in a few ball bearings to keep the cubes tumbling. Using this method, I produced a dozen or so perfectly shaped balls in an hour's sanding time. Had I shaped the balls by hand it would have taken longer and the result would have been less uniform. Perhaps laziness really is the mother of invention. —*Charles Reed, Washington, D.C.*

EDITOR'S NOTE: Starting with rectangular blocks you can use Reed's technique to produce oval shapes.

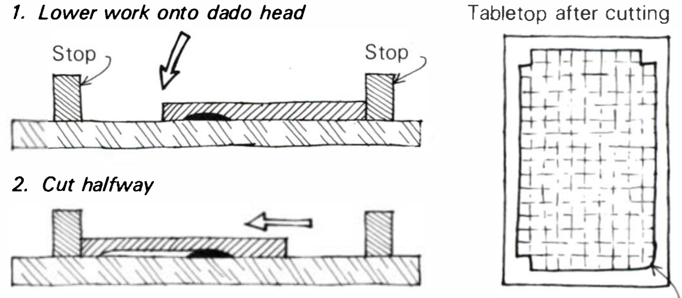
No-mess doweling

To reduce the glue-all-over-the-hands, sticky mess that goes with dowel work, cut the spout off the glue bottle until the dowel pin just fits inside. Slip a dowel pin into the spout, then invert and squeeze the bottle to cover the dowel with glue. Turn the bottle right-side-up and twist the dowel out. No mess, no fuss. —*E. Khalsa, Espanola, N. Mex.*

Recessed tabletops

Wasting the central area of a top to form a lip on a bedside table or bureau is attractive and functional. Recessing emphasizes the grain, shows that solid wood has been used and prevents pencils and spills from falling to the floor. I cut the recess on the table saw using a dado head with all the chippers to get the widest cut. The circumference of the dado head leaves a pleasant curve at the inner edge of the tabletop.

To cut the recess, first clamp blocks of wood to the saw's rip fence to serve as stops. Then set the dado head to the right depth (¼ in. suits my taste). Holding the wood against the back stop, carefully lower the tabletop into the dado head. Do not cut across to the near edge, as it's liable to split out. Instead, cut halfway across, reverse the tabletop and cut halfway again from the other edge. Waste the bulk of the mater-

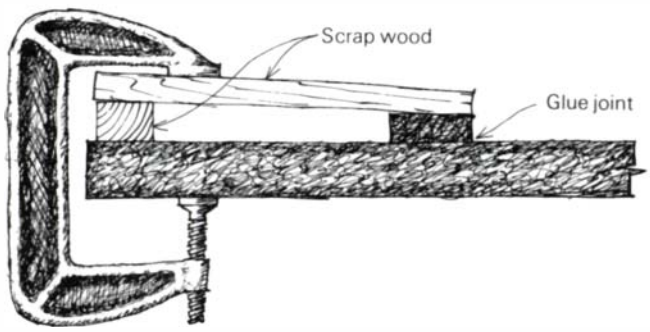


ial by cutting crossgrain, repeat passes along the grain, then carve out the corners by hand. Finish the surface by scraping and sanding. —*Pendleton Tompkins, San Mateo, Calif.*

Deep-throat clamp

If you need a deep-throat clamp and none is available, substitute a conventional *C*-clamp and two blocks of wood arranged as in the sketch below. Though direct pressure is less than with expensive specialty clamps, the system works fine for gluing inlays, guitar bridges and other simple joints.

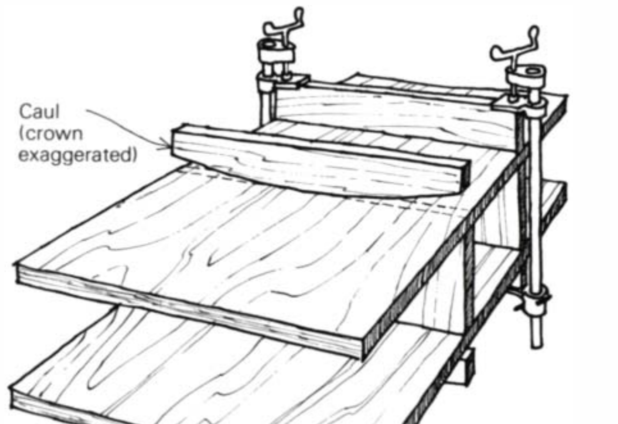
—*Bob Osbahr, Tucson, Ariz.*



Clamping wide boards

In bookcase construction and other large-carcase work, it is often necessary to join wide boards in an *H*. Without special clamps, it is difficult to achieve the necessary clamping pressure. This simple crowned caul, used with ordinary bar clamps, solves the problem.

To make the caul select a 1-in. thick, 2-in. wide block as long as your lumber is wide. Plane a crown on one edge, leaving the center high and each end about a degree lower. Now lay the caul, crown edge down, across the width of the board to be clamped. As you apply pressure to each end with bar clamps, the end-gaps will close, resulting in even pressure across the joint. —*David Shaffer, Silvercliff, Colo.*



Tighten clamps to apply even pressure across board

Square cuts

Most table-saw and radial-arm-saw blades that I've worked with have a tendency to climb and squirm when crosscutting. The result is an out-of-square cut. I've found, quite by accident, that if the crosscut is very thin, say one half the kerf, the saw cuts amazingly true. This approach does require that you

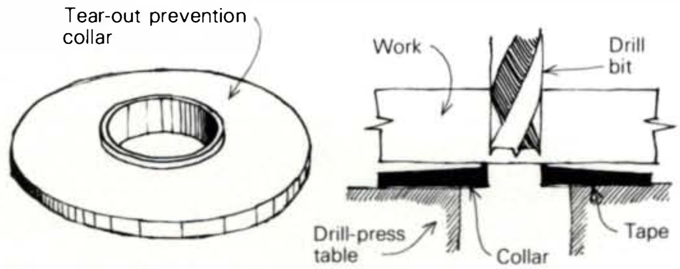
make two cuts—one to rough length (leaving a half-kerf extra) and the second to final length. Of course if the machine is out of square to begin with, all bets are off.

—Pat Warner, Escondido, Calif.

Preventing tear-out

The problem of excessive tear-out at the bottom of drill-press holes can be solved with a simple metal collar. I discovered the collar solution during a 30-unit production run of a small piece of furniture. Each unit required a drilling operation of eighteen holes in warped 1x12 pine. Without question, the tear-out problems I experienced were because the warped stock was inadequately supported on the drill table.

I'm aware that the classic prevention for tear-out is to support the stock to be drilled with a scrap back-up board. This I wished to avoid because of the hazard, nuisance and expense. I used my small metal lathe to turn a substitute for the back-up board—a steel collar with a $\frac{1}{32}$-in. protruding lip to compress and support the wood in the area of the hole. When the wood is adequately supported and compressed in advance of the rotating bit, the result is a clean hole.



The profile of the collar is shown in the sketch. Except for matching the collar's bore to the drill bit used, the dimensions are arbitrary. Turn the bottom of the collar flat (perhaps even a shade concave) to prevent the collar from rocking.

To install the collar on the drill press, put double-sided tape on the bottom of the collar and slip it over the drill bit. With the bit lowered into the table, carefully slide the collar down and press it onto the table. Counterboring the hole in the table will prevent shavings from jamming the collar hole.

—Carl Hogberg, North Chatham, Mass.

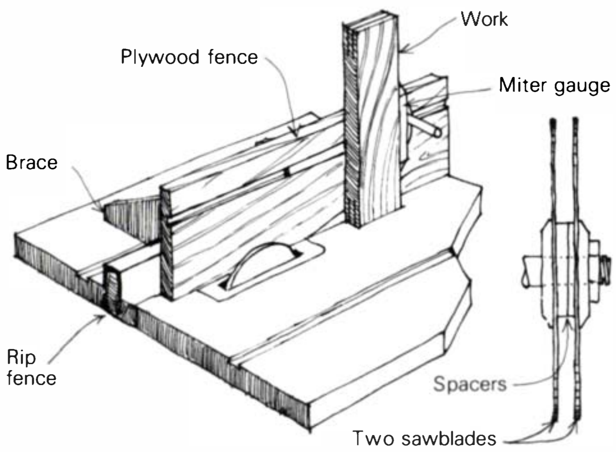
Triangular scraper

This graunching tool (that's what we called it in the old days back in New England) is used for deburring metal, enlarging holes, scraping paint or glue from hard-to-reach places and many other jobs where a sharp, hard tool is necessary. Break off an old triangular file, hollow-grind it to the shape shown and mount in a handle.—*H. Norman Capen, Granada Hills, Calif.*

Table-saw tenons

This method for cutting tenons on the table saw uses two blades with spacers between. The beauty of this system is that the tenon thickness is "locked in" and does not depend on variables such as stock thickness or pressure against the fence.

I keep a pair of special hollow-ground blades for tenon work. They are jointed as a pair and filed for ripping. Since the hub and tooth thickness are the same, cutting a $\frac{5}{16}$-in.



tenon, for example, simply requires mounting the two blades with a ¼-in. and a 1/16-in. spacer between. My set of custom-machined spacers are 2½-in. discs drilled to slip over the saw arbor. Spacer thicknesses range from ¼ in. to 0.005 in. To pass the work through the blades, I use a standard miter gauge tracked in a plywood fence as shown above. This approach eliminates vertical rocking and thus is safer and more accurate than other methods.

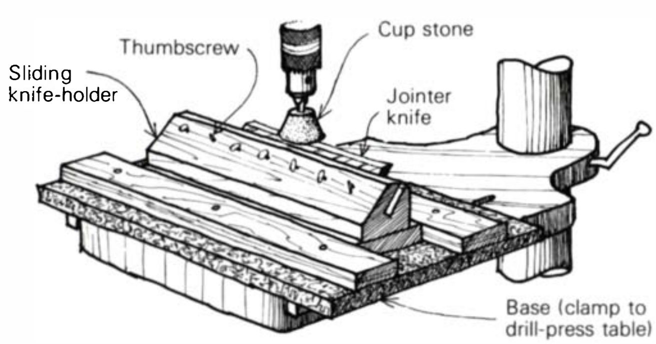
—Mac Campbell, Harvey Station, N.B., Canada

Sharpening jointer knives

Here is a jointer-knife sharpening jig that saves money, eliminates frustrating at-the-sharpening-shop delays and gives the woodworker a bit more independence. The jig, used with a drill press and cup stone, consists of a ¾-in. plywood or particle-board base and a sliding knife-holder. The holder, slotted to accept the jointer knife at the right sharpening angle, slides in an accurately sized channel in the base. Several thumbscrews, tightened in threaded holes, threaded inserts or *T*-nuts, lock the knife in the holder slot during grinding. (To tap wood, drill pilot holes, use a tapered tap and back the tap out often; maple and other hardwoods tap about like hard brass and hold as well.)

To use the fixture, chuck a medium-grit 1½-in. cup stone (contact Norton Co., 1 New Bond St., Worcester, Mass. 01606 for distributors) in the drill press. True the stone if necessary (I use an old masonry blade). Then clamp the base in position on the drill-press table so the knife and stone are aligned as shown in the sketch. Lower the quill until the stone barely touches the knife, lock the quill and grind the knife by sliding the holder under the stone. Lower the quill a bit and grind again. Repeat this operation until all nicks have disappeared. When the final depth is reached on the first knife, set the drill-press stop to preserve the setting for sharpening the second and third knives.

To avoid warping the knife by heating unevenly, take light cuts, move the holder smoothly and use plenty of thumb-



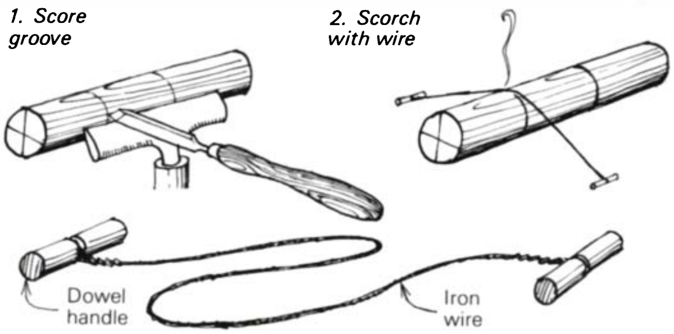
screws to lock the knife in the holder. Long knives are especially prone to warping, so mist them or let them cool between passes. —*James E. Gier, Mesa, Ariz.*

Decorating turned goods

To produce decorative black rings on tool handles and other lathe work, twist a dowel peg handle on each end of a 12-in. long piece of soft iron wire. Any medium-gauge wire will do.

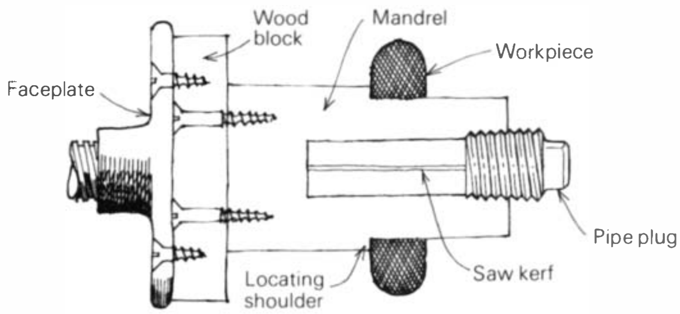
To use, scribe a shallow starting groove in the work with the point of a skew. Then press the wire against the starting groove. In five or ten seconds friction will generate enough heat to scorch the groove. The resulting fine black ring, sparingly used, gives a tasteful decorative effect.

—*Larry Joseph, Alva, Okla.*



Turning ringed objects

An effective mandrel for turning napkin rings and other annular objects can be made as follows. Choose a suitable hardwood (such as hard maple) and mount the wood to the faceplate with the grain oriented perpendicular to the axis. Turn down the end of the mandrel to give a slip fit with the workpiece, leaving a larger-diameter locating shoulder on the base as shown in the sketch. Next, drill and tap the end of the mandrel for a tapered pipe plug of suitable size. First select the recommended tap drill size for the pipe thread and drill into the end of the mandrel ¾ in. or so deeper than the locating shoulder. Then tap the hole so that a pipe plug will thread in halfway. The resulting threads, though rough in appearance, are quite strong if the grain is oriented as suggested. To complete the mandrel, cut two crossed saw kerfs to the same depth as the hole.



To use, slide on the workpiece and screw the pipe plug in the hole. The plug will expand the mandrel, gripping the workpiece firmly. —*Edward F. Groh, Naperville, Ill. and Charles E. Cohn, Clarendon Hills, Ill.*

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.*

I do a lot of kitchen cabinets and have tried various finishes—in particular, polyurethane, lacquer thinned 50/50 and Watco oil followed by wax. I like both the look and the working properties of the lacquer and the oil finishes better than the polyurethane, but when I'm asked about which finish is most durable, I don't know what to say. Is there any information available on the comparative durability of these finishes? —*Claire O'Meara, Washington, D.C.*

To the best of my knowledge, there's nothing in print that deals with the kind of durability comparison you're looking for. Theoretically, a good polyurethane should be the most durable and wear-resistant because it leaves behind a thick film upon drying. Polyurethanes have a higher solids content than either lacquer or Watco oil, which means that more material is left on the surface when the solvent evaporates. However, polyurethane wouldn't be my first choice since you often run into problems of poor adhesion when refinishing with it (if refinishing is a consideration).

Lacquer (Deft) thinned 50/50 as you use it produces extremely thin coatings. I wouldn't thin it. Try using it straight from the can, brushing it so that laps and bristle marks don't show. A little thinning might be necessary, but 50/50 is way too much. Lacquer produces a good, wear-resistant finish, but you need two or three coats to build up a decent thickness. This will probably stand up as well for your purpose as polyurethane, without recoating problems if you ever have to refinish the cabinets or touch them up.

Watco oil penetrates more deeply than either polyurethane or lacquer, and builds up a protective coating in the wood rather than on the surface only. Because it helps toughen and stabilize the wood, it also delivers excellent wear resistance. I'd use at least two coats, with a couple of days drying time between. Using wax as a final treatment over Watco is a good way to give you the luster you want, though it will eventually soften and pick up fingerprints and dirt and will require cleaning and rewaxing at intervals. —*Don Newell*

Recently I tried veneering and came upon an unexpected problem—separation and splitting of the veneer sections shortly after gluing. I used Elmer's Professional Acrylic Contact Cement and followed the instructions in gluing a four-section walnut veneer to a sheet of 1⅛-in. particle-board (Novaply) core backed with a ⅛-in. three-ply doorskin. I scraped off the paper veneer tape about an hour after I rolled down the veneer. About an hour later the originally tight joints began to separate as much as 1/32 in., and cracks developed along the grain.

What went wrong? Did I use the wrong kind of glue? Did I remove the tape too soon? The veneer was slightly lumpy before gluing. Should it have been steamed and pressed flat? —*Richard E. DeSimone, Lisle, Ill.*

Because Novaply is quite stable, your problem is probably the result of the veneer shrinking rather than the substratum expanding. To solve the problem, figure out why the veneer is losing so much moisture during the first several hours following assembly. The veneer might have a fairly high moisture content in an extremely dry workshop. Was your veneer stored in a damp place such as a garage or basement?

Another source of moisture could be the adhesive itself. I'm not acquainted with the particular brand of glue you used, but it sounds like a water-base emulsion. Did the veneer tend to curl (convex to the spread side) when the adhesive was applied? Since contact cements aren't very rigid, the shrinking of the swollen veneer as the moisture gradually dissipates could cause the glue line to creep and result in open joints. I suggest rereading the instructions carefully to see if the glue is intended for solid-wood parts only. Also, try another type of adhesive and see if the trouble disappears.

—*R. Bruce Hoadley*

I do custom inlays and marquetry and want to know if there is a solvent-base glue for wood. I have no trouble with the marquetry when using Titebond (aliphatic-resin glue), but when I inlay designs in solid wood, the glue expands the veneer enough to cause buckles, even though I use a veneer press. I prefer not to use contact cement because it has no gap-filling properties. If epoxy glue is my only alternative, where can I buy it in quarts or gallons? Also, what is Scotch glue? I've read about it in marquetry books but have no idea what it is.

—*Mike C. Durbahn, Mankato, Minn.*

Many marquetarians and inlay craftsmen use epoxy (some formulas dissolve with lacquer thinner or acetone), and you can get large quantities from marine suppliers, or you can order it from Chem-Tech, 4669 Lander Road, Chagrin Falls, Ohio 44022. If you decide to use epoxy in your marquetry, it will fill gaps quite well and can be colored with aniline dyes to match the wood. Many woodworkers grind up some scraps of the wood they're using to get dust of the right color and mix it with the glue.

Elmer's Carpenter's Wood Glue seems different enough from Titebond to make it worth a shot. Or, if your shop is cold, rig up a tent over the work with light bulbs inside to keep the work warm enough for plastic-resin glue (cascamite). Your problem might be compounded by winter dryness, making the water added by the glue an important factor.

Scotch glue is hot hide glue. It's the traditional choice, but it's water-soluble. Tage Frid writes about hide glue in his article on hammer veneering (*FWW* #10, Spring '78, p. 52). You can get some feel for its characteristics without having to buy a glue pot by trying Franklin's liquid hide glue, although it's not really the same. You are wise to avoid contact cement.

I have an 8-in. jointer and am having difficulty setting the outfeed table at the proper height in relation to the knives. I try to set it so that it's in exactly the same plane as the top of the cutting arc. But sometimes the jointed edges of my boards are concave, and sometimes they're convex. Very seldom do I get a perfectly straight edge, especially on long boards. Obviously I'm doing something wrong. What is it?

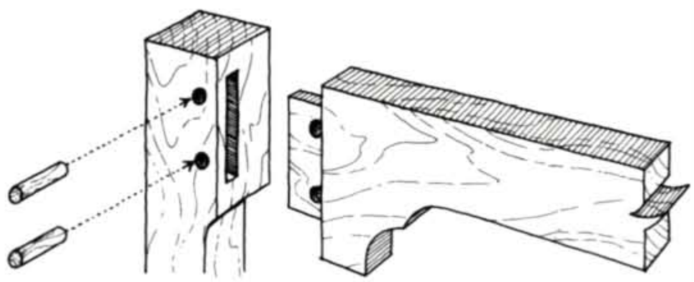
—*Larry Green, Bethel, Conn.*

To joint a perfectly straight edge on a long board requires more than a properly adjusted machine; it demands correct technique as well. You're right about the outfeed table being the same height as the knives at the top of their cut, but this adjustment can be tricky, and the slightest variation will produce a difference in the jointed surface. If the outfeed table is lower than the knives, you'll get a concave surface (a sprung joint); if the outfeed table is higher than the knives, the opposite will happen. And, even if the outfeed table is set exactly at the height of the knives, you'll get a sprung joint if the table, not locked firmly in its ways, angles down slightly from the cutterhead. In fact, one way to produce a sprung joint is to loosen the lock screw that bears against the gibs. This lets the outfeed table droop. Also, putting the proper pressure on the gibs is necessary to get a good cut.

To set the outfeed table in the right relation to the knives, get a freshly jointed board, lay it on the outfeed table and rotate the cutterhead so the knives make contact with it. If they lift the board from the table, even slightly, raise the table until the knives make tangential contact only. If you still don't get a straight edge, determine whether it's concave or convex, and raise or lower the table minutely to compensate.

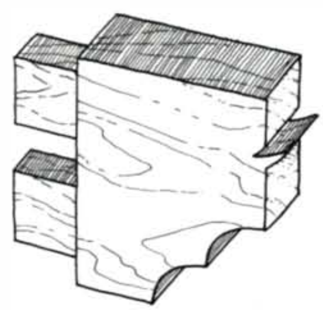
When jointing long, heavy stock, you should support the work at the outfeed end with a roller that's precisely the same height as the outfeed table. While feeding the stock, concentrate downward pressure over the outfeed table, just behind the cutterhead. Too much pressure on the work as it passes over the infeed table can produce a convex edge.

When fitting a wide, 7-in. table-apron tenon into the leg mortise, would it be better to eliminate glue and just use a couple of pins as fasteners, thus allowing for the crossgrain movement that's bound to occur in a piece this wide? If one depended solely on glue as a fastener, would not the shrinking and swelling of the tenon eventually cause the dried glue to split loose and lose its binding qualities? Also, do you know of a source for metal shrinkage plates used to fasten tabletops to carcases?



—Hal T. Bigelow, Saratoga Springs, N.Y.

Any tenon more than 5 in. wide I usually divide to minimize the effects of shrinkage and swelling. This also makes a stronger joint, as the mortise is less liable to break out. I don't recommend making a dry joint with pins because it's sure to loosen up with time.



The tabletop fasteners can be bought from Paxton-Patterson, 45 Samworth Road, Clifton, N.J. 07012, or you can make your own. See my article on tables (*FWW* #18, Sept. '79, p. 64).

—Simon Watts

Definitely, glue it. There's a better chance that the apron will split if you use only pegs. *—Tage Frid*

Why did the designers and builders of yesteryear put so many locks on their drawers, desks and cabinets? Did strangers come snooping in bedrooms more readily in the 18th century than now? Were socks and shirts and bow ties so valuable? Were people more afraid of thieves, or less able to keep their own kids and cousins out of the silverware or other private goods? Such questions arise everytime I repair some old piece with the inevitable lock on every door or drawer.

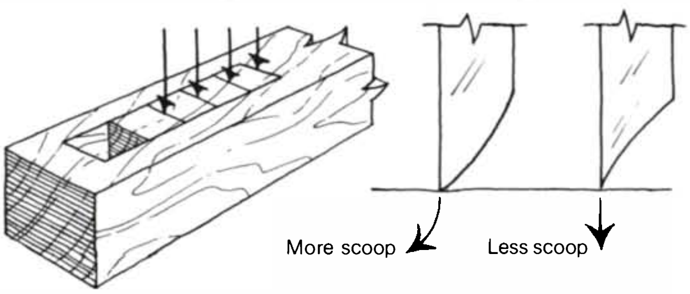
—Stephen Sidora, Albany, Calif.

A few aspects of 18th-century life contributed to the proliferation of the security devices you describe. Yes, textile goods and tableware were more valuable then; they were handmade and expensive. The finer households, whose furniture was what most was modeled after, often contained matching pieces of clothing, jewelry and arms, difficult to replace. Since houses as a whole were not so secure as today's, the furniture had to have locks. Often the keys to drawers, closets, larder and wine cellar would be kept in one drawer, and the key to that carried by the master of the house, to be passed on to servants or guests when necessary. The need for secure case furniture is one reason for dustboards; they prevented access to other drawers by forcing open only one.

I read an article in a British journal where a cabinetmaker states that a hollow grind on a mortise chisel is wrong and renders it useless. He claims that a correctly sharpened mortise chisel has a convex profile. Could you comment?

—Barry Schwartzberg, Forest Hills, N.Y.

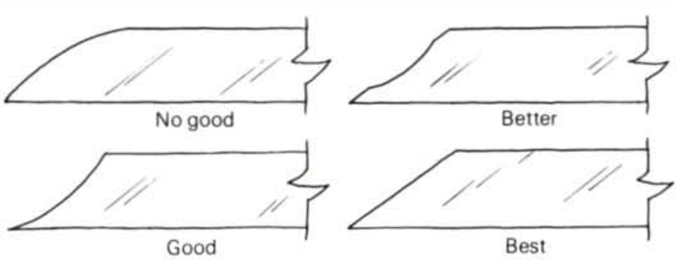
The profile of a mortise chisel can be convex, concave or straight. In any case, the angle of grinding can vary considerably, and this is of as much consequence as the profile. The grinding angle and profile, like so many decisions in working wood, will depend on the wood that's being cut, its density and the amount of waste to be removed. With a convex profile, the blade will be pushed away from the tissue. In cutting



large joints, such as those used in timber framing, there is a place for this profile. Likewise, if you want to take large bites out of the mortise with each move, then the scooping action will be assisted by the convex profile. Under either of these conditions, a hollow-ground blade is liable to break or would be less effective in its scooping action.

Now consider a ¼-in. wide, through mortise in a piece of cherry that's ½ in. thick. The hollow-ground chisel would be perfectly good for this. The chisel with the convex profile would be clumsy. In either case, a straight-ground chisel would perform well. *—Ian Kirby*

If the grind is too hollow, the chisel tip may break off.



—Frank Klausz

I'm trying to find a tool called a grinder-honer. It has interchangeable stones and a special honing speed of about 78 RPM. *I've seen some cheap, junky models of this machine, but I want one that's heavy, steady and produces little vibration. I need to hone and polish tiny tools to precise angles.*

—Stephen Litchgaren, Austin, Tex.

Oliver Machinery Co. makes a machine called an oilstone grinder. It has three speeds—1800 RPM, 700 RPM and

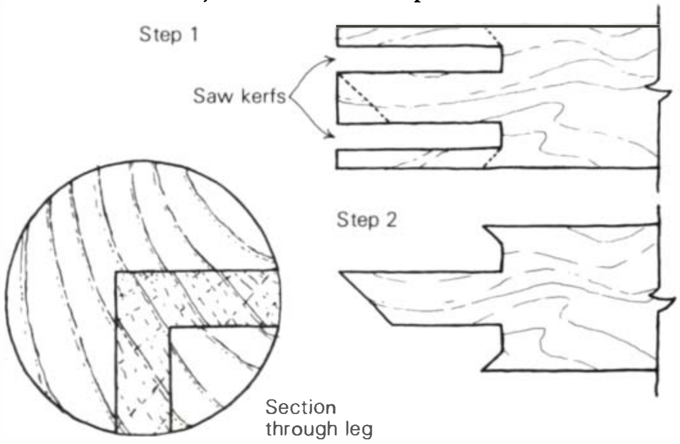
300 RPM—and can do conventional grinding as well as honing. It's also equipped with a leather stropping wheel and a special tool holder. It costs about $1,900. The address is 445 Sixth St. N.W., Grand Rapids, Mich. 49502.

—Lelon Traylor

What's the best way to join chair rails to round, slightly tapered legs? My main concern is how to use a mortise-and-tenon joint and still get a precise fit where the shoulders of the rail meet the leg. *—Fredrick Lehman, Cedar Rapids, Iowa*

The easiest way to make a tight mortise-and-tenon joint in a turned chair leg is to cut the cheeks of the tenon in the regular way and then to cut the outer edge of the shoulders in at an angle that's a little steeper than the one made by the arc of the circumference of the leg. Usually the length of leg that's involved in the joint is left untapered; otherwise, the shoulders of the tenon must be contoured appropriately. When pulled up in a clamp, the edges of the shoulders will cut into the leg. The best glue for this joint is epoxy because it will fill the small gaps left between the shoulder and the leg.

—Tage Frid



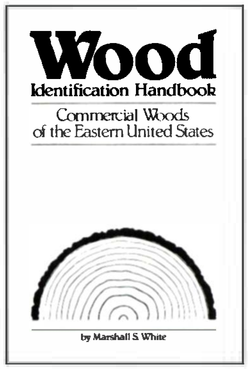
Follow-up

Re nontoxic bowl finishes *(FWW* #22, May '80, p. 24): Thank you for the recent advice on finishes for bowls. Shortly after writing you, I wrote to United Gilsonite Laboratories in Scranton, Pa., the makers of ZAR polyurethanes. I was happy to hear that ZAR is nontoxic and suitable for bowls and other food utensils. *—Thomas A. Laser, Springfield, Va.*

In reference to Frank S. Bowman's question *(FWW* #21, March '80, p. 24) about single-end tenoners: These machines are a waste of money. They are designed to perform only a very specific function in connection with the mass production of windows and doors. If you have enough quantity runs to afford the required setup time for a single-end tenoner, then you might as well buy a double-end tenoner, which will perform many more tasks much more economically. If not, stick to your table saws and shapers.

—Walter Rich, Philadelphia, Pa.

Re George Frank's reply to Michael McCann *(FWW* #22, May '80, p. 21), I congratulate Mr. Frank on his ability to develop statistics on the relative risks of being poisoned by driers and being hit by a construction crane at home. I don't know of any other source for such remarkable risk estimates. More seriously, being hit accidentally by a crane is something over



which one has little control. Being poisoned by a possible toxic drier in a salad-bowl finish, however, is completely preventable. Further, I'm not the only one concerned about the matter. A distributor of these driers also advises against using them with items in which food or drink may be served.

—Michael McCann, Center for Occupational Hazards, 5 Beekman St., New York, N.Y. 10038

Several readers have responded to the request for information about finding parts and an owner's manual for a Walker-Turner lathe, and we will send a fuzzy zerox to readers who ask for one. Rockwell Manufacturing Co. bought Walker-Turner back in the early 1950s. Some parts for Walker-Turner machines are still available; for specific information, write Rockwell Manufacturing Co., Power Tool Div., 400 North Lexington Ave., Pittsburgh, Pa. 15208.

Readers want to know:

Henley Optical Co., Reading, England, makes custom metal-bodied planes. These tools cost between $500 and $1,000. Do you know of anyone who has a set of these planes or who has tested them and can comment on their performance? Any plane that costs on the order of $1,000 must be a godsend to those working with wild-grained wood.

—Steven Goddard, West Grove, Pa.

Supplies:

—Casters and hardware for rolling library ladders: Putnam Rolling Ladder Co., 32 Howard St., New York, N.Y. 10013.
—Musical movements for over 800 melodies plus any tune for which you provide score. Special-order movements cost about $75. Write for catalog: World of Music Boxes, 412 Main St., Avon, N.J. 07719.
—Custom brass castings and furniture hardware: Bergen Point Brass Foundry, 179 W. 5th St., Bayonne, N.J. 07002.
—Another source for Japanese hand tools: Anzen Hardware and Supply, 220 E. 1st St., Los Angeles, Calif. 90012.
—Antique icebox hardware: The Renovator's Supply, 71 Northfield Rd., Millers Falls, Mass. 01349.

Readers can't find:

I'm looking for a leather embossing tool that consists of a long wooden handle and an electrically heated roller with the pattern engraved on it. I used one once that also had a dispenser for the optional use of gold-backed tape for gilded embossing. *—King Young, Highland, N.C.*

. . . measured drawings or full-size plans for a cylinder desk similar to the ones pictured in the Nov. '78 issue of *Fine Woodworking*. *—Colon McNease, Jackson, Miss.*

. . . die-stamped steel or brass hardware for old-time steamer trunks. *—John H. Mitchell, Memphis, Tenn.*

. . . decorative copper hinges that extend about 10 in. over the lid of a chest. *—Richard Riddle, Ute, Iowa*

. . . the hardware and mechanism for a desk typewriter lift. *—Lyle Pelissier, Lafayette, La.*

. . . copper hinges and other hardware items for old kitchen cupboards. *—Phil Regier, North Newton, Kan.*

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

The Dory Book by John Gardner. *International Marine Publishing Co., 21 Elm St., Camden, Maine 04843, 1978. $20 cloth, 275 pp.*

The first known reference to the dory, a flat-bottomed, keelless, lengthwise-planked small boat, is in a 1719 sea captain's report, but it wasn't until about 1870 that there were any drawings of dory lines, details, or lists of particulars that enable us to describe with certainty the precise appearance of these boats. John Gardner, a writer for *National Fisherman* magazine and teacher of boatbuilding at Mystic (Conn.) Seaport, has written extensively on the history and construction of the dory. The first half of this book traces the gradual emergence of the Bank dory, the most well-known and ubiquitous type, and devotes several chapters to the lines and specific construction procedures for building several kinds of dory. The second half of the book has plans and offsets (hull dimensions) for 23 different dories, ranging from a 10-ft. dory tender to a 32-ft. Maine river-driving batteau. The clear drawings by Sam Manning, the variety of boats presented and the detailed explanatory material make this book particularly useful to the amateur boatbuilder looking for a first project that is within his grasp, yet that also can result in a functional, salty and seaworthy traditional boat. *—Roger Barnes*

Making Musical Instruments by Irving Sloane. *E.P. Dutton, 2 Park Ave., New York, N.Y. 10016, 1978. $17.95 cloth; 159 pp.*

Irving Sloane has written several books on guitar construction and repair, but in this book he applies his talents to six other instruments—banjo, dulcimer, Hardanger fiddle, snare drum, tambourine and recorder. As far as I know, this is the only available source of detailed directions for making a banjo and Hardanger fiddle. The latter is a Norwegian folk violin that has four sympathetic strings in addition to the bowed strings, and a few other peculiarities as well. Sloane's description and illustrations are very thorough and will be interesting to anyone who wants to know more about this unusual instrument, whether or not he intends to make one.

Sloane does not have the field so completely to himself with the other four instruments, but what he has to say is worth reading. The Appalachian dulcimer is regarded as the simplest stringed instrument to make and play. The one described here, though, is a top-of-the-line model—simple as compared with banjo, guitar, or violin but still an instrument calling for the craftsman's best work.

With the two percussion instruments Sloane enters territory that has been covered previously in Jeremy Montagu's *Making Early Percussion Instruments* (Oxford University Press, 1600 Pollitt Dr., Fair Lawn, N.J. 07410; $9.95), but there is room for both of them. Sloane's lavish use of illustrations and his more expansive description of construction procedures are easier to follow than Montagu's terser treatment. Still, Montagu has some useful things to say that Sloane omits, and Montagu has a particular concern for reproducing medieval and Renaissance instruments. My greatest disappointment with Sloane's drums is that they have metal rather than wooden shells. There's nothing really wrong with that because after 1700 many drums were made with metal shells, but a description of making wooden ones would have been a valuable addition. Montagu isn't much help here either because he gives a number of general suggestions but not the

kind of hands-on description that Sloane gives for what he does include.

The chapter on the recorder is quite different from the others because Sloane does not make recorders, and he does not really tell the reader how to make a recorder either. What he does is describe very well how a recorder is made at the Dolmetsch factory in England. Once I got over a feeling of being baited and switched, I realized that the chapter is worthwhile all the same. It is always interesting to visit a large, commercial shop because some of its methods can be taken over or adapted by the small-time worker. Sloane's guided tour is the next best thing to being there. He also includes a measured full-scale drawing of a Dolmetsch alto recorder. No one should take seriously, though, the stated precision of fingerhole measurements—5.7564 mm indeed!

To sum up, it's a good book that fills a large gap in the literature. A lot of very good instruments should result from following Sloane's careful instructions. *—Trevor Robinson*

Weekend mariner Roger Barnes is art director of this magazine; Trevor Robinson, author of The Amateur Wind Instrument Maker, *is a biochemist at the University of Massachusetts.*

Events

Events listings are free but restricted to workshops, fairs, lectures and exhibitions of direct interest to woodworkers. The next deadline is July 7, for events beginning Sept. 15 to Nov. 15.

Weekend Seminars—lectures and demonstrations on bentwood lamination (Art Carpenter), solid panel cabinetmaking and hand planes (Michael Bock), dovetailing and templates (Dale Holub), limited-production techniques (Dean Santner), exotic router joinery and air tools (Jim Sweeney), inlaid wall and door treatment (Al Garvey), power and hand shaping of irregular forms (Don Braden), solutions to common errors and imperfections (Grif Okie) and tambours, decorations and finishing (Bruce McQuilkin), Aug. 22-24 and Aug. 29-31, $150, sponsored by Baulines Craftsman's Guild. Contact The Signature Gallery, 127 Clement, San Francisco 94118.

The Western Edge: Designer & Production Crafts—all media, works by California, Oregon and Washington craftsmen, July 11 to Aug. 5, Brand Library Art Galleries, Glendale, Calif.

Touch Wood 1980—juried exhibition, trade show, a "local and international celebration of the tree, forest, wood, woodworking and woodworkers," sponsored by the Ontario Woodworkers Association, Sept. 21-28. Write John Harrison, Tempo Foundation, Cavell School Route 2, Owen Sound, Ont. N4K 5N4.

1980 Convention/Exhibition—workshops, seminar, concerts, Guild of American Luthiers, July 17-20, Palace of Fine Arts, San Francisco. Write GAL, 8222 S. Park Ave., Tacoma, Wash. 98408.

Marietta College Crafts National '80—juried craft and sculpture exhibition, Nov. 1-30, Grover M. Herman Fine Arts Center, Marietta College. Slides due Sept. 13. Write MCCN '80, Arthur Howard Winer, Director, Marietta College, Marietta, Ohio 45750.

African Furniture and Household Objects—exhibit, July 3 to Aug. 3, Nelson Gallery, Atkins Museum, 4525 Oak St., Kansas City, Mo.

Steambending Hardwood—summer course taught by Michael Fortune, July 14 to Aug. 1, $180. Sheridan College, School of Crafts and Design, 1460 S. Sheridan Way, Mississauga, Ontario L5H 1Z7.

Workshops—Photographing Crafts (Doug Long), Aug. 15-16, $50; Shaker Furniture (John Kassay), Aug. 11-22, and Traditional Woodturning (Bob Brunk), Aug. 23-24, $15/workshop day. Appalachian Center for Crafts, Box 5106/TTU, Cookeville, Tenn. 38501.

Woodturning Workshop—beginning to advanced, taught by Rude Osolnik, Ray Huskey and J. F. Webber, July 24-26, $150 includes room and board. Contact James R. Hall, Industrial Arts Dept. CPO 758, Berea College, Berea, Ky. 40404.

Pacific States Craft Fair—Aug. 7-10. Fort Mason Facilities, San Francisco. American Craft Enterprises, Box 10, New Paltz, N.Y. 12561.

Boston University Certificate of Mastery 1980—exhibit, works by Tim McClelland (metals), Mary Fisher (ceramics) and Thomas Hucker (wood), July 11 to Aug. 1, Lopoukhine Nayduch Gallery, 354 Congress St., Boston.

Connecticut Contemporary Wood Furniture—work by six Connecticut craftsmen, to July 20. Farmington Valley Arts Center, Avon Park North, Avon, Conn. 06001.

Excellence in Woodworking—trade show, woodworking exhibit, Oct. 2-5, Hyatt Regency Hotel, Chicago. Write Marvin Park and Associates, 600 Talcott Rd., Park Ridge, Ill. 60068.

11th Annual Peters Valley Craft Fair—outdoor exhibit, juried, July 26-27, Peters Valley, Layton, N.J.

Out of the Woods—sculptural furniture by David Flatt and David Holmes, exhibit, July 24 to Aug. 31, Cudahy Gallery, Milwaukee Art Center, 750 N. Lincoln Memorial Dr., Milwaukee, Wis.

International Wood Carvers Congress—Aug. 1-10, Fairgrounds, Davenport, Iowa. Write Chester Salter, Great Mississippi Valley Fair, 2815 W. Locust St., Davenport, Iowa 52804.

4th International Wood Carving Exhibition—Aug. 13 to Sept. 1. Canadian National Exhibition Place, Toronto. Write Ross Farr, Canadian National Exhibition, Toronto, Ont. M6K 3C3.

2nd Annual Woodcarving Show—Oglebay Wood Carvers Guild, Aug. 2-3, White Palace, Wheeling, W. Va. Write Mary Sieber, 74 Crestview Dr., Wheeling W. Va. 26003.

1980 Annual Exposition/Competition—work by members of the Marquetry Society of America, Sept. 1-29, World Trade Center, New York, N.Y. Deadline, Aug. 15. Write Gene Weinberger, 940 N. Hamilton Ave., Lindenhurst, N.Y. 11757.

Workshops in Bending Wood—with Steve Foley. Bentwood I, basic form-building and design, June 30-July 11, $115; Bentwood II, design and construction of a piece, July 14-25, $115. Oregon School of Arts and Crafts, 8245 S.W. Barnes Rd., Portland, Ore. 97225.

Workshops—Contemporary Residential Furniture (Stephen Crump), July 14-18; Woodturning (Palmer Sharpless), July 21-25; Wood Sculpture (Gary Singleton), July 28 to Aug. 1. Cedar Lakes Crafts Center, Ripley, W. Va. 25271.

47th Annual Craftsmen's Fair—League of New Hampshire Craftsmen, Aug. 5-10, Mt. Sunapee State Park, Newbury, N.H.

World Woodworking Expo '80—international woodworking machinery and supplies show, Aug. 23-27, Georgia World Congress Center, Atlanta. Write Cahners Exposition Group, 8687 Melrose Ave., Los Angeles, Calif. 90069.

Contours in Wood—sculpture by Doug Ayers, July 19 to Aug. 16, Mindscape Gallery, 1521 Sherman Ave., Evanston, Ill..

International Woodworking Machinery and Furniture Supply Fair—Sept. 13-17, Convention Center, Louisville, Ky. Write Marvin Park and Associates, 600 Talcott Rd., Park Ridge, Ill. 60068.

Symposia—Reproduction and Restoration, with Franklin Gottshall and Alan Miller, Aug. 1-3, and Joinery: Philosophy and Practice, with Richard Kagan and Simon Watts, Aug. 22-24; $125 each. Bucks County Community College, Newtown, Pa. Write A. LeCoff, 2500 N. Lawrence, Philadelphia, Pa. 19133.

34th Annual Meeting—Forest Products Research Society, July 6-11, Sheraton-Boston Hotel, Boston. Details from Connie Walling, Forest Products Research Society, 2801 Marshall Court, Madison, Wis. 53705.

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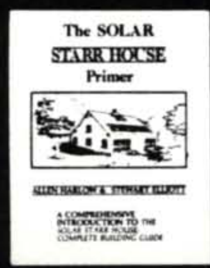

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How I Got Started

My woodworking adventures began in the woods of Bucks County, Pa. I was looking for firewood with my newly acquired chain saw, when I happened on buried treasure: a vine-covered log, about 4 ft. in diameter and 20 ft. long.

I whacked away the vines and then climbed on top, trying to figure out where to begin. It turned out to be a large crotch section of white oak. Once opened, it changed my whole life. Its figure was like a chest of jewels shimmering in the sunlight. I worked on that log for the next two weeks, sawing and dragging huge planks out of the woods. The farther into the log I got, the more I was awed at its beauty. I wondered what had happened inside that tree so long ago that made the grain twist and erupt so. Whatever guided my saw to cut those flitches right, I'll never know, but as long as someone owns the furniture I eventually learned how to make from them, that tree will never die.

The grain in that wood left an impression with me that started me on a fantastic journey. I hitch-hiked to wood shops all over Bucks County, looking at other people's work, asking for jobs, getting ideas. I sent for tool catalogs and, well, I wasn't sure what I should get first, but there was this set of chisels, and who could wait for mail order? I had never hitched to Massachusetts before, especially in a February snowstorm, but that sure was a fine set of chisels.

I finally landed a sanding job in a woodshop in New Hope, and just knew I'd be making furniture in a month or two. I sanded my way through several seasons, collecting more tools along the way. The people I met and listened to, the wood I rubbed hour after hour, the pile of fine oak sitting in my garage waiting for me—woodworking was becoming a way of life, a way of thinking and of expressing myself. I started to understand the wood and grew more confident with my projects, simple slab work, basic tables and benches.

Two years after I had cut the oak log, an incredible itch to dig in brought about a quilt box and a pair of night-stands. Since they were the first things I made from the oak, I was set on keeping them, until I spotted this 36-in. Crescent band saw in an old shop in Philadelphia. There was this big old jointer-planer too, piled with grime, lurking in the corner.

A lot has happened since those beginning years, but I still get excited about a batch of new wood or an old machine or an old tool I resurrect. I've got my own shop now, and there's this young sander who wandered in the shop one day when he was about six. His mom says he looks just like me, and he's got his eye on my chisels, too.

What made me open that log, I'm not really sure, but I'll always be glad I did. —*David Griffith, State College, Pa.*

After a year or so of collecting wood from a local sawmill, I sought out a retired wood craftsman for advice and help to make some bookshelves. After several hours of getting to know each other, I showed him my plans drawn up in half-scale. He made several comments and invited me to return to his shop when I wanted. I took a week's vacation, set up my expectations of what I wanted to accomplish, and then entered another world.

The shop, a building 35 ft. by 20 ft., was constructed during the Depression by his friends from materials that had been part of his father's lumber mill. Suspended from its ceiling and walls were thousands of jigs, patterns and leftover pieces of various projects. The tables of a jointer, table saw, shaper, drill press, band saw, and several workbenches were immaculate. He greeted me with a shy smile, and we began.

By five o'clock that day I knew that to enter his world I had to leave parts of mine. I had rough-cut all the parts for six bookcase units and in the first day I had expected to have them fine-cut and glued up to width. But the simplest crosscut seemed to take forever. The table saw needed a coat of wax; small tear-outs necessitated sharpening its blade; each piece had to be carefully clamped in a hold-down jig. By the end of the next day I had abandoned my expectations. And gradually I began to pick up his philosophy.

His first presupposition to work seemed to contradict everything I had been taught in life. To him, there was no such thing as time. "Is it 5:30 already?" he said one day. "I thought I was hungry." Then I remembered the table in his dining room which his grandfather had made: "It took all winter to make that one...They just put the carving on to pass the time away." Concentration on the immediate, doing the best one could with tool and wood, were considerations that seemed to obliterate time. "This has always been a hobby with me," he said one day. "Ever since my dad closed the shop and powered automatic machines came in, I knew that I could never make a living in wood." Whatever time it took to do anything was what time it took. Time was not counted, thoroughness was.

His second presupposition was that tools and machines did the work, not the craftsman. Thus he not only maintained a relatively objective perspective concerning a project, but he focused constant attention on maintaining and upgrading his tools. He showed me his first tool, a small hatchet from his boyhood. It looked new. He had drawers of hand tools, each kept in its original box. It was not just a matter of neatness and order; his tools did the work and they could work only as well as they were maintained.

None of these presuppositions was ever directly articulated, and the last one is the most illusive for me to reconstruct. Work, machines and tools, time and materials, all these things were to flow together naturally and he was only the catalyst to blend these components for the use of another person. "But how will I finish the set if I run out of wood?" I said one afternoon as a marginal piece of wood was rejected. "It will come," he said. "I might have some, or we will find someone who has an extra piece."

One day the door opened without a knock and I was introduced to a smiling man in his late forties. After a half hour of small talk he brought in his project, some boards to be ripped and jointed. Later I was able to talk with him alone as he told me of how the shop began during his childhood. "I was the youngest by twenty years," he said. "There were about a dozen men altogether who helped build the building, put in all the machines, tools and workbenches, even the pot-bellied stove. We each had a key. On Saturday no projects were allowed to be worked on, that was clean-up day. They're almost all gone now, except me. An awful lot of stuff has been made in this shop."

The fellow in his forties takes care of the shop now. Last December the retired craftsman passed away. I finished the bookcases his way and have made a few things since. Every time I look over my wood to begin a project, I think of his approach. He was a quiet influence.

—*John S. Naugle, Masontown, Pa.*

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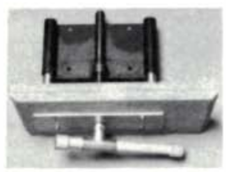

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800 bd. ft. of 160-year-old 1-side-planed clear pine. Was attic floor. Some nail holes. N. Perrin, Thetford, VT 05075.

Boice-Crane stroke sander, 7 HP, like new. R. Newman, 66 Frost Ave., Rochester, NY 14608. (716) 328-1577.

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Connections

In CONNECTIONS *we'll publish membership calls for guild-style organizations, letters from authors compiling directories of craftsmen and appeals from readers with special interests looking for others who share them.*

Furniture makers are invited to submit slides and resumes for a Midwest furniture invitational exhibition in the fall of 1980 at the Octagon Center for the Arts, Ames, Iowa. Send materials and a self-addressed stamped envelope to Martha Benson, The Octagon Center for the Arts, 427 Douglas, Ames, Iowa 50010.

I am preparing to write a book about woodworking with children ages 4 to 14, focusing on craft rather than industrial arts or career education. During the 1980-81 school year I would like to visit teachers who have developed creative woodworking programs. If you would like to share your experiences, write Richard Starr, Thetford Center, Vt. 05075.

I am organizing a trip for 15 woodworkers to a village in southern China, including a visit to local furniture shops and a chance to learn local techniques. The two-week tour will take place early in January 1981; the cost will be around $2,100. Write Robert Ghelerter, 1411 Cypress, Berkeley, Calif. 94703.

Woodworkers are invited to submit slides (three views and two details of each piece) for a juried turned object show that will open in Philadelphia in the fall of 1980, then tour the U.S. and Canada. Entry fee, $5; slides will not be returned. The best sculpture, furniture and bowl each wins a $500 award. Contact A. LeCoff, 2500 N. Lawrence St., Philadelphia, Pa. 19133.

Lovers of wood and woodworking are invited to attend the next meeting of the Baltimore-Washington Woodworkers Guild. For details, send a self-addressed stamped envelope to Arthur Breton, 1133 William St., Baltimore, Md. 21230.

The American Shipcarvers Guild, founded in 1976 to foster woodcarving as an art, promotes teaching of carving techniques and encourages good fellowship. Membership is open, and the guild certifies carvers on five proficiency levels from apprentice to master carver. Write John H. Davies, Box 482, Camden, Maine 04843.

The Georgia Woodworker is a new organization formed in order to offer a weekend seminar once a month on the woodworking arts. Each seminar will feature lecture, demonstration and discussion with a master craftsman; enrollment is limited to 25. Contact Herb Teeple, 5015 Spalding Dr. N.E., Atlanta, Ga. 30360. Phone (404) 394-5784.

A week-long trip to England is planned for November 1980 to visit the Woodworker Show in London, with an optional extra three days to tour John Makepeace's studio in Dorset, The London College of Furniture, the American Museum in Bath and the Pinto collection in Birmingham. Limit: 40 people. Details from Russ Zimmerman, RFD 3, Box 57A, Putney, Vt. 05346.

The Society of American Woodworkers is sponsoring a conference, Wood '80, July 25-27 at the State University of New York, Purchase. For information about SAWW or the conference, write Ken Strickland, Visual Arts Dept., SUNY, Purchase, N.Y. 10577.

PUBLISHER'S NOTE: The introduction of *Fine Homebuilding* magazine announced in our May issue has been postponed until late this year to give us more time to prepare. Readers of *Fine Woodworking* will of course be given a chance to be charter subscribers.

Walnut pieces for grips, inlays, etc. List, 50¢ and SASE. Larson, 1800 Shade's Cliff, Jasper, AL 35501.

Complete shop of almost new woodworking machinery for sale. Heavy-duty but all equipped with single-phase motors. Send for list. Arthur Reed, 112 Rosewell Meadow, DeWitt, NY 13214.

Stanley #55 complete in original box with instructions. Never used. $350. J. Marshall, Box 306, Winona P.O., Ontario, Canada. (416) 643-3459.

Stanley #45, new condition, never used. In original box with 23 cutters and manual. $225. R. J. Schaefer, RR 1, Box 66, Shakopee, MN 55379. (612) 445-4340, evenings.

Lurem C26 multipurpose woodworking machine, new condition. Cost $4,500, sell for $2,500. Huntington Station, NY. (516) 427-9710.

Rockwell thickness planer, 13x6. Rolf Gorlan, 27 Fifth Ave., Newburgh, NY 12550.

Wanted to Buy

Information regarding manual, parts, accessories, etc. for a Walker-Turner lathe. G. Dease, Site 11, Box 82, RR 2, Windsor Jct., N.S., Canada B0N 2V0.

4-in. by 12-in. planer, Red Fox by Partington, Inc., Cincinnati, Ohio. B. Bunker, Box 295, Franconia, NH 03580.

Accessories for Walker-Turner lathe: tool rest, tailstock, faceplates. J. P. Emmett, 1345-B El Caminito Pl., Tucson, AZ 85705.

Left-handed Milwaukee or Porter-Cable circular saw. B. Williams, 50 Harbord St., Toronto, Ont., Canada. (416) 979-2592 (collect).

Stanley #65 block plane in good condition, Newman, 66 Frost Ave., Rochester, NY 14608. (716) 328-1577.

Thickness sander-Drum sander, used. D. Hartmann, Rt. 1, Box 172, Murphysboro, IL 62966. (618) 684-6614.

Record 044 plough and Record 050 combi., all cutters, 1930s-40s vintage, prime condition. Call collect evenings after 6 p.m. PST and weekends: (213) 547-0010.

Trade—Lion mitre trimmer for 6-in. by 48-in. wood lathe, heavy-duty ball bearing; also planer-jointer. W. Buffington, Zearing, IA 50278.

Manual on J.D. Wallace combination woodworking equipment. Copies okay. L. Woodward, 20007 Drasin Dr., Canyon Country, CA 91351.

SITUATIONS WANTED

Experienced woodworker seeks apprentice custom furniture position with master. I.I.E.A. top state honors. Will relocate small town. Neil J. Davaz, Box 129, Priest River, ID 83856.

Serious experienced cabinetmaker tired of routine cabinetry desires challenging quality position where he can learn art of aesthetic furniture making. Keith, 1318 E. Willetta, Phoenix, AZ 85006.

Woodworker with tools seeks work in one-of-a-kind, limited-production shop. 5 years experience in same. Hudson Valley or w. Mass. areas. Jack Kavana, Owega Hill, Dryden, NY 13053.

Seeking furniture/cabinetmaking apprenticeship, interested in a career. Have basic skills and tools, will relocate. Celia A. Szczesny, 311 Pine, Rochester, MI 48063. (313) 652-2684.

Furniture/cabinetmaker apprenticeship or work in restoration sought anywhere in New England or New York. Mature, some experience, have tools. Anthony Melino, 89 Wisdom Ave., Providence, RI 02908.

I would like to meet a woodturner in N.Y.C. area for instruction and/or part-time work. Call Joel, (516) 651-4427.

Rent-free 2-bedroom apt. and large studio in northern Maine coastal village in exchange for some work on rest of building. Person(s) willing to make a commitment. Call Rick Snyderman, (207) 497-2450.

RISD-trained woodworker seeks use of shop once a week in Wash. DC area. Will pay & share my tools. Call Ken Rivkin, (202) 547-4319.

The CLASSIFIED rate is $3 per word, minimum ad 15 words. Payment must accompany order. The WOOD & TOOL EXCHANGE and SITUATIONS WANTED rate is $2 per line, minimum three lines, maximum six lines, limit two insertions per year. Allow 30 letters or spaces per line, including name and address. The Wood & Tool Exchange and Situations are for private use by individuals only. Commercial accounts must use Classified. Please inquire for DISPLAY CLASSIFIED rate. Send to: The Taunton Press, Advertising Dept., Box 355, Newtown, CT 06470. Deadline for ads is the 25th of the third month preceding publication date.

In Search of Period Furniture Makers

What they do about what the 'old guys' did

by Rick Mastelli

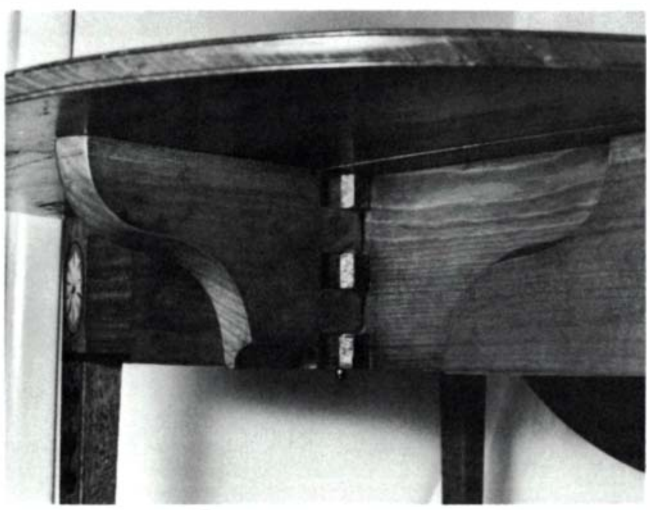
About a year ago we received a letter from a reader, Grover W. Floyd II of Knoxville, Tenn., telling about the cabinetmaker with whom he had been studying, whom he believed to be "among the nation's finest." The letter included a newspaper clipping about Robert G. Emmett, 77, quoting him as having promised himself, "If I ever got to touch a piece of Goddard furniture, I never would wash my hands. But now I have seen the back of a genuine Goddard piece and its drawers. And I wash my hands. My construction is better."

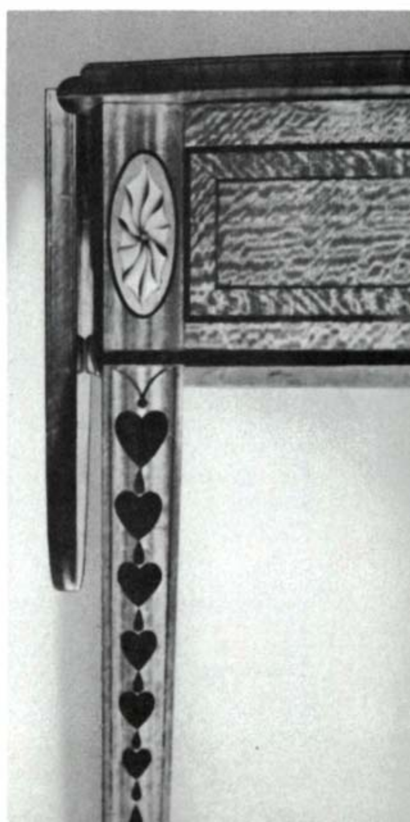
It wasn't long before I had arranged a trip to Knoxville to meet Emmett and to see his furniture. The visit turned out to be the start of an odyssey—to the back rooms of museums, to historic sites and to the shops of reproduction cabinetmakers, all to gain a perspective on what Emmett was to show me. Here he was declaring his furniture construction to be better than that of 18th-century master craftsmen, to be "second to none in the world."

I met Floyd first, a 29-year-old Scotsman who works out of a 500-sq. ft. shop, modestly equipped with the basic machines, all kept in faultless tune. When I arrived he was at the table saw, stacking and slicing arrowhead inlay banding 1/10 in. thick, practicing a technique he had learned from Emmett. He showed me a number of simple blanket chests, identical in design but of different sizes—experiments in proportion. Floyd is a professional cabinetmaker who earns his living restoring and building traditional furniture. But since he met Emmett, he's considered himself a student. He brought me to meet the teacher.

Even at 77 Emmett retains a full head of white hair, neatly parted and laid down. Along with his mustache, it frames a face styled in the 1920s, aged, but well kept. He talked of his future, for which he was "hoping to put a little something away," and of his desire to share what he'd learned, to help revive the making of American furniture. And he talked of his past: "The main thing is the construction. I've gone into that deeper than any man ever has. I've lived furniture. I've dreamed it. My poor wife: a widow all these years."

The furniture he showed me did not belie the devotion he claimed. There's a Pembroke table, among ten he made in the early 1940s in a number of different woods, most of them inlaid, some simply banded, others with shells or bleeding hearts. The construction, Emmett points out, is exceptional. The width of the tabletop is marginally oversized for the skirt, so shrinkage across the grain, between the rule joints, will not stop the leaves from dropping free. The rule joints themselves are cut over an arc slightly greater than 90°, to ensure that there is no space when the leaves are down through which to see the hinges. The knuckle joint for the leaf support stops its swing at two points instead of one. This prevents the support from acting as a lever and breaking out the pivot pin. Also the joint is cut and the pin is driven not quite plumb, but canted, so the leaf support swings slightly up. This ensures, in





Emmett's Pembroke table is solid satinwood with maple and pine secondary wood and vermilion, holly and ebony inlay. The rule joint, right, is cut over an arc greater than 90° to keep the hinges concealed when the leaf is down. The leaf rests 1/4 in. away from the skirt on a wooden button, which can be shaved down as the top shrinks to ensure that the leaf will rest always perpendicular. The knuckle joint of the leaf support, center, is not rounded, as is traditional, but square-sectioned, so in swinging open, the knuckles are stopped at two points. One is at the far side of the support, against the outside of the skirt; the other is in mortises cut in the skirt. These two stops keep the leaf support from acting as a lever to break out the pivot pin.

spite of seasonal dimensional changes, that the leaf can always be supported exactly level with the center section of the tabletop.

Such careful attention to details characterizes all the work he shows me. He learned, he says, by repairing older pieces in his father's antique shop, correcting the consequences of flaws in construction. "I got so tired of repairing cracked knuckle joints and having to leave drop-leaf tables with their leaves up because they wouldn't set down straight—there ain't nothing you can do about that once the top shrinks, except rebuild the whole bottom or the whole top—that I resolved never to build anything that won't last right. I don't care if nobody built things this way before. Those old guys give me a lot in the way of design and styling, I can't beat that. But their construction, I take what they give me and go on from there." He details his experience with American antiques: the sides of highboys and lowboys, cracked because they were glued crossgrain to the leg posts; bracket feet cracked or missing because they were glued crossgrain to support blocking; drawers protruding or stuck shut because carcases have twisted; drawers broken apart because stylishly thin dovetail pins didn't hold.

For 21 years, Emmett was the salaried cabinetmaker of a wealthy Knoxville family. His patron provided almost unlimited facilities, choice woods, and put minimal constraints on time or cost. "They would come to me with a picture of a Philadelphia highboy or a Goddard-Townsend kneehole and say, 'Robert, make me one of these.' And I'd study up on it and figure out how to make it, and sometimes a year or so later I'd have the piece done."

I left Emmett's shop with photos of his work and a list of preoccupying questions. How could 18th-century cabinetmakers have conceived such sophisticated designs and not have figured that wood moves, or not have known that if glued crossgrain it will crack? Did they know and not care? Or was Emmett wrong: were only the shoddy pieces built this way? Is it true that most 18th-century pieces have structural problems? And if so, what about craftsmen reproducing those pieces today? In pursuit of stylistic authenticity, do they imitate faulty constructions? Or do other reproduction cabinetmakers share Emmett's devotion to improving construction?

* * *

Emmett's reproduction of the Townsend-Goddard kneehole bureau (front cover and next page) posed the most intriguing questions. Built on an independent, full-blind dovetailed bracket-foot frame, with half sliding-dovetailed dustboards, the blocking and shells carved from solid curly cherry, the reproduction begged comparison with its source. Could the original be anything like this tour-de-force? I arranged to meet with Pat Kane, curator of American decorative arts at the Yale University Art Gallery in New Haven, Conn., where a Newport kneehole resides. Yale's Garvan collection includes some of the best American 18th-century furniture and indeed, as we walk past them, I notice many of the highboys, lowboys and secretaries have split sides and cracked feet.

The kneehole bureau, dated 1755-1785, is of Honduras mahogany, dark with stain and patina. Thus the first impression it makes is quite different from Emmett's curly cherry reproduction, which seems fairly on fire with color and figure. The Newport blockfront sits dark and quiet on its pedestal, its kneehole like a cave. Its age is evident from the way it has worn and settled into itself. It has dignity. The drawer insides

Detail of Newport kneehole bureau in the Garvan collection at the Yale University Art Gallery (top) and of Emmett's reproduction (bottom). Other photos of these pieces appear on the front cover.

are a greyed, mild-grained tulip poplar, in striking contrast to Emmett's shimmering blistered poplar. But it isn't just the materials or their newness that makes Emmett's blockfront the more assertive. Comparing the original closely with the photos I have brought from Knoxville, I see that Emmett's carving is simpler, his shaping bolder, his reliefs sharper. At the periphery of the concave shell, Emmett's carved line approaches a zigzag, punctuated with *V*-grooves not present in the Newport shell, which curves more gently in and out. Emmett's ogee foot bulges emphatically, and his moldings are heavier. The effect is surreal. Emmett's piece seems to take the original design and say "THIS is what I am."

I ask Kane what she thinks of Emmett's work. It is masterful, she says, but overdone. She prefers the original blockfront. I ask if she knows of any 18th-century blockfronts with carved shells and elaborate molding in such a highly figured, difficult wood as curly cherry. Maybe some Connecticut piece, she says, but probably not: 18th-century craftsmen did not usually model highly figured wood, they rather displayed it in flat surfaces, as in highboy drawers.

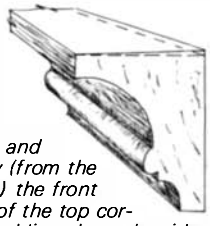
I point out the construction of Emmett's piece. She's never seen a full-blind-dovetailed bracket foot, sometimes a splined miter, but generally the bracket pieces are simply mitered together with a glue block behind. The direction of the glue block's grain? Vertical, perpendicular to the grain of the bracket pieces. Does she encounter many cracked and broken bracket feet? Yes, it's quite common. How about drawer dividers, are they full dustboards, half-dovetailed into the carcase side? Hardly; it's usually only Philadelphia pieces (later I find out it's Williamsburg pieces too) that include full dustboards, usually dadoed into the sides. The blocking—is it applied or carved from the solid? The blocking is usually solid,

My Construction of a Newport Kneehole Bureau

The first Goddard-Townsend kneehole bureau I saw was in *The Magazine Antiques* in May, 1922. I fell in love with this wonderful design but did not get to build it until 1963—good thing, for in the twenties I would have made a mess of it. In 1938, on a trip to the lumberyard, I came across a pile of curly cherry boards, aged and rich, 12 in. or 14 in. wide by 16 ft. long. I was so excited, I carried 100 ft. of that wood out of there myself; honestly I don't think I could have lifted it if it hadn't been curly. It was that wood I eventually used for my kneehole bureau. By 1963 I had seen a few other photos of kneeholes, but I never managed to get more than three dimensions: 34 in. high by 20 in. deep by 37 in. wide. I didn't know if that last measurement was to the edge of the top or to the edge of the carcase, and I'd never seen anything but the front of one of these pieces. I know what I built isn't exactly like the original, but I spent enough years trying to imitate the construction and workmanship of the old masters to know of their shortcomings. I hope what I've done can be seen as continuing where they left off. *—Robert Emmett*

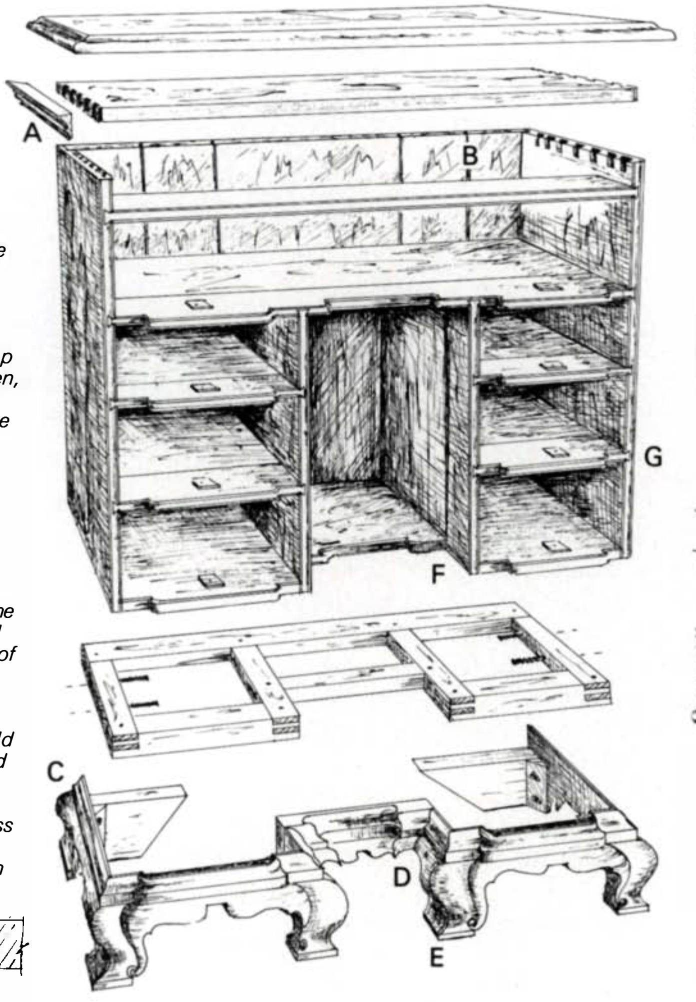
The half-blind dovetails between the pine subtop and the carcase side could as well be through dovetails, because the molding would cover the joint; except I find it easier to make a good, square case if the opposite boards are the same size. I clamp them together and run them over the jointer, end grain first, then edge grain to clean up any tear-out.

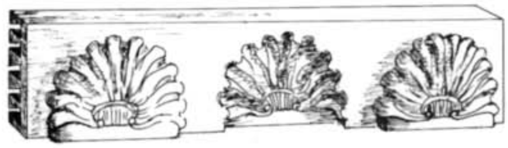
I make my dovetails and pins equal size because I got tired of repairing drawerfronts with those thin pins that break out. I cut the sides of my tails on the table saw set at 22°; then I chisel the waste and the pins. All of these drawer fronts and the kneehole door are solid curly cherry; the top drawer front is carved from 12/4 stock. Most carvers prefer to use straight-grained woods, but I love figured wood too much to avoid it just because it's difficult to work.



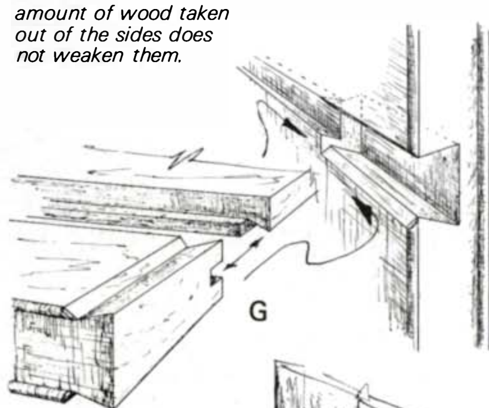
I glue and screw (from the inside) the front 2 in. of the top corner molding along the sides of the case. From here to the back I slot-screw, so the crossgrain carcase side can move without cracking. I relieve the top face of the molding so it contacts the top only at the outside edge. Then, when the top is screwed on from underneath, through the subtop, the seam between molding and top is tight.

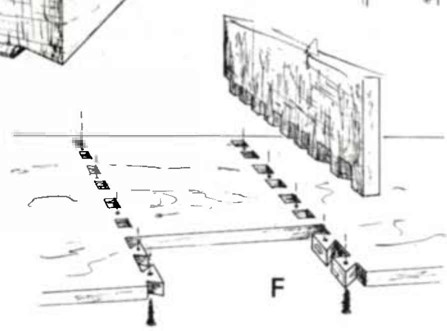
The subframe is of pine, finger-jointed and through-tenoned where those joints won't show. Because this bureau was to be placed in front of French doors, and the back would be visible, I used cherry for the back member of the subframe, stub-tenoned the interior frame members and half-blind finger-jointed the corners so the back would look neat. I also quirk-beaded and shiplapped the cherry backboards, screwing them into the dustboards with brass screws on one side of each board, leaving room for them to expand and contract.

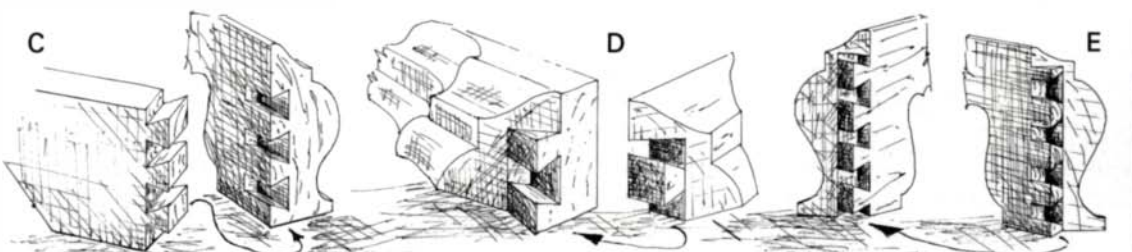


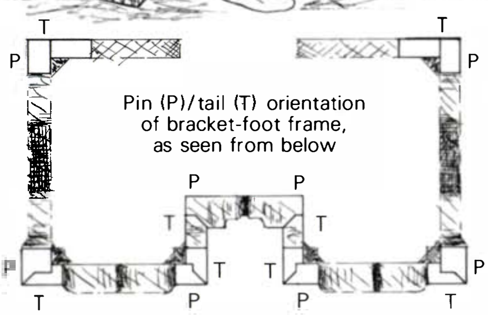


I use full, thin dustboards, half-dovetailed to the sides all the way to the back of the case to help hold it together. I make this joint shallower than the full dovetails of the drawer dividers so the amount of wood taken out of the sides does not weaken them.









The bracket-foot frame is made of nine pieces of wood, all full-blind dovetailed together, except for the back, which is half-blind dovetailed. In making this bureau, I figured out which end of each piece should be tails and which pins so that I could start in the middle at the back of the kneehole and fit each joint tight as I built the frame around to the back (diagram, left). In the back of each bracket-foot joint, I glue and screw a glue block, its grain running parallel to the foot itself. The subframe gets glued and screwed to the bracket-foot frame (the grain of the adjoining parts goes in the same direction) and the subframe is slot-screwed to the carcase bottom. Thus, there is no applied base molding running crossgrain to the carcase sides.

but the convex shells are applied. Kane says yes, these particular shells have held up well; she has seen some cracked.

Visiting a museum with the curator at your side is a wonderful opportunity. It's my first chance to see the inside, back and bottom of a famous piece of furniture, and, naively, I am taken with how mundane it is. The boards are roughsawn, unfinished; the numbered drawers and the word "upper" scrawled on the upper drawer divider attest to the piece's real-shop origin. Galleries today display contemporary furniture, whose undersides are finished with the same preciousness as their faces. (Emmett's, in that sense, is contemporary furniture.) It's good to know a great piece of furniture can have its back nailed on. But it's not so good to know that beneath the finely worked face are some unquestionably troublesome constructions. Not only are the glue blocks running crossgrain to the bracket-foot members, but the bracket feet themselves aren't even attached to the carcase. They're attached to the moldings, outside the line of gravity of the carcase. And the molding is merely nailed (on the side, crossgrain) to the carcase. I can't understand how the thing is standing there, until I realize it's resting on its glue blocks. No wonder the feet are so vulnerable, they're only molding.

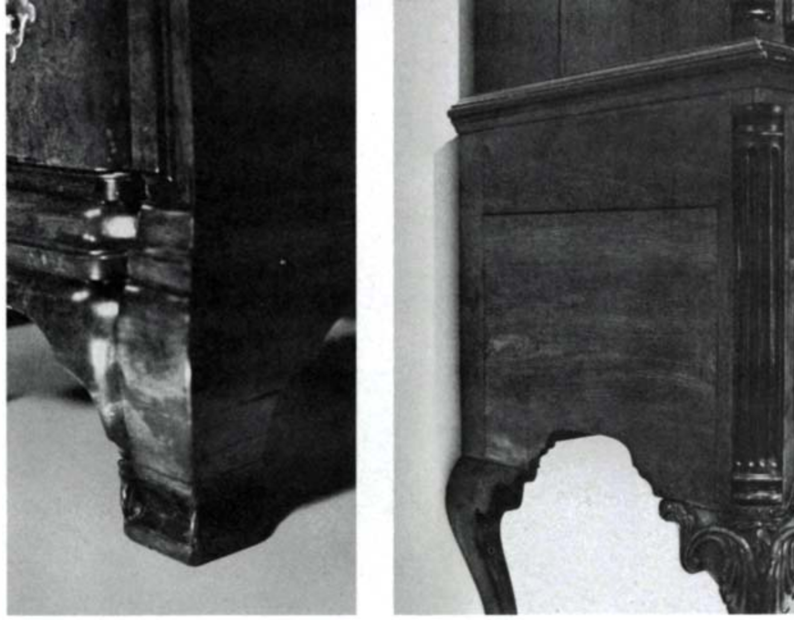
I leave Yale understanding better why Emmett got absorbed in redesigning traditional construction, and I sense too how the inner strength of his pieces came to be reflected in their faces. Nonetheless, I need to know about 18th-century furniture makers: What did these inconsistencies in construction mean to them? I arrange to meet with Robert Trent, research associate, and Robert Walker, furniture restorer, both at the Boston Museum of Fine Arts.

* * *

The kneehole bureau at the Museum of Fine Arts is by Edmund Townsend (1736-1811), a grandson of Solomon, the progenitor of 13 Townsend cabinetmakers. With the seven Goddard cabinetmakers, related to the Townsends by marriage, they produced the remarkably consistent, well-developed Newport style. This kneehole is mahogany, like the one at Yale, though the grain is more rowed. The curves, however, are less pronounced, and there is almost as much difference in composure between this blockfront and the one at Yale as there is between the Yale blockfront and Emmett's. These convex shells are almost perfect domes, with only the barest undulation at the periphery. The beading is softer. The ogee foot is straighter. The brasses are more sedate. The construction is virtually the same as in the Yale blockfront.

When I show my photographs and drawings of Emmett's blockfront to Trent and Walker, they hear me out. Finally, Trent says, "Well that's fine, but it looks like he's building a suspension bridge.... There's no question that it's possible to improve upon the designs, but what people appreciate about the old stuff is the fact that it was produced under pressure and with a commitment to making a profit. It's the deftness of it—getting an effect with a reasonable input of time and money. I know there were wealthy people supporting the Townsend-Goddard shops, but it was still a business."

What about the structural weaknesses in the design, I ask. "I don't think those are structural problems," says Walker, "I think those are atmospheric problems. People say to me, 'I've got this foot that keeps dropping off my chair. What can I do about it?' They're asking the wrong question. They should be asking, 'What should I do about the *environment* that my chair is in? What do I do to control it?' "



Bracket feet and highboy side cracked because of crossgrain construction. Courtesy Yale University Art Gallery, Garvan collection.

I was to hear this argument again from other curators and furniture restorers. Wallace Gusler (p. 50) at Colonial Williamsburg in Virginia told me most problems with 18th-century furniture are 20th-century problems. Insulated homes with central heating have created a significantly drier winter environment for furniture than was so for the first 150 years of its existence. Cabinetmakers 200 years ago did not have to deal with today's extremes of wood movement. But this only points the question: If you were reproducing an 18th-century piece today, would it make any sense to duplicate constructions that have become inadequate? "Not at all," answered Trent, "but Emmett isn't simply eliminating weaknesses here, he's souping this thing up; it's become a showpiece, a jewel. It's modern furniture, and I don't see how it's economically realistic."

Are structural shortcomings compromises, then, with economic reality? Trent continues, "People talk as if 18th-century cabinetmakers were building pieces of architecture that were going to last forever, and that's not what they were trying to do. I don't think they had any interest beyond the gen-

Newport kneehole bureau, circa 1770, by Edmund Townsend. Courtesy Museum of Fine Arts, Boston; Karolik collection.

Left, Gerald Curry's reproduction of a Queen Anne highboy in walnut. Right, Douglas Campbell at his tenoner made from a Sears table saw. The extension table is hinged at the far end of the main table and is raised and lowered by a threaded rod. On this swinging table is mounted a 1-HP motor belted to a saw arbor. Both this arbor and the saw's regular one are fitted with plywood blades (to cut the tenon shoulders) and a Sears molding head with straight knives (to waste the wood and produce the cheeks). With a miter gauge and an angle block, Campbell's tenoner can quickly make the double-angled tenons on traditional chair stretchers.

eration it was owned in, and, of course, most of the pieces didn't last more than a couple of generations."

I leave Boston beginning to realize the variety of attitudes possible toward making period furniture. But if Emmett's work is unrealistic, what, according to cabinetmakers who earn their livings building reproductions, is realistic?

* * *

For four years, Gerald Curry has run a one-man reproduction shop in Auburn, Maine. He's built a stable business in part by paying attention to promotion. He advertises, and answers inquiries with a 20-page catalog of Queen Anne and Chippendale furniture. In it Curry writes about the authenticity of working mainly with hand tools, and about the concentration and harmony afforded by working alone on one piece at a time. It is an attractive and—to people contemplating parting with $3,000 for a reproduction—a reassuring presentation.

I am a little surprised, then, when I drive up to his shop, which has neither sign nor showroom. It is a barn with gate doors and a noisy gas heater. The machines are few and simple: a 6-in. jointer, a Sears shaper, no thickness planer. Curry began woodworking as a finish carpenter in Boston; then he did commercial and domestic installations. Wanting to do "something nicer" than kitchen cabinets, he haunted the Museum of Fine Arts to learn about proportion and what makes a good piece good. "At first," he says, "I went to furniture stores. That's where a lot of people go wrong. They look at pieces two or three times removed from the originals. Many reproductions are composites. Proportions, detailing, construction don't have much to do with what they originally were. When I do a reproduction I try to make it as authentic and exact as possible, but I know 1980 slips in."

We look at a Queen Anne highboy in walnut (above), almost finished. The molding, upon close inspection, retains the uniformity of the router and shaper. The flat surfaces, though hand-planed, are sanded fine and sealed with a contemporary oil/varnish mix. How does this compare with his usual work? "Usually I talk to people for quite a while before beginning a piece. Different people want different things. The guy I'm making this highboy for is used to 20th-century perfection—smooth, machined surfaces, no rough edges. I'm talking with another fellow about a similar piece and he's very concerned that the drawer bottoms and inside be left rough-planed. He likes the idea of its being obviously handmade." I ask why people buy reproductions. "I get people sending me photographs of museum pieces or advertisements from antique dealers. This Queen Anne highboy, for instance: The original is priced at $30,000. I'm doing this reproduction for $3,500. And it's a more usable piece. The one in the advertisement has problems. The side is cracked, it's missing a brass, it needs restoration work that may cost as much as this piece new. And how can you feel comfortable using a piece of furniture that costs $30,000? I know I wouldn't."

I show Curry my talisman, the pictures and construction drawings of Emmett's curly cherry kneehole bureau. Curry nods; he is well aware that many of the pieces he copies have construction problems. Emmett's improvements make sense, but Curry can't expect his customers to pay for full-blind dovetailed bracket feet.

* * *

In search of reproduction cabinetmakers the name Douglas Campbell kept coming up. Campbell recently moved to Newport, R.I., having turned to cabinetmaking 20 years ago at age 30, when, for health, he had to quit salvage diving. Three years ago he was in Denmark, Maine, employing eight men, drying wood in his own kiln and turning out a dozen pieces a week. ("I've got nothing against Grand Rapids," he told me. "If it weren't for Grand Rapids, you and I wouldn't have anything to sit on.") His business was doing well, except that Maine is far away from most potential customers. An accessible shop and showroom were in order.

Campbell found that Newport, with a history of 18th-century prosperity and turn-of-this-century affluence, still attracts people with money. Now he makes $1,000 worth of furniture a week, working by himself. With a year's work on order, he's looking to open a larger shop, and wishing business might ease up a little in the meantime.

Campbell is the sort of fellow who can grin at you and say, "I don't fool around." He's learned to work fast, he tells me, out of desperation. "It's making things work that buys the groceries. No matter how cute some people want to be, it doesn't mean anything until you sell the piece. That's how you get the opportunity to make another. . . . When I started out I knew nothing about woodworking. I bought a hundred dollars worth of old hand tools, and it was ridiculous. I worked so hard—hand-planing sugar maple boards four sides—it was pathetic. I still don't have a decent hand plane. But that's all right. I don't use them anymore."

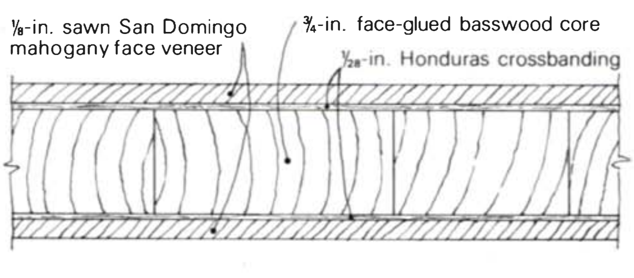
Campbell's work, though built fast, is not unsound. His joints are mortise and tenon ("I have dowels I bought 20 years ago; I don't use dowels"). He stabs out his mortises with a hollow-chisel mortiser ("I hope I never have to cut them any other way"), and he cuts tenons on a tenoner home built from a Sears table saw. I ask Campbell how he feels about working in fabled Newport, just three blocks from where the building that housed John Townsend's shop still stands and eight blocks from John Goddard's. "I don't mind a bit," he says. "Oh, I read up on them some, but it was a business. Most of what you learn isn't anything to dream on. I was reading how John Goddard was finishing a piece—it was on order—and someone walked in off the street *with cash*, and he sold it to him, right there. Now that makes sense to me; I'd do that if I needed the money."

I debate whether there is any point in showing Campbell my pictures of Emmett's work. There is a reproduction of a Newport blockfront in his showroom. Its construction follows the original, though the joinery and detailing are coarser. The top drawer is that of a butler's desk: the front unlatches and hinges down, revealing a writing surface and pigeonhole gallery—a lucrative idea, Campbell points out. "You could do well converting chests of drawers to butler's desks. All you'd have to do is have your customer send you the top drawer of his chest, and you could copy the materials, dimensions and finish." I ask if he's built any kneehole bureaus. He has. Does he like them? "Actually," he says, "I hate the looks of the damn things." I decide not to show him the photos of Emmett's work.

* * *

Harold Ionson ushered me into his shop in Westwood, Mass., settled back against a bench and nodded the brim of his blue baseball cap at the surroundings. "This," he said, "is where I play." Do you make a living here too, I ask? "Oh no," he says, "there isn't any money in this business, never has been. That's why all the fine custom shops died. Even when I got out of trade school in 1938, they were dying then. You can't count on people's taste. All my life I made things for other people, 90% of whom didn't appreciate what kind of work it was. I arrived at a point in my life, at age 55, when I decided I was going to play the rest of my life and build a few things for myself. I wanted a couple of banjo clocks. It's too much setting up for just one. So I built 24. If people want to buy the ones I don't want, fine, but that isn't why I built them."

A museum curator in Boston had recommended Ionson to me as one who makes careful reproductions of the furniture of John and Thomas Seymour. The Seymours came from England in 1785 and excelled here in making double-tambour desks of mahogany and satinwood, inlaid with rosewood, ebony and ivory. They worked not in the familiar Queen Anne or Chippendale style, but in those of the Federal period. Their adaptations of Hepplewhite and Sheraton were distinctly American. They alternated tambours of curly and bird's-eye maple, for instance, with mahogany, and painted case interiors an American robin's-egg blue. They are rich



Harold Ionson, above, and one of his 11 Seymour-style, double-tambour desks, right. This one is in San Domingo mahogany and maple burl with satinwood and ebony inlay. The keyholes are bordered in ivory; enamel pulls have yet to be mounted on the bottom drawers. Ionson deals with the problem of wood movement in his cabinet sides by making his own thick-veneered plywood. Face-gluing the core (as shown in the drawing) orients the grain so that maximum expansion and contraction take place in the thickness rather than in the width of the plywood.

and colorful pieces, little known to most people simply because they are now out of fashion.

What attracted Ionson to Seymour? "The beauty. You put a bunch of pieces in a room and the Seymour piece will stand out, even from 50 feet away—*that's* a Seymour piece. And the workmanship is good, even inside. Most of the old pieces, you probably know, are rather rough inside: glue blocks, wedges, they really hacked them together. Before the Federal period, furniture depended on carving for its beauty. I'm not much of a carver. They were massive pieces, too. Not badly proportioned, just large. In the Federal period, furniture became delicate and feminine. It got its beauty from figured veneers, inlays and exotic woods. Now a lot of people say, 'Oh, this is a veneered piece, it's cheap.' And they have good reason to think that way. Furniture manufacturers brought that on, veneering everything, burlap bags almost, which gave veneered furniture a bad name. But originally, only the finest pieces were veneered—because it's ten times more work."

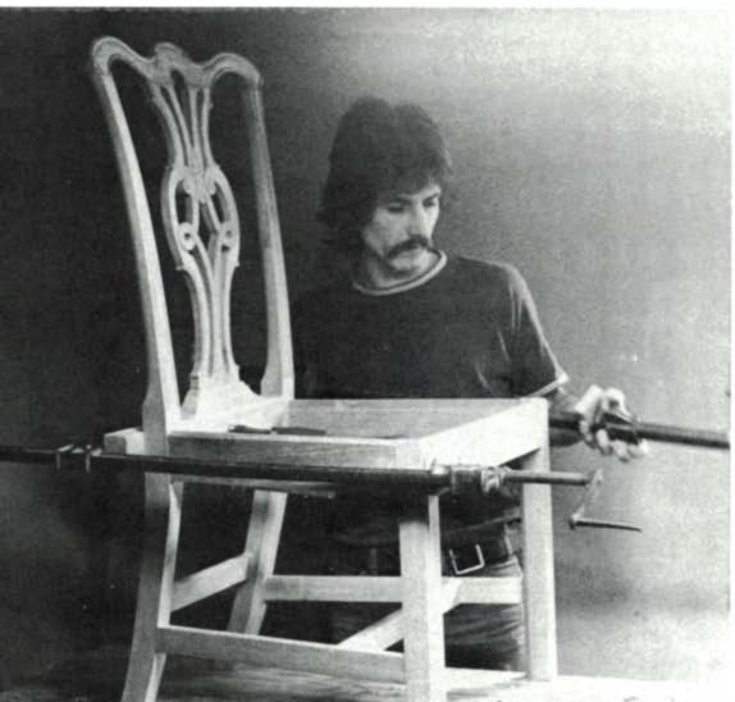
Ionson is working on one of a run of eleven folding-leaf, double-tambour desks. They are like Seymour's desks, though not copies of any particular one. Ionson's construction is more sophisticated. He makes his lumber-core plywood from ⅛-in. sawn San Domingo mahogany, laminated over Honduras mahogany crossbanding and a basswood core. The core is face-joined rather than edge-joined (pp. 37 and 78) so that maximum expansion and contraction takes place in the thickness of the stock rather than across its width. In spite of the dimensional stability this provides, Ionson does not glue these panels solidly to the legs. For added insurance against cracks that have occurred even in veneered panels, he mortises the legs, fixing the panel at the top and allowing it to float in oversize mortises at the bottom. All the tenons are pinned, the ones toward the bottom through elongated holes. Veneer conceals the pins. The drawer faces are veneered, too, and rabbeted out to receive satinwood and ebony banding, then cockbeaded. Even the end-grain edges of the drawer fronts are veneered so that when the dovetail pins are cut, they contrast well with the pine drawer sides. In short, practically the whole piece is veneered and inlaid, yet because the veneer is thick, the surface is remarkably substantial. It doesn't look ready to delaminate, it doesn't even look like veneer. "I couldn't work this way before I retired," he remarks. "I had a living to make."

David Salisbury explaining 18th-century woodworking at the reconstructed Anthony Hay shop at Colonial Williamsburg.

I am anxious to get Ionson's reaction to Emmett's work: The technical attention each has given the original designs seems something they have in common. Right away Ionson is taken with the full-blind dovetailed bracket feet. "Now that's not bad, that's good, that's nice." So is the rest of the piece, he decides. The dovetails on the drawers look too uniform for his taste, "but I won't disagree with him. I've seen those thin pins fail." Ionson wants to know how much time Emmett spent. I tell him 1,200 hours. Says Ionson, "That's 30 weeks. There wasn't any grass growing under his feet while he was doing this." I play devil's advocate and point out how economically unrealistic the work is. Ionson replies, "Oh, that's all right. Nothing's too good for me."

* * *

Colonial Williamsburg in Virginia is the premier restoration site of 18th-century life in America. At least 17 cabinetmakers worked at Williamsburg between 1720 and 1776, and the furniture they made is known for its refined construction and restrained styling (p. 50). At the Anthony Hay shop, rebuilt on its original foundation, I met David Salisbury, who came to Williamsburg to learn 18th-century woodworking. He was reproducing four bookcases for an 18th-century interior. Not only were their style and construction authentic, but he was using only authentic tools and techniques. This shop does not sustain itself by the pieces it produces. Its main purpose is to be a living museum, and much of the craftsmen's workday is spent explaining to visitors how Anthony



Mack Headley, Jr., left, removes the clamps from one of a set of twelve side chairs he is reproducing for Colonial Williamsburg. Below, the work of three Headley generations: Grandfather Boyd, Sr.'s, lowboy (right), his son Mack Headley, Sr.'s, Chippendale slipper chair (left) and Mack Jr.'s, Philadelphia Chippendale armchair (center).

Hay and his contemporaries made furniture.

Mack Headley, Jr., was master cabinetmaker here for three years; Salisbury had been his apprentice. When I went to see Headley at his shop in Winchester, Va., I learned why he had left. At Williamsburg he'd been able to study many fine original pieces of furniture, and had come to understand them. Now it was time to apply what he had learned.

Headley, 29, is a third-generation cabinetmaker. The family shop produces several hundred pieces of period furniture a year, including custom work and restorations. At its largest, when run by grandfather Boyd Headley, Sr., the shop employed 14 people. Now it's seven people, producing sound furniture in factory volumes and at factory prices—in the shop outside the house. "We used to build everything," says Boyd's son, Mack, Sr. "We're a little more specialized now than my father was. I draw the line at Victorian stuff, he didn't draw the line anywhere." Mack, Sr., tells of the transformation of Empire chests: "We used to take Empire chests—my father would get a truckload for $10 apiece—and we'd cut off the bonnet drawer and get rid of the panel sides and replace those turned feet with bracket feet and carve in a couple of quarter-columns and we'd have a Chippendale chest. 'Add a hundred years to the piece and a hundred dollars to the price,' my father used to say. Once a man got the hang of it, he could do one in 24 hours."

Mack, Jr., did not return to the family business upon leaving Williamsburg. "Dad and I just have different ideas about furniture," Mack says. "It takes me ten days to make a chair; it takes him two. We're both happier in separate shops." Mack, like his father, was brought up using machines to make furniture. It wasn't until he went to Williamsburg that he did much handwork. "In joinery and in carving especially, when you make an exact reproduction, you commit yourself to learning how the maker used his tools. The better you understand that, the better the reproduction you can make. A lot of people getting started are anxious to declare their independence, not willing to put themselves aside for awhile to study how early craftsmen worked. If you try to be too creative when you do a reproduction, you're going to miss a lot of what it has to teach you; it's very much a learning experience."

Headley's reproductions are each true to an individual style (see box, below). Variety is a matter for customer relations: "What do you enjoy in your furniture?" he asks. "If a customer hasn't come to me with a particular piece in mind, or with a photograph, I ask if it's high-style or country that appeals to him, if he wants the piece to depend on its sculptural qualities or on its carving. You have to decide when you start a piece what you intend to be its graces. Period furniture forms are well established. Variations within them, therefore, allow for subtle effects. One chair will stand out because of a slightly more forward cant to its legs, and this calls attention to the splat, which can be shaped to direct the eye to a particularly delicate crest rail. You don't appreciate a lot of these things until you put two chairs next to one another. Then the overall similarities make the differences more pronounced."

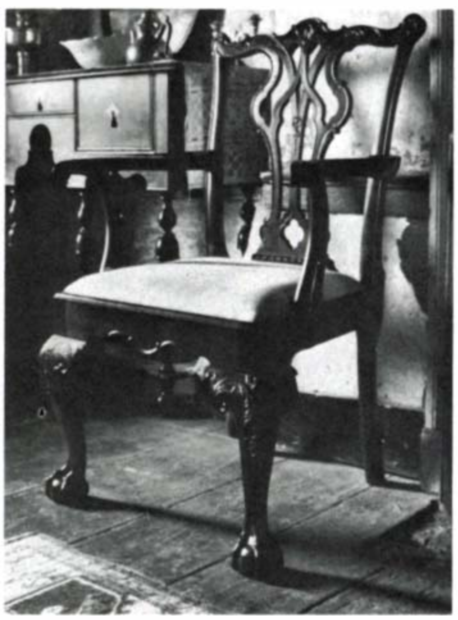
I show Emmett's work to Headley. He has seen full-blind

Two reproductions

The sidechair (right) that I reproduced from a piece by Peter Scott (1694-1775) shows how strongly he was influenced by early Georgian design, even after he'd lived thirty years in this country. The emphasis is sculptural; the carving flat and subordinated to gently rounded, reflective surfaces. The cabriole leg satisfies a restrained and sober taste, ending in a flattened ball and claw that suggests weight.

The armchair (left) is my interpretation of a pattern popular with high-style Philadelphia chairmakers in the early 1770s. The curves are freer and defined by elaborate carving that plays a larger role in the design. The leg is curvier and stands higher and lighter on its ball. The claw itself is tense with sinews and bones, yet because the transition to the ankle is more gradual and the final shape closer to the original blank, this foot is easier to carve than a Scott foot.

In construction, the Scott chair has the rail running behind the kneeblock rather than above it, which allows an extra ¾ in. for the mortise-and-tenon joint between the leg and rail. The Scott kneeblock is also supported by glueblocks absent from the later Philadelphia-style piece. *—Mack Headley, Jr.*



John Westervelt

Eugene Landon, left, among some of his 500 molding planes and other 18th-century tools. The underside of one of his reproductions, a Chippendale armchair, above, reveals how closely he copies the original textures.

dovetailed bracket feet among the more demanding constructions at Williamsburg. He does not disagree with Emmett's technology, but raises the issue of context: "For extra work and extra time, you have to have a patron who is willing to pay. Here in Virginia there was an old moneyed aristocracy, very conscious of what was currently fashionable in England and expecting the more elaborate English constructions. So that's what cabinetmakers here were paid to produce. In New England, they had to use less time-consuming constructions because the newly moneyed merchants there wouldn't pay otherwise. There are records of English cabinetmakers who tried to establish themselves in Boston and just couldn't do it. The important thing is to understand that there were reasons for pieces to have been produced the way they were."

Later that day Mack's father put it this way: "A lot of people would dearly love to be artists for a living. But I haven't found enough people who'll pay for pure art."

* * *

Almost a year after receiving the letter from Grover Floyd I drove up to Eugene Landon's place in Montoursville, Pa. It was raining. The driveway was mud, and piled in the mud, uncovered to the rain, were flitches of walnut and cherry. A few of the walnut pieces were crotches with curly sections more than 15 in. wide. The cherry boards were 12 ft. long. All were dripping with rain, thoroughly wet. Most of the sapwood had deteriorated and was crumbling off. One cherry flitch had a check 3 ft. long, right up the middle.

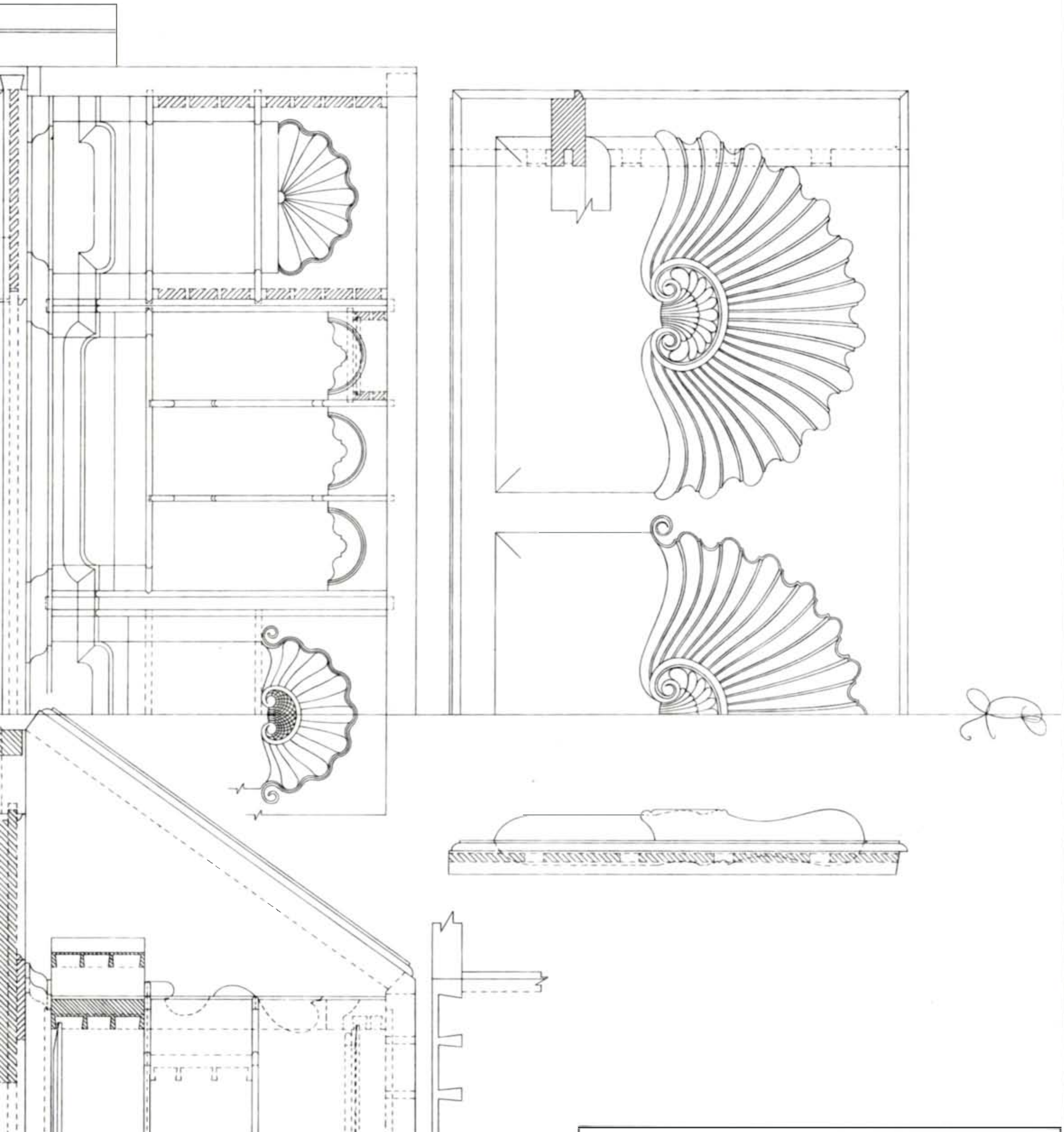
I'd first seen Landon's work in photos of the Appalachian Craft Center show (back cover, *FWW* #21, March '80). His Queen Anne side chair looked intriguingly old. The surface texture, the joint lines, its presence seemed not typical of a reproduction, certainly not a recent one. Yet it was.

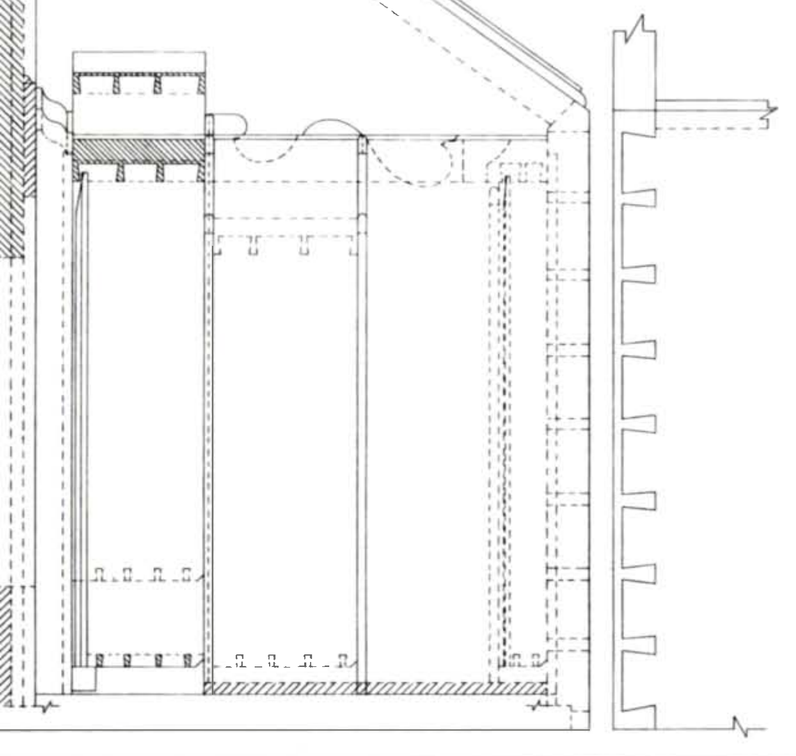
After I wipe the mud off my feet, I learn that Landon had been for 20 years a paint and varnish chemist, though he'd built and restored furniture as a hobby and part-time business since he was in high school. Six years ago he left his job to do it full time. Now, never having advertised, relying solely on referrals for business, he does 40 to 50 pieces a year, about half of which are restorations. "People from all over bring me their basket cases," he says. "But I've been very fortunate to work on some of the greatest pieces of furniture in this country. That's how I've learned. Old pieces have a soul—they'll talk to you, if you listen. It's amazing how consistent the old guys were once they found the right way to do something. I find it creative to figure out how a piece was done, retracing the steps the maker must have gone through." He points out scribe marks on an old chair. They show how invariably the marking-gauge fence was placed on the outside surfaces to ensure visual balance despite stock that was not uniform in size. "I used to work from photographs," he says, "but no photograph is going to show you the little things, the mark of the hand that gives a piece its character. So the pieces I get in for restoration, they're what I copy and learn from, though if I copied all I wanted to, I wouldn't have time to do the work they're in here for. Actually I'd like to cut back on my restorations, so I can build more. But I can't, they're my source of learning."

So I am talking to yet another student of 18th-century design and construction whose textbook is the doing of it. Emmett, unable to directly contact the furniture he was reproducing, idealized its construction. Ionson's improvements are more modest, though no less technically modern or sophisticated. Mack Headley Jr.'s craftsman-scholarship is most sensitive to the historic and aesthetic identity of the pieces he copies. Landon's attentions take him close to anachronism. He doesn't use sandpaper. He owns and uses more than 500 wooden planes, having sold his shaper long ago because "you don't get the little tear-out or imperfections the old guys did." His other power tools he expects similarly to get rid of; he uses them rarely and always obliterates their markings with traditional hand tools. If the glue blocks in an original were split or hewn out with an ax, Landon gets out his 18th-century hatchet. The result is a piece that, as Ionson might say, is rather rough inside. I ask Landon about the constructional shortcomings that initiated my search. Does he glue panels crossgrain to leg posts as they originally were? Of course. Does he not expect them to crack? "It delights me when they crack," he says. "It makes them more authentic."

I realize I have come full circle since I met Emmett. As we look out the window of Landon's shop at the dripping flitches, I ask if that's where he dries his wood. "Well," he says, "I've got to move that down to the cellar. I've got 10,000 feet of wood down there and a half-dozen walnut logs in the backyard. I saw all my own wood. What I do is throw it in a pile and leave it there for four or five years. The outside rots and you can just kick the sapwood off with your foot. It gives the walnut that good brown color. They used to bury wood in the barnyard, you know. That's how the old guys did it." □

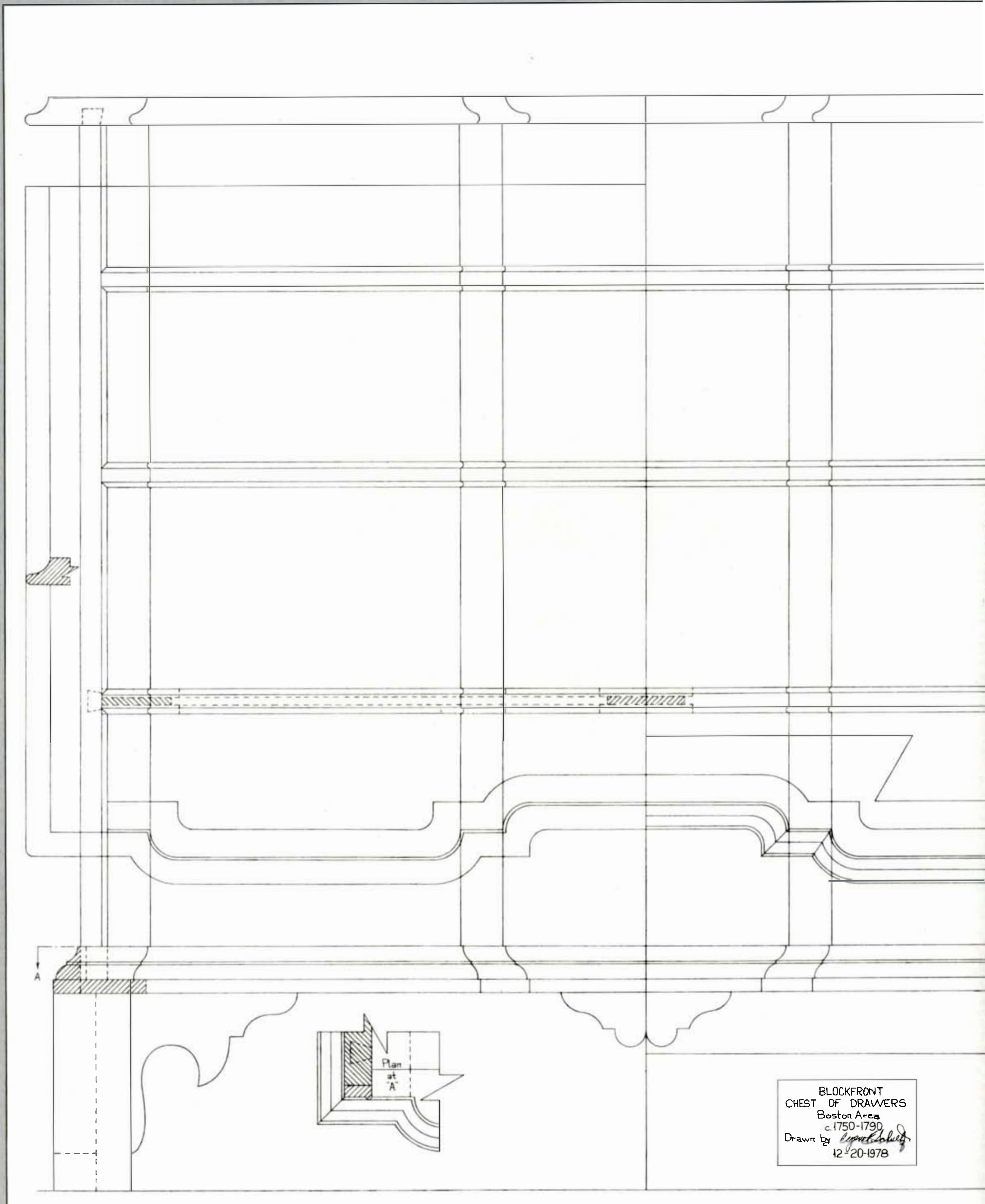
Rick Mastelli is associate editor of Fine Woodworking.





EDITOR'S NOTE: This centerfold, which we suggest you remove from the magazine, contains completely detailed measured drawings of two pieces of blockfront furniture at ¼ scale. On this side of the sheet is a Newport-style slant-top desk. On the other side is a Boston-style chest of drawers. Both are authentic reproductions externally, but their internal construction has been modernized in the manner described by the designer, Eugene Schultz, in the article beginning on page 47.

We've published Schultz's drawings this way to avoid discontinuities between pages, and to keep the scale accurate. You can pick off dimensions with dividers and a scale, and you can enlarge either drawing to full size by the usual draftsman's means, or photographically. Full-size blueprints, made directly from the original drawings, can be purchased from Schultz at Boston Cabinet-Making, Inc., 27 Kingston St., Boston, Mass. 02111.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Plan
at
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BLOCKFRONT
CHEST OF DRAWERS
Boston Area
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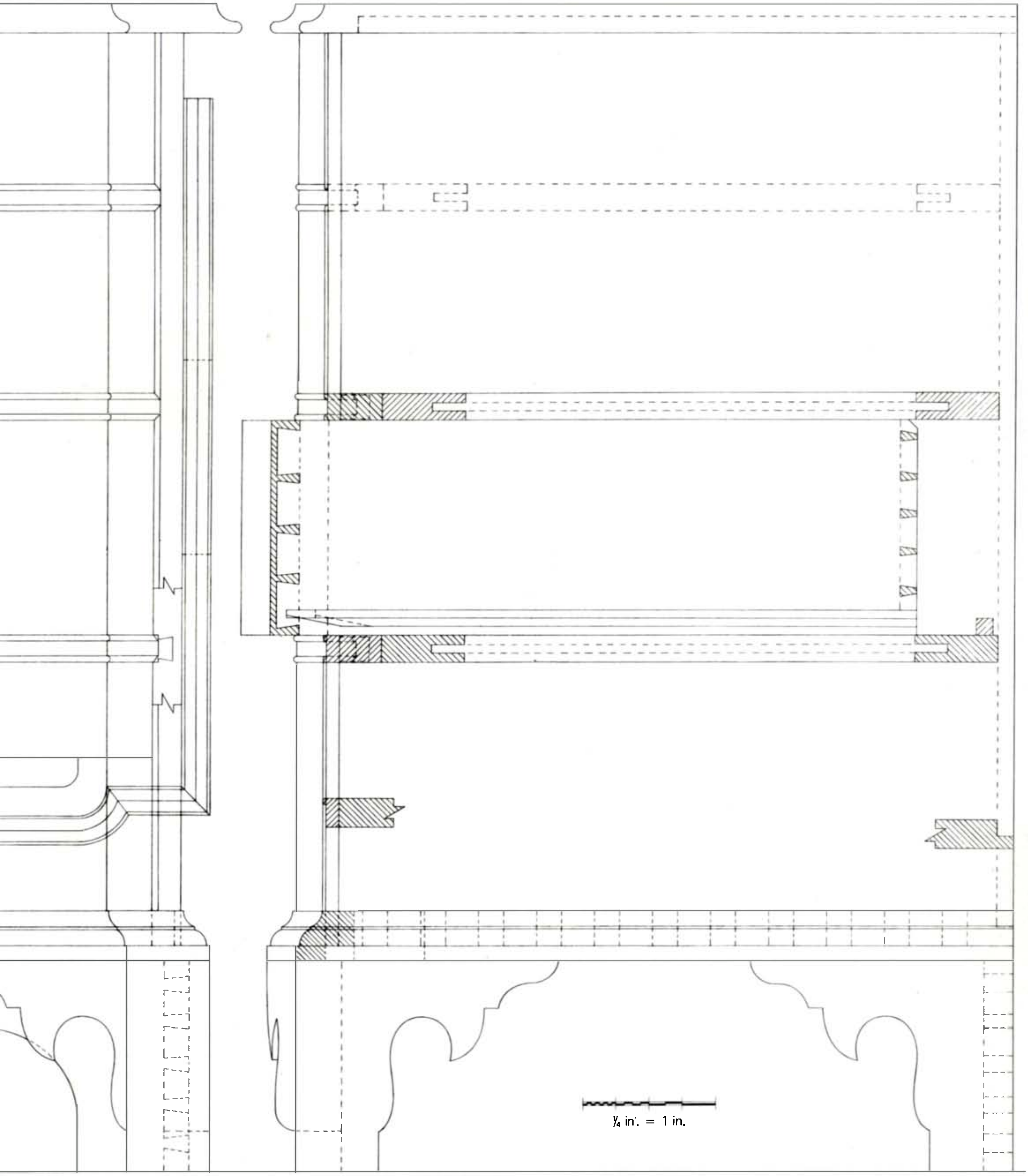
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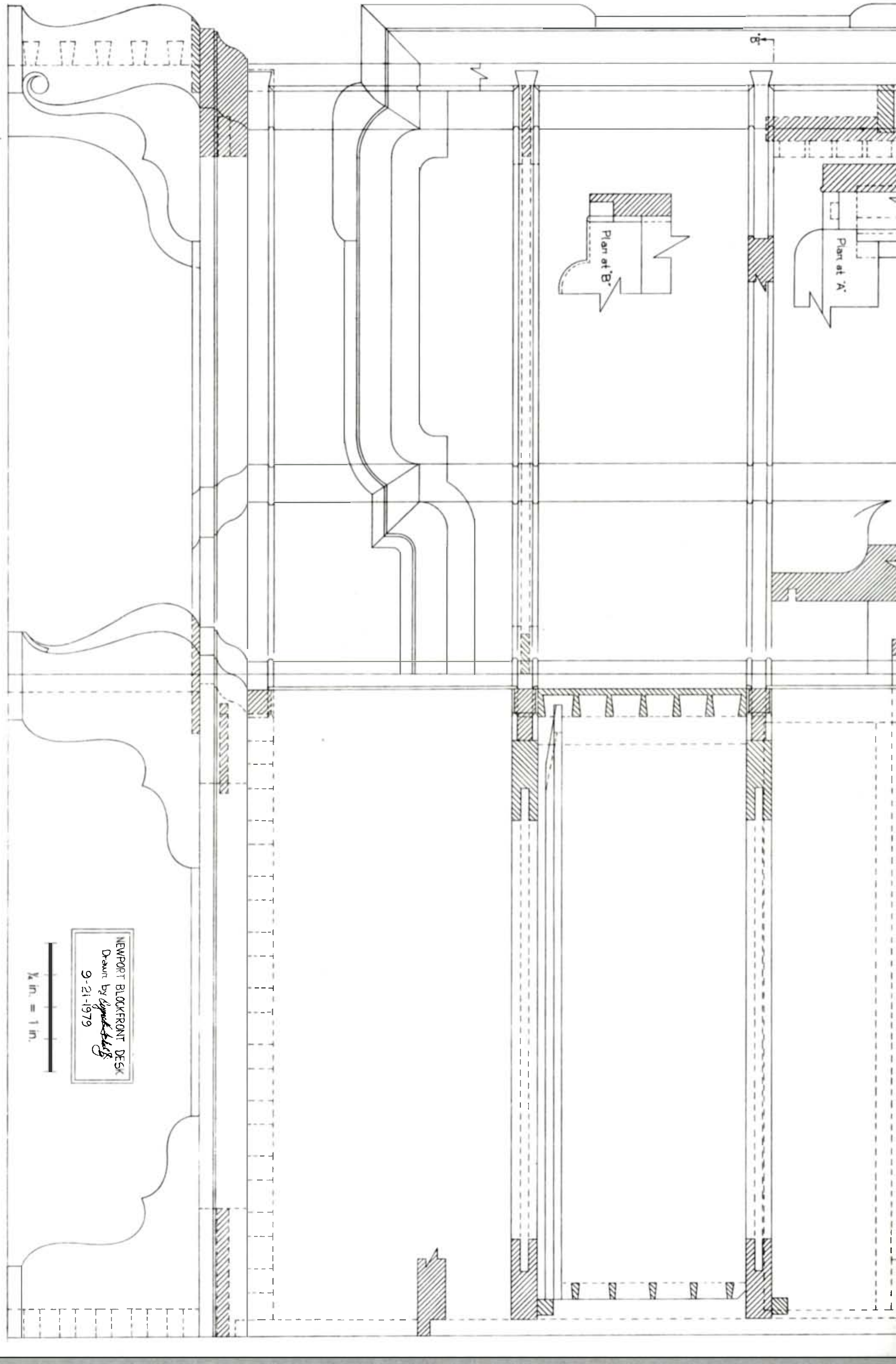
B
Plan at 'B'
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NEWPORT BLOCKFRONT DESK
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The Blockfront

Its development in Boston, Newport and Connecticut

by Margaretta M. Lovell

Blockfront casepieces (chests of drawers, slant-front desks, kneehole desks, high chests, chest-on-chests and desk-and-bookcases) were made in great numbers in New England during most of the 18th century. There are many variations, even within regional characteristics, but all of these blockfronts exhibit an undulating facade made up of three vertical blocks: two of them convex and one concave. These act visually (along with a proportionate decrease in drawer widths from the bottom to the top of the piece) to give these casepieces a sense of lift as well as a sense of plastic complexity. The blockfront is an expensive and showy design (the blocking is usually carved out of a single piece of primary wood) and many of the pieces are among the finest American cabinetmakers have produced.

Characterized by sweeping curves, rational symmetry, closed composition and a general richness of effect, blockfronts represent a distinctly native interpretation of Baroque (or Queen Anne) aesthetic ideals. Although the generating design principles originated in Europe, and a number of English casepieces exhibit a thin and tentative variety of blocking (see M. M. Lovell, "Boston Blockfront Furniture" in Walter Muir Whitehill, ed., *Boston Furniture of The Eighteenth Century*, Colonial Society of Massachusetts, Boston, 1974), no specific prototype exists. The blockfront, it seems, is an American invention.

Three areas are noted for their blockfront casepieces—Boston, Newport, R.I., and the Colchester region of Connecticut. Each of these areas produced a distinct "school," represented by a fairly consistent set of compositional principles, decorative motifs and habits of construction. The dynamics of regional characteristics are not well understood but clearly the ties of kinship, the phenomenon of specialist craftsmen and the force of apprenticeship training encouraged the establishment and repetition of distinct regional design vocabularies.

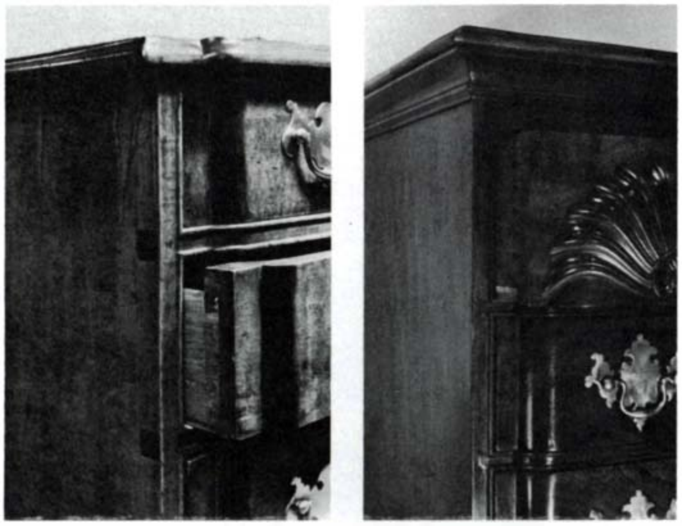
Boston seems to be where the blockfront originated, for the earliest signed and dated example (1738) was made there. Although noted for their richly varied forms and decorative features, Boston blockfronts nevertheless have basic things in common. The example illustrated in figure 1 will serve as an archetype. Its primary wood is West Indian mahogany (usually darker in Boston examples than in those made to the south), and its secondary wood is white pine (native to Massachusetts and imported from Maine since early in the

Figure 1.

Figure 2.

Figure 3.

Fig. 1: Boston chest, mahogany, pine and poplar, 31½ in. by 33¾ in. by 20⅞ in., 1755-1790. Courtesy Yale University Art Gallery, Mabel Brady Garvan collection. Fig. 2: Newport chest, mahogany and tulipwood, 34½ in. by 36¾ in. by 19 in., made by John Townsend, 1765. Courtesy The Metropolitan Museum of Art, Rogers Fund, 1927. Fig. 3: Connecticut chest, cherry and pine, 35¾ in. by 40 in. by 20 in., 1765-1790. Courtesy The Henry Francis du Pont Winterthur Museum.



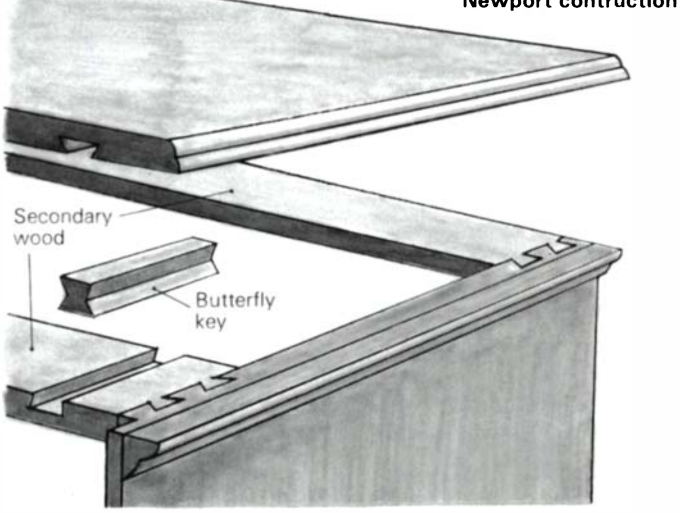
Boston pieces, as at left, follow the English practice and typically cover the sliding dovetail that joins drawer divider to carcase side with a thin strip of molded wood nailed on. In most pieces the drawer divider does not go all the way through the carcase side, and so the joint is completely concealed. Newport pieces, as at right, display the sliding dovetail. The pins of the drawer dovetails are thin and precise. Courtesy Yale University Art Gallery, Mabel Brady Garvan collection.

18th century). Its feet are of the straight bracket type (although short cabriole legs with claw-and-ball feet are almost equally common on Boston examples). A decorative drop, which is not found in pieces from other regions, usually punctuates the bottom line of the piece at its midpoint. (This feature, absent on the piece pictured in figure 1 on the previous page, is shown in the drawing below.) The drawer dividers are joined to the carcase sides with a full sliding dovetail, sometimes cut all the way through so that the end grain of the dividers is visible on the sides of the chest. Usually a thin strip of mahogany, bead-molded on its inner edge and nailed to the front edge of the carcase side conceals the joint. With the bottom drawer removed, a giant dovetail is visible behind the central concavity where the mahogany bottom molding is joined to the white pine carcase bottom. The juncture between these two parts is in one plane.

By contrast, Newport blockfronts are usually made of lighter, redder mahogany, and the grain of the wood is an important feature of the design (figure 2). Secondary woods are characteristically chestnut (on the back of the carcase) and tulip poplar (the drawer interiors). The feet are invariably of the ogee bracket type; its gentle waving line complements the three-dimensional curves above. Carved shells, a feature not found in Boston examples, terminate the columns of blocking. The convex shells are almost always applied. Rather than conceal the joint between the drawer dividers and the case, the neat and precise dovetails that anchor the case together are clearly visible on the facade—one of the rare instances of joinery being used for decorative effect in an 18th-century design. And instead of the thin, abrupt top common to Boston chests, Newport cabinetmakers modified this transition from vertical to horizontal by a series of wide compound moldings. Behind the mask of these moldings two boards of secondary wood run under the top, one at the front, the other at the back, half-blind dovetailed into the carcase sides. The top is glued to the front member and cleated to the back member by means of a neat, sturdy butterfly, visible from the back of most Newport chests of drawers. This method of construction fixes the top at the front, allowing it, without warping or cracking, to expand and contract at the back. (The tops of Boston pieces are put on in a variety of less ingenious ways, including glue blocks, nails, and, in some cases, sliding dovetails at the top of the carcase sides.) Another obvious difference from the Boston pieces is that Newport blockfronts have no giant dovetail in the carcase bottom. The lower rail, shaped in front to repeat the line of the blocking, is straight on its back and often buttressed with a 2-in. or 3-in. wide straight piece of secondary wood in the same plane. The actual carcase bottom is about 2 in. below this piece, flush with the bottom of the molding.

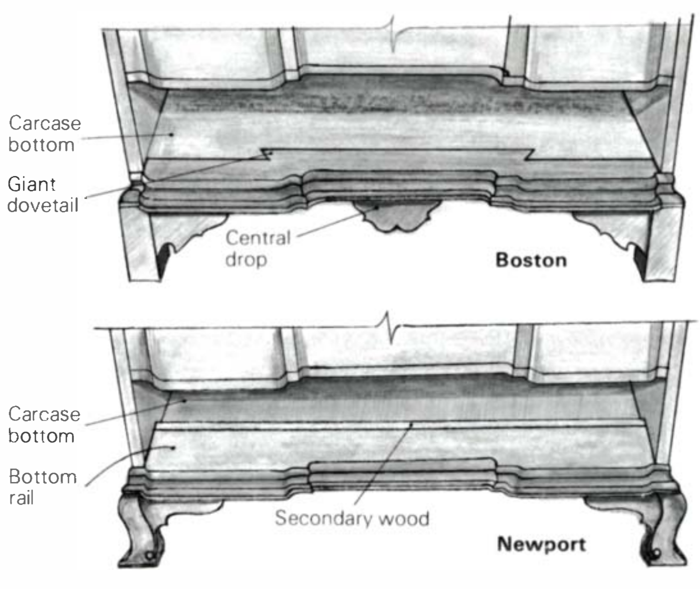
In general, Newport blockfronts are renowned for the neatness of their construction. Impeccable drawer dovetails have thin necks, and the complicated moldings and the beading in the dovetailed drawer dividers are finely mitered. The consistency in quality of craftsmanship is matched by an almost equal consistency in design. The Newport school was obviously a tight network of individuals who—once the original Newport formula was established—stuck to variations on the major theme from the 1760s until the early 1800s. Although almost a hundred cabinetmakers worked in Newport during

Fastening of the top, Newport contruction



Note: Few Newport pieces have been taken apart for examination. This drawing is partly conjectural.

Bottom-rail/carcase-bottom construction



Illustrations: Ric Lopez

this time, all the signed or labeled blockfronts that have survived were made by members of the Townsend family. There is evidence that Edmund, John and other family members collaborated on blockfronts—either side-by-side in their small shops or separately, each man working on his specialty in his own shop. Almost all the Newport blockfronts bear elaborate directions (in 18th-century calligraphy) indicating "front top," "left side," etc., on the designated member, or *A, B,* and *C* on drawer series. Perhaps the craftsman needed to remind himself of his parts, but it is more likely that these notations were made to communicate between craftsmen. Such assembling instructions are absent from the interiors of Boston blockfronts, which—judging by the seven signed and documented examples—were made by individual craftsmen in widely separated places and not linked by the tight kinship system that characterized the three generations of Newport's premier cabinetmaking family.

Such cohesive cooperation is not evident in Connecticut blockfronts (figure 3), which, if we may judge from surviving examples, were exercises in eccentric individual interpretation. In general, Connecticut blockfronts follow Newport, not Boston, in design and construction. The Newport shell capping the blocked areas, the ogee bracket feet, the wide top molding, the straight, internal front of the carcase bottom, are all carry-overs from Newport to neighboring Connecticut. However, significant differences are even more apparent. As in most Connecticut furniture, even for these expensive, showy pieces, the primary wood is cherry stained to resemble mahogany rather than the imported mahogany favored in Massachusetts and Rhode Island. The secondary woods are chestnut and tulip poplar as in Rhode Island, but pine is also used. Together with ogee bracket feet, short cabriole legs with claw-and-ball feet are common. Drawer dovetails are more widely spaced and less elegantly made, and secondary pieces (such as drawer bottoms) are often heavy and chamfered at their edges. But most characteristic of Connecticut is the variety of forms and arrangements attempted within the basic tripartite blockfront arrangement. The piece shown in figure 3 has, for instance, heavier feet than the Newport type with an extra energetic curve on the bracket. The classical vocabulary of Palladian architecture, which underlies the proportions and motifs of all the furniture of this period, has been stretched here to produce a non-Renaissance effect. The flanking pilasters lack both base and capital while the dentil course at the top is doubled; oddest of all, the base molding is also ornamented with a dentil course.

Made by and for a pragmatic people, blockfronts exhibit an unusual disregard for expensive materials and time-consuming labor. That they existed in such numbers and developed such complex forms over such a long period of time and over such a wide geographical area attests to the power of the design to satisfy the self-image of a large number of customers, both rural and urban. The style went through an adventuresome investigative period in Boston (1730 to 1780), moved into its classic phase in Newport (1760 to 1800) and then experienced a second, more mannered, inventive stage in Connecticut (1770 to 1815). Throughout, it retained its original appeal as a design based on rational symmetry and plastic, tactile richness of form. □

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Building Blockfronts

Improving traditional constructions

by E. F. Schultz

Blockfront furniture has always been regarded by antiquarians and craftsmen alike as a unique, beautiful and important American decorative-arts creation. Students of furniture and design admire the blockfront for its boldly sculptured form, its fine proportions and its superlative moldings. This article attempts to deal with some of the demanding constructional features particular to Boston and Newport (R.I.) blockfront furniture. The cabinetmaker today can construct period reproductions either exactly like the original in every detail or with modifications, incorporating contemporary improvements in the joinery without visually altering the piece's magnificence. I choose to improve the construction where time has shown the originals to have shortcomings.

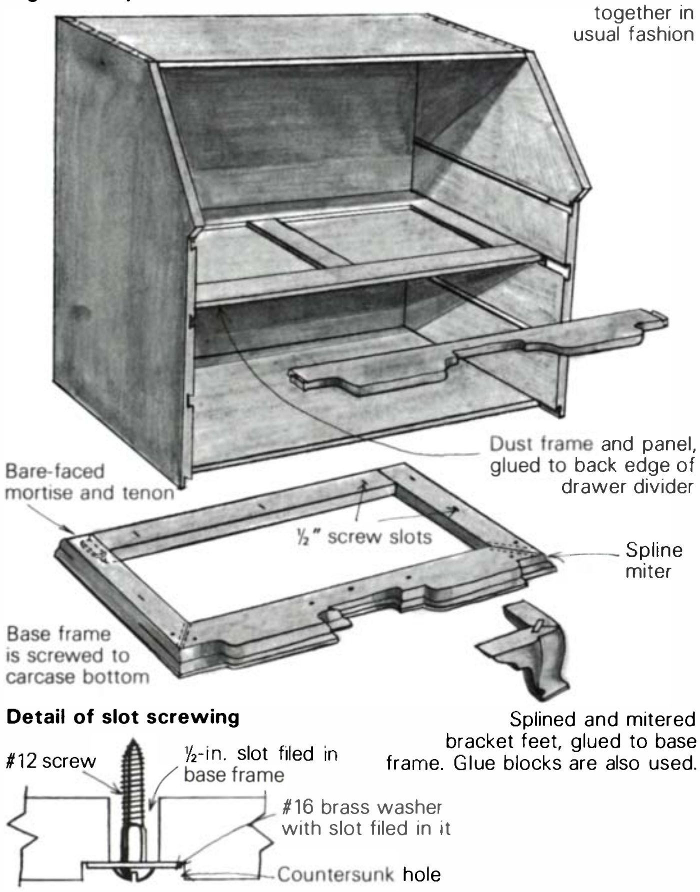
Before beginning, it is important to note the complexity of these designs and the meticulous execution they warrant. Be prepared to spend several months in a well-equipped shop to complete a blockfront like the ones discussed here. A time-consuming, but indispensable, first step is to draft full-scale plans. They indicate the relation of all the parts, their joinery and detailing, and thus prove whether or not your planned method of construction will work. In effect, once you have successfully completed a set of plans, you will have mentally assembled the piece of furniture. The plans are then a record of information often not easy to recall in the midst of actual construction. They also can be elaborated upon in designing more sophisticated pieces. I prefer full-scale plans when the size of the piece permits, as you can measure from them directly and use them to make and check templates.

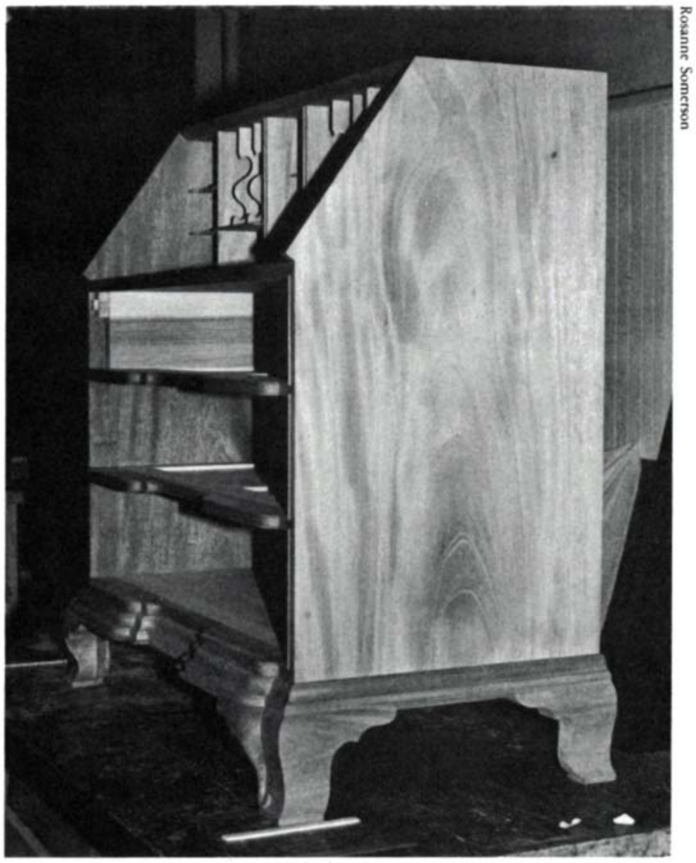
Much of the beauty of blockfront furniture is attributed to

Joseph Benenate

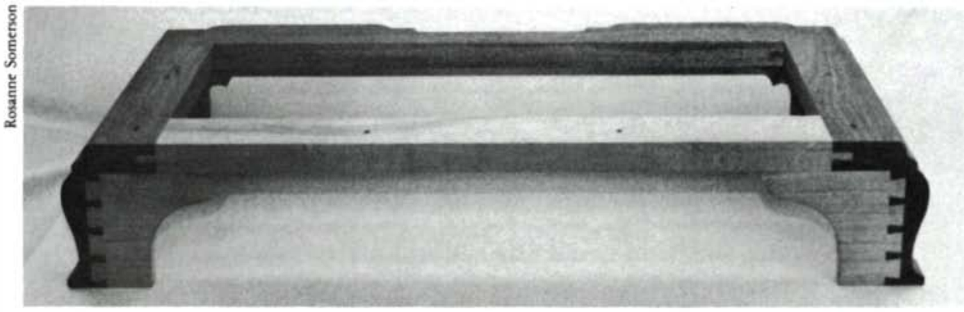
Schultz's reproduction of a Boston blockfront chest of drawers, 40 in. by 35⅜ in. by 22½ in., Honduras mahogany. Plans for this piece and for the Newport blockfront slant-top desk on the next page appear as a center insert, pp. 41–44.

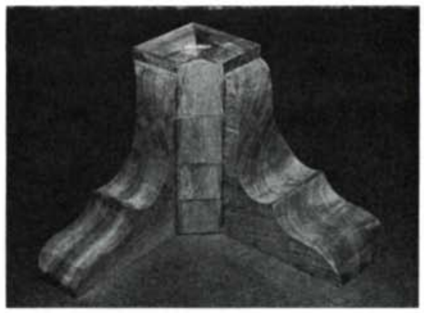
Fig. 1: Newport case construction





Newport blockfront slant-top desk in construction. One-piece mahogany side is 20¾ in. wide.





From the back, base frame (left) shows bare-faced mortise and tenon, and half-blind dovetails between back feet and braces. Segmenting the bracket-foot glue blocks (right) minimizes the chance that the bracket pieces, which run crossgrain, will crack.

the wide, one-piece ends and top. A mahogany board of the required width will usually display quite diverse visual grain characteristics: flame figure, dark (almost black) stripes, rich swirls and beautiful iridescent colors. To make a visually accurate blockfront reproduction, the cabinetmaker must first deal with the problem of locating suitable and worthy stock, and then plan his construction to cope with the constant movement of even well-seasoned boards. However they move, they must provide a stable carcase for the sculptured drawers they contain. With both Boston and Newport furniture, these wide boards must also attach to a sculptured base molding and to bracket feet. Because the grain direction of the carcase sides is perpendicular to that of the base molding, the traditional construction techniques—gluing and nailing this molding to the carcase side—is troublesome. Many cases have loose moldings and/or cracks originating from the molding because it constrained the movement of the sides and thus caused them to relieve their internal stresses through checking. Also, the ogee bracket feet were glued across the grain of the wide boards, so this joint too loosens in time. One possible solution to this problem is to allow the wide boards to move, but to direct their movement. The aim is to have the exterior remain visually perfect, so we construct the piece for the movement of the wide boards to occur from front to back. The visual facade of the piece remains tight while expansion and contraction occur "behind" its exterior surface. This can become somewhat of an engineering job.

The construction that I suggest for the Newport case is shown in figure 1. In simplified terms, a dovetailed carcase is attached to a molded base frame. The front corners of the base frame are mitered and splined, with bare-faced tenons cut on the back rail and mortises on the sides. The front and sides of the base are glued up first, the back rail afterward. Remember when gluing up the miters that only the outermost edge shows; therefore, this edge should be tightly fitted even if the inner edge of the miter is not.

Next, the front two ogee bracket feet are splined and glued together while the back feet are half-blind dovetailed to the back braces (photo, above). All four are then glued directly to the base frame. Glue blocks are used as well. For the bracket feet themselves, cutting several short glue blocks instead of one long one should keep the deleterious effect of wood movement to a minimum.

The entire base has now been assembled as a separate unit. The bottom surface of the case and the top surface of the base frame should now be trued with a plane and straightedge prior to slot-screwing the base into place. I use a Starrett 36-in. straightedge because of its heft and resistance to bending. Slot the screwholes in the center and rear of the base frame only; thus the carcase is fixed to the base frame at the front and allowed to expand and contract at the back.

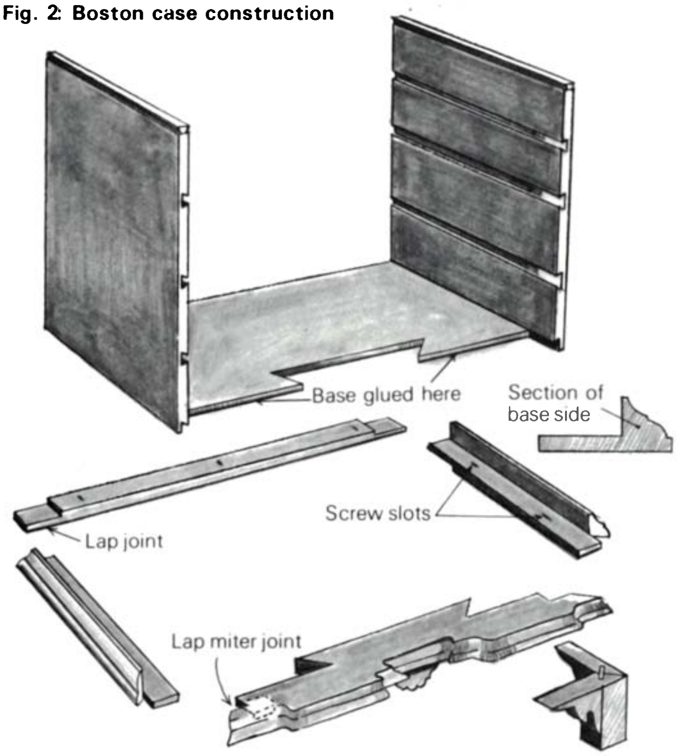
With Boston blockfronts the suggested construction for attaching the base molding must differ somewhat from the Newport style because of the absence of a drawer divider between the bottom drawer and the molding. This, along with the absence of a drawer divider between the top drawer and the carcase top, gives the Boston chest a more starkly linear appearance. The joinery for constructing and attaching the base on the Boston blockfront is more complicated than with the Newport style, but the principles are the same (figure 2). A major difference here from the Newport construction is that the base, once installed, is not removable. The molded base front, incorporating its giant dovetail, is glued permanently to the case bottom's leading edge. The base sides are then glued to the front of the base with a lap miter joint. Thus the base molding is held secure to the front of the case, allowing the carcase to move in slotted screwholes from front to back. The rear rail of this base "cradle" is fitted and lap-joined to the base molding sides *after* the sides are screwed to the bottom of the case. This sequence is followed to ensure a tight fit between the case sides and the *L*-shaped, molded base sides. The bracket feet are applied to the base in the same manner as in the Newport blockfront, using segmented glue blocks. When completed, and even with the bottom drawer removed, unless one looks underneath the Boston case, it is not possible to differentiate this type of construction from the original.

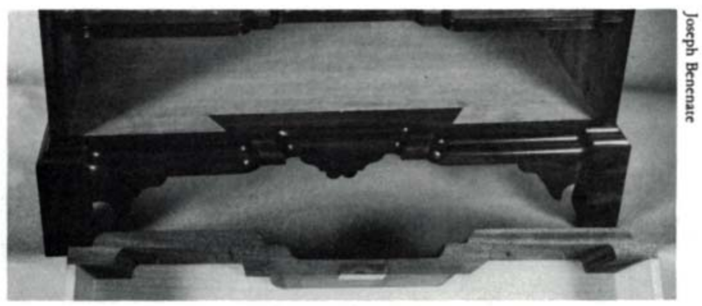
Because the wide boards, whose movement we have been taking into account in our construction, must also be an integral part of a sturdy carcase for supporting the large, sculptured drawers, the joinery between drawer dividers and carcase sides deserves attention. Newport pieces traditionally have exposed sliding dovetails with cockbeading on both drawer dividers and carcase sides. Boston pieces usually cover the drawer-divider dovetails with thin cockbeaded strips of wood the length of the carcase sides. In both Boston and Newport blockfronts there are no dust panels. The period pieces, for the most part, have drawer runners dadoed and glue-blocked to the carcase sides, a crossgrain construction that can result in cracked sides.

I prefer to incorporate dust panels whose frames provide more than adequate drawer support while allowing the runners to float free of the carcase sides (figure 1). The extra time and stock required for this construction is negligible when compared to the sturdier, more durable and more finished piece that results. Figures 3 and 4 contrast the Newport and Boston-style joints between carcase side and drawer divider. The cockbeading and its mitering in both cases present a special challenge in fine joinery. □

Gene Schultz, 34, builds custom furniture at Boston Cabinet-Making, Inc., in Boston, Mass.

Fig. 2: Boston case construction





A giant dovetail joins Boston-style base frame to carcase bottom.

Fig. 3a: Stages in cutting Newport drawer divider

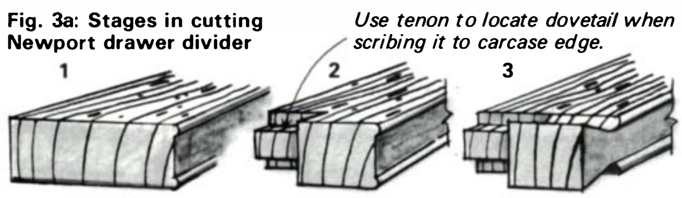


Fig. 3b: Stages in cutting Newport carcase side

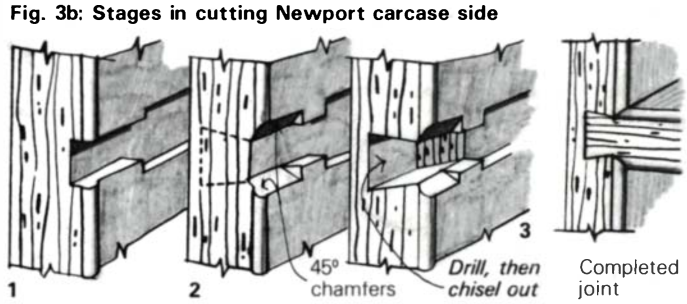
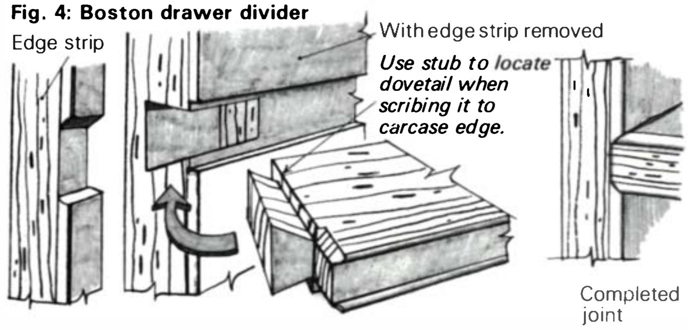


Fig. 4: Boston drawer divider



Variations in 18th-Century Casework

Some 'old masters' built better than others

by Wallace B. Gusler

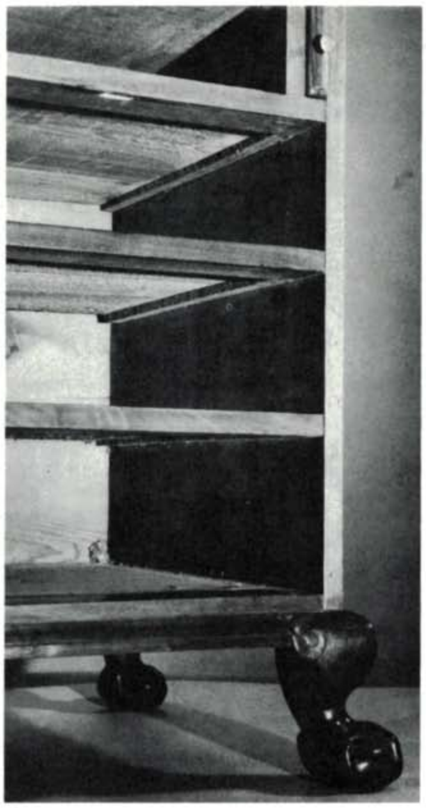
Some people, in their reverence for the "old masters," believe the 18th-century furniture makers knew all and could do no wrong. Others claim that traditional excellence is a myth. The truth is that furniture construction in the 18th century varied almost as much as style—both construction techniques and style can be spread on a spectrum ranging from London high-style to English and American urban and provincial, to rural, and to non-professional folk art. The style and construction of a particular piece of furniture was affected by the economic and commercial conditions prevailing at the time and place it was made, as well as by the professional and ethnic background of the maker. Patronage was extremely important—provincial furniture was supported by provincial patrons, who were either ignorant of more sophisticated production, or else unable or unwilling to pay what it would have cost. Generalized statements praising or criticizing 18th-century furniture construction do not consider the varieties of context, and are not very useful.

In the English-speaking portion of the 18th-century world, London was the center for both stylistic and technological developments in cabinetmaking as in most other fields. Though Continental developments did shape London cabinetwork, in considering American furniture, it is London's leading role that is most important. Proclaiming American furniture superior to English examples, as patriotic curators, dealers and students have done, represents an inversion of values. The most highly developed construction in chairs and case furniture known from Colonial America was produced in Williamsburg, Va.—not because of any American technological developments, but because cabinetmakers there followed the highest levels of London style and technology. And what fostered this extraordinary production was the advanced economic, political and social status of Colonial Virginia. Wealthy patrons there were attuned to London's cultural life and demanded the latest London styles and technology.

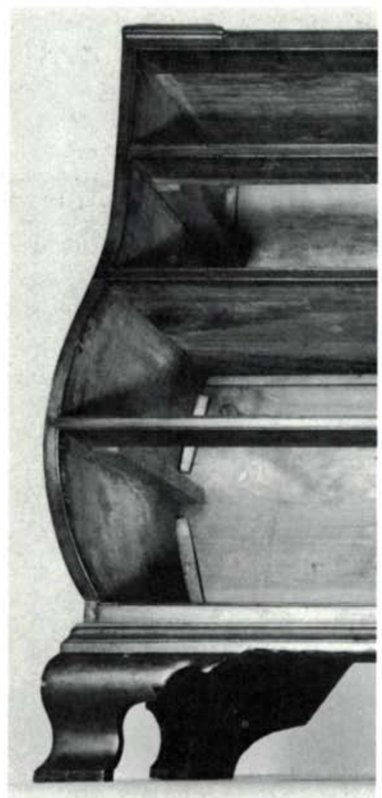
Casepieces attributed to the shop of Peter Scott (1694-1775) of Williamsburg are of outstanding construction, and possess features not found in pieces from other

A: *Desk-and-bookcase, attributed to the Peter Scott shop in Williamsburg, Va., circa 1760. Walnut, poplar, yellow pine and beech; 90¾ in. by 44½ in. by 23½ in.* B: *Carcase construction of the Scott desk-and-bookcase is modeled after English techniques, using full, thin dustboards with kicker strips below.* C: *Lower portion of a Boston chest on chest, circa 1760, has drawer runners nailed directly to sides and one full dustboard. A crack is visible at the bottom of the carcase side, and the dovetail of the middle drawer blade has been forced out from the carcase edge; both defects are the result of troublesome crossgrain construction.*

A



B



C

Photos: Delmore A. Wenzel; Courtesy Colonial Williamsburg

American cabinetmaking centers. Examining the case furniture of this shop and comparing it with English developments and with other American production reveals things useful to contemporary and reproduction cabinetmakers alike.

The main case construction of Scott's desk-and-bookcase, shown in photo *A,* is of the board and dovetail type. Dovetail case construction was introduced into England from the Continent in the second half of the 17th century. Early examples with dustboards have "full bottoms," i.e., dustboards as thick as the drawer blades that continue to the back of the case. (The English cabinetmaker's term "drawer blade" may be unfamiliar, but it avoids the ambiguity of the term "divider," which is also used for partitions *within* a drawer, and of the term "rail," which is used for just about any narrow piece of wood that happens to be horizontal.)

The English (apparently in the George I period, 1714-1727) developed a dustboard thinner than the drawer blade, which makes the case lighter in weight, and this is the type Scott used here (photo *B*). The drawer blades are about 3 in. wide and ⅞ in. thick and made of solid walnut. They are dovetailed into the carcase sides and the joints covered at the front by a glued strip ³⁄₁₆ in. thick. (Leaving the dovetail joints exposed, as in some Boston casepieces and in much rural American and English furniture, is a provincial detail not in line with the finished approach of London furniture.) Rabbeted into the back of the drawer blades are ½-in. thick dustboards that extend all the way to the back of the case. The sides of the case have dadoes cut the full thickness of the drawer blades to receive these dustboards. Narrow strips of wood inserted below the dustboard keep the dustboard at the top of the dado. These strips, which are sometimes called kickers, have two other functions: They keep the drawer beneath from tipping down when it is opened, and they also provide solid support under the dustboard where the drawer above runs.

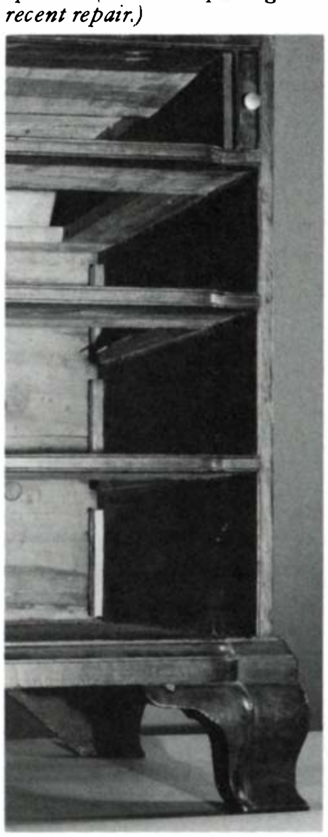
This dustboard construction avoids several problems seen in cheaper constructions of the period. Because the grain of the dustboards runs in the same direction as the grain of the top, bottom and sides of the case, they can expand and contract compatibly as they respond to humidity changes. Full dustboards also hold the case square, preventing the sides from cupping or twisting out of plane. The kickers that wedge the dustboards in the dado are slightly shorter than the depth of the case, leaving a gap between their ends and the backboards. This prevents them from pushing out the backboards or drawer blades when the sides of the case shrink. These strips are not nailed but are glued only on the end that butts against the drawer blade. This allows the sides to expand and contract without restriction.

The cheaper alternatives to this full-dustboard construction are of two general types. The one seen most often is simply a drawer blade dovetailed into the carcase side, the joint left uncovered (photo *C*). The drawer support is inserted into the dadoed sides and nailed, or is nailed to the plain sides of the case. This solution is obviously simpler, faster and cheaper than dustboard construction but it has serious drawbacks. The grain of these nailed-in drawer supports runs across the grain of the case sides; thus the supports become battens impeding the movement of the sides. The nails further complicate the situation, causing compression shrinkage between them. Split sides often result, and sometimes split tops and bottoms as well. These drawer supports can also force the drawer blades out of their housings and push the backboards from their rabbets. Additionally, cases built this way lack the stability that full dustboards provide. In the Boston bombe example (photo *C*), the single full dustboard in the center of the case shows that the maker understood the problem and its proper solution. His compromise was probably a result of economic necessity.

The other major type of construction used instead of dustboards consists of a joined frame. The front of the frame is the drawer blade, the back element fits against the backboards, and the two side elements form the drawer supports. These two sides are usually mortised into the front and back elements of the frame; therefore, although dadoed into the carcase sides, they need not be glued or nailed there. The top drawer cavity on the Massachusetts desk (photo *D*) is constructed this way. Frames do not usually split the case sides, but can push the drawer blades out of their housings, or push the backboards off, when the sides of the case shrink. This frame method was very popular in the back country of Pennsylvania, Maryland, Virgina and North Carolina, and perhaps it derives from a Germanic approach. Unlike the Massachusetts example shown here, examples from these areas usually have frames at every drawer blade.

Typical of Philadelphia, the thin dustboard in a high chest of drawers (photo *E*) appears to be the product of a loss or misunderstanding of the London construction seen in the Scott case. Instead of the dado being cut the full thickness of the drawer blade, it is thin, receiving the thin dustboard snugly and omitting the kicker. This construction was usual in Colo-

D: *Massachusetts slant-top desk, circa 1770, has a full frame, but no dustboard behind the drawer blade of the top-drawer cavity. Usually the side member of this frame is not glued to the sides; often it forces the drawer blade or the back boards out as the case side shrinks.*
E: *Philadelphia high chest, made by Henry Cliffton in 1753, has a thin dustboard, but no kicker to keep the drawer from tipping down when opened. (The two square glue blocks on the side of the chest are a recent repair.)*



D

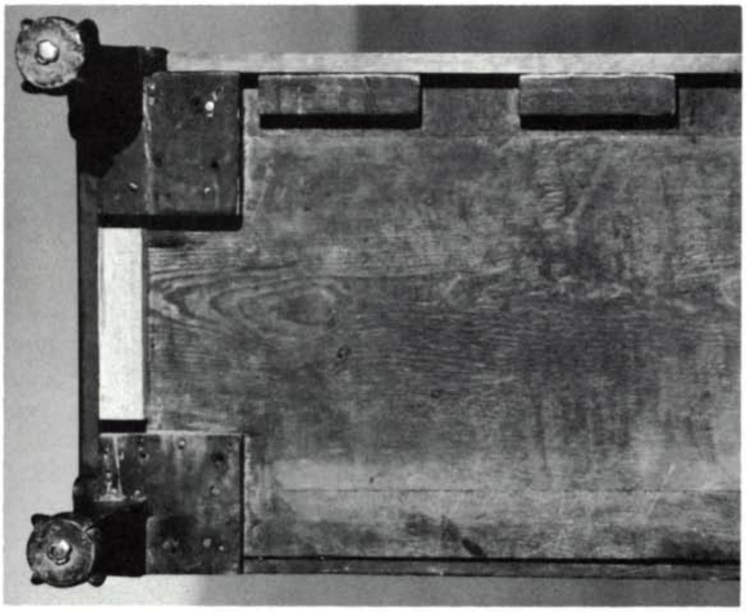
E

nial Philadelphia and to some extent in other areas. During the Federal period it became common in American production.

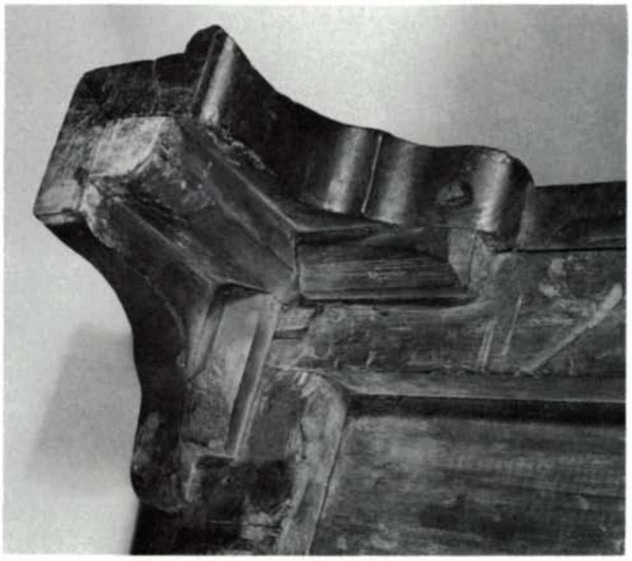
The range of construction techniques in 18th-century furniture can also be seen in carcase base-moldings and bracket feet. Scott of Williamsburg followed advanced London practice. He glued base moldings to a series of secondary wood blocks, which were in turn glued to the bottom of the case (photo *F*). The base molding is not attached directly to the carcase, but overlaps it by $\frac{1}{16}$ in. to $\frac{1}{8}$ in.—just enough to prevent a visible gap. This arrangement allows the case to expand and contract without great stress developing between the sides and the molding. The gaps between the blocks add some flexibility, and since the blocks are smaller than the sides and bottom and made of a weaker secondary wood (pine or poplar, usually), they give way first.

Scott's base construction is rarely found in other areas of Colonial America. The most common systems are of two types, both of which present shrinkage problems. In one system, the base molding is glued and nailed directly to the sides of the carcase. In the other a wide frame is glued and nailed to the case bottom, the nails often driven through and clenched. These batten frames are sometimes made entirely of primary wood whose edge is molded, but more commonly the primary-wood molding is nailed and glued to a frame of secondary wood. Both of these systems restrict the movement of the crossgrain sides, causing them to crack.

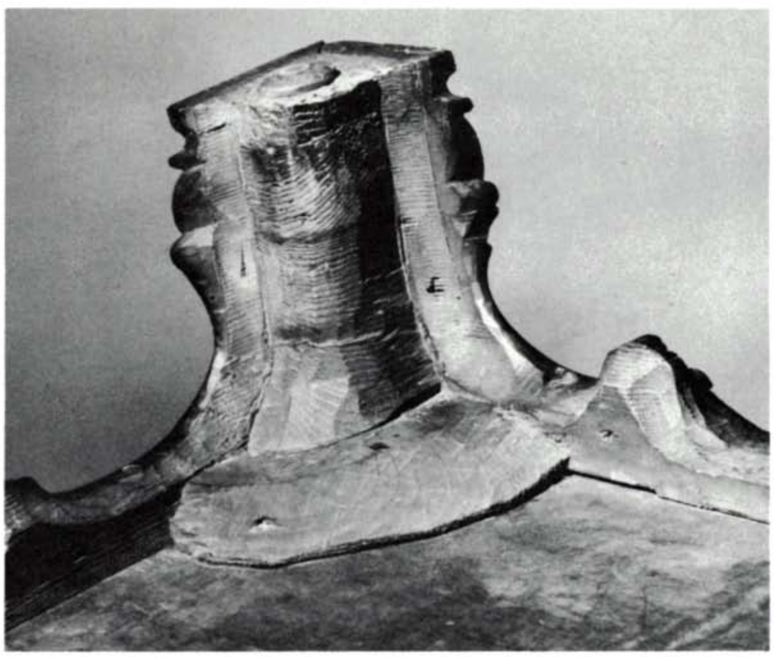
Bracket-foot construction in Scott's shop has two sophisticated features unknown in cabinetwork from other American cities. Both features can be found in production from major London establishments. The ogee bracket feet are formed from two-ply laminated boards, the outer portion of primary wood (walnut or mahogany) and the inner of yellow pine. This two-ply composition provides two grain patterns at the weakest point, where the ogee curve swings inward, therefore



F: *Bottom of the Scott desk-and-bookcase in photo A shows the English method of applying molding to segmented glue blocks instead of directly to the carcase side and front. This system allows the carcase sides and bottom to expand and contract without cracking.*



G: *Typical bracket-foot construction, as in this view of the Massachusetts slant-top desk, (also shown in photo D) employs a corner glue block with the grain running perpendicular to the grain of the bracket members. Cracked bracket feet are common. Note that the base-molding glue blocks run all the way into the corner, unlike the glue-block construction shown in photo F.*



H: *Bracket foot of a Scott bookcase, above, and of a London-made china cabinet, right, both show composite glue-blocking and laminated bracket members: primary wood on the outside and secondary on the inside. These two features, unknown in combination in American shops other than Scott's, have ensured exceptionally good survival of his bracket feet.*

helping to prevent fracturing at this critical location. Additionally, the softer secondary ply provides a resilient core that enables the foot to withstand greater shocks without breaking than if it were constructed entirely of hardwood.

The essential strength of the 18th-century bracket foot is the glue-blocking inside its corner. In the better pieces, the weight of the case is on these glue blocks and not on the brackets. The blocks are directly below the corners of the case, while the brackets are directly below the base molding. In pieces where the weight is taken by the brackets, the base molding is often broken loose, allowing the case corner to slide downward. The typical glue-blocking in bracket feet is made up of a square, vertical piece glued into the corner formed by the two brackets (photo *G*). The grain is perpendicular to the horizontal grain of the brackets. Excessive or sudden changes in relative humidity can cause the brackets to shrink, often breaking the glue joint since the block does not shrink in like amount. In some cases the glue-block joint holds and the brackets split at their weak point where the ogee swings inward. After splitting, each segment shrinks unto itself, leaving a gap at the fracture point.

Another defect of this construction shows up when the case is moved. If slid along the floor, the foot glue block is liable to catch on an uneven area and snap off.

By the mid-18th century, a composite glue-blocking technique that solved these problems had evolved in some London shops. Composite glue-blocking consists of several layers of secondary wood blocks stacked one on the other to build up a vertical foot block. All the grain in the glue blocking runs horizontally, parallel to the grain of the bracket itself. In addition, the blocks are stacked crossgrain, which alternates the grain orientation at the joint between glue-block and bracket-foot member to provide long-grain gluing surfaces to each side of the bracket. The layers are also face-glued together, producing an extremely strong foot (photo *H*). Scott's pieces combine this feature of foot construction with the laminated bracket, and his is the only American shop known to do so. Several other Williamsburg shops used composite-blocked feet, as did some in Norfolk, Va., and Annapolis, Md., but to my knowledge, this construction does not make a single appearance in the furniture of Boston, Newport, New York, Philadelphia or Charleston.

In summary, if it is to 18th-century American furniture that the craftsman and designer look for instruction, it is wise to realize that there were various construction methods as well as levels of sophistication. All American production is an offshoot of the English techniques that were most highly developed in London. The transition to America involved some loss or distortion of the original systems. Cabinet shops producing furniture closest to London in style and construction centered in Williamsburg. According to the degree of sophistication in typical case constructions, the other centers range, from high-style to provincial, as follows: Charleston, Philadelphia, New York, Newport, and Boston/Salem. Other cities should be in this list, but their production has been too little studied to reach definitive conclusions. □

Wallace Gusler is curator of furniture at Colonial Williamsburg. His book, Furniture of Williamsburg and Eastern Virginia, 1710-1790 *(Virginia Museum of Fine Arts, Box 7260, Richmond, Va. 23221, $24), covers in detail the production of the Scott and other Virgina shops.*

Post-and-Panel Chests

A 19th-century design

by Jim Richey

Experts on antique furniture usually advise, "Buy it and leave it alone." They didn't see the 140-year-old chest of drawers we brought home. Once sturdy and clear-finished, it was wobbly and covered with ugly paint. A previous owner had cured its loosened joints by driving nails through the cheeks of the mortises. Proper restoration had to start with complete disassembly.

While rebuilding, I realized that the post-and-panel construction of this unadorned country antique is really quite sophisticated and deserves to be better known. It is strong and handsome, and not likely to crack apart over the years. Hundreds of these chests survive: They were made throughout the Ohio River Valley states, of local hardwoods by village cabinetmakers who cared more for function than for fashion.

The post-and-panel chest is designed to cope with seasonal humidity changes and long-term panel shrinkage without damage. All the critical dimensions of the chest are determined by long-grain members—posts and rails. Built like a post-and-beam barn, the chest is strong enough to handle the strains of cross-country moving. Yet, there are disadvantages. The joinery is difficult, the material list calls for more and thicker wood than slab-sided construction and the finished chest seems to weigh a ton.

The old chest shown on the next page is 44 in. high, 44½ in. wide and 20½ in. deep. The top, front and sides are solid cherry. The back, drawer sides and drawer bottoms are poplar. The side panels are 16 in. wide, cut from a single board. Nowadays, unless you have access to unusually wide, clear stock, you would have to glue up two boards for the side panels. It is also perfectly acceptable to construct two (or more) panels per side with a stile between that's mortised into the top and bottom rails. Authentic 1830 panels are flat on the outside, beveled on the inside. The bevels can be turned to the outside for an attractive, if not authentic, effect. As with all frame-and-panel construction, the panel is left unglued in its groove, free to move as humidity changes.

If you decide to adapt the post-and-panel design to a chest project, carefully cut and dry-fit all the joints first. The mortise-and-tenon joints where rail meets post are crucial to a strong chest. Single tenons on the ends of the rails will work, but divided tenons mated with divided mortises are stronger and not much harder to make. Drawbore and peg the mortise-and-tenon joints, if desired, to gain extra strength and to reduce the number of clamps needed for assembly. Don't substitute one horizontal tenon for the two vertical tenons shown in the sketch at the ends of the drawer dividers; a horizontal tenon here won't hold, and it will weaken the posts.

Don't try to glue up the carcase all at once. First glue up the more complex side assemblies. The drawer-guide supports (with the drawer guides yet to be screwed on) need not be glued in; the post-and-rail frame will hold them in. With the side assemblies done, you can glue up the back or leave it

Post-and-panel chest construction

Post-and-panel chest of drawers, cherry and poplar, circa 1840, left, and a contemporary variation on the theme, right, which includes central side stile, panel bevels turned out, and bracket, instead of turned, feet.

Photos and Illustration: Jim Richey

unglued and fit it into the side assemblies piece by piece. The best way to assemble the whole carcase is to lay one of the sides on the floor and fit the back rails, panel, and front drawer dividers into the posts. Then fit the other side onto the other end. Turn the carcase upright, clamp it together and glue in the top drawer divider, which is dovetailed into the posts. With the carcase completed, the drawer guides can be screwed in flush with the drawer dividers. The guides will wear in time and so should not be glued, making their replacement easier.

Fasten the top to the frame with screws through screw-pockets cut in the top side rails. The screw holes should be large enough to allow for some movement of the top. If the top is warped, put the concave side down to reduce gapping at the front. After the frame is together, cut the drawer parts to fit the drawer openings. Use traditional drawer construction with dovetailed corners and solid, beveled-panel bottoms.

Most antique chests have a turned foot at the bottom of the legs ending at the floor with a ball. If you prefer molded bracket feet to turned posts, just rabbet out a portion of the face and side at the bottom of the front posts equal to the height of the foot. Fasten the bracket foot below the resulting shoulder with screws from the back. Since part of the post touches the floor and backs up the feet, the arrangement is quite strong. □

Jim Richey, of Ponca City, Okla., is Methods of Work editor of Fine Woodworking *magazine.*

The Frame and Panel

Ancient system still offers infinite possibilities

by Ian J. Kirby

Scarcely another system in the whole range of woodworking has more variation and broader application than the frame and panel. In the frame-and-panel system, pieces of solid wood are joined together into a structure whose overall dimensions do not change. The frame is usually rectangular, mortised and tenoned together, with a groove cut into its inside edge. The panel fits into this groove: tightly on its ends since wood does not move much in length, but with room to spare on the sides because wood moves most in width (figure 1). Wood is not uniform and as it moves in response to changing moisture conditions, it cups, twists, springs and bows. Trapping the panel in the groove inhibits this misbehavior.

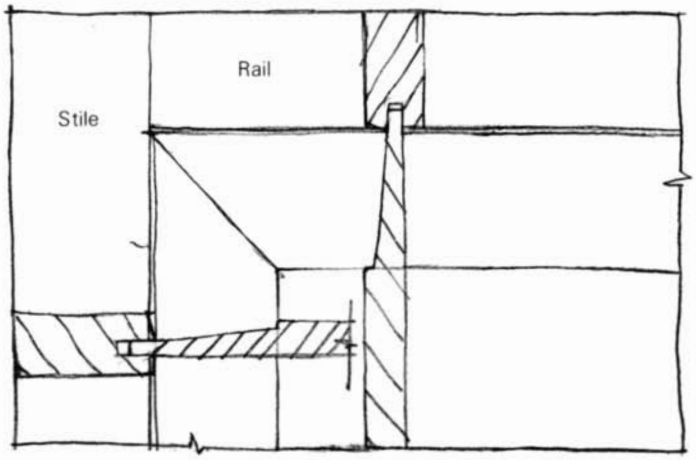
Historically, the basic technique that made possible the frame and panel is the mortise-and-tenon joint, on which I have already written extensively. The frame and panel is a basic unit of structure. It can be used singly (a cabinet door) or in combination (to make walls, entry doors, cabinets). The several elements of a single frame and panel may be varied almost without limit, and its aesthetic possibilities are infinite. The little choices made during its manufacture are aesthetic choices, and we can begin to see the interdependence of design and technique. Neither the frame-and-panel system nor its joinery can be thought of as an end in itself. Neither has any importance except in application, toward the end of making a whole thing out of wood.

To overcome the panel's tendency to distort, we make it as thin as the job will allow, while we make the frame relatively thick. By doing this we haven't significantly altered the amount by which the panel will shrink and expand, but we have rendered it weaker so that the frame has a better chance of holding it flat. Panels can be made as thin as 3/16 in. but such panels were uncommon before the 19th century because woodworking tools were not readily capable of such refinement. The thickness of the panel was dealt with in a number of ways, the most usual being to raise and field it.

Generally raising and fielding are thought to be the same thing—the process of cutting a shoulder and a bevel on the edges of the panel and thereby elevating the field—that is, the central surface of the panel. I'd like to distinguish between these two terms. Fielding refers to any method of delineating the field of the panel from the frame; raising means cutting a vertical shoulder around the field, which may or may not be accompanied by a bevel.

Given this system for maintaining panel size and shape against the hygroscopic movement of wood, woodworkers in the past found that the system's elements could be varied to produce different aesthetic results in terms of form, color, texture, pattern value, proportion of parts, highlight and shadow (figure 2). By carving the panel, we imprint upon it richness and grandeur. By inlaying it, we make it into a vehicle for the decorative use of other materials, and by using moldings of different profiles, we change the various propor-

Fig. 1: Section through frame and panel



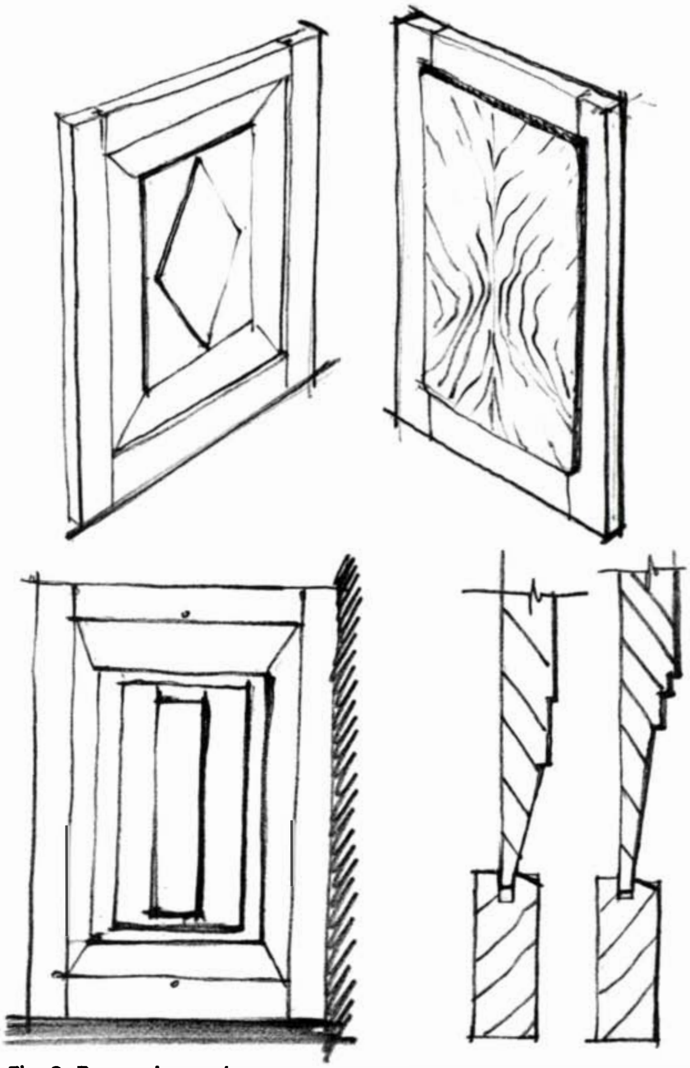


Fig. 2: Proportion and pattern

The pattern possibilities are infinite. The peg holding the panel on center can be an interesting detail for the observer to discover—don't let it become a cliche. It needn't be taken through to the front of the rails.

tions within the whole. We can alter the mood of a piece by changing the panel's attachment to its frame.

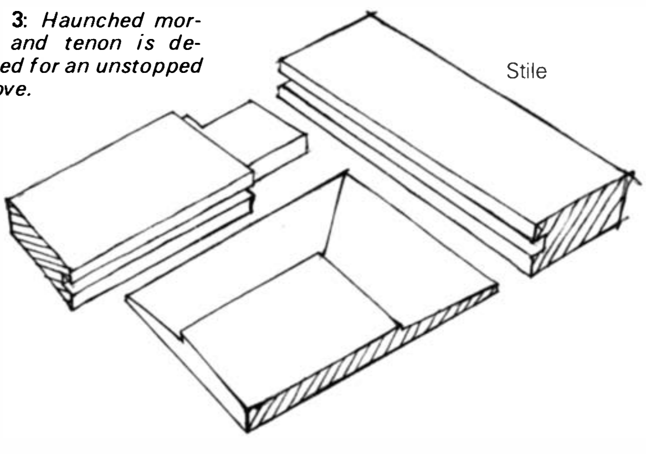
Within the predetermined dimensions of the frame, the relative proportions of the rails and the stiles can vary considerably, though it is common to find the top rails in a door to be about two-thirds the width of the bottom rail, and the stiles to be about three-fourths the width of the top rail. This isn't necessary to produce an acceptable appearance, but many woodworkers build doors as though these proportions were divinely decreed. Altering them within the limits of structural necessity can produce a wholesome diversity of appearances. The proportions of the panel—the dimensions of its field, the depth of its shoulder, the width and slope of its bevel—are all subject to considered alteration.

For showing off highly figured wood, the frame and panel is excellent. The usual way of doing this has been to resaw the figured piece and to edge-join the halves into a bookmatched panel. Edward Barnsley's desk *(FWW* #16, May '79) exhibits how figured wood can be enhanced by a frame. This desk, by the way, incorporates two different types of frame-and-panel construction and shows the discriminating and sensitive use of a frame and panel typical of Barnsley and others, such as Gimson and Vals, who were part of the Arts-and-Crafts movement. Generally, the plainer form of paneling—overlaying it onto the frame—shows a highly figured piece of wood to its greatest advantage. Raising and fielding can look fussy when the wood is highly figured.

The face of the panel can be treated in countless other ways. You can inlay it with mother-of-pearl, ivory, brass or other materials, or the field can serve as a ground for marquetry or wood inlay. Carving on panels has taken many forms. English "joyners" of the 13th to 15th centuries imitated almost slavishly the tracery and linenfold patterns common in stonemasonry. It was also common in this period for panels to be painted with vibrant colors in a variety of abstract geometric designs. In our own century, Mousey Thompson adzed the surface of quartersawn oak panels for a mild rippled texture, subtle to touch and sight.

I wish contemporary panels conveyed such vitality and served the imagination as well. I'm not saying that we have to paint panels or inlay them or dress them up in other ways. I am saying that we ought to realize that the panel is an unexploited vehicle for expression, for there is in fact no woodworking system with as great a potential for individualization within its essential structural features. This invites the woodworker to explore some of the system's possibilities. The easiest way to play with all of these possibilities is to make a full-size drawing, or several of them, to help you visualize the critical relationships between the parts. A further survey of traditional treatments and manufacture of the solid-wood frame and panel may help contemporary woodworkers to a livelier use of the system.

Fig. 3: *Haunched mortise and tenon is designed for an unstopped groove.*



The frame — Designing a frame and panel begins with a sectional view of the two parts and a decision about the joint to be used in bringing the frame together. The groove is generally placed in the center of the frame stock. If you use a square haunched mortise and tenon to join the frame, then the grooves can be plowed right through the joint without interruption (figure 3). This is no happy accident. The joint was designed for the groove to be continuous, because a plow plane can't cut a stopped groove. When making the haunched mortise and tenon by hand, the question arises about what to do first, plow the grooves or cut the joint. I recommend cutting the mortises and tenons first. If you plow the groove first, you obliterate the gauge lines on the mortise and on the inner edge of the tenon. And nothing is more agonizing than trying to cut an accurate mortise without reference to gauge lines. Also, it's easy to be tricked into thinking that you are cutting the mouth of the mortise at the same time you plow the groove. You can in fact. But if your mortising chisel is not exactly the same width as the groove, you'll find it almost impossible to cut the rest of the mortise in an accurate way. Using a chisel that is too large or too small, even by a minute amount, makes cutting the mortise walls an exercise in guesswork and error.

If you wish to use a mortise and tenon of the sloping haunch type so that the joint shows an uninterrupted straight line, then some means of stopping the groove must be employed. This is quite easily done on a router, shaper or circular saw by the use of end stops.

Another aspect of the frame that deserves attention is the profile of its inner edges. Since standard shaper knives are frequently used to make molding and scribe cuts in rails and stiles, I'd like to describe the less common practice of chamfering the inner edges. It creates a boundary that is decisive and bold, not busy or blurry like poorly conceived moldings. There are three conventional ways to chamfer the inner edges of the frame, two of which require redesigning the joints.

The simplest way is to assemble the frame dry and cut a 45° chamfer with a router, using a bit with a ball-bearing pilot. The cut will be rounded in the corners (figure 4) but can be squared up if desired with a sharp chisel to form what is called a mason's miter (figure 5). But if you want the line of the joint and the outer edges of the chamfer to form one continuous line, then more refined joinery is called for. The first method involves cutting the tenons on the rails as if you were making a long-and-short-shouldered joint (figures 6 and 7). Cut the mortise in the conventional fashion, and then chamfer the inner edge of the stile. To accommodate the chamfer, the long shoulder of the tenon is beveled inward from the shoulder line. A variation of this method also leaves the line of the joint and the outer edge of the chamfer uninterrupted. But instead of beveling the underside of the long shoulder on the rail, you remove a section from the face of the stile to accommodate the long shoulder. Then the chamfers on both rail and stile must be mitered to fit (figure 8). Making this joint requires careful measuring and marking with a mortise gauge and cutting gauge. Chiseling should be done across the

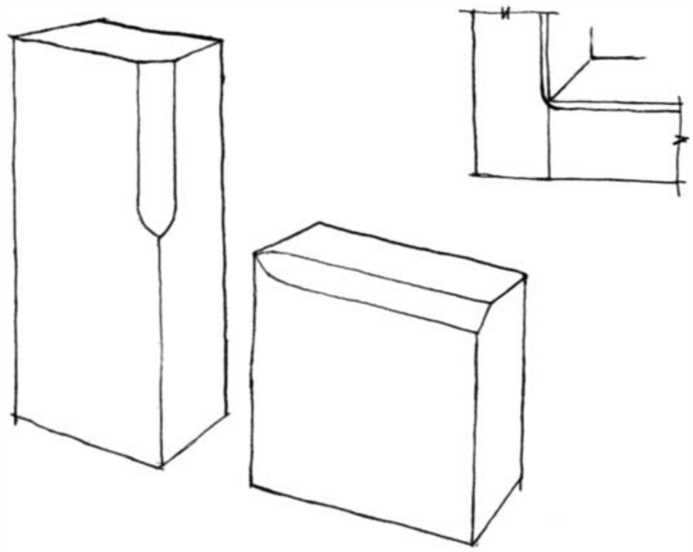


Fig. 4: *To bring the chamfer around the corner in a 90° arc, cut most of the bevel before assembly. The corner round should be completed after gluing up because of the fragile short grain on the rail.*

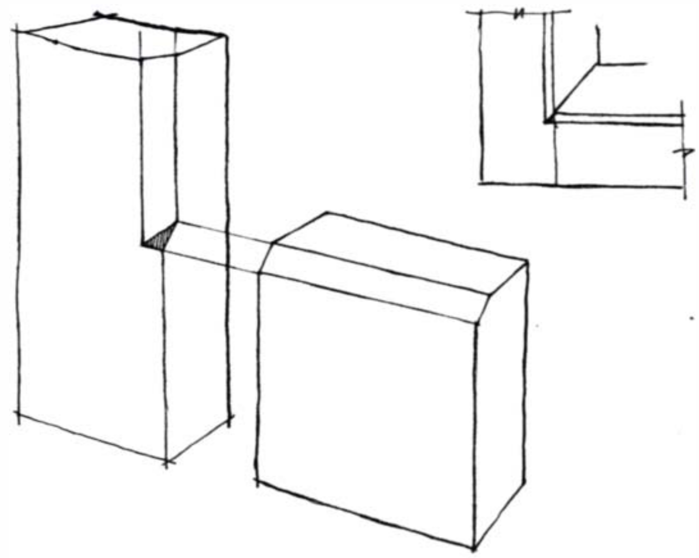


Fig. 5: *Mason's miter brings vertical and horizontal chamfers together. The disadvantages are that the chamfer does not line up with the shoulder of the joint, and a little triangle of end grain spotlights the mitered corner.*

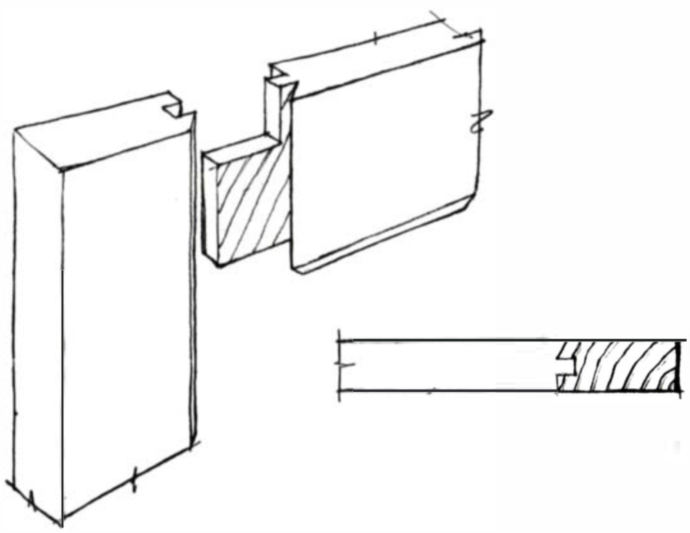


Fig. 6: *Beveled or scribed version of long-and-short-shouldered mortise and tenon permits precise alignment of joint and chamfer lines.*

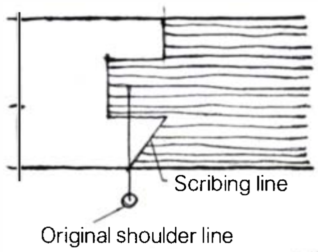


Fig. 7: *Plan of stile/rail joint showing original line of shoulder before undercutting.*

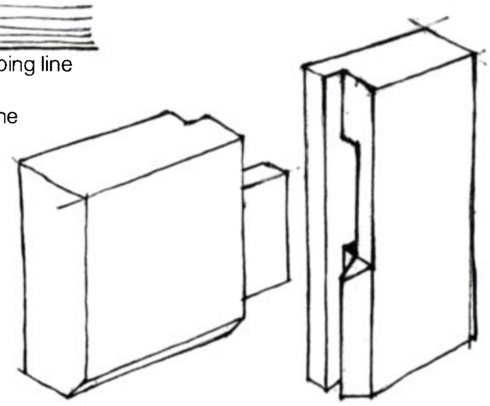


Fig. 8: *Another variation of long-and-short-shouldered mortise and tenon demands care in marking out to get the joint to close properly and the miters to meet on a line.*

grain, and the mouth of the mortise plugged with a softwood block to prevent the tissue from splintering out.

Don't sand the chamfer if you wish to retain its crisp edges and the fine texture of its tooled land. Sandpaper rounds and softens these critical light-reflecting angles and faces. You may try sanding, and even get an apparently satisfactory look until the finish is applied, but then you will find the crispness lost and the clarity of the land muddied.

Yet another variation in the design of the frame is not to use grooves at all, but to lay the panel in a rabbet cut into the edges of rails and stiles. The panel is retained with an applied molding on the show side of the work. Some might think this method to be a good example of bad workmanship, but it is well suited for some types of work, including those using modern materials. It's worth noting that much of the traditional frame-and-panel joinery was done this way.

The panel — When thinking about the design of a panel three possibilities are available: a fielded panel, raised or not, an unfielded panel and an overlapped panel. According to the type of design you choose, you must consider variables such as the size of the field relative to the frame dimensions, the width and slope of the bevel, the depth of the shoulder, and the treatment of the field (carving, inlay, figured wood)—all of which combine to determine the finished look.

You can field a panel without raising it by cutting the bevel right through to the field and eliminating the shoulder. But it's difficult to get good results when you define the field with the bevel alone because invariably that critical line where the two converge will be untrue. It can be straightened out with a hand plane, but it's not easy. Also, panels without shoulders look indecisive, even if the field edge is straight.

It's common practice when raising a panel to cut the shoulder lines first (figure 9). This fields and raises the panel and gives you an idea of its proportions. You can accomplish this by setting the fence on your bench saw to the width of the bevel and the blade to the depth of the shoulder, producing four shallow cuts equidistant from the panel's edges. Saw the bevel by tilting the sawblade to the required angle and setting it to the required depth. When cutting the bevel, a wedge should fall off the waste side of the cut; this means that pressures on the blade are equal right and left. But raised

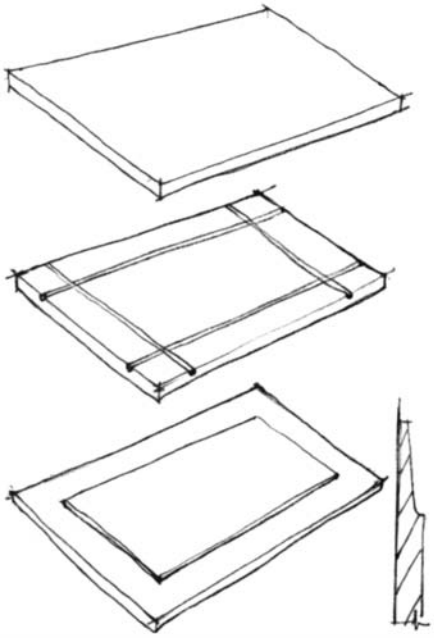


Fig. 9: *The field is defined by saw or router cuts. You can use a nosed cutter in your router to give the shoulder a softer profile. The bevel is angled at the time of sawing or it can be cut with a bench rabbet plane.*

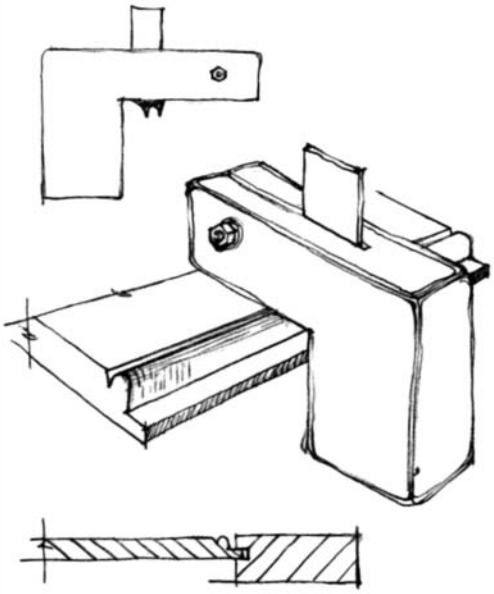


Fig. 10: *A panel edge need not be beveled. Here it is rabbeted and a bead mold run down its edge. The scratch-stock must be held firmly and pushed away from the body. It should settle gently into the cut and not be forced.*

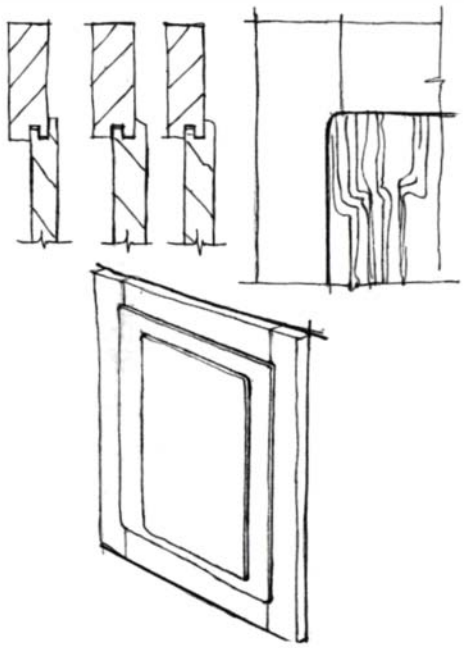


Fig. 11: *The edges of the overlapped panel may be treated in a variety of ways—rounded, beveled or left square. At this stage you introduce details that affect the highlights and shadows of the panel.*

panels are usually more delicate than this will allow. So to minimize blade vibration and consequent scoring of the bevel, use a sharp, stiff tungsten-carbide-tipped saw and feed the work gently into the blade.

However carefully you cut the bevel, its sawn face will need some cleaning up. It can be sanded, but you'll have greater control and get better results using a rabbet plane that's wide enough to clean the whole width of the bevel in a pass. You could also make a jig for your router and make the cuts with a properly profiled bit, or you can obtain the fastest results with a spindle shaper. The latter should be used with great caution, and you should make three or four passes, removing only a little stock with each.

Because the whole system is designed to accommodate the hygroscopic movement of wood, it's not unusual for a panel to travel about in its grooves, sometimes being noticeably off center. This is easily rectified by driving two nails or wooden pegs into holes on the inner edge of the frame, top and bottom, so that they capture the panel on center (figure 2, p. 55). The pegs make interesting little details if left slightly proud and rounded off. You can get the same result by applying a dab of glue in the center of the grooves top and bottom, taking care during assembly to position the panel properly. It is normal for the panel to rattle when tapped. The rattle can be eliminated, but need not be.

The panel doesn't have to be raised and fielded to be held in the frame. One of the sweetest systems brings the groove forward of center to create a flush panel from very thin stock. This system demands accuracy in cutting the top and bottom shoulders so they just touch the rails. The panel edges, which move slightly over the frame, can be molded by using a scratch-stock that you can make yourself (figure 10).

The third possibility exchanges the angular, vigorous look of the usual raised panel for the softer, more subdued look of the overlapped panel. Panels of this sort are rarely seen because most woodworkers hesitate to depart from the more accepted method, yet they are no more difficult to make. The panel is held in the frame by a set of tongues and grooves, which should not be cut too deep as a long tongue is likely to curl back (figure 11).

Given the possibilities of the frame and panel, it is surprising to find them so little realized by contemporary cabinetmakers working in solid wood. Industry, however, has not ignored their appeal. In one method of quantity production, frame-and-panel doors are molded from a mulch of the sort used to make particle board. After a few seconds of heat and pressure, out pops a frame and panel, raised, fielded and detailed to your requirements, ready for printing with a photocopy of wood grain. Before the offended reach for their pens, consider that if industry will apply its technical and economic resources to such an extent, there must be a strong demand for the frame and panel. Given this market, there is a noticeable lack of frame and panel being used in a refined and exciting way by makers of hand-built, solid-wood furniture. This seems a pity since I've always felt that the cabinetmaker's shop could be the birthplace of technical and aesthetic models for industrial production.

The sad fact of the matter is that there exists an emotional antagonism between the designer/craftsman and the designer/executive, and little productive communication is shared between them. The craftsman suffers the most as a result, because he closes the door on salespeople, designers, decorators and others who work either with or for the larger furniture manufacturers. It does the craftsman little good to have a vast technical knowledge, a keen aesthetic sense and a shop full of tools if he denies himself contact with people who can market his furniture and who can benefit from his fidelity to quality and his innovative thinking. I hope this examination of the frame and panel will promote improved communication between the craftsman in his shop and the larger world of woodworking. □

Ian Kirby, a regular contributor to this magazine, teaches woodworking and makes furniture in Bennington, Vt.

The Legacy of Harry Nohr

Durable, delicate bowls of native hardwoods

Harry Nohr began turning bowls from green wood in 1960, and during the following decade he explored various methods of curing, tooling and finishing wooden bowls. By 1970 his experiments had come to fruition, and he began to gain national recognition for the unparalleled beauty and unusual strength of his delicately thin bowls. Four of them were selected by the Smithsonian Institution for its craft display, and several more found their way into permanent museum collections. But it wasn't Nohr's intention to turn out works of art for collectors and museums. He wanted rather to make practical and durable household objects that could be used and enjoyed without needing special care and attention.

With a chain saw, Nohr harvested his wood locally, near Madison, Wis., trying to use as much figure as possible and always looking for burls, stumps and crotches. He cut his bowl blanks from the green logs in the usual way (*FWW* #16, May '79, pp. 48-51) and then bandsawed them into plugs (bowl blanks ready for turning). He coated the plugs with a log-wax sealant, wrapped them in newspapers and stored them in a humidity-controlled room for periods of from 4 to 24 months, depending on the species. This sealant, Clear Sealtite 60, can be obtained from Chapman Chemical Co., 416 E. Brooks Rd., Memphis, Tenn. 38109.

When a plug had cured to about 20% moisture content, Nohr glued a mounting block to its base and screwed the block to a faceplate. For turning the bowl to a final thickness of ⅛ in., Nohr made special tools from metal-turning bits. He ground the bits to a relief angle of 15° and fitted them into long handles. During the turning process, Nohr worked from the outer edge of the bowl toward its middle, maintaining little clearance between the trailing edge (heel) of his tool and the turning blank.

When the turning was done, he sawed off the mounting block and popped the bowl into an oven to bake it thoroughly dry. Then, to immortalize his creation, he painted it with four coats of epoxy varnish, beginning with a dilute solution and then applying it full strength. This process generally took about a week. Sanding, steel-wooling and rubbing with rottenstone followed. Because his bowls were turned so thin, the epoxy finish penetrated every cell, giving great strength and flexibility to an otherwise weak and brittle object.

After Nohr died in January, 1977, his wife and friends, including his long-time associate Bob Gilson, set up a special internship program so that his skills and methods could be passed on to others. Because Gilson had acquired Nohr's techniques during a long friendship, he agreed to teach the students who were selected to participate in the program. David Lory, the author of the following article, was one of those students. Now both Lory and Gilson continue the work pioneered by Nohr, although both have adapted what they learned to their own way of doing things. Gilson, of Middleton, Wis., is a businessman who turns bowls for pleasure. Lory, who lives in Platteville, Wis., turns bowls full-time and sells them with a lifetime guarantee. →

Bob Coyle

Turning Thin and Finishing with Epoxy

by David Lory

My turning tools are made from an Armalloy alloy. I get the bits, as did Nohr, from the Richard Ela Co., 744 Williamson St., Madison, Wis. 53703. I grind them to a 15° relief angle and secure them in long, square-sectioned shafts with two allen screws (photo, below). I have two tools, one a roundnose and the other a spear-point chisel. They require honing several times during the course of turning a single bowl.

I do all of my turning on the outboard side of the lathe. I get the block rounded at the slowest speed. Then, still working on the outside, I shape the plug into the largest bowl possible. Moving my tool rest around, I turn the inside. On larger and deeper bowls I use a 1/2-in. electric drill with a 2 1/2-in. wood bit to drill out the center before turning it. When turning the inside, I cut from the rim toward the center. This compresses the wood fibers and allows me to turn the bowl to a finished thickness of 1/8 in. I stop at stages to examine the grain, so I can work with it and bring out the best it has to offer. Fancy cuts detract from its natural flow. The interior grain generally determines the shape of a bowl, as that's its most visible part. I then return to the outside and reshape it to follow the contour of the inside. On these last cuts the lathe is speeded up as much as possible without the wood chattering.

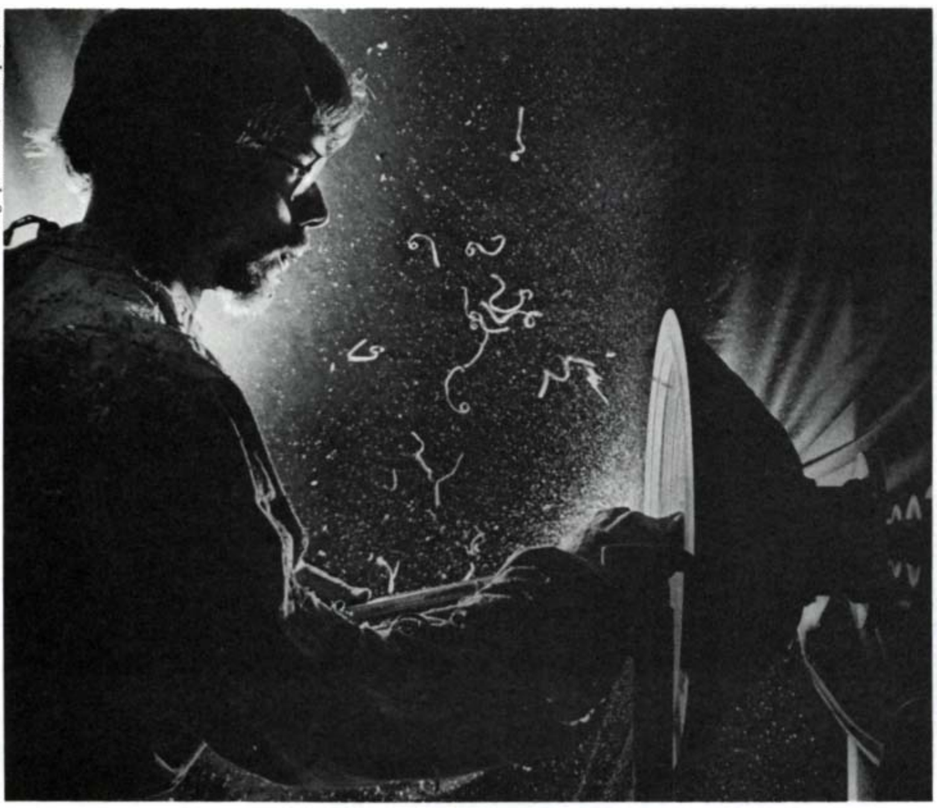
To prevent checking and to reduce tear-out and pecking, I turn the bowl as quickly as possible. And once I begin, I carry through to the end without interruption. If I have to put my work aside temporarily, I cover the bowl with a wet cloth to keep it from drying out.

Bowls can fly apart while being turned. Some break because of unseen flaws in the wood; others may break apart if they're gouged too deeply. Excessive dryness may cause some to crack while being sanded. Some bowls will fly apart for no apparent reason. The turner should take every precaution in selecting his blanks, in controlling their moisture content and in properly tooling the rotating plug.

After a bowl is turned to shape, I sand the outside, starting with 80 grit and working up to 220. I return to the inside, make the finishing cut, and sand it. The bowl should be 1/8 in. thick at the sides and 3/16 in. to 1/4 in. thick at the base. This thickness is important because its uniformity helps prevent checking when it's dried to about 0% moisture. I cut the bowl off the glue block with a handsaw, leaving the bottom somewhat thicker so if it does warp I can sand it flat without ruining the bowl. If I did a good job of turning, the bowl will not need any hand-sanding.

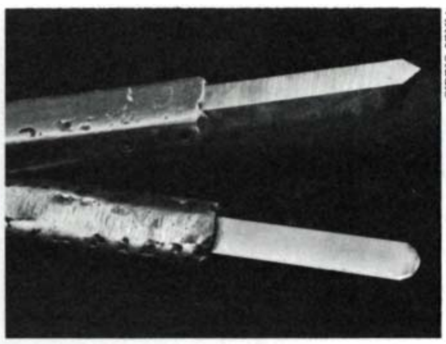
Now the bowl is ready to be finished. Instead of the usual oils and varnishes, I use a heavy-duty epoxy-resin paint, No. 100 Clear Epoxy (Peterson Chemical Corp., 1104 S. River St., Sheboygan, Wis. 53081). It comes in two parts—paint and hardener. When it dries it doesn't become brittle, and bowls will flex rather than break. It is clear and there is no discoloration of the wood. It meets federal requirements for use with food, and hot (up to 250°F) and cold foods can be served without bad effects. This finish is resistant to acids, detergents and alcohol. To prepare the bowls for the application of epoxy, I put them in the oven for five hours at 150°. Some of them will warp greatly during the baking; all of them will warp in different ways and to differ-

Telegraph Herald, Dubuque, Iowa



Using a steel-hafted chisel, Lory takes a cut off a rotating bowl blank. Tooling the alternating long and short-grain surfaces produces both shavings and dust.

Virtue Studio



Square-sectioned steel shaft securely holds replaceable metalcutting tool bits. Armalloy is harder than ordinary high-speed steel and will hold a sharp edge longer. You can grind it on a fine aluminum-oxide wheel.

Virtue Studio

Some of Lory's bowls turned from locally available burls and stumps. Epoxy finish, which completely penetrates the 1/8-in. thick walls, makes the bowls flexible and durable.

ent extents. This gives each piece character and life.

After the baking, I resand the bottoms on a belt sander to make them flat. Because the bowls may pick up moisture, I rebake them. Then I take a few out of the oven at a time and epoxy them with a 1-in. brush, which minimizes runs. For durability, I use four or five coats. The first is mixed with 40% *A* (paint), 40% *B* (hardener) and 20% thinner. The thinner makes for deeper penetration, but any more than 20% would make the mixture useless. For subsequent coats I use 50% *A* and 50% *B*. These coats are applied every other day with a light sanding (using 320-grit aluminum-oxide paper) in between. I apply the epoxy to the inside of the bowl first, and when that is dry to the touch, I do the outside. Good ventilation and a mask are important. Though the toxicity is low, it can be irritating. At 75°F and 60% relative humidity, the finish will dry dust-free in 30 minutes. It will dry to touch in two hours and cure hard in seven days. To speed up curing time, place the bowl in an oven five minutes after applying the finish, and bake it for 20 minutes at 180°F.

The epoxy leaves a high-gloss finish when it hardens, and I feel this detracts from the natural beauty of the wood. To get back the natural patina and glow of the wood, I spend several hours rubbing down each bowl by hand. The epoxy finish is not easy to sand because special care must be taken not to sand through the fourth layer into the third. If this happens, a dull spot will appear and the bowl must be repainted. I rub the bowl with 320-grit aluminum-oxide paper, 00 steel wool, 0000 steel wool and then with rottenstone. Rubbing brings out the true beauty of the wood. Epoxy makes the wood stronger than it was before and much more useful. The combination of beauty and practicality make the bowls truly functional pieces of art, which I believe will last well beyond my lifetime. □

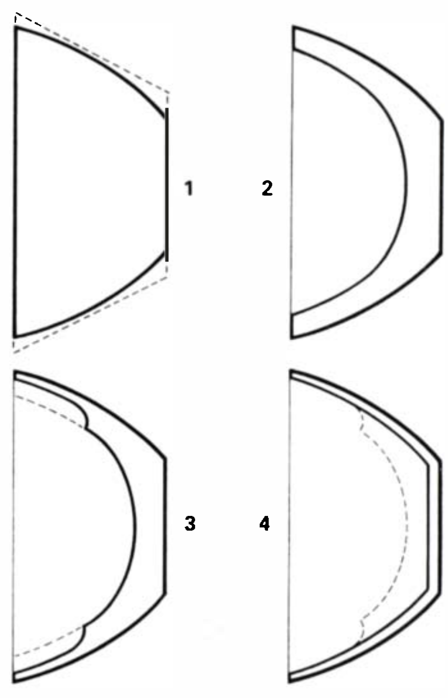
Tool Rests and Turning Tactics

by Bob Gilson

For outboard turning, Nohr showed me how to make a tool support from a brake drum with three feet welded onto it so it won't rock. The vertical post can be 2-in. steel pipe with a ½-in. by 1-in. by 12-in. steel tool rest welded to the top. Make your cuts toward the lathe, from the rim to the base of the bowl, to load the wood compressively and reduce chatter. Good lathe speeds for bowls are 900 RPM for a 6-in. turning, 600 RPM for 12-in., and 350 RPM for 18-in. bowls. At this point you will find out how solidly your lathe is mounted to the floor or wall (yes, wall). Sometimes it is necessary to run a brace from the lathe table behind the headstock to the wall to reduce vibration. If your lathe has enough power and is well mounted, it is possible to remove ¼ in. at a pass, but this isn't necessary. As you make the first cuts, the outside of the bowl will be out of round from sawing and mounting. Take care to avoid too heavy a cut on the invisible spinning projections. The angle of the tool relative to the cut should remain constant, with the trailing edge clearing the work by 1/16 in. As the inside corners are turned, it is important to be aware at all times of the clearance to prevent the heel of the tool from catching the work. The smaller the clearance without catching, the smoother the cut. The finish cut with these tools is not as smooth as from a regular woodturning tool, but they make possible the thin sections. When using a floor tripod, it is usually necessary to plant one of your own feet on it to hold it in place.

The following steps will help you avoid most problems of warpage and vibration when turning a bowl 12 in. or larger. Rough out the outside of the bowl to within ⅛ in. of the desired shape. Then rough out the inside, leaving a wall thickness of 1 in. (The outside may be out of round at this point.) Next, sharpen the tool and take a finish cut of 1/16 in. on the outside. Rough-sand the outside with a glass-foam sanding block (a respirator should be worn), and then fine-sand in stages from 120 to 280 grit. Now turn the inside of the bowl ¼ in. thick to a depth of about 2½ in. The wall should be slightly thicker at the end of the cut to allow for blending with the next cut. Then sand the same as the outside.

On a larger bowl another 2½-in. step would be turned, but on a 12-in. bowl the rest of the inside may now be turned to ¼ in. to blend with the previous cut. Start by removing the wood nearest the lip. A caliper is useful for measuring wall and bottom thicknesses. The two cuts are blended with the sanding block and then finish-sanded in stages. The outside of the bowl may be ¼ in. or more out of round at this point as the wood dries. The bowl is then sawn off the mounting block as close to the base as possible. For a beginner the total time for turning a 12-in. bowl might by 4½ hours. With experience, and a good wood like shagbark hickory, you may cut the time down to 2 hours. Once you take a finish cut, the bowl should be completely turned as quickly as possible, as there is the likelihood that it will warp overnight, even if covered with a plastic bag that has moistened wood chips in it.



Sequential order of turning. Centrifugal forces might cause the bowl to distort or even to fly apart if the rim is not cut first, leaving mass of turning in center.

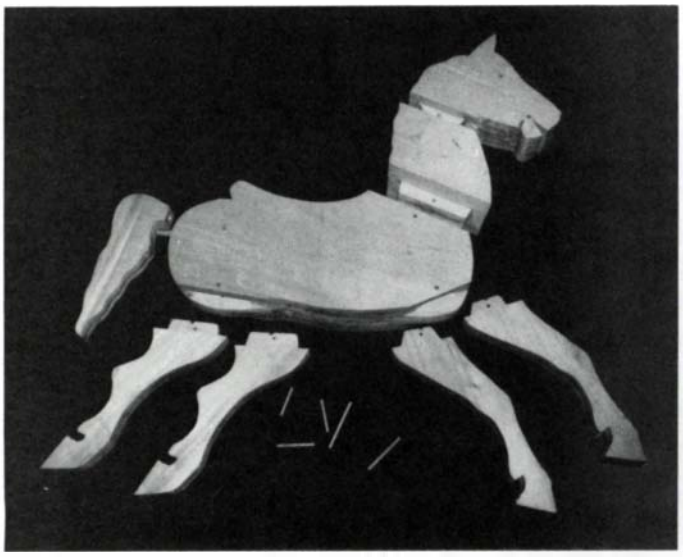
The bowl at this time may have a 20% moisture content. Bowls that will fit into an oven should be baked at 150° for two hours to dry them completely. Larger bowls must be left several months to air-dry. The remainder of the mounting block is then sanded off and the bottom sanded flat. If there are any flaws, such as those that frequently occur in a burl, fill them with a filler, then sand.

Finish the bowl with four coats of clear epoxy varnish. After the epoxy has cured for about four weeks, sand it with 240-grit paper (for light woods) or 360 (for darker woods) to smooth out any irregularities and take off the gloss. Then continue to polish with steel wool and pumice followed with rottenstone. □

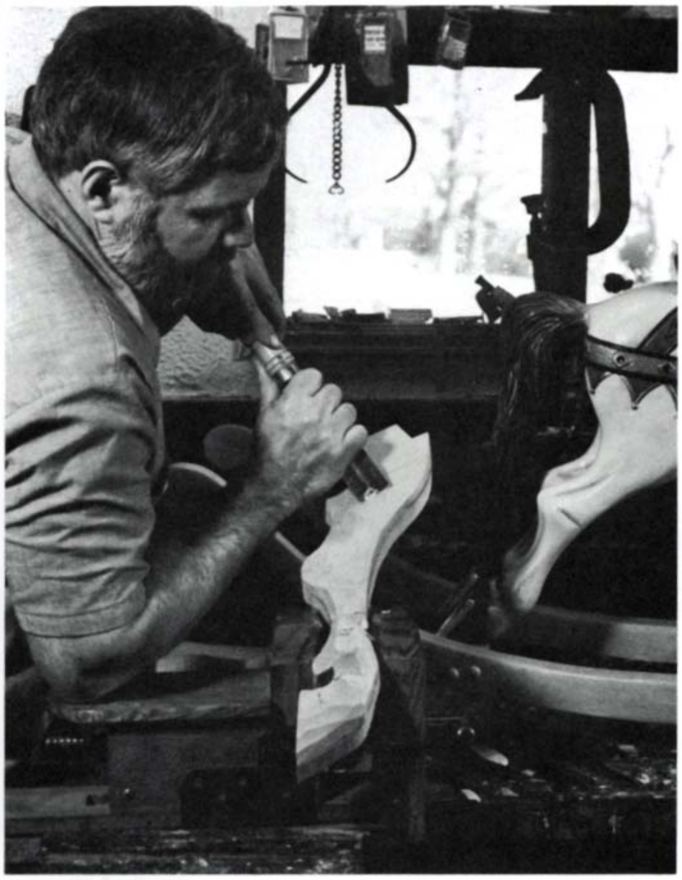
The Carousel Horse

Hollow carcase makes a sturdy beast

by Roger E. Schroeder



A scaled-down version of the carousel horse shows one way to join extremities to body. Because these legs have no sharp bends, they can be cut entirely from a single piece of stock.



Gerry Holzman carves the hind leg of a rocking horse. Leg is held in a chops, a traditional English carving vise. Carousel horse and smaller hobby horse have identical structural features.

Despite their often massive and muscular appearance, wooden carousel horses have hollow bodies. Centrifugal forces exerted by spinning carousel platforms that parade as many as 64 horses, not to mention chariots and other encumberances, make weight important in the design and construction of the horse. Aside from lightness, the hollow body has another advantage—it's less likely to develop the deep checks so common in large, solid-wood carvings and statues. The hollow carcase makes the horse durable and able to cope with seasonal and atmospheric changes.

The carousel is a European invention. The Italians gave us the word (*carosello,* meaning a joust), the French made it mechanical, the English gave it steam power, and German cabinetmakers brought it to this country in the late 1800s.

Early in our century a typical carousel shop may have employed as many as 20 to 30 workers. An apprentice started as a sander, progressed to roughing out the body, then might become the head carver—literally carving only the heads. Working from memory and a few sketches on the block, he could recreate anatomy and muscle tone, as well as create bold and even flamboyant features.

Today wooden horses have given way to steeds of plastic and metal. But a New York trio of carvers is reviving the beauty and grace of the wooden carousel horse through restoration and construction. I met Jim Beatty, Gerry Holzman and Bruno Speiser at their East Northport shop and learned some of their techniques for continuing this form of folk art.

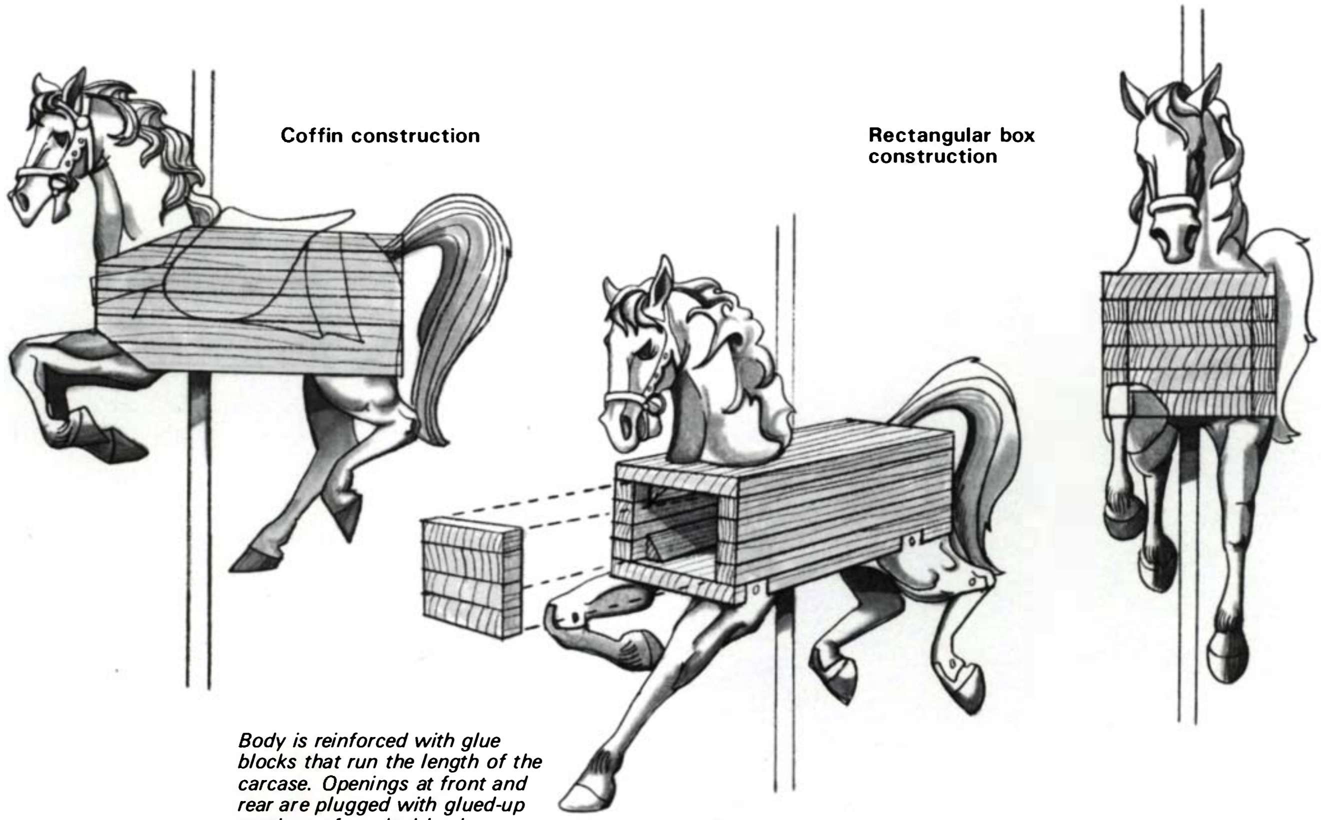
Speiser, who has himself restored 25 horses, bought his first one for $25 almost two decades ago. Today a restored horse costs between $3,500 and $5,000, depending on the company that made it, the carver, the age of the horse, and the workmanship. Restoration might include removing dozens of coats of paint (many horses were painted yearly), disassembling 40 or more pieces of wood (if the joints have separated) and replacing broken pieces. Restoring a horse has its rewards. As Holzman says, "In recarving a line or muscle, you get a communication established between you and the carver. . .who originally did it 50 or more years ago."

Construction — Whether you're restoring a horse or designing a new one, it's a good idea to visit a carousel or a museum that displays horses. Bring your camera and plenty of color slide film. Take full-view shots of the sides, the front and the back, and take close-ups of details. Project the images onto a sheet of tracing paper hung on a wall and transfer the projected lines and shadows to the paper. You determine the size of the horse by increasing or decreasing the distance of the projector from the wall. Sometimes it's feasible to trace the image of one horse and then to project the image of another on top of it. Designing from a composite frees you from the necessity of choosing one model and sticking with it.

At this point you'll have to decide on which body stance you prefer, and the composite method is helpful here because you can use a number of different horses in different positions to produce the single posture you're after. Whether running or jumping, with the head forward or down, the position and attitude of your horse can be pieced together from various models or simply copied directly from one you like.

Once all of the design decisions have been made, you'll

Roger Schroeder, a woodworker, teacher and freelance writer, lives in Amityville, N.Y.



Body is reinforced with glue blocks that run the length of the carcase. Openings at front and rear are plugged with glued-up sections of stacked lumber. Grain direction of plug and carcase are the same.

Doweled lap joint where limbs make sharp bends enables grain to run the length of any single piece. Lapped bare-faced tenons secure legs to body. Sometimes these members were simply butted together and doweled from the outside.

Carcase construction

need to superimpose on your drawings the outline of the carcase construction I'll describe below. Also, it's wise at this point to draw in the appropriate joints that will hold the discrete parts of the body together. The body of the horse consists of a bottom, two sides and a top all made of 2-in. stock. Usually four pieces of lumber, stacked and face-glued, are used to fill the openings at either end. These laminations project several inches into the carcase to accommodate carving the curves of the chest and rump. The grain in these pieces must run parallel to the length of the body to enable the entire area to expand and contract as a single piece of wood. Orienting the grain in this direction also facilitates carving.

Since carving makes the use of nails and screws unsuitable, the case is reinforced with glue blocks that run the entire available length of the four inside corners. The glue blocks ought to be made of the same material as the body, traditionally basswood or poplar.

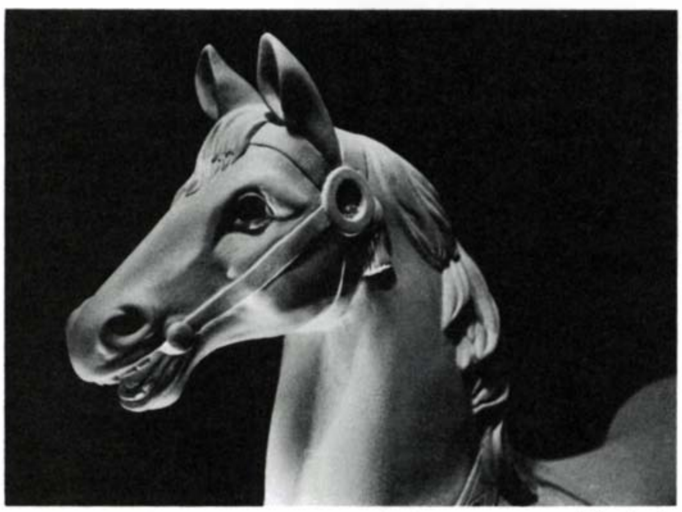
The front corners, top and bottom, are sometimes angled inward to make the juncture with the neck and forelegs. This is called coffin construction. Large pinch dogs hold the body together after hide glue is applied. Wood for the saddle is then added while the extremities are cut to shape.

The legs are a special consideration. Wherever a knee or hoof makes a sharp bend, another piece of wood is used to keep the grain running the length of the member. Some shops used a butt joint held together with dowels inserted obliquely through the two pieces from the outside. The best way is to use a lap joint reinforced with a dowel run through from the outside. Where legs join bodies, dowel-reinforced butt joints can be used or tenons can be cut on the legs and set into mortises in the body. If the tail is wood, it usually is

Lines and arrows show location and angle of joints on full-size carousel horse.

Head blank is tenoned and pegged into partially carved neck. Mortises for forelegs have already been cut in lower chest.

Holzman puts finishing touches on head with carving gouge.



Carving complete, the undercoat is applied. Flaring nostrils, perky ears and tensed neck muscles impart vitality to wooden steed.

doweled into the rump and made to flow into a leg where it can be attached. This prevents it from being easily broken off. The tails of many horses were of real hair, not difficult to obtain when horses could still be seen on city streets. Still others were carved.

Carousel carvers like to emphasize muscles, tendons and bone structure. Common are flaring nostrils, prominent teeth, straining heads and bodies. To reduce the difficulty of the undertaking, it is advisable to carve the legs, neck, head and body independently of each other. Each part should be taken to a near-completed state, leaving a couple of inches undone where each piece will be joined to another. After that the pieces can be faired into each other. There are decided advantages to working this way and not having to manipulate a glued-up horse that may be bigger than you are.

It is best to bandsaw the rump and chest profiles if possible. Use a large, three-sweep fishtail gouge for roughing out the body. Where there are depressions in the flanks, use deeper gouges. Straps, blanket and saddle are drawn in and outlined with a *V*-parting tool and carved with appropriate gouges. Some carvers suggest leaving the head for last to allow time for the wood and tools to be gotten used to, especially since this part of the anatomy is the most difficult to do. Templates can be used to gauge symmetry and contours. More detailed photos of the head will be required than of any other part of the body. Generally, the head was made from two or four pieces of wood glued up face to face. The neck is a separate piece, also a lamination, with the grain running sometimes parallel to the body. This was done because manes would not flow down but would wrap around the neck, and horizontal grain would facilitate carving the hair. The ears should not be carved too soon, as they are delicate and may break off. Once finished, the head and neck can be attached to the body and faired in.

Here is a technique used by Speiser for setting in the kind of glass eyes that can be purchased from a taxidermist. Draw a rough profile of the head on a piece of stiff paper and cut a small triangular hole for the socket. Try inserting the glass eye edgewise through this hole. Keep making the hole larger until the eye falls through. Transfer the outline of this hole to the carving. Gouge out and undercut the hole enough for the eye to be rotated. Remove it and partially fill the cavity with plastic wood. Immediately insert the eye, rotate and press it into the proper position. The displaced plastic wood will ooze out, and the excess can be removed. After the plastic wood has hardened, you carve the details of the eyebrows and eyelids.

Once the horse has been carved and sanded smooth, a heavy-bodied paint sealer should be applied. Sand this coat lightly when it's dry and apply another coat, which this time should be tinted with the colors that will finish the horse. Give each separately painted area its own tinted undercoating. Choice of paints may be individual, but flat oil-base colors flow together better. As a final step, apply a coat of clear varnish.

Additional touches might include gold leafing on the blanket fringes, harnesses and other trappings, and adding flatback mirrored jewels to the blanket. □

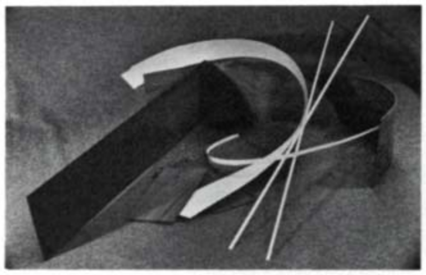
EDITOR'S NOTE: Two publications about the design, construction and lore of carousel animals are Frederick Fried's *A Pictorial History of the Carousel* ($17.50 from A. S. Barnes and Co., Box 421, Cranbury, N.J. 08512) and *Carrousel Art*, a quarterly magazine ($10 a year from Box 667, Garden Grove, Calif. 92642).

An Abrasive Planer

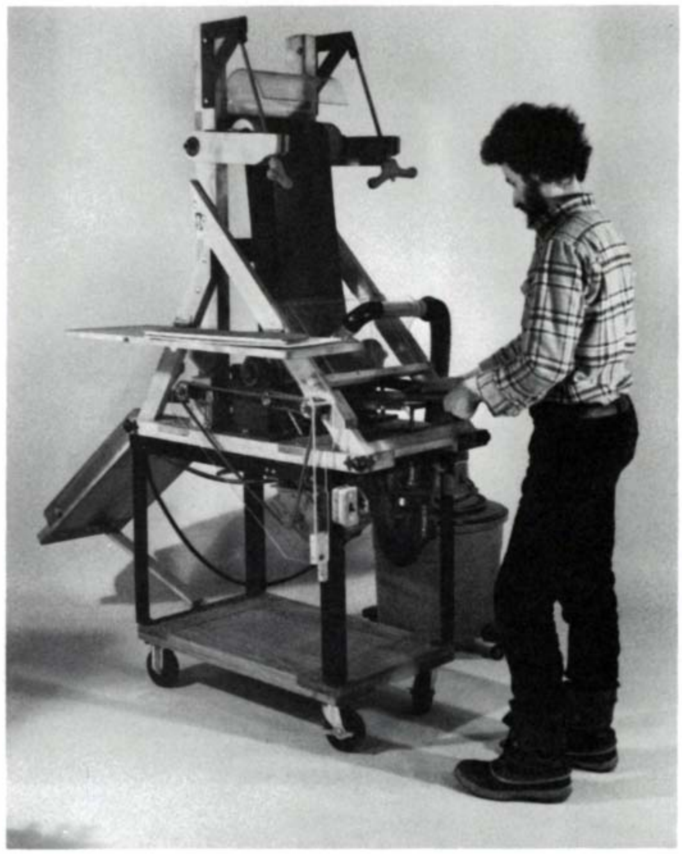
Automatic feed and rigid bed offer exceptional accuracy

by Michael Horwitz and Michael Rancourt

Stringed-instrument makers, marquetarians and boxmakers all deal with thin stock that must be thicknessed accurately. Luthiers in particular need to thickness tops, backs and sides often as thin as 0.080 in., and to make bindings and rosette components that commonly measure 0.010 in. or less. Knived planers can rarely handle stock less than ⅛ in. thick, and they produce a scalloped surface. An abrasive planer increases the possibilities for both production and design in thin stock. Simple drum-type, hand-fed sanders (*FWW* #21, March '80) give modest results and do provide an alternative to tedious hand-planing or to purchasing thicknessed wood. However, to the woodworker involved in light production and/or requiring great accuracy, an automatic-feed, continuous-belt abrasive planer can prove valuable. In the seven machines we have built, a rigid bed provides advantages over the conveyer bed of other abrasive planers currently available. The machine detailed here can handle with greater accuracy the most delicate pieces of wood, and its cost and size make it feasible for the small shop. With the construction drawings on the next page, some mechanical know-how and basic machining, a superior abrasive planer can be home-built.

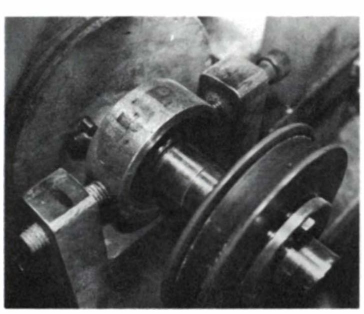


Left, stock thicknessed on abrasive planer, the thinnest pieces to 0.005 in. Below, Michael Horwitz at the 12-in. model.



Construction — We make our planers, a 12-in. and an 18-in. size, on a movable base. It consists of eight pieces of angle iron and a half-lapped 2x6 maple frame. The angle iron forms a table whose legs are bolted to the frame, which rides on casters. The top surface of the angle-iron table is 31½ in. high; from it hang the motors (the machine has two motors) and on it is mounted the machine's superstructure. This consists of another 2x6 maple frame into which we mortise 2x4 uprights, attached from beneath with lag bolts. Two cross braces keep the uprights parallel, and two diagonal braces hold them perpendicular to the base.

The machine has two belt rolls: a lower sanding roll, which drives the belt, and an upper belt-tensioning idler. These we make of hardwood plywood discs, stacked and glued together on cold-rolled steel shafts, then turned and sanded with 50 grit. Leaving the bottom roll rough gives necessary belt grab. To prevent warping, the rolls are sealed with sanding sealer and polyurethane. The upper roll is then covered with 3/16-in. cork (applied with contact cement) to help belt tracking. A locking pin system keeps each roll from turning on its shaft.



The bearings for the belt rolls are sealed roller-type with double-width races, and must be press-fit onto their respective shafts. The sanding-roll bearings are pressed into housings held in place with setscrews in two steel mounts. The mounts are 1-in. thick milled forks, welded to ½-in. steel plates bolted to the machine base. The idler is supported by two belt-tensioning arms that pivot from the uprights on ¾-in. steel rod pinned to the arms. Cutouts drilled with a circle cutter on the insides of the arms receive the bearings for the idler. A snug fit here ensures consistent belt tracking. Slots in the ends of the swing arms receive threaded rods. These pivot from steel angle brackets bolted to the top of the uprights. Each of the two adjustment handles, which control both belt tension and tracking, is a homemade rod-coupler pressed and pinned into a piece of maple shaped like a giant wing nut.

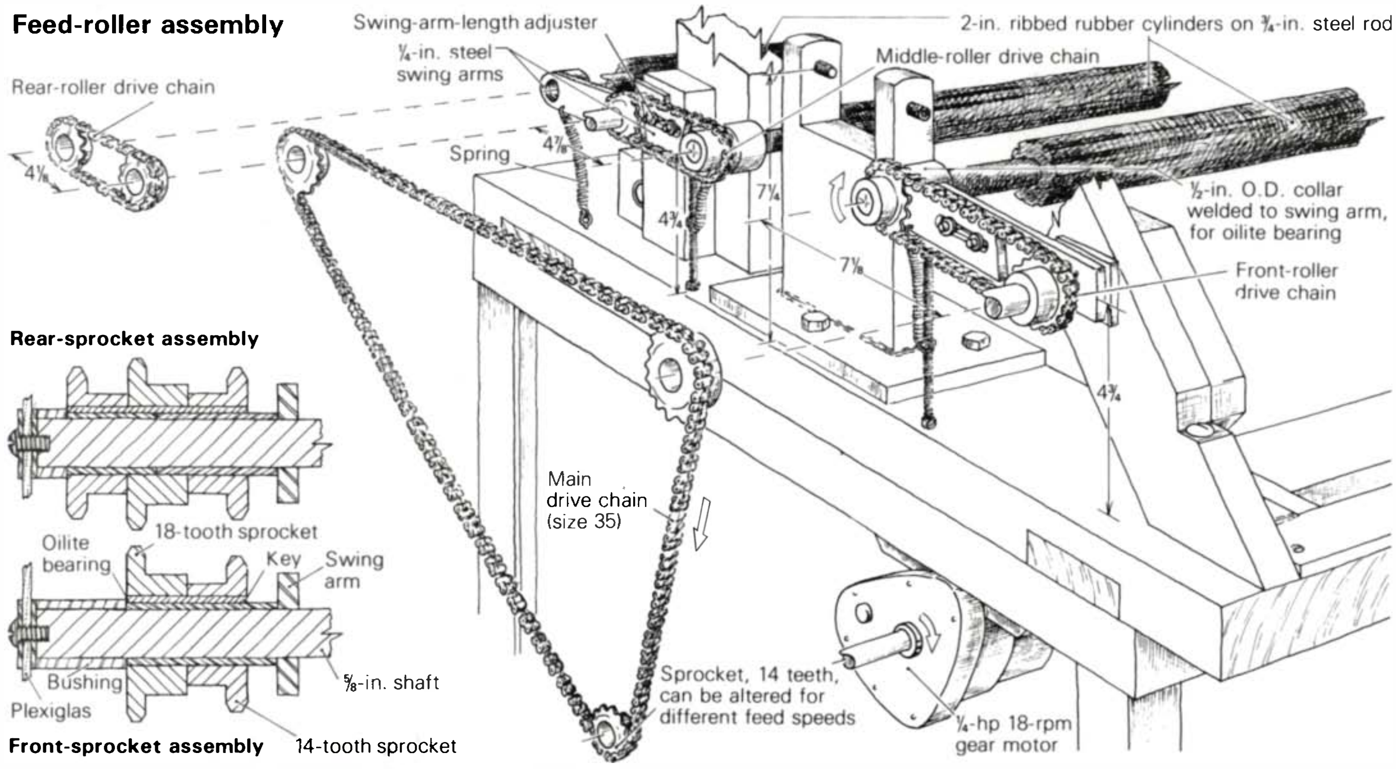
The bed is a piece of ⅝-in. hot-rolled steel covered with Formica. Attached to the underside of the bed by five machine screws is a ¾-in. cold-rolled steel rod, which serves as a pivot mounted in oilite bearings at either end. One end of the pivot is in a fixed maple block; the other adjusts to true the bed parallel to the sanding roll. A piece of threaded rod with a handwheel attached raises and lowers the bed to adjust depth of cut. The rod passes at a 6° angle through a tapped block, welded to a steel cross member. The end of the threaded rod is turned to a soft point to achieve a smaller and more positive contact. A dead stop (two jam nuts on the threaded rod) keeps the bed from contacting the sanding roll.

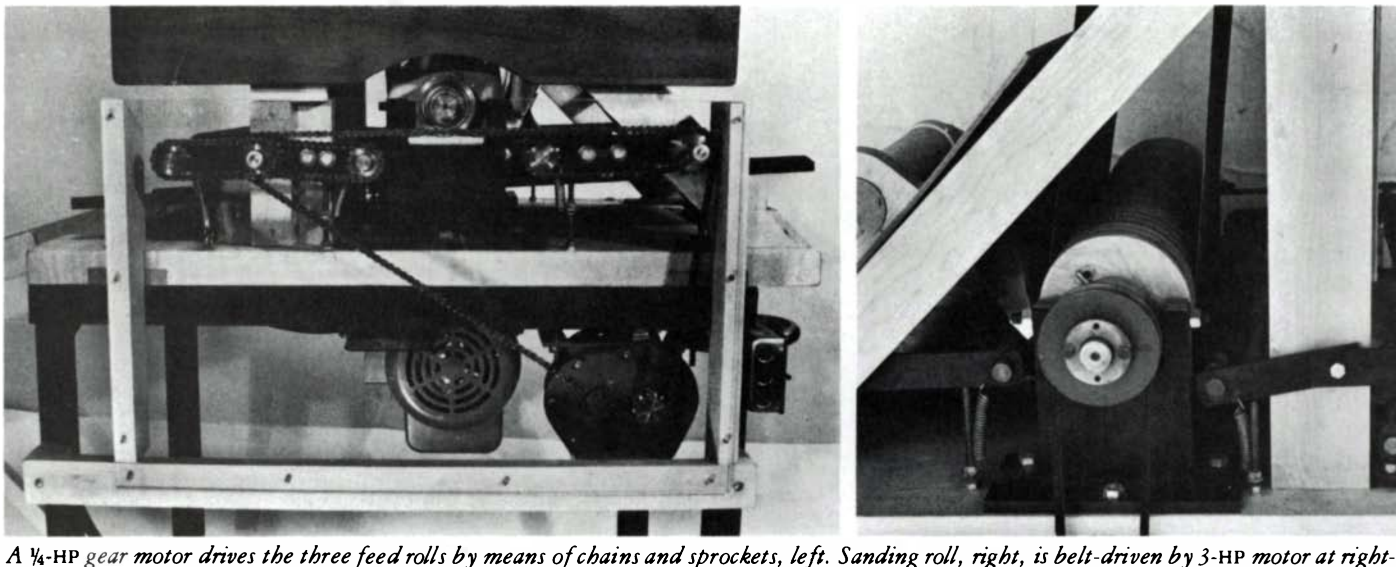
The accuracy of this machine is achieved in good part by driving the stock past the sanding surface at a steady rate. The three rubber drive rolls are chain driven by a ¼-HP, 18-RPM gear motor. It produces a feed rate of 9 SFM. We made the drive rolls by cutting to length 2-in. medium-hard rubber cylinders and slipping them onto the cold-rolled shafts. We then ribbed the rubber on the table saw and fixed it to the shaft with ¼-in. roll pins. The feed-roll shafts rotate in oilite bearings pressed into collars welded on the end of steel swing arms that pivot on the frame. Tension springs attached between the arms and the frame provide downward pressure on the stock. Adjustable arm length compensates for chain slackening.

The abrasive belt for the 18-in. machine is driven by a 3-HP, 1725-RPM, totally enclosed, fan-cooled motor, the 12-in. machine by a 2-HP motor. The motor's speed is reduced slightly by a 3½-in. pulley on the motor and a 4¾-in. pulley on the roll. These produce a belt speed of 1,700 SFM. The motor is equipped with an overload button, and all electrical components are matched according to motor amperage.

A vacuum hood mounted directly over the space between the sanding roll and the front drive roll collects dust immediately as it leaves the board. The entire evacuation unit, including the ¼-in. Plexiglas guard, is hinged so it can be swung away during belt changes. For safety, Plexiglas also encloses the drive system and the idler.

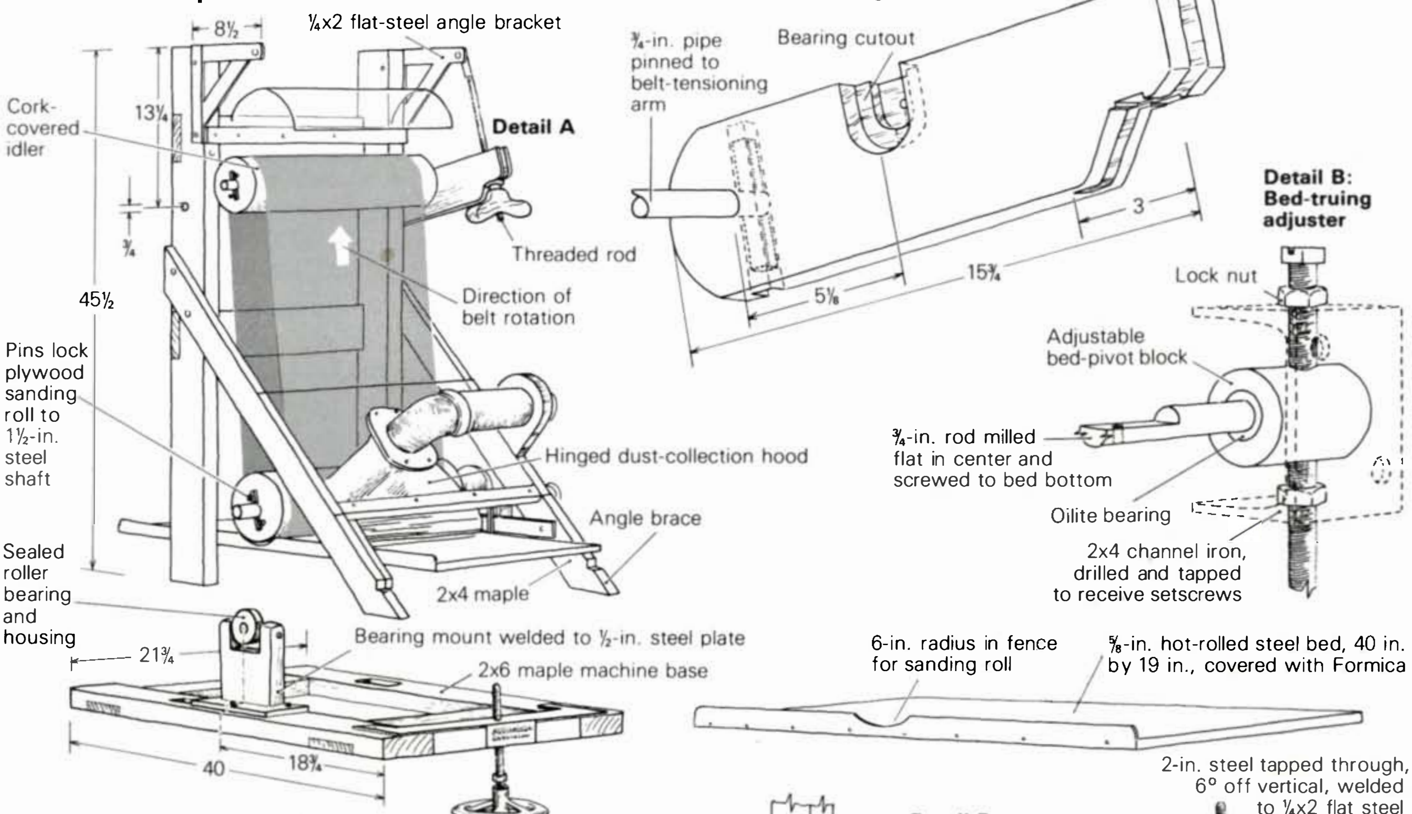
For passing many boards through the machine in succession, we designed a stacking attachment to receive stock at the outfeed end. It is a collapsible birch-plywood shelf,

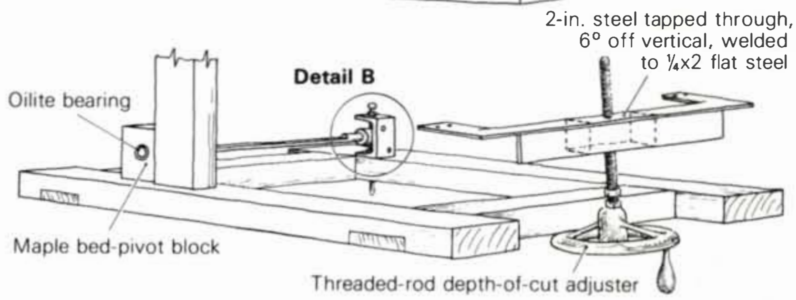


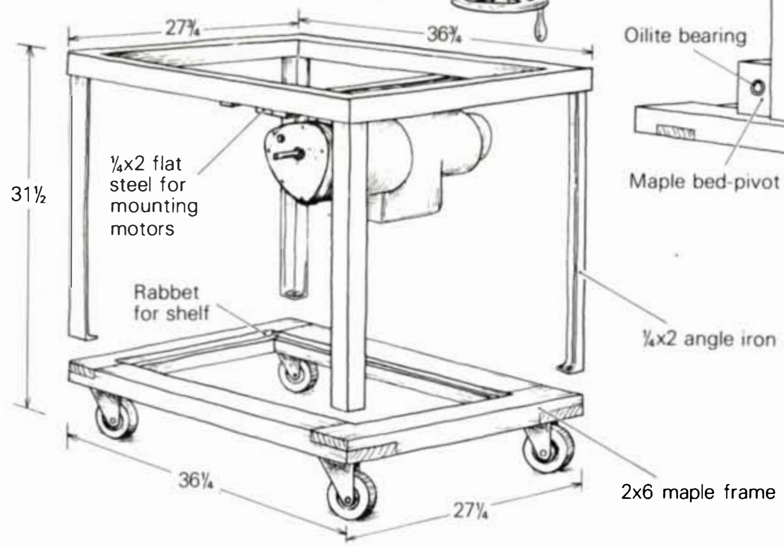


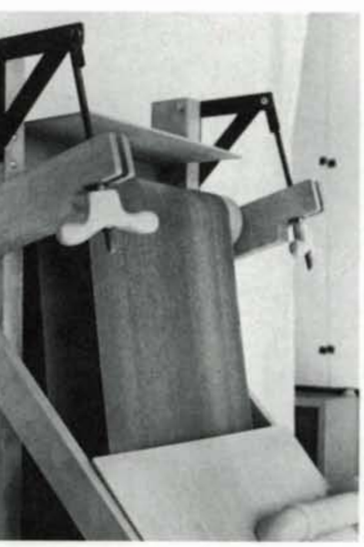
A ¼-HP gear motor drives the three feed rolls by means of chains and sprockets, left. Sanding roll, right, is belt-driven by 3-HP motor at right-hand side of machine. Bed-truing adjuster can be seen attached to back of 2x4 upright.

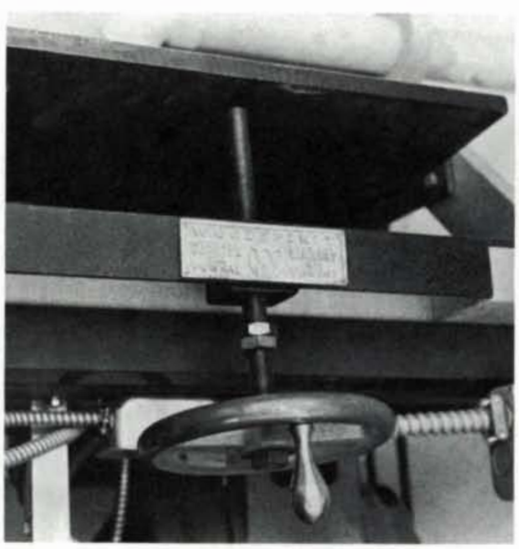
18-in. abrasive planer

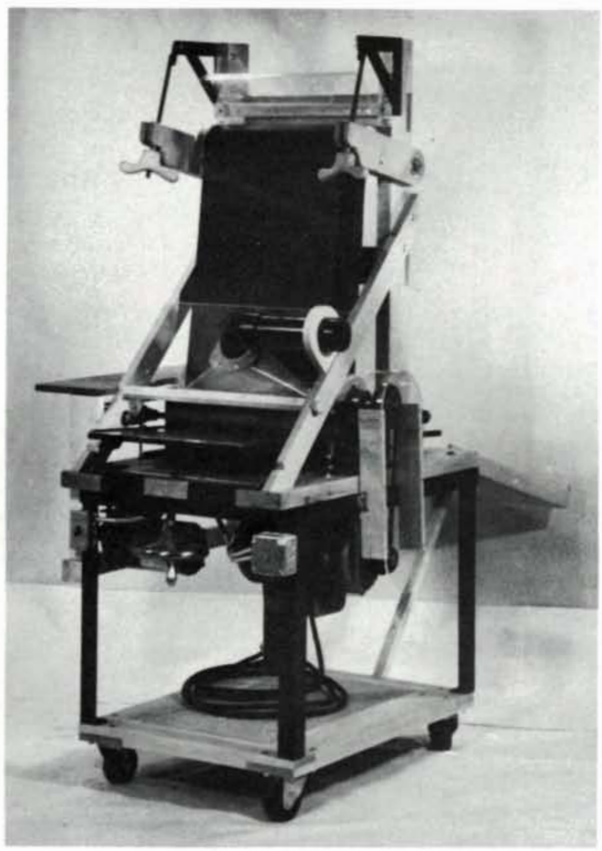












Belt-tensioning arms, left, depth-of-cut adjuster, center, and full view of 18-in machine, right. It measures 76 in. by 44 in. by 34 in. and weighs 800 lb.

Photos: Raymond P. Bub; Illustrations: Christopher Clapp.

hinged from the rear of the base. The rear feed roll eases each piece down onto the stacking shelf.

Operation — To install the belt, loosen the setscrews that retain the sanding roll. Tilt the roller assembly, remove the drive belt and then the roll itself. At the tensioning arms the idler can be removed, passed through the abrasive belt and replaced. Then pass the lower roll through the belt and replace it in the steel mounts. To tension and track the belt, tighten the two wooden wing nuts so that each side is firm but not forcibly stretched. For an initial tracking check, bump the motor on and off. Final tracking is achieved with the motor running. Keep a close eye on the belt for a while, as even a 5° turn of the wing nuts takes minutes to show up as belt movement. Don't get the belt too tight. Tracking can be achieved by loosening as well as tightening the wing nuts.

To get accurate results, the bed must be absolutely parallel to the sanding roll. After turning on the two motors and the vacuum, run narrow test boards through the machine at the sides of the roll, compare their thickness and true the bed using the bed adjuster at the right-hand side of the machine (detail B in the drawing). To begin sanding, lower the bed, using the handwheel at the front, beyond the thickness of the board and pass the board under the feed roll. As the board goes under the sanding roll, raise the bed slowly until light contact is made. Now that the bed is adjusted to the board's thickness, the depth of cut depends on grit, wood density and width of the board. For example, 0.050 in. can be removed from a 10-in. Sitka spruce board with 36 grit, 0.025 in. with 60 grit. In wood as dense as Brazilian rosewood, the maximum cut might be 0.015 in. with 60 grit on an 8-in. board.

Saddle jig with two cam clamps.

Special jigs can hold even the shortest pieces of wood, which to guitar builders can mean the accurate thicknessing of nuts, saddles and bridge blanks. By taping strips of stock to support boards, one can make custom bindings and rosette components. In the repair of a rare Torres guitar, we matched the original binding with maple purfling strips measuring 0.005 in., a size thinner than those available commercially.

We're working on several options to improve the machine. They include a variable-speed feed motor to accelerate taking light cuts and a more powerful sanding motor to make heavier cuts. Another idea is a thickness-calibration system using two dial indicators that would eliminate manual measuring of stock thickness.

The only maintenance necessary on this machine is an occasional oiling of the drive chain, and keeping the machine clean. The vacuum system, which is hooked up to a shop vac, picks up 99% of the dust produced; to achieve accuracy of ±0.003 in. across the whole width of the planing surface, a relatively dust-free situation is necessary. □

AUTHORS' NOTE: All machine components and complete machines, both the 12-in. and the 18-in. models, are available through us at Woodspirit, Hidden Valley Rd., Pownal, Vt. 05261.

And a Disc Sander

by Donald C. Bjorkman

As the price of tools becomes astronomical, I rely more and more on equipment I build in my own shop. Having been given a ¾-HP., 1,750-RPM motor retired from pumping well water, I felt I was on my way to the sander of my dreams. As with many such projects, procuring parts was most demanding. The materials list at right tells where I got my supplies and what I paid for them last spring.

As I planned to have my sander last me a long time, and because it would cost about one-eighth as much as a comparable commercial machine, I felt I should go first-class on components. I also wanted a sander that would satisfy as many sanding needs as possible. With this in mind I designed a dual 16-in. variable-speed sander with two adjustable tables. As I use both sides of the discs, I have four disc surfaces, each with a different sanding grit: two outboard with tilting tables and two inboard with a stationary table.

Besides the motor, the basic components include ball-bearing, self-aligning pillow blocks to guide the ¾-in. shaft, a hardwood frame joined with mortise and tenon and ⅜-in. Finnish birch plywood for the cabinet stress panels and the sander table. The 30-in. by 44-in. table consists of three layers of plywood laminated together to give a strong 21-ply top, 1⅛ in. thick. (For a simple vacuum press to laminate this top together, see *FWW* #16, May '79.)

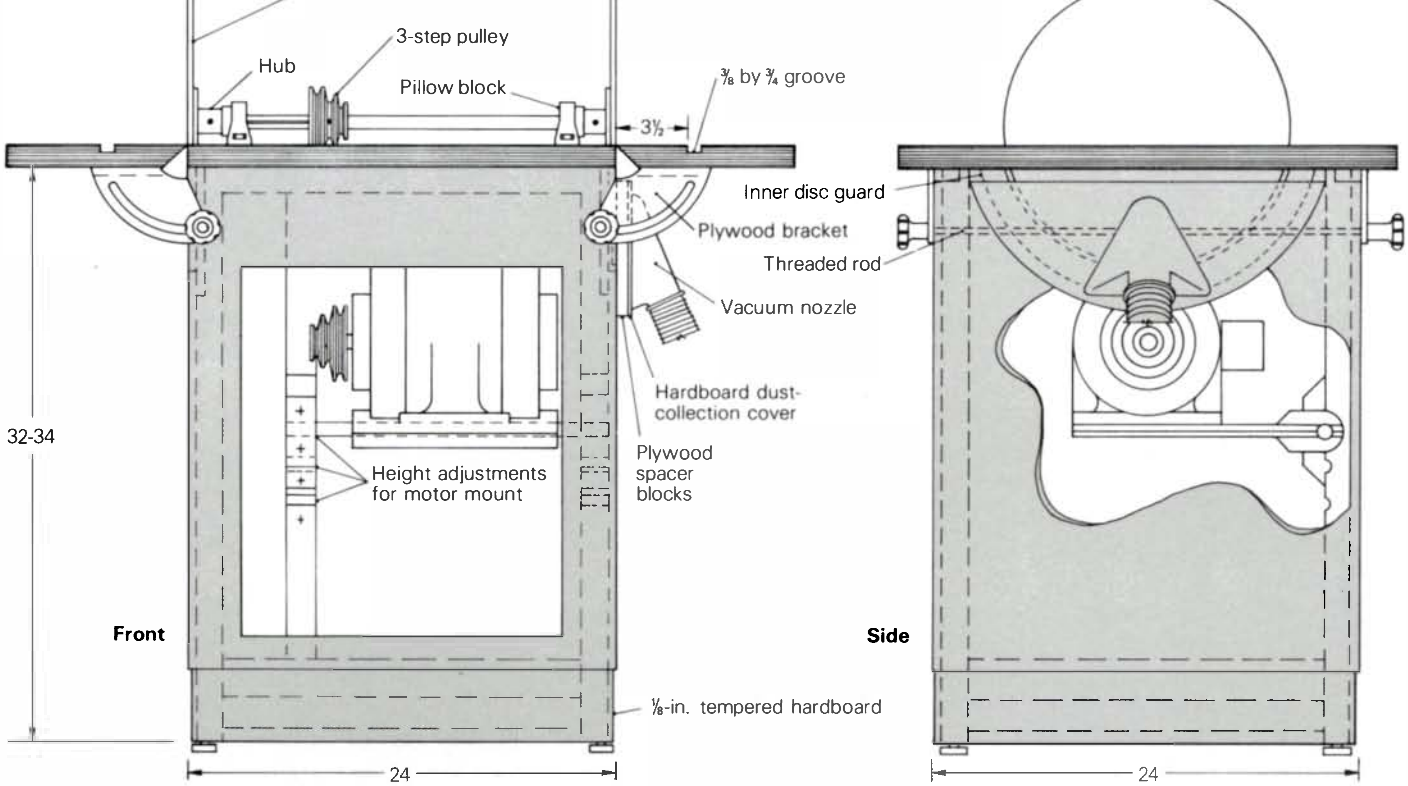
Putting the motor down low in the cabinet keeps it out of the dust, allows access to both sides of the discs and makes for a more stable machine. The shaft is fitted with step pulleys. This is helpful when going from rough sanding to medium and then to fine. With 16-in. discs I have found that speeds over 2,000 RPM burn the wood and that speeds less than 1,000 RPM are too slow for good cutting, so I use a 3/3½/4-in. step pulley on the motor and a 4/4½/5-in. step pulley on the shaft. For smaller discs, faster speed could be used.

My only complaint with the machine was the lack of a dust-collection system, which I have recently remedied. As shown in the drawing, the discs run in slots that prevent dust from entering the cabinet. I cut two half-circles of tempered hardboard and glued plywood spacers around the edges. I sanded flat the mouths of two Sears corner nozzles and epoxied them over openings in the hardboard. The covers are attached with wing bolts and *T*-nuts, and the nozzles connected to a vacuum, which removes most of the dust. □

Don Bjorkman is a professor of fine woodworking and furniture design, industrial design and interior design.

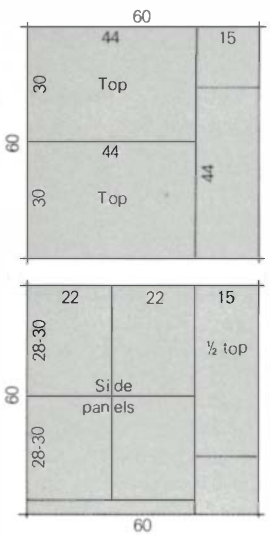
Bjorkman's 16-in. disc sander incorporates tilting tables and uses all four surfaces of the discs. Pulley guard removed for photo.

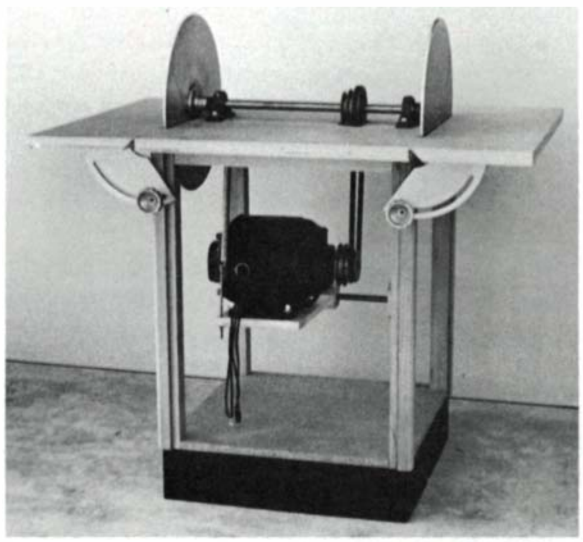
16-in disc sander



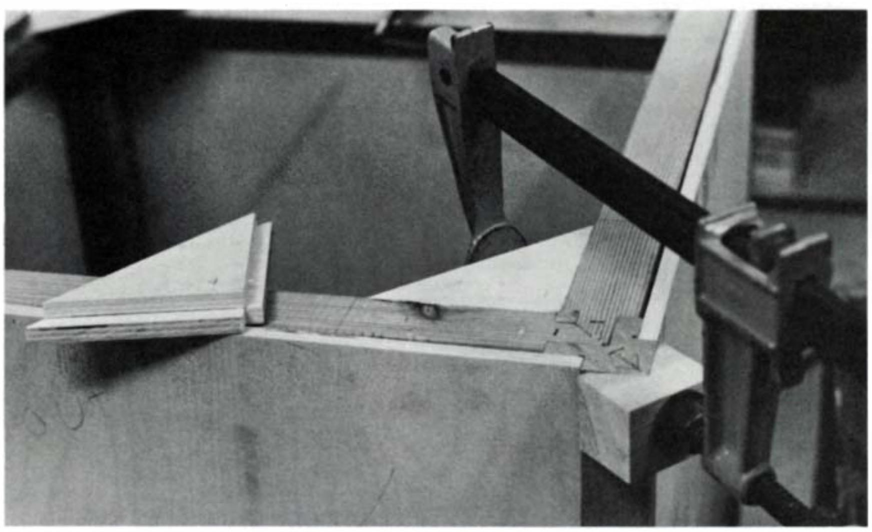
Materials list		
Quantity	Purchased parts	Approx. cost (Spring, 1979)
	Local lumberyard:	
2	⅜x60x60 birch ply	$33.00
5	2x2x34 maple	10.00
8	1½x1½x24 maple	
4	⅛x4x24 hardboard	
2	⅛x8x18 hardboard	1.00
	Machinery supplier:	
1	Manual switch	9.00
24 in.	¾-in. shaft w/keyway	20.00
2	¾-in. ball-bearing pillow block	26.00
2	¾-in. bore step pulley	15.00
4	Adjustable glides	4.00
1	*V*-belt	3.00
	Metals company	
1	¼x16x32 aluminum plate	21.00
	Hardware store:	
6 ft.	Electrical cord	2.50
1	Electrical plug	1.50
2	Cord connectors	.50
1	Tension spring	2.00
24 in.	1¹⁄₁₆-in. continous hinge	3.00
24 in.	2-in. continuous hinge	3.00
4	½x20 *T*-nuts	1.00
4	½x20x1½ wing bolts	1.00
	Bolts, washers, screws	4.00
	Gilliom Mfg., 1109 2nd St., St. Charles, Mo. 63301:	
4	Lock knobs	5.00
2	3 flange hubs	6.00
	Brookstone Co., 127 Vose Farm Rd., Petersborough, N.H. 03458	
4	Thread inserts ⅜-16	1.50
	Sears Roebuck	
2	Corner nozzles (#14277)	3.00
		$176.00

Layout for parts from two sheets of Finnish plywood





The motor is counterbalanced on its pivot with a spring.



Upper corner bracing is set into groove in frame.

Photos and Illustration: Don Bjorkman

Turning Thin Spindles

Lacemaker's bobbins demand speed and precision

by Mike Darlow

Turning small yet clean, crisp spindles, such as bobbins for lacemaking, requires a special technique. The professional woodturner who's interested in achieving both speed and quality cannot rely on complicated jigs and lathe attachments because they take time to make and set up and because they limit the range and versatility of his work. But with a simple driving device and a practiced method, ordinary tools can produce the desired results.

Lace bobbins are usually made from fine, straight-grained woods—plum, olive, boxwood and walnut were most commonly used in the past. Bone, ivory and hard softwoods such as yew are also ideal. Being small and slender, lace bobbins require a sound turning technique, particularly with the skew chisel. Though there are varying methods of work, the one I'll describe here is straightforward. Begin by preparing the stock for turning, sawing it into square-sectioned strips whose lengths are determined by the finished length of the bobbin plus an allowance for chucking and parting off.

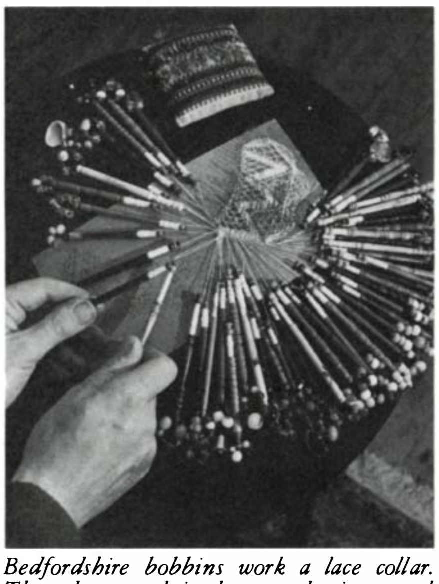
There are four common methods of holding the wood at the headstock. The traditional way employs a small, pronged driving center. One can be made by turning a piece of hardwood to the appropriate taper and pushing it into the swallow of the headstock spindle. Start the lathe, flush off the projecting end and mark its center with the long point of a skew chisel. Next, stop the lathe, drive a brad into the center and pinch it off about 6 mm (¼ in.) from the face of the wood. Then with the lathe running, file the brad to a slim point. Now stop the lathe and hammer in two more brads about 3 mm (⅛ in.) from the center pin and diametrically opposite to one another. Pinch them off about 3 mm (⅛ in.) from the face. With this method there is no need to stop the lathe in order to remove the finished bobbin and to center a new blank. To avoid damage to both the skew and the drive center, part off just to the right of the drive center.

The second way uses a steel driving socket on an arbor of appropriate taper. The socket may have either a cone-shaped cavity, with an internal thread to grip the wood, or a pyramidal one. You can easily make the latter from hardwood.

A third way to drive the stock is by means of a jaw chuck. I prefer the Jacobs type because it is small in diameter and has no dangerous projections. This method allows both ends of the bobbin to be finished in the lathe. And because the left-hand end of the stock is held rigidly along the lathe's axis of rotation, the effective diameter of the turning bobbin is increased and there is less chance of breaking it while cutting the long neck. The fourth and simplest method is to push the blank directly into the swallow of the headstock spindle, providing the opening is small enough. Pressure from the ram will keep the wood from slipping while it's being tooled.

Bobbins are usually turned with their heads at the tailstock

What bobbins do



Bedfordshire bobbins work a lace collar. Threads are plaited around pins stuck through holes in the stiff paper pattern into the pillow below.

There are two main types of lace—needlepoint, made by sewing and oversewing with a needle and thread, using mainly buttonhole stitches; and bobbin lace, which uses the weaving and plaiting of threads. It is this latter method of lacemaking that chiefly concerns the woodturner, for he produces much of the necessary equipment, most notably bobbins. Each separate length of thread used in a piece of lace must be wound on a bobbin at each end. Hence, lacemakers refer to a number of bobbins as so many pairs and many prefer to buy their bobbins in identical pairs. A piece of lace can require several hundred pairs of bobbins, but thirty pairs is about average.

Lace bobbins have three distinct functions. First, they store the thread, sometimes up to seven meters in length, and allow it to be fed out as required. Second, they tension the thread. The lacemaker relies upon the weight of the bobbin (and the attached spangles) to provide this tension, and therefore all the bobbins used for a particular piece of lace need to weigh pretty much the same. Third, they weave and plait the threads without soiling them, because the shank of the bobbin is used as a handle.

There are three main bobbin styles. Continental bobbins follow traditional styles that evolved in particular European lacemaking centers. Honiton bobbins are indigenous to southwestern England. They are used for a fine lace that is usually built up from sprigs—small, complete pieces of lace representing flowers and figures, which are then joined or set into a new ground, using the bobbins as needles. This is why Honiton bobbins have smooth, narrow shanks with pointed ends.

East Midlands Bedfordshire bobbins are slim and basically cylindrical. Most of the bobbin's weight is provided by the spangle. The turner supplies the bobbin drilled, but the spangle is supplied and fixed by the lacemaker. How this unlikely appendage originated is unknown, but spangles—glass beads used as weights—were threaded into 17th and 18th-century laces as decoration. Perhaps a lacemaker wishing to increase the weight of her bobbins tied on some of these spangles, and this evolved into the nine-bead spangle found on East Midlands bobbins from the late 18th century. —*M.D.*

Photos: Henry Strasburger; Illustration: Ric Lopez

end. In the overhand turning method, which is the most common, the left hand either rests on the turning tool or acts as a mobile steady with the left thumb assisting in controlling the tool. The fingers are wrapped over and behind the bobbin to give it support. With this method it's wise to turn the long neck at the tailstock end, as the left hand can more easily support the shank and is clear of the drive center.

I prefer the less common underhand turning method (photo, right) in which the index finger of the left hand goes beneath the tool rest and supports the work, while the thumb and remaining three fingers grip the tool. With this method it's best to turn with the head toward the headstock. This allows the bottom end of the shank to be finished off in the lathe. Finishing off is tricky but can be accomplished by passing the last three fingers of the left hand beneath the bobbin and bracing them against the tool rest, while steadying the right-hand end of the bobbin between the thumb and forefinger. Slacken the tailstock a little to facilitate parting off with the long point of a skew. After withdrawing the tailstock further, you can sand the free end of the bobbin while still supporting it with the thumb and forefinger. Then part off the head. With a little practice you can catch and present the bobbin in your left hand.

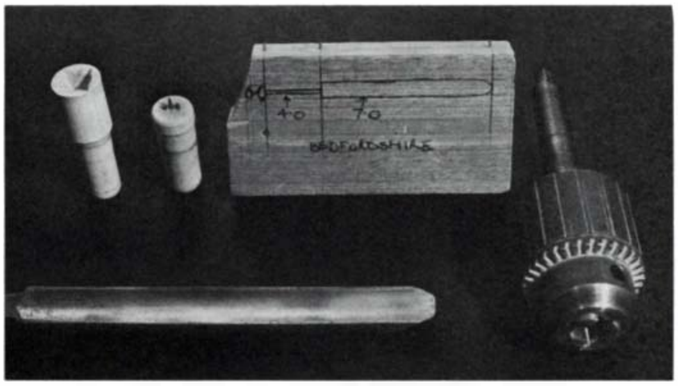
Once you've decided on which way to drive the stock, prepare a pin gauge by drawing the bobbin full size on a piece of wood about 13 mm (½ in.) thick. Project main bobbin features onto its edge where you drive in brads that are pinched off to a length of ³⁄₁₆ in. Then sharpen the brads with a file to screwdriver-like points. When centering your stock, take care not to force the tailstock as the wood may split, and once you've centered it, back off slightly on the ram. Excess axial pressure will cause the spindle to spring into a bow when the long neck is cut.

With the lathe running at its fastest speed, rough out the stock using a shallow-nosed gouge about 19 mm (¾ in.) wide and partially ground off on its left-hand side so that you can rough right up to the headstock. A 7-mm (about ⁵⁄₁₆ in.) gouge and a 7-mm skew chisel complete the tool kit. With the lathe still running, lightly press the points of the pin gauge into the rotating wood and then proceed to turn the spindle in the order prescribed in the diagram.

On your first few attempts you may want to caliper the diameters, but it's best to train your eye to gauge them properly. It is preferable to use the skew chisel as much as possible since it's a less risky tool than the gouge. It is possible that the wood will climb up over the nose of the gouge and fracture. When using the gouge, turn it on its side and approach the work obliquely, using it like a skew chisel. The long neck has to be cut with the skew chisel, while either the skew or the gouge may be used to cut the short neck.

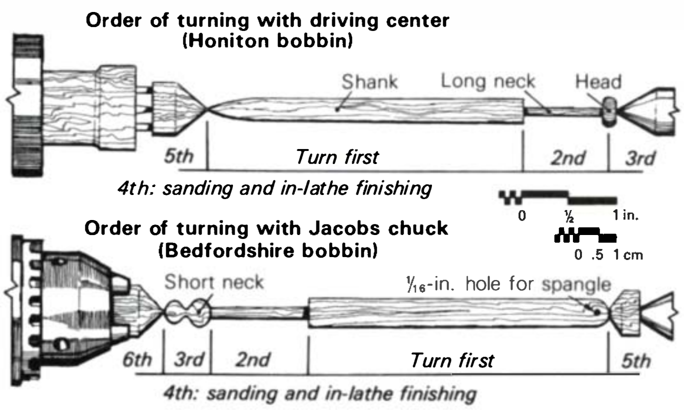
I usually sand with 180, then 220-grit aluminum-oxide paper. Traditionally bobbins were not polished, and an attractive patina developed during use. Some turners finish in the lathe, either with beeswax or with a friction polish. I recommend neither, since the wax could soil the thread and the friction polish is slow to apply and too glossy for my taste. After any required hole-drilling, I finish just by dipping in a penetrating oil, which dries completely, brings out the wood colors and leaves an attractive satin sheen. □

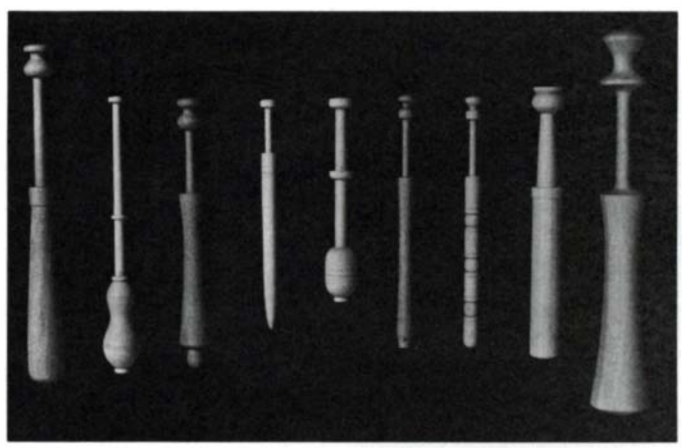
Mike Darlow, 36, is a professional turner and cabinetmaker in Sydney, Australia.



Bobbin turner's tools: wooden driving socket, pronged driving center, pin gauge and Jacobs chuck. Note shape of roughing gouge, ground from a standard spindle gouge.

Turning the long neck using the underhand method. Index finger of left hand reaches below tool rest to support work beneath cutting edge of skew chisel.





Bobbins, some traditional, some of author's design. The stout ones are for coarse or woolly fibers.

Carbide-Tipped Circular Saws

Alloy's hardness is its weakness

by Simon Watts

Most woodworkers now own a carbide-tipped sawblade or have at least considered getting one. The advantages are many. The teeth are accurately aligned so they make a cleaner and more precise cut, producing a good gluing surface directly from the saw; the tooth form stays practically the same after each sharpening; carbide-tipped blades can cut teak and other abrasive materials, and they last about 40 times as long between sharpenings as steel-toothed blades.

The main disadvantage of carbide-tipped blades is the cost. Not only is the initial cost substantial—$75 to $125 for a 10-in. blade—but also since you cannot file them yourself you have to send them out for sharpening, which now averages 25¢ a tooth, about $15 for a 60-tooth blade. A good sawblade can be ground more than 30 times before it has to be retipped, so you can expect to spend $450 on sharpening over the life of the blade—three or four times your original investment. Because saw manufacturing is a highly competitive business, a substantially lower price inevitably means inferior materials and poorer workmanship. The cheaper blade will need more frequent sharpenings, which soon will swallow up the original savings.

Woodworkers use their saws for cutting a wide variety of materials and for a number of different operations. Few of us can afford a different saw for each use and so we usually buy combination blades, which may do everything claimed for them, or may not. Carbide-tipped saws come in a bewildering variety of tooth shapes and configurations. How does one choose the right blade for ripping and crosscutting? For hardwood and softwood? Is price the only indication of quality? Is a retipped blade as good as new? What about cutting veneers, plywood, particle board and plastic laminates? Can the same blade be used on a radial arm saw and a table saw? What are the differences between a high-quality blade and an inferior one, and how can one tell?

Before getting into these and related questions, let's take a look at carbide itself and at how a modern carbide-tipped circular saw is manufactured. The alloy tungsten carbide, to give it its full name, can be made only by a process known as sintering, in which powdered tungsten and carbon are mixed together and heated under tremendous pressure. The carbon atoms penetrate the crystal lattices of the metal, creating one of the hardest synthetic materials known. This new alloy retains the granular structure of the original metal powder but the individual grains now have a hardness that is second only to diamond.

It is important to remember that tungsten carbide, although immensely hard, is also extremely brittle. It can be chipped easily by vibration or rough handling and can be used for cutting only when backed by another metal having the tensile strength it lacks. It cannot be drawn to thin edges with very acute angles, cannot be ground thin, and must not be left overhanging and unsupported. It must not be vibrated against a grinding wheel because the particles of carbide will be torn out.

The body of the saw (shown below in figure 1) is made from heat-treated alloy steel, which can be harder and tougher than an ordinary all-steel saw because the teeth don't require filing or setting. Slots are cut in the plate to allow its rim to expand without buckling. To reduce the danger of cracking, the slots end in round holes, which sometimes cause an annoying whistle. This whistling can usually be stopped by plugging the holes with a soft metal such as copper. Pockets are cut into the teeth of the saw, and the little grey blocks of carbide are brazed into them. The carbide tips are then

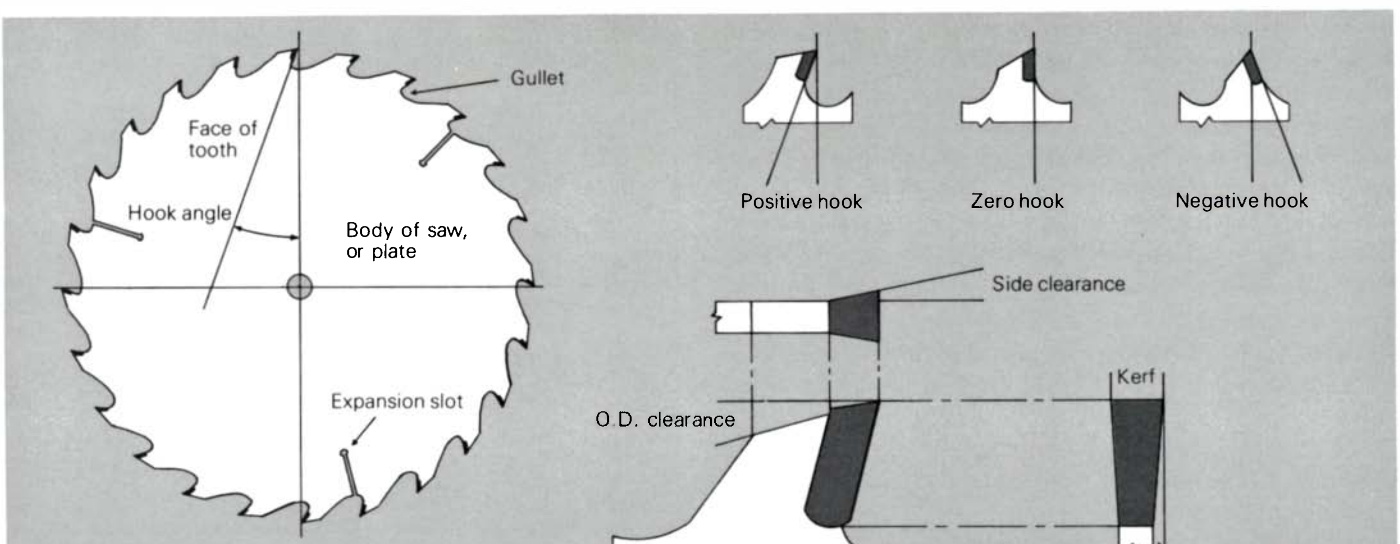


Fig. 1: Sawblade and tooth orientation

ground on a diamond abrasive wheel to the required shape and bevel.

All circular saws are subject to centrifugal forces, which tend to make the blade fly apart. These destructive forces are directly proportional to the radius but increase as the square of the speed in rotation. These rotational loads cause the saw to expand unevenly across its diameter, giving it a tendency to buckle. If uncorrected, these forces can prevent the saw from running true, cause noise and vibration, and can even crack the saw body.

To minimize these effects, all good-quality circular saws more than 6 in. or 8 in. in diameter are put through a manufacturing process known as tensioning. This consists of hammering the bodies to an extent determined by their thickness, diameter and operating speed. The work, done with curved hammers on a crowned anvil, puts the middle in compression to compensate for tension of the rim at high speed. Machining done on finished saws (enlarging bores, drilling mounting holes, etc.) will upset the tension and should not be attempted by anyone unfamiliar with this technique. Warped saws can be made flat by hammering, but it is highly skilled work and likewise should be left to the experts.

The thinner the saw body, the more crucial tensioning becomes. Very thick saws have little or no tension added by hammering. Large saws, 20 in. or more, are usually tensioned three times at different stages in their manufacture. Three common types of saw bodies are shown in figure 2. The straight body is the cheapest and most widely used. The other two styles have one or both sides ground away to reduce the width of the saw kerf and are used mainly for cutting thin, non-ferrous tubing and plastics.

The most common tooth form is the flat top (figure 3) also called plain tooth, rip tooth or chisel tooth. The advantages of this tooth form are that since each tooth cuts the full width of the kerf, it has twice as many effective teeth as a staggered-tooth saw. Also, the cutting forces are balanced on the body, the tooth form is easier to maintain, square bottom cuts are ensured and each tooth carries an equally distributed load. The disadvantages are that the chip drags the sides of the cut, reducing the freedom of the chip flow. Chisel teeth can be damaged more easily by side thrust or twisting of the work than can staggered teeth, and the square corners are dulled when cutting abrasive materials. Tooth drag can increase power consumption significantly. Chisel-tooth blades are good for ripping, but when used for crosscutting, they leave a ragged end-grain surface.

All other basic tooth forms (except scoring saws) need more than one tooth to complete the cut. The alternate top bevel (figure 4), known also as a crosscut tooth or simply A.T.B., has the tops of adjacent teeth ground at alternating angles. It makes a very smooth crosscut, particularly across stringy fibers. Its disadvantage is that the leading-point edge is fragile and wears relatively quickly. Also it cannot make a square bottom cut. Crosscut-tooth blades can be used for ripping but easily become overloaded if the work is fed too fast.

To prolong the life of the blade between sharpenings by reducing wear, a rougher tooth, or lead tooth, is introduced. Its function is simply to open a path for the following raker teeth, which take only a finishing cut on the sides of the kerf. Rougher teeth have one or both corners ground at 45°. The raker teeth are usually square, as in figure 5, but they may have the alternate top bevel as in figure 6. Note that the

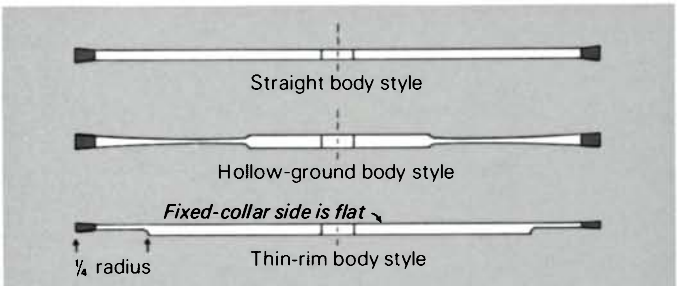


Fig. 2: Three different body styles

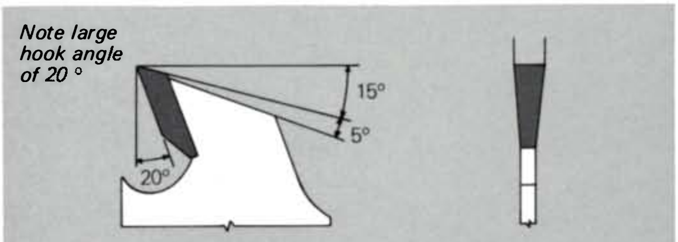


Fig. 3: Typical chisel or rip tooth

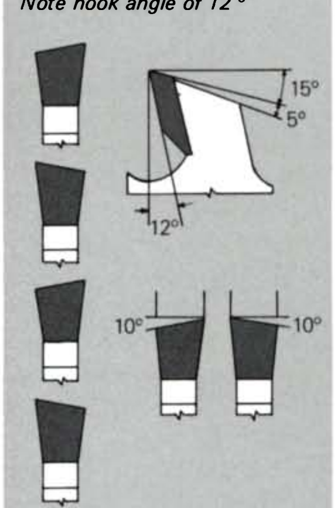


Fig. 4: Alternate top bevel (A.T.B.)

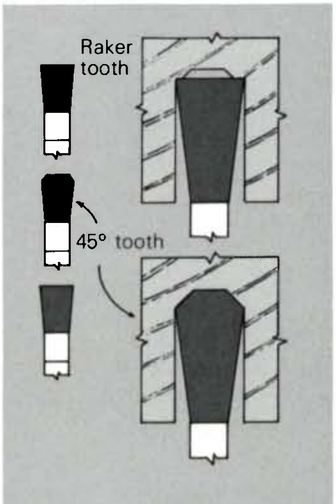


Fig. 5: *A triple-chip saw design. Every other tooth has its corners ground off at 45°. This makes a very strong and durable blade.*

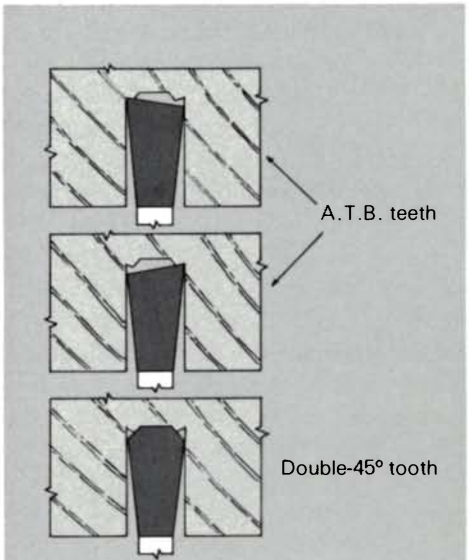


Fig. 6: *In this saw, two A.T.B. teeth are followed by a double 45 ° tooth. This design combines the benefits of smooth cutting in sensitive materials with strength and long life.*

Fig. 7: Alternate face bevel

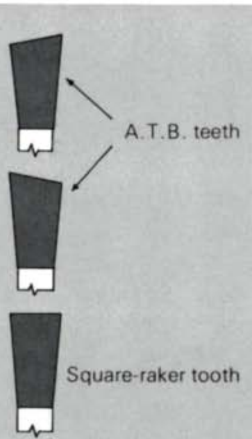
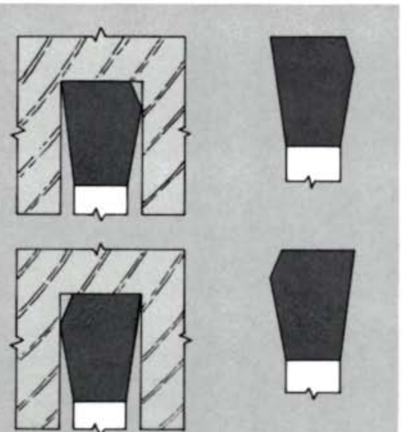


Fig. 8: *In this design, two or more A.T.B. teeth are followed by a square raker.*



Here rougher teeth are beveled on alternating sides.

Fig. 9: Alternating corner tooth form

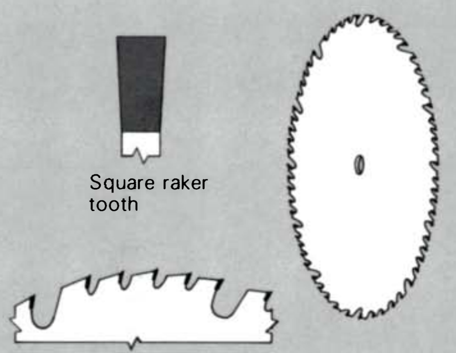


Fig. 10: *Typical combination blade designed for both ripping and crosscutting. Four A.T.B. teeth are followed by square raker.*

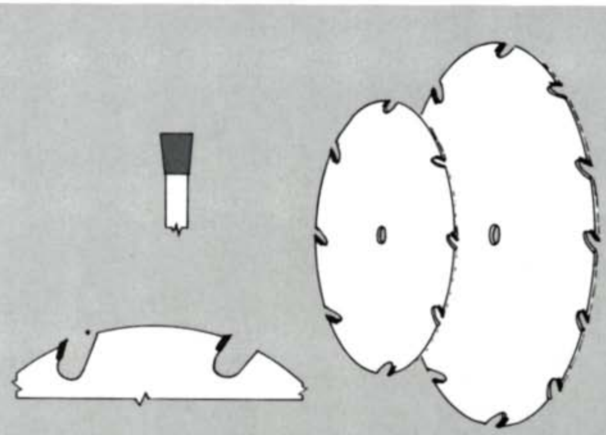


Fig. 11: Limited-feed combination blade

Distance between teeth determines maximum rate of feed.

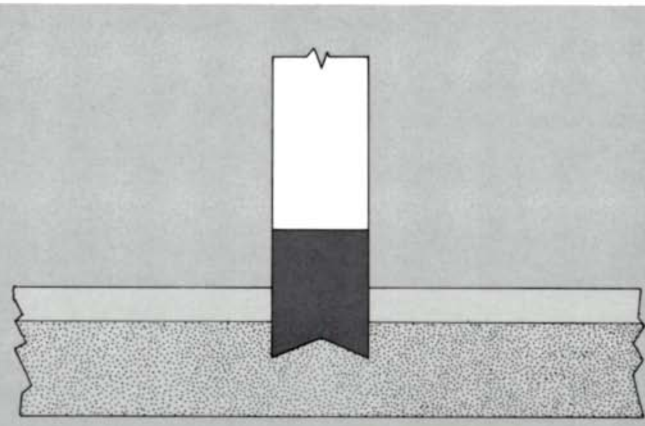


Fig. 12: *A scoring saw is used for cutting thin veneers. Usually its depth of cut is very shallow.*

rougher tooth makes a slightly deeper cut, in order to protect the tips of the rakers.

For abrasive, brittle materials like particle board, the faces of the teeth are slanted alternately right and left (figure 7, previous page), a configuration that reduces chipping out. This arrangement is achieved by placing the teeth in the plate at the required angle or by grinding them.

There are many other possible tooth configurations. For example, every second or third tooth in an A.T.B. can be followed by a square raker (figure 8), or the rougher tooth itself can be beveled first on one side and then the other, as in figure 9.

Figure 10 shows a typical combination blade. It has four alternating beveled teeth followed by a square raker and is designed for both ripping and crosscutting.

Another general-purpose saw is shown in figure 11. It is designed to limit the feed to a predetermined chip load and can be used in portable electric saws, table saws and radial arm saws when smoothness of cut is unimportant.

Most carbide blades can be used on both radial arm saws and table saws. However, as the hook angle increases (see figure 1, p. 72) so does the danger of a radial arm saw grabbing the work (self-feeding). Positive hook angles of 13° to 15° are usual, although some blades designed for swing-and-pivot saws may have a negative hook. Heavy-duty ripsaws go to the other extreme with a 25° positive hook.

Figure 12 shows a scoring saw, which is designed to cut cleanly through fragile veneers. It usually cuts only about $\frac{1}{16}$ in. deep.

Chip loads — For a particular tooth configuration, there are four factors that govern the performance of a circular saw: speed of rotation, number of teeth, rate of feed, and chip load. Chip load is nothing more than the thickness of the chip removed by a sawtooth. There is a simple relationship between these four variables which can be expressed by the following equation:

$$\text{Chip load (in./tooth)} = \frac{\text{feed rate (in./min.)}}{\text{RPM} \times \text{no. of teeth}}.$$

As one would expect, halving the rate of feed or doubling the number of teeth reduces the chip load by half, and it is easy to see that a smooth cut requires a low chip load—either a slow rate of feed, lots of teeth, or both. What is not so obvious is that increasing the chip load increases the life of the blade. This is because the greatest wear on the tooth occurs when the cutting edge strikes the work at high velocity. Therefore, the larger the chip load per tooth, the fewer times each tooth has to separate a chip from the material, and the fewer impacts the tooth withstands in cutting a given length of material. Maximum attainable chip loads are affected by the condition of the machine, the thickness of the blade relative to its diameter and the nature and thickness of the material that is being cut. Accurate alignment of the sawblade with the path of feed makes a considerable difference in the performance of the blade.

Choosing a blade — Once you have decided on the tooth configuration you want, how do you select a good blade? Much of the work that goes into making a high-quality carbide blade is invisible (tensioning, for example), and it is difficult to make an intelligent choice between competing brands. In general, the price, the terms of the warranty and the manufacturer's reputation are the best indicators, but here are some other things to look for: A good blade should be flat. When placed on a true arbor, the total indicator runout of the blade body should not exceed 0.005 in. for a 10-in. blade, and outside-diameter runout should not exceed 0.002 in. With a hand lens, check the quality of grind on the sawteeth. If the carbide looks smooth and shiny, it's good, but if it has deep and irregular grind lines, the teeth will dull rapidly. The teeth should be notched in and neatly brazed to the body of the saw (figure 13). There should be at least ⅛ in. of carbide on each tooth of a 50-tooth saw.

Sharpening — Carbide blades are sharpened on special machines using diamond grinding wheels, and only about 0.005 in. of carbide should be removed each time. This requires skill, and blade life can be considerably shortened by careless or improper grinding. Saws sometimes come back from being sharpened with the tips missing carbide particles on one side because the tip was not properly supported and the pressure between the wheel and the sawtooth produced vibration. Another common way of losing carbide particles is to use coarse-grit wheels for finish-grinding. It may cost less, but the results are expensive. The peaks and valleys left by these wheels leave unsupported particles that can easily be knocked off during the cut, rapidly dulling the saw.

Broken and damaged teeth can be replaced and ground to the exact size and shape of the others. If properly cared for, a good blade can be sharpened 30 to 40 times before it needs to be retipped.

Retipping — When there is not enough carbide left to grind, the remains of the teeth are removed with a torch. The notches are ground out, new teeth are brazed on and then ground to the same shape as the original ones. Next, the body of the saw is checked for flatness and, if necessary, straightened by hammering. The result should be a blade equal in quality to the original one. There will not be a great savings in money, but you will have the satisfaction of making a small stand against our throw-away economy.

Care of blades — Ruining a carbide blade is much easier than you think, and I have been guilty of most, if not all, of the following abuses. Saws are most frequently (and most seriously) damaged by overheating. This is usually caused by continuing to use a blade that is dull but can also happen by trying to feed stock too fast. Saws warped by overheating have to be straightened by hammering and sometimes retensioned as well. When the teeth are very dull they have to have more carbide ground off to make them sharp, and this shortens the life of the blade. Like steel saws, carbide blades gum up when cutting resinous woods. The best way to clean them is by soaking them overnight in kerosene or paint remover.

Faulty alignment is another major source of trouble. To get

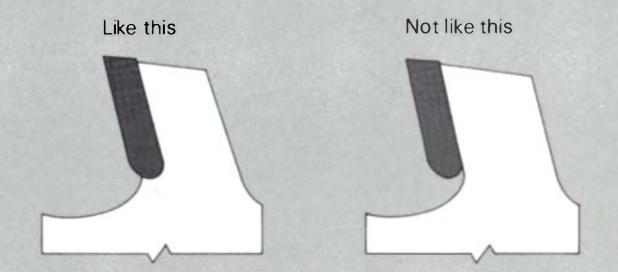


Fig. 13: *Carbide tips should be brazed into pockets in the saw body, not stuck on the leading edge of a gullet.*

a clean, accurate cut, the sawblade must not only run true (no wobble) but also be parallel to the direction of feed, which means parallel to the miter-gauge slots in the saw table. Getting proper alignment (if you don't have it already) usually requires loosening the trunnions and moving the arbor assembly slightly.

Once the sawblade is trued up with the line of feed, you should align the rip fence with the blade, and on this there are two schools of thought. One argues that the blade and fence should be exactly parallel. The other maintains that the fence should be canted slightly away from the line of feed (about ⅓₂ in. or less) on the outfeed side of the table. This ensures that only those teeth on their downward cutting arc contact the workpiece. Too much of a cant will result in a "heel-and-toe" condition, make feeding difficult and possibly cause the blade to overheat and distort.

To see whether the saw is running true, clamp a machinist's dial indicator to the saw table. Mark a spot near the perimeter of the blade and rotate it slowly through 360°. If you cannot get a dial indicator, clamp a piece of smooth steel almost up to the blade and check the distance between it and the blade with feeler gauges as you rotate the blade. If the indicated runout exceeds 0.005 in., find out the reason. First take the saw off the arbor and make sure the saw collars are clean and not worn. Try the blade on another machine. If the trouble is in the blade and it is not flat, do not take a ball-peen hammer to it, but send it out for correction. Never try to put shims between the saw collars and the blade. This can distort the blade and damage it permanently.

Other factors that will affect a saw's performance, if not its health, are throat plates (table inserts) that are not close enough to the saw or not level with the table, vibration from loose arbors or bearings, tables not flat, and mismatched or loose *V*-belts. Never try to slow down a saw by pressing something against its side. This can generate enough heat to distort the body. Don't drill holes in a blade or enlarge existing holes. This will upset the tension. Keep it on a wooden peg or rack all by itself when not in use. When shipping make sure, if there is a bolt through the arbor hole, that it is not putting pressure on the body. Finally, never lay a carbide saw (or any other edge tool) down on a hard surface like a cast-iron saw table. Remember, the teeth are made of grains of tungsten carbide bonded together—super hard but vulnerable to mistreatment. □

Contributing editor Simon Watts prepared this article with the help of Steven A. Segal of North American Products in Atlanta, Ga.

Hardwood Plywood

Modern 'glued-up stuff' saves work, money and wood

by Tage Frid

There is great confusion about how to buy hardwood plywood, about the different grades and qualities, and about its advantages and disadvantages against solid wood. Having a good knowledge of these things makes it easy to decide when to use plywood and when to use solid stock.

The advantage of plywood is that it's more stable and won't change its dimensions, except in thickness. It's easier to make machine joints using veneer-core plywood because the alternating direction of the plies makes for about 50% long-grain to long-grain gluing surfaces. It would be impossible to make much modern furniture without plywood.

The advantage of solid wood is that it can be shaped and carved. Its color is usually darker and its figure more pronounced because it's not cooked and steamed like veneer. The joints in solid-wood constructions can be exposed, making an attractive addition to the design. Solid-wood surfaces are also easier to repair, something to consider when making a piece that will receive lots of wear and possible abuse.

The greatest disadvantages of solid wood are that it doesn't have much strength across its width, and its dimensions never stabilize—it's always moving in width and thickness. The disadvantages of plywood are that it's difficult to repair, its joints usually have to be hidden and its edges have to be faced with either veneer or strips of solid wood.

Many people talk about plywood and veneer as "that modern glued-up stuff." Actually there's nothing modern about it, except the glues used today. Veneering, the basis for plywood construction, was known to the Egyptians 3,500 years ago. The ancient Greeks and Romans used the technique also, but during the Middle Ages the technology was lost, and solid-wood furniture was joined with pegs rather than glue. In the 15th century the Italians rediscovered the technique of veneering and the art spread throughout Europe, reaching its climax of skill and artistry in 18th-century England and France. With the introduction of machinery and the decline in craftsmanship during the 19th century, the art of veneering again suffered. After World War I, the first fumbling experiments were made to use plywood in furniture construction, and since then it has become indispensable.

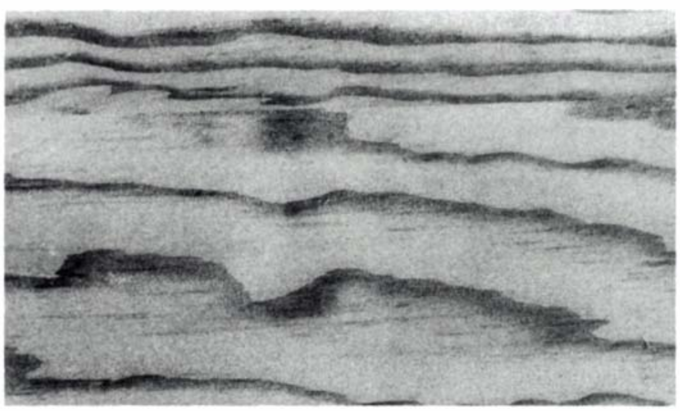
The flush corners and edges of modern furniture and the development of panel constructions into plain unbroken surfaces would have been impossible without the dimensional stability of plywood. Architecture has been revolutionized by the availability of standard-size sheets of wood that are stronger than ordinary lumber. Exterior-grade plywood made with weather-resistant glue and used for decking and siding has changed our conception of house framing. And with the shortage of wood today, manufacturing veneer for plywood, unlike sawing boards from logs, produces little waste. Almost 100% of the log is made into plywood, except for its center, which is put to other uses.

Plywood means less waste for the craftsman too—there are no knots, checks or other natural defects that must be cut out. Also, more expensive species of woods, such as rosewood and teak, can be purchased in plywood form for about half the cost of an equal amount of solid stock. Generally though, the cost of one square foot of good quality ¾-in. hardwood plywood is about the same as one board foot of solid stock of the same species. Using plywood saves labor as well as material because it's not necessary to glue up large panels from narrow boards or to construct frames to hold the panels. Woodworkers should not rule out using plywood because they think it costs too much.

Plywood veneers are cut in one of four ways, depending on the species of the lumber and the use to which the veneer will be put. Most veneer is rotary cut. This method requires first cooking the log and removing its bark. Then it's placed between centers in a big lathe and revolved into a knife. As the log turns, the knife automatically advances into the stock at a controlled rate, which determines the thickness of the veneer. A cylinder six or seven inches in diameter is left over. Rotary-cut veneer (*FWW* #12, Sept. '78, pp. 83-85) doesn't have the fine figure of sliced veneer, because when rotary cut, the veneer is peeled off the log like a sheet of wrapping paper being pulled from a roll. Because the cuts are always parallel to the annual rings, the grain of the veneer looks unnaturally stretched and doesn't have much character.

For face veneer the finest hardwood logs are used, and the veneer is sliced instead of rotary cut. Whether cut tangentially or quarter-cut, there are several ways to slice veneer. Usually the log is rammed into a fixed knife and automatically advanced between cuts so each slice is the exact same thickness, usually 1/28 in. The pieces are kept in order as they come from the machine so they can be matched. Sliced veneers are sold in flitches, bundles containing all the stock from one log or from a section of a large log. This makes it possible to panel a whole room with face veneer from the same tree.

Somewhat similar to sliced veneer, but cut instead on a



Rotary-cut veneers often lack natural-looking figure because they're cut parallel to the growth rings.

lathe, is half-round veneer. The log is bolted to a stay and mounted to the lathe in eccentric chucks. As the log revolves, it presents only a small arc of its circumference to the knife. Another method of getting veneer is by sawing on a band saw with a thin blade, which makes a narrow kerf. Even so, as much wood is wasted as is saved. Because this way produces so much waste, it is little used.

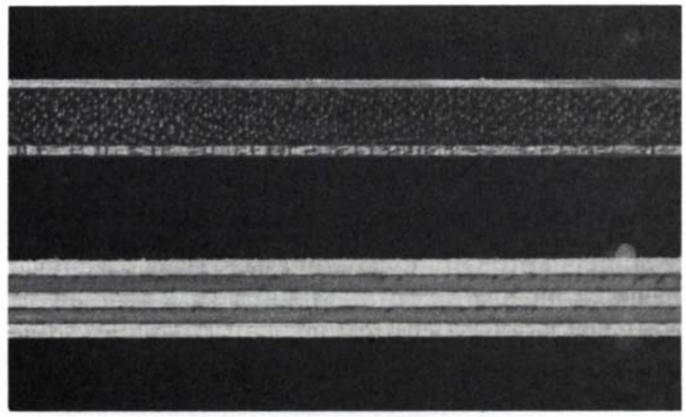
Though most plywood is made for the building industry, there are several good products available to the craftsman, who can buy them with the face veneer already glued on or with no face veneer at all (so he can veneer it himself). The plywoods commonly used by the craftsman are veneer core, lumber core, particle-board core and fiber-board core. All plywood is built up of an uneven number of plies of various thicknesses, depending on the finished thickness of the sheet itself. But whatever the thickness and the species of lumber used, the grain direction of any ply must be at right angles to that of the adjacent plies. This crossing of the grains gives plywood its great strength and dimensional stability.

The most used and best-known plywood is veneer core. The thinner the veneer used to build up the core, the greater the strength of the plywood. I would never use, for example, three-ply ¼-in. plywood. In most cases such plywood is made of cheap materials, especially the core, so any imperfection in the core telegraphs right through the face veneer. Assuming that the face veneers are 1/28 in. thick, this makes the core about ⅕ in. thick, and because the grain of the core must cross the grain of the face veneers at right angles, the plywood is weak along its length and easy to break. If ¼-in. plywood is made out of five plies, the center ply and the face veneers run in the same direction, and with the two crossbands, it's stronger and more stable.

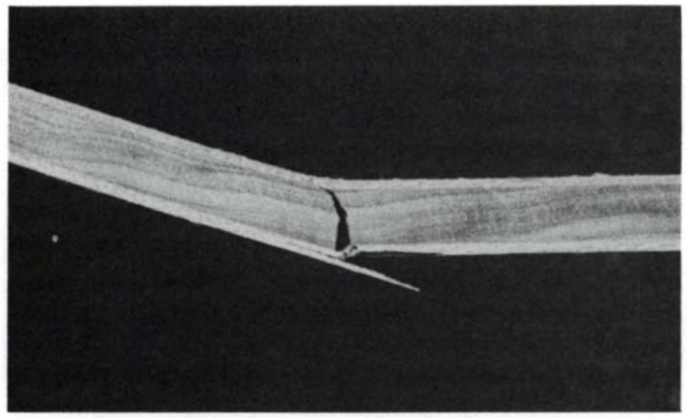
The quality of veneer-core plywood varies greatly. Cheaper plywood contains voids and unsound knots in its inner plies. Voids in the crossband, the plies directly below the face plies, make the face veneers weak in those places because there's nothing to back them up, and they can break through. A better veneer-core plywood is a Russian product called Baltic birch. The quality of the wood is good, but the plywood itself tends to twist, and lately I've found that the layers sometimes separate. Most Baltic birch plywood is made to metric dimensions—standard sheets are 150 cm by 150 cm (roughly 5 ft. square) and the thickness also is in millimeters. Another very good veneer core is made in the Philippines and is sold under the general commercial name lauan. It is very stable and the core is good. Its color is close to mahogany.

Lumber-core plywood is made up of two face veneers, two crossbands and a solid-wood core. Because the core is much thicker than the crossbands and its grain runs in the same direction as the face veneers, it has great strength lengthwise. Most lumber-core plywood is made up of edge-joined strips in its center; poplar and basswood are common, though mahogany is better. These strips vary in width, but 3 in. is usually the maximum. The strips are glued together and then dressed to the necessary thickness. Next the crossbands and face veneers are glued on. Lumber-core plywood can twist because the glued-up core acts like one piece of wood.

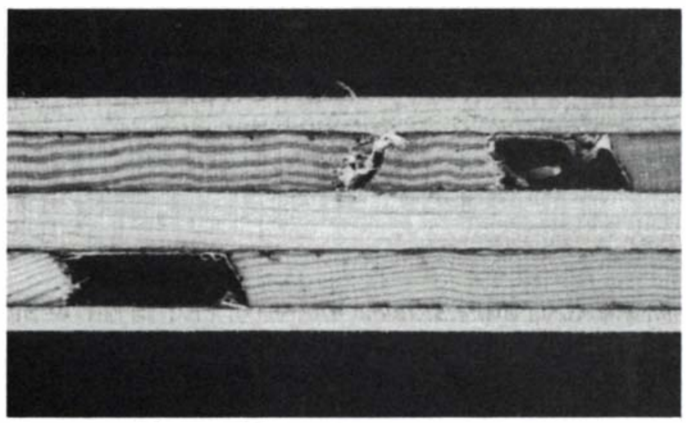
Imported lauan plywood is also available in lumber core. The difference between the lauan lumber core and the ordinary commercial kind is that the core strips in the lauan are not glued up into one solid sheet. They're held together by the crossband plies with small spaces between the strips. This



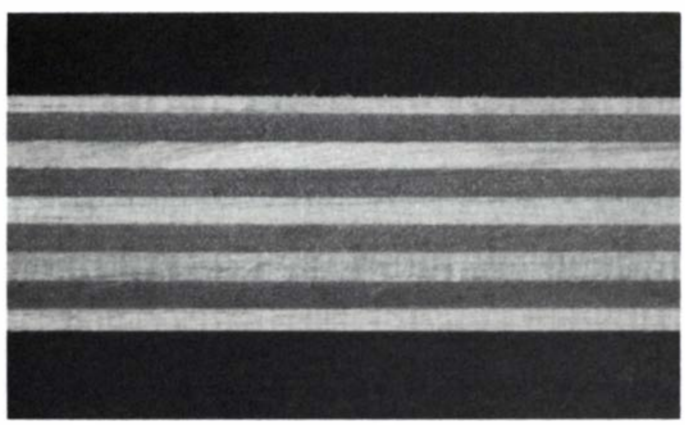
The three-ply material, top, is weaker than the more expensive five-ply material, bottom. Defects in the three-ply core will telegraph through the face veneer.



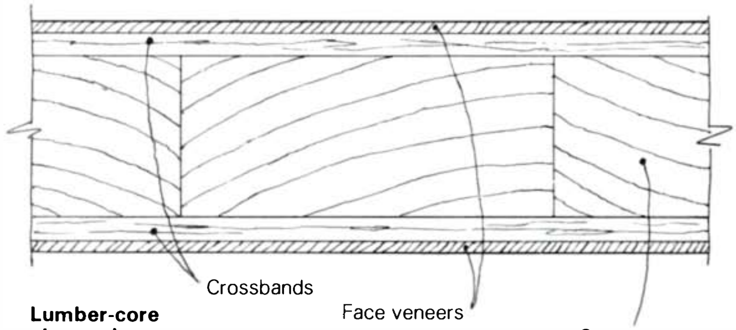
Three-ply ¼-in. plywood breaks easily, especially if it is used in narrow strips.



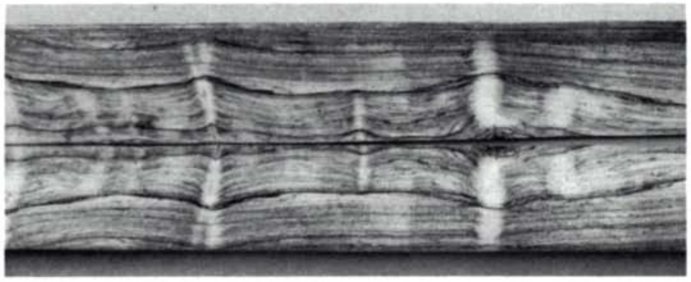
Voids in cheap plywood weaken the entire sheet and make the face veneers vulnerable because there's nothing to back them up.

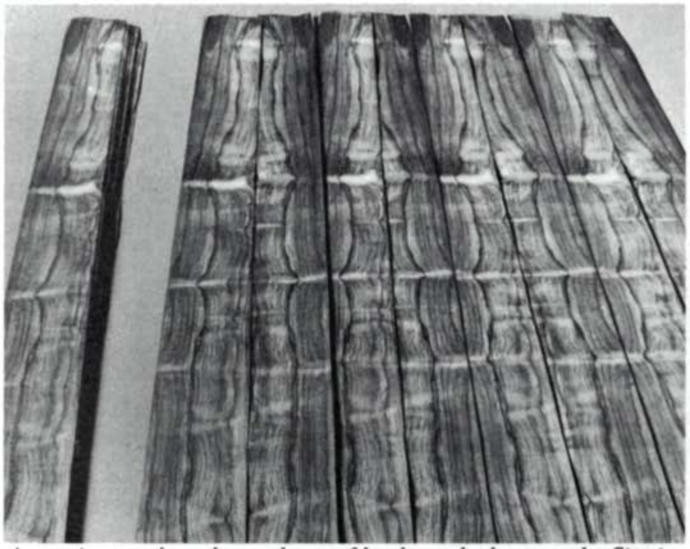


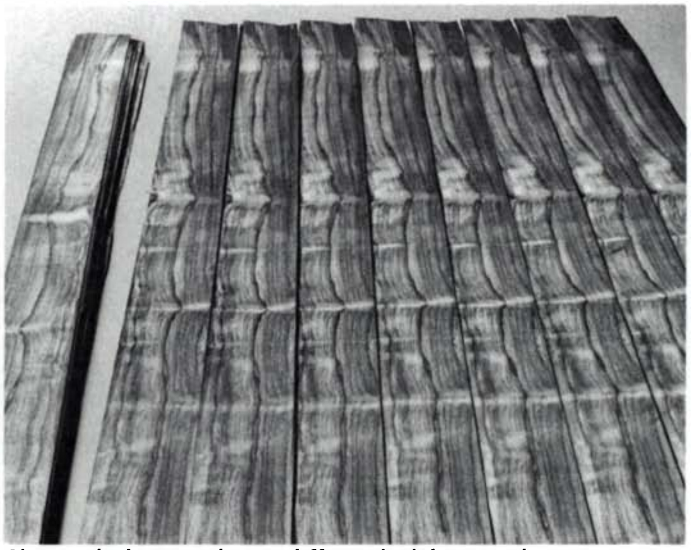
Baltic birch plywood, a Russian import, contains no voids and has exceptional strength and good working properties. Though it sometimes twists and delaminates, it's generally a superior product.



Lumber-core plywood


Two bookmatched veneers. When taken from the flitch, one piece is flipped over, as you would open a book.


An entire panel can be made up of bookmatched veneers by flipping every other piece as it comes from the flitch.


Slipmatched veneers have a different look because there's no mirror-image effect.

allows each core strip to move independently, making the plywood more stable and more suitable for cabinetmaking. This lumber-core plywood is available without face veneers in 4x8 sheets that the craftsman himself can veneer..

When veneering plywood yourself, take the pieces of veneer from either the top of the flitch or the bottom. Don't pull them out of the center or any other place in the bundle because that splits up the flitch and makes it impossible to match the figure later on. There are two ways to match veneer on a panel. One is called bookmatching, because the piece on top is flipped over, as though you were opening the cover of a book. Bookmatching can be done with more than two pieces of veneer, and this is usually how good-quality sheets of plywood are faced. The other way of matching is to use veneers in the order they come from the flitch, only without flipping them. This is called slipmatching.

When working plywood of any type, the cardinal rule is that what you do to one side you must do to the other. Whether you veneer your own plywood blanks or buy them with the face veneers already glued on, make sure that the face ply and the back ply are the same species. If two different face veneers are used, for example, walnut on the front and poplar on the back, the two will expand and contract at different rates. There are plywoods available with plies of the same species on the front and back, though usually the quality of the front veneer is better and allows for fewer defects.

There are other materials that can be veneered or that come already faced with veneer. These are sold under the commercial names of particle board and fiber board and are usually less expensive but not nearly as strong as plywood. The greatest advantage in using these materials is that because they're made out of sawdust or fibers they don't have any grain direction, so the veneer can be applied with its grain going in any direction. The greatest disadvantage of this type of material is that it doesn't have much strength and that it's not easy to join together, because the joints must be reinforced with splines made of some other material. Another disadvantage of particle board is that it will bow if it's used to make doors that slide in a track on the bottom. This is because there's no grain direction to support the weight. To prevent this from happening, either put a wide facing on the edges of the doors or hang them from a frame at the top.

The U. S. Department of Commerce has established voluntary product standards for grading hardwood plywood. This grading system is different from the one used to grade softwood plywood, and the two should not be confused. Premium-grade veneers are given the symbol *A*, while other quality veneers are designated by a number: good grade—1, sound grade—2, utility grade—3, backing grade—4, and a specialty grade—*SP*. Any combination is possible, the first symbol representing the quality of the face veneer and the second the quality of the back veneer. Plywood grade *A*-3, for example, has a premium-quality face veneer and a utility-grade back veneer. The absolute best would be *A-A*. Often the back veneer is a different species from the front veneer, so it's a good idea to ask about this when ordering because the grading system doesn't take this into account. For more information, write the Hardwood Plywood Manufacturers Association, Box 2789, Reston, Va. 22090. □

Tage Frid, professor emeritus at Rhode Island School of Design, is senior editor of Fine Woodworking *magazine.*

French Fitting

Making the presentation case presentable

by John Lively

Though the term is most often applied to arms cases, a box, a drawer or a chest can be French-fitted to hold almost anything. Drafting, optical and photographic equipment, large pieces of jewelry, hand tools and musical instruments are but a few of the items that can benefit from being snuggled into a closely fitting, leather-lined recess. The method I will describe deals specifically with cases for handguns.

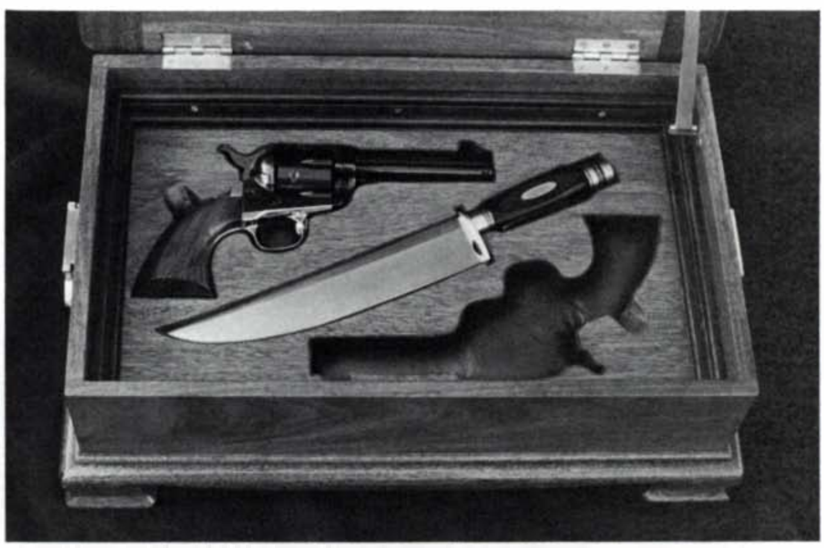
In the last quarter of the 18th century, a gentleman's purchase of a pair of new pistols was no casual matter. As much objects of art as instruments of defense, the custom-built pistols of Georgian times involved the cooperative efforts of many skilled artisans. Master gunsmiths, acting much like general contractors, retained the services of independent founders, barrelmakers, lockmakers, woodcarvers, goldsmiths, silversmiths and engravers. After designing the parts and farming out the various jobs, the gunsmith's work was done, except for collecting and assembling the finished pieces. Then the pistols were delivered to one more specialist—the casemaker. It is the work of these casemakers that has ensured the survival into our time of so many splendid examples of 18th-century gunsmithing. Thanks to them, it is not unusual for an auctioneer's bulletin to describe the condition of 200-year-old firearms as "excellent" or "original."

Though these cases served well enough for storage and display, they were designed for traveling by coach. They were usually shallow, rectangular boxes in sturdy oak or mahogany, dovetailed together, with their flush-fitting lids secured by hinges at the rear and an inlet, keyed lock at the front. On the outside, these cases were paradigms of unadorned simplicity, relying on the wood's figure and color for decoration.

Yet on the inside, things were not so simple. Muzzle-loading arms required a number of accessory tools that had also to be fitted into the case, and all the pieces had to be kept from coming into damaging and possibly dangerous contact with one another. Two distinct methods of casefitting arose to address this necessity—the English and the French. English casemakers found it expedient to divide the case into straight-sided, cloth-lined compartments, each conforming, more or less, to the shape of the piece it contained. The inside of the typical English case appears labyrinthine. The French casemakers chose instead to fashion compartments in the precise shape of the pieces. They created these negative spaces either by cutting the shapes into a solid panel of wood or by making molded impressions. In either event, they usually glued cloth inside the impressions as well as to the ground surface above, so it covered the entire inside of the case. Though elevations vary from case to case, the typical French-fitted box presents its contents in half relief, the metal of the pistols contrasting nicely with the cloth-covered ground.

The fitted pistol case remained an indispensable part of a gentleman's traveling gear until the advent of repeating arms and pocket pistols toward the middle of the 19th century. The wooden carrying case then gave way to the leather holster and the vest pocket. But as a presentation case for custom-made or special-issue arms, the fitted wooden case continued to be made, and even today the major arms manufacturers sell them as accessories. Their cases are inferior, however, and in recent years the interest of collectors in black-powder and reproduction firearms has created a new demand for custom-fitted presentation cases. The woodworker is in a good position to compete. Too, the marketplace is accessible via the well-attended gun shows held several times a year in most

Black walnut main case holds Colt dragoon revolver and powder flask, while cleaning and bullet-making tools fit into lidded inner box at right.



French-fitted presentation case, 21 in. by 18 in. by 5 in., is made of mahogany with padauk molding inside, and red leather lining. An inner lid (not shown) rests atop the molding inside the case.

Photos: John Barretto; Illustration: Ric Lopez major cities. With samples to show, the casemaker is sure to generate considerable interest.

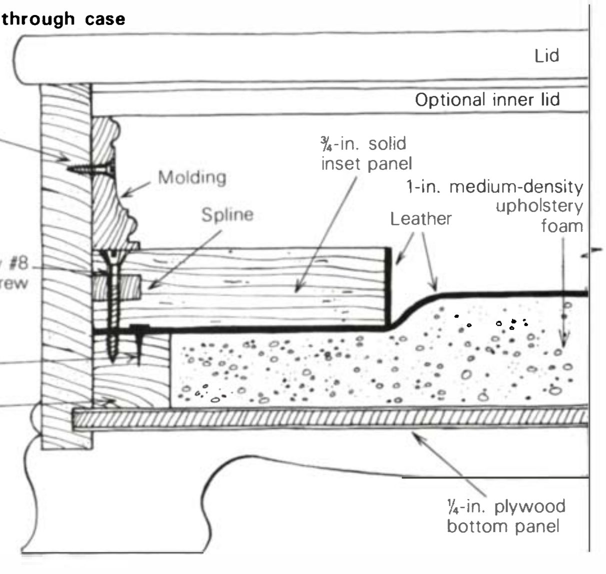
Before proceeding, I have to point out that my fitting method differs in several significant respects from the traditional treatment. First, I line the case with leather instead of cloth. I've found that fabric wears quickly where it contacts the pieces, and it eventually becomes grimy from gun oil and other residues. Also, it is almost impossible to line the cavities with fabric without unsightly wrinkles. Second, I don't make a molded impression of the pieces, but rather I cut the shapes into a solid panel of wood (called an inset panel), line their inner edges with leather, and secure the panel above a leather-covered cushion that fills the bottom of the case. Using wood rather than cloth as the visible ground not only allows me greater opportunity to create visual effects, but also makes for a more durable interior. And because it is small, the inset panel is the perfect place for using a nicely figured scrap from the stash under my bench.

Making the inset panel — French fitting begins where casework ordinarily leaves off, though it's good to have all the materials on hand before starting the case itself. If you want to use several different species of wood on the interior, you will need to coordinate these with the color of the lining material. Leather comes in lots of colors, but they may not all be available all of the time. At a leathercraft supply store, select upholstery leather that is finished on one side but left unfinished or sueded on the other. Buy enough to cover double the bottom surface area of the case.

Finished upholstery leather is many times more durable than cloth, its finished surface will not soak up oil and dirt, and it can be cleaned with a damp cloth. The leather's unfinished side has just the right texture for gluing to wood with contact adhesive, and its finished side will resist glue penetration. You can wipe off glue smears with your finger.

Once the case is made, cut four cleats ¾ in. square by its inner dimensions. Miter them to length and glue them to the bottom and inner sides of the case. Next, obtain a piece of medium-density upholstery foam exactly 1 in. thick, and cut it to fit snugly between the cleats. As you will see later, the ¼-in. difference between the thickness of the foam and the thickness of the cleats is important. Now cut a piece of leather to the inner dimensions of the case and tack it securely along

Section through case



its edges to the top of the cleats, one tack every 1½ in. The leather should be taut, but not stretched across the cushion. When the leather is tacked down, there must be no wrinkles or bulges caused by uneven tension.

Start by making templates from the pistols or whatever is to be fitted. This requires tracing around the contours so that the completed outline is larger than the object piece by the thickness of the leather. Leather does not come uniformly off the cow, but if your outline is 1/16 in. larger than the piece you are fitting, your template will be close enough. To make this tracing, clamp the object over a piece of poster board. I use a bench holdfast with a pad of foam and a small scrap of wood. To produce the slightly enlarged outline, use a device similar to the one described by Carlisle Lynch (*FWW* #18, Sept. '79, p. 83). But make yours with a *V*-shaped base (because it must follow tight curves) and a tracer positioned 1/16 in. in advance of the scribing tool.

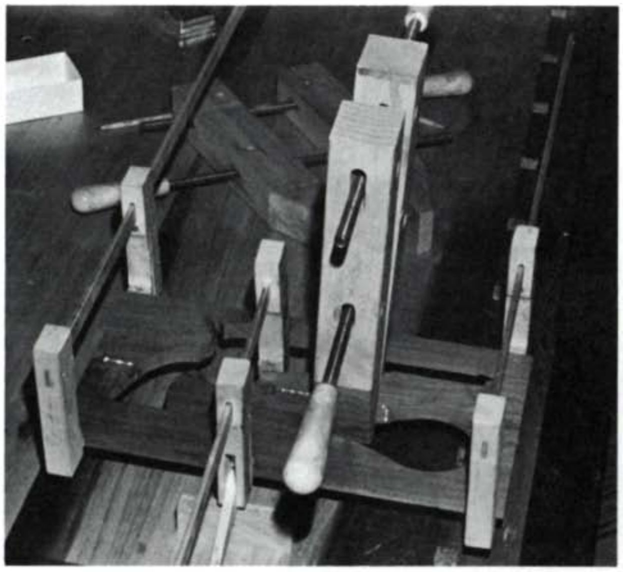
Once you have completed the template, dimension the stock you have chosen to the inside measurements of your case, and at least half as thick as the object you are fitting—¾ in. does well for pistols. Lay the template on the stock and move it around until you are satisfied; if more than one object must fit, try different arrangements until you find one that is both pleasing and practical. Trace the outline of the templates onto the bottom face of the panel. If you have a jigsaw, drill starter holes and cut out the shapes, being careful not to stray beyond the inside edge of the traced lines. Don't risk ruination by sawing too close to tight corners. These areas will be properly enlarged by filing later.

Rather than jigsawing, I prefer the band saw. But instead of attempting to weld a blade threaded through a pilot hole, I simply rip the panel in two so the saw kerf passes through all the proposed negative spaces at once. Joint the sawn edges, dry-clamp the two pieces together, and reposition the templates on the top surface to make new tracings corresponding to the ones on the bottom. This is necessary because the ripping destroys the original proportions. Then I unclamp, saw out the spaces, and glue the two parts back together. You will probably need to clamp from the inner edges of the sawn-out spaces, using several small handscrews, along with bar clamps at either end of the panel. Different panels will call for different strategies.

Before proceeding any further, saw a slot along each end-grain edge to receive a spline ¼ in. thick by at least ½ in. wide, the full width of the panel. Rip the two splines from solid material. They should seat tightly enough to require a few gentle taps with hammer and block. Do not omit this step or postpone it; without reinforcement, the short-grain portions of the panel won't stand up to subsequent handling, and it will crack the first time you give it a hard look. I usually take the additional precaution of boring through narrow short-grain walls and gluing in bits of ¼-in. dowel.

Now you should begin to clean up the bandsawn inner edges with bastard files—a half-round, a triangular and a small round. Assuming the entire width of your traced outline is still visible, as it should be, you will want to file the sawn-out spaces just to the other edge of the line. Do not obliterate the line, but leave a visible trace of it all around.

The next steps are quick and easy. Make sure the panel fits easily in the case, bearing in mind probable movement across the grain. With a marking gauge, scribe the panel's upper face ⅜ in. in from all four edges. Then mark equidistant



Halved panel stock is reassembled after spaces are bandsawn.

Leather is cemented into place. Note reinforcing spline in panel's edge.

centers for pilot holes, three of them along the length and two on the width. Bore and counterbore on these centers for 1¼-in. by #8 wood screws. If you anticipate more than negligible movement, slot appropriate holes to allow for it. Transfer the centers to the leather-covered cleats on the bottom of the case, and bore pilot holes in them, too.

Lining the spaces — At last it is time for an initial fitting. Return the panel to the case and screw it down. Since the foam cushion is higher than the cleats, it will be compressed. Tighten the panel as you would tighten a drum-head—not all at once on any one side, but in even stages all around. When it is firmly seated, you will see that the covering has welled up into the cavities, forming a firm, neatly crowned pillow. Now you can nestle the items into their compartments. Cut several patches of leather and slip them between the edges of the cut-out and the object pieces at various places along their contours. Then study the unfilled spaces to determine whether a proper fit will be achieved once the entire inner edge is lined with leather. Remember that you want a smooth fit, but not one that is tight. Whatever you are fitting should settle into its compartment by its own weight. Once settled in, there should be an absolute minimum of slop. If you try to wiggle it around, it should not move more than 1/32 in. in any direction and preferably it should remain dead still. Shade the tight spots with a pencil, remove the panel from the case and file some more. Then test it again.

When the fit is correct, seal the surfaces of the panel so that they will resist the glue you will apply inside the cavities later. Take care to prevent the finish from dripping over the edges of the cut-outs, as this will interfere with gluing the leather.

When the faces of the panel are sealed, you are ready to line its inner contours with leather, which should be cut (straightedge and sharp knife) into long strips a uniform 1 in. wide. These strips must be long enough to run the entire distance—any attempt to splice will leave ugly gaps. Now lay the strips face down and apply three coats of contact cement to their unfinished sides, waiting for each coat to dry. Do the same to the inner edges of the panel. When the final coats have dried, clamp the panel in a vise and begin sticking the strips of leather to the contoured edges, allowing the strips to overhang about ⅛ in. to each side. Begin and end in the same corner to make the junction as unobtrusive as possible.

Press the leather firmly into place with your fingers. For those tight little curves and culs-de-sac, use a round screwdriver shaft or the like to put pressure where it belongs. Don't rush this operation, and don't permit the leather to touch the tacky surfaces ahead of the spot you are working on. If it sticks to the wrong place and you try to pull it loose, half of the leather strip will remain stuck to the wood. Should this happen, pull all the leather loose and clean up the mess with lacquer thinner, which will probably also dissolve the finish on the panel's face. Be assured of a nasty tussle if you let the leather stick where it doesn't belong.

When the inner edges are lined, take a pair of manicure scissors and trim the leather flush with the top and bottom surfaces of the panel. Before going further, you need to work in a bead of yellow glue with your fingertip to stiffen the raw edges of the leather so that they will not roll over in use. When the glue has hardened, sand the face of the panel with 220-grit paper. A subsequent sanding with 400-grit paper will leave the panel ready for final finishing, which should be done before it is fastened to the cleats.

The final step is to design and make a molding to trim out the inside corners of the case. The only requirement of the design is that the base of the molding be thick enough to obscure the heads of the screws that fasten the inset panel. You might attach this molding with small brass screws, so you can remove the panel should the need for repair arise.

Having said little about the design of the case itself, I would like to close with a few prejudicial remarks. For a contemporary collector, a presentation case is seldom used as a traveling container. It's an article of household furniture with the specific function of preserving and displaying objects of significance and value. Though it may be carried about from time to time, there is no need to feel restricted by the design requirements of a traveling case. Apart from structural necessities, your design should be aimed at achieving harmony, balance and continuity between the case and its contents, so that the two can be perceived as one thing. □

John Lively, 35, has joined Fine Woodworking *magazine as assistant editor. He used to make cabinets and billiard tables in Dallas, Tex.*

PRESCOTE'S LONDON SHOW British woodworkers stretch traditional forms

British designer/makers almost always use traditional forms of construction, and their designs push these forms to their limits, and sometimes beyond. This traditional impetus can be traced back to the Arts and Crafts foundations, established early in this century by Ernest Gimson and Sidney and Ernest Barnsley. So far there has been little experimentation with sculptural forms worked from solid blocks or stacked laminations in the mode of American furniture sculptors, though this is not to say that there has been no innovation. If the successes of the British are often less spectacular than those of their American contemporaries, so then are their failures less disastrous. British craft furniture is still made essentially for use, and, as this exhibition shows for better or worse, the craftsman still prevails over the artist.

Ann Hartree, who operates the Prescote Gallery in Oxfordshire (Cropredy, Banbury, Oxon OX17 IPF, England, telephone 0295.75.660), produces an annual show in London. For this year (March 4-28) she assembled an impressive array of contemporary craft furniture. Accompanied by wall hangings, rugs, calligraphy and books bound by members of the Society of Designer Bookbinders, the exhibition included the work of over 50 craftsmen, half of whom were woodworkers. Most of the major pieces were commissioned works shown on loan.

Other shows at the Prescote Gallery include Furniture Makers 1980 (June 1-28), which exhibited pieces of furniture that were begun no later than two years ago, and the Edinburgh Festival (Aug. 17 to Sept. 9), a major showing of wood furniture and crafts in other media. □

Ashley Cartwrights's elm garden table and chairs welcomed visitors and set the tone for the first of the exhibition's three spacious rooms. The table, 25½ in. square and 28½ in. high, and the chairs, 13 in. square and 18 in. high, have four-board tops that are joined together by square-section pegs.

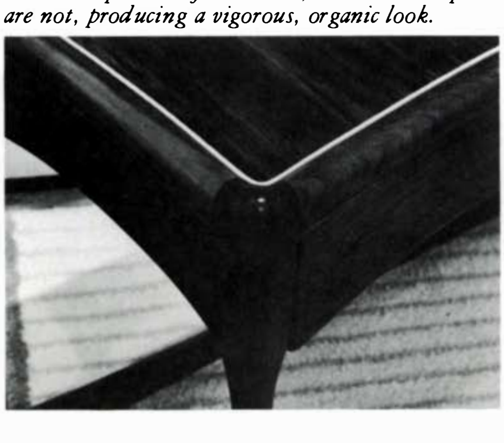
Edward Barnsley's rosewood chair and dining table, skillfully executed by George Taylor. The tabletop is inlaid with a sycamore banding, and its curved trestle legs are laminated from ⅛-in. thick resawn strips, bent and glued together in the same order they were sawn from the stock. The stretcher is also laminated, though the trestle feet and tops are solid.

Below, Richard La Trobe Bateman's elm dining table, 36 in. wide, 84 in. long and 30 in. high, along with his smoker's chair, have somewhat of a self-conscious country feel about them, due in large measure to the adzed surfaces of the chair seat and tabletop. Right, high stool, also by Bateman, is made of elm and has a scooped and adzed seat. The back is sawn, not bent.

Sharing a small room with other, more conventional pieces was Fred Baier's pastel pink and green desk, above. Baier's work is about as close as British craftsmen get to fantasy furniture, though this piece still serves a practical function even if it is a bit whimsical in design. Made of sycamore and colored with translucent dyes that allow the grain of the wood to show through under a clear lacquer top coat, the construction of the desk is dominated by its central pedestal. Branching out from this are the feet and the supporting arms that run beneath the writing surface, whose plane is intersected at either end by storage boxes. Commissioned along with Cartwright's garden furniture for a book on furniture making, the desk lacks the technical virtuosity that seems to overwhelm some of the other pieces.

Martin Grierson's cabinet, right, in shedua and pear, 15¾ in. deep, 44 in. wide and 72 in. high, is made entirely from solid stock except for the back, which is veneered. Note how the panels in the doors and sides are raised and fielded but not accompanied by the usual bevel. The band that sets off the field from the frame is flat, producing a deep and pleasing shadow. The edges of the field, as well as the edges of the frame members, are gently rounded. This softens the appearance of what is otherwise a very imposing, megalithic structure.

Exemplary construction and idiosyncratic design mark Richard Heatley's American walnut desk, 22 in. wide, 49 in. long and 29 in. high. Its drawers fit with the close precision of machine parts, and its thin frame and articulate joints look like bone structure. The carcase is veneered, the top made of bookmatched pieces with sycamore banding. The frame, legs, fall front and drawer fronts are of solid walnut, while the drawer sides are of English oak. Though the whole piece is symmetrical, its individual parts are not, producing a vigorous, organic look.



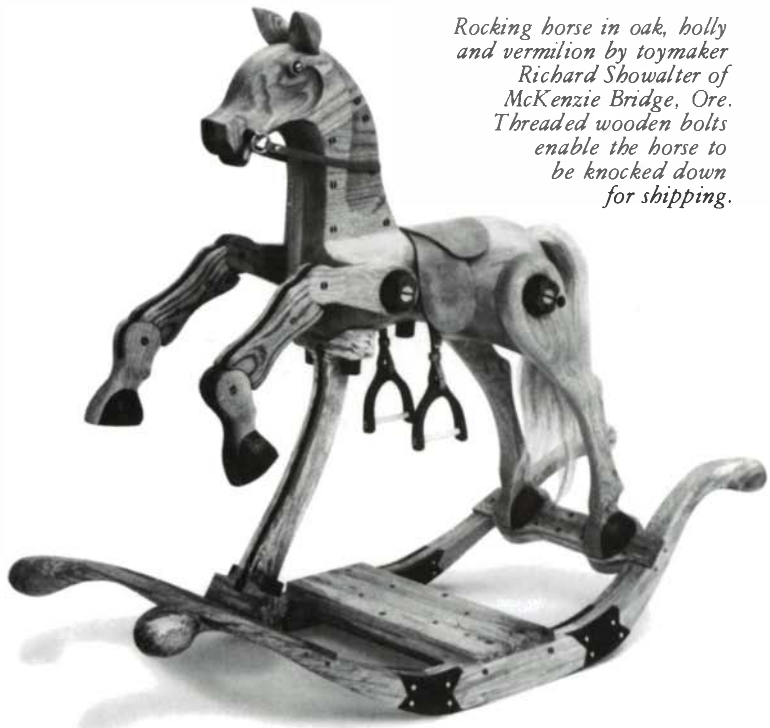
Photos: Rick Paulson

Plow of oak, koa, ash, walnut, rosewood and bubinga is by David Watson, a truck driver by trade, of Lakewood, Wash. What appears to be a motorcycle engine, left, is connected via a wooden chain to a drive wheel, although nothing actually moves. When asked what function the piece serves, Watson replied, 'It sort of divides the shag carpet in my living room.'

The Northwest Woods

At the end of its first year of operation, the Oregon School of Arts and Crafts in Portland organized a juried exhibition by Northwest woodworkers, and a wood conference for professionals and amateurs. Both the show and the mid-April conference pinpointed the issue of how to marry innovative design and sound technique. One cabinetmaker summed it up: "I'd almost rather see something badly designed but well-crafted than something well designed but badly crafted." Another countered, "Up to now I've concentrated on technique, but now I'm asking myself, 'Where do I go from here?'"

The Oregon school, which teaches ten major crafts, is becoming a center for craft education and promotion. Its success can be gauged by how many times a conference participant said, "I never knew so many people were doing this kind of work in the Northwest. I've been working in isolation too long." —*Curtis Erpelding*



Rocking horse in oak, holly and vermilion by toymaker Richard Showalter of McKenzie Bridge, Ore. Threaded wooden bolts enable the horse to be knocked down for shipping.

Cherry secretary by Stephen Barney of Seattle. Barney apprenticed in Japan and uses Oriental tools and techniques. Through dovetails join the carcase, which sits freely on its stand. The rounded edge of the dropleaf closes into a cove in the carcase. Drawer sides are lap-dovetailed in basswood; hardware is hand-forged.