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Fine Woodworking

June 1995, No. 112

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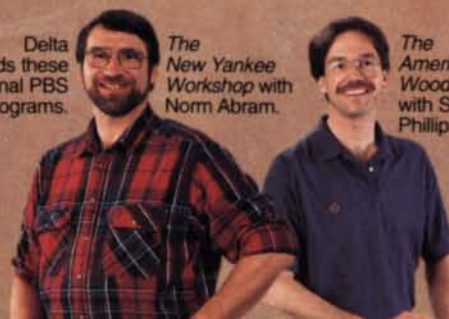
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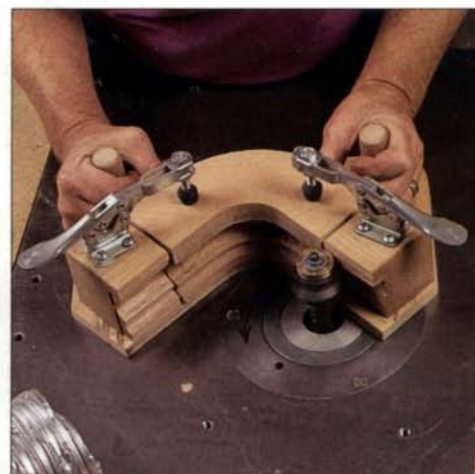


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On the Cover: At least four handplanes belong in every woodworking shop, even shops where most of the work is done by power tools. Sven Hanson explains why on p. 40. Photo: Boyd Hagen

Hearing loss in the workshop—Jack Vernon's article on noise-induced hearing loss (*FWW* #110, pp. 74-77) addresses a safety issue of importance to all woodworkers. Some of the information, however, is misleading.

Bone conduction is very important to our hearing and to the acoustic trauma we endure but not in the way the article portrays. Sound waves striking the skull are, in fact, conducted to the cochlea (hearing apparatus) and can contribute to hearing loss. When testing hearing, we often check air conduction vs. bone conduction with a tuning fork placed on the mastoids (behind the ears) and the midline forehead. A vibrating tuning fork placed in those spots easily can be heard by persons with normal hearing.

The contention in the article that vibration from hand-held power tools conducted through the body can contribute to hearing loss is absurd. The only appreciable noise reaching the inner ear through bone conduction is that traveling directly from the power tool to the skull through the air. Vibrations conducted through the body must cross several joints, large and small, before reaching the head. Cartilage, tissue and joint fluid would dampen any vibration to the point of insignificance. Therefore, we submit that the only way anti-vibration gloves might help prevent noise-induced hearing loss is if you covered your ears with them. Anti-vibration gloves, however, can help reduce cumulative trauma disorders like carpal tunnel syndrome and tendonitis.

The author also emphasizes the amplification of sound at the eardrum compared with the sound outside the ear. He attributes this to resonance in the ear canal. But the physical dimensions of the ear canal are simply not large enough to allow for resonance at these lower frequencies. The higher measurements he and his researchers obtained are most likely due to internal amplification of the miniature microphone or resonance of its sound tube.

An incorrect definition of the decibel was also given in the article. Named in honor of Alexander Graham Bell, one bel represents the difference in sound intensity between two sounds, one being 10 times more powerful than the other. A sound carrying twice the power of another sound is 3 dB louder, not 6 dB, and a 10-time power increase results in a 10 dB increase in loudness, not 20 dB as stated in the article.

Last, the statement is made in the article that tinnitus (ringing in the ears) will warn you of impending hearing loss if it occurs after loud noise exposure. While this is true, it is very common for a person to experience noise-induced hearing loss without having tinnitus. So relying on this symptom to give you early warning is not

useful. Damage may have already been done. Prevention is the name of the game.

—*Theodore J. Fink, M.D.,
and James R. Fink, Shelburne, Vt.*

As a sufferer from tinnitus, a very frustrating condition, I was pleased to read Jack Vernon's article "Taming Woodworking Noise." In years past in my work place, I was subjected to continuous loud noise and am now suffering from tinnitus (in my case, an ever-present buzzing).

Use care. I will be forever plagued by this condition. This could have been avoided if the danger of continuous loud noise had been recognized. A safe shop must include noise reduction and ear protection.

—*Charles Brownold, Davis, Calif.*

Thanks to Jack Vernon for his excellent and well-researched piece. Because there are few companies actually producing quiet blades, we felt it was important for your readers to know Amana Tool Corp. is a leading supplier of these products.

As additional tips, your readers may wish to consider motor enclosures and fully enclosed cabinets for their tablesaws. Also, a close-fitting throat plate (other than metal), blade height and blade guards can contribute to noise reduction.

Mr. Vernon's worthwhile mention of dull and, therefore, noisy cutting tools was excellent and has long been overlooked as a source of unnecessary shop noise (not to mention the extreme physical danger of using dull cutting tools).

—*Brian Corbley, Marketing Director,
Amana Tool Corp., Farmingdale, N.Y.*

Article was insensitive to native culture—In the "Notes and Comments" section of *FWW* #111 (p. 122), there was a short piece titled "A raven's tale in African mahogany." It is apparent the creators of this piece know little or nothing about the art and culture of the native people of the Northwest coast. They have erroneously stated an important myth of the raven and the sun (the chief was not "greedy," but a proud possessor of a valuable resource) and demonstrated virtually no knowledge of the sculptural and two-dimensional art style of these people.

There is a serious disrespect here for native culture. No attempt has been made to understand or learn this complicated art style, nor to understand the essence and importance of this myth.

I have spent years studying and learning about the art form of the Northwest coast peoples. My respect and admiration for these cultures compels me to make these pieces in a respectful manner. I do extensive teaching of this art form to woodworkers, including native people.

It is important that woodworkers who

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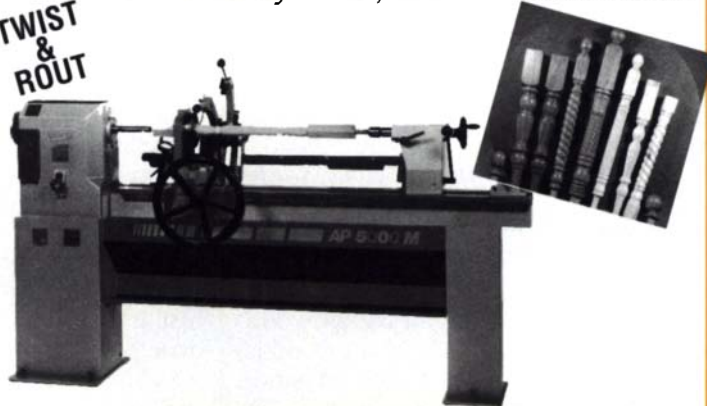


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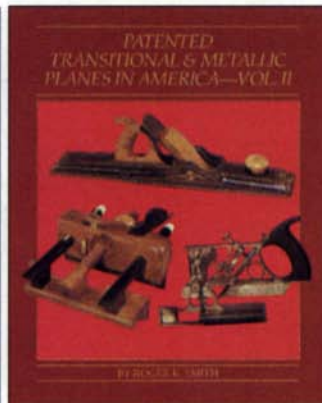
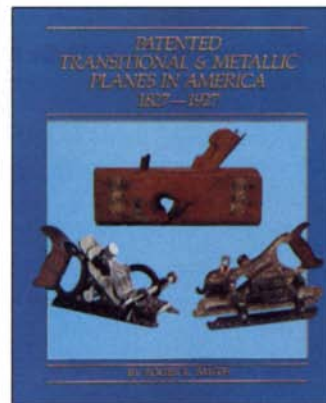
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might want to adapt or borrow another culture or tradition are sure that they have done the necessary research and learned the proper skills to be respectful of that culture or tradition.

—Jay Haavik, Seattle, Wash.

Wood strength has its limits—Purely in the interest of safety, would you mention the very limited tensile strength of wood as it concerns the safety of the all-wood winch (*FWW* #110, p. 22)? When wood is thus used, parts in tension must be banded with metal straps. The shaft, which is in shear, must be of adequate diameter. In my view, the device as drawn is dangerous.

—Charles H. Price, Winnsboro, Texas

Ironing on veneer is an old technique—I recently noted your article, and the later responses to it, on using a household iron to apply veneer (*FWW* #108, pp. 48-51). This is a technique I have used since I first saw it in 1960 when I was a lab technician at Baldwin Piano.

In those days, I made a lot of water skis using 5/8-in. ash. I often inlaid mahogany veneer and ironed it down. I also patched and edged plywood using some veneer and my wife's old iron. The veneer scraps from Baldwin were about 1/16 in. thick, thicker than most veneer today. Because of the thickness, we had fewer bleed-through problems. We did have problems bending it, though.

I still iron on veneer, but today, I have my own iron just for that work. Great magazine. Keep up the excellent work.

—Ed Hiestand, Hillsboro, Ohio

An iron also works for hide glue—A household iron also works well in thermosetting veneer using traditional hide glue. Some 12 years ago, I needed to bond a 2 1/4-in. piece of birch veneer in a valance that concealed indirect lighting. The veneer was laid wrong side up adjacent to the substrate, and I brushed both with full-strength hot hide glue. With no great rush, the glue-covered veneer was reversed onto the workpiece and held in place while I ironed it down (using the "cotton" setting

on the iron). The heat reactivated the hide glue and set the bond. Despite heat from a 48-in. fluorescent fixture and temperature extremes resulting from its proximity to a large window and an exhaust fan, the veneer is still firmly attached.

At one time in the lutherie trade (in England, as late as the mid-17th century), flat-top plates (bellies) of lutes and viol da gambas were attached in a similar manner, using hide glue and a hot iron. With care to avoid scorching the spruce, this is still a valid method for assembly of any flat-top, stringed instrument. Success requires a clean iron to avoid surface marks and a full (but not runny) glue coating.

—David Brownell, Ann Arbor, Mich.

A few cautions on vacuum-bag veneering—David Square's article "Basics of Vacuum-Bag Veneering" (*FWW* #109, pp. 62-66) was informative, but I'd like to offer a few thoughts. Pressure of around 8 lb. per sq. in. (psi) is more than enough to bond veneer to a substrate. So it's unnecessary to pull a vacuum of more than 18 to 20 in. of mercury (Hg).

Remember, too, that there is a moisture-capture problem inherent with vacuuming. The entire project is encased in an air- and water-tight container. If the caul suggested by Mr. Square is also melamine, the moisture transfer is hindered further. If you agree that the glue will not air dry as we know it, but rather will moisture-transfer from the glue into adjacent dryer material in vapor form, a more readily absorbent material should be used.

We know that the boiling temperature of a liquid is lowered as pressure is reduced. Glue will dehydrate rather than absorb into the fibers and dry normally if the negative pressure is brought down too low. I called Borden and Franklin (two makers of yellow glue) to get technical specs on this concern. Borden couldn't recommend either its Professional Carpenter's wood glue or its white glues because water-based glues could warp the wood during vacuuming. I didn't hear from the technical staff at Franklin.

Every article that I have read recently

talks about the problems of accurately butting the seams of the veneer. Sharp planes, veneer saws and sanding blocks have all been tried. No matter how hard I tried, a 1/16-in. gap was found to be somewhere along a 4-ft. run. (Although that's no worse than the gaps we see when we inspect our \$55-a-sheet oak plywood with its caulked imperfections.) Try using a circular cutter, like Taconic's TM 9090 (P.O. Box 69, Petersburg, N.Y. 12138; 518-658-3202). It looks like a pizza cutter. By slicing through two layers, any slight wandering compensates itself. A regular knife or razor blade tends to follow the grain.

—Jack Caldwell, Wheeling, Ill.

A vote for Lamello plate joiners—Your plate-joiner review (*FWW* #110, pp. 52-57) says the fence is the most important feature of the tool. It must be square and parallel to the base. I agree that the fence is important, but to do accurate work, the fence also must be square and parallel to the cutter and the carriage slide must not have any noticeable vertical play.

The Lamello machines are the only ones I've found with accurate slide movements. Machines by Black & Decker, DeWalt, Bosch, Skil, Sears and Porter-Cable all have sloppy slide movements that would make precision work impossible. The Lamello Top 10 is expensive, but what a pleasure to use! I just completed joining a 4-ft. by 6-ft. cherry tabletop using 11 boards. There was no more than a two- or three-thousandth of an inch mismatch between each board along the length. The top required about 15 minutes of sanding. The Lamello Top 10 also has the cutter precisely centered between the fence and the base. The feature is very useful when doing a variety of case and frame joinery.

—Andrew G. Peterson, Danville, Calif.

The finisher's secret is the climate—The article by Sven Hanson on a two-day oil finish (*FWW* #109, pp. 59-61) sounded too good to be true. I couldn't believe (although I often dream) that anyone could get a great finish in 48 hours.

I looked forward to finding either a se-

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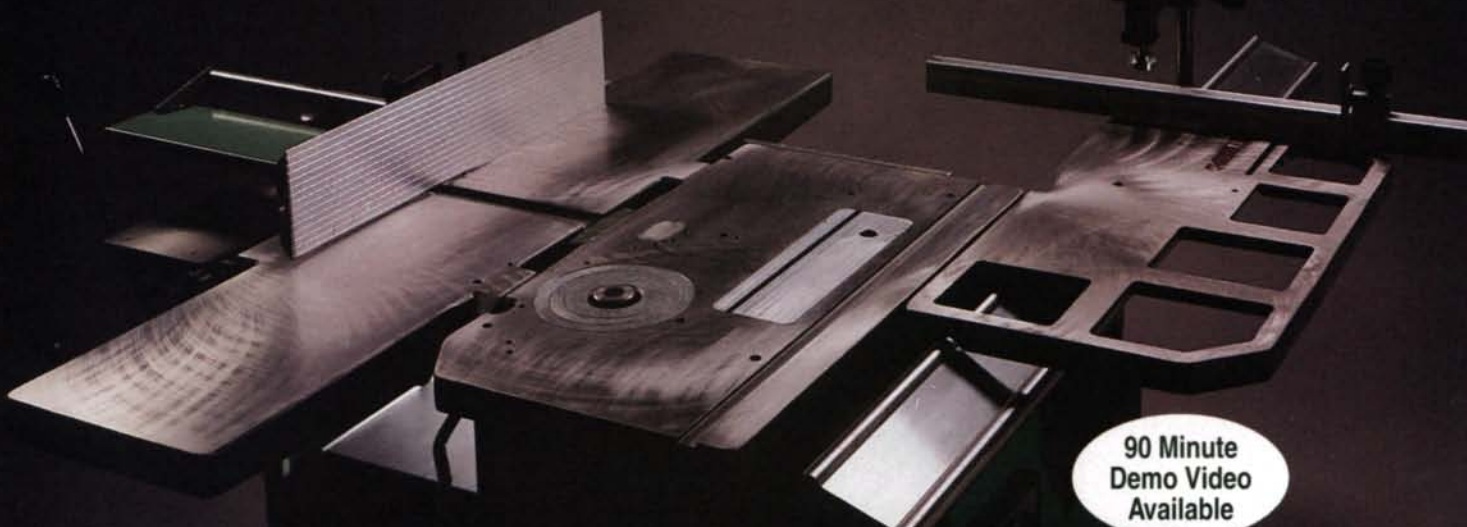
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cret finish or a secret process that would revolutionize the industry.

The secret was hard to find. It wasn't the finish ingredients or the finish process. The secret wasn't in the article itself, but hidden away in the last words of the footnote. The secret is the author's hometown, Albuquerque, N.M., and its hot, dry climate. On future articles, please provide a disclaimer that the information only applies to those fortunate enough to live in Arizona or New Mexico. You should provide the real time it takes to produce a similar finish for those of us working in 95% humidity. Thanks for reminding me where I want to retire to pursue my woodworking hobbies.

—Eugene Holladay, Audubon, Pa.

SVEN HANSON REPLIES: You didn't say precisely what went wrong, but it sounds like low temperature and high humidity slowed the cure of the finish too much. I have two quick and cheap solutions. But first I'll share the one thing I learned in physics class: With every temperature decrease of 10°, the speed of a chemical reaction decreases by approximately half.

Ancient chariot builders used to say "carpe virons," which today's successful woodworker may interpret as "seize the environment." Why stop at providing a roof, walls, windows and doors when, for a few dollars more, you could put in a dehumidifier and some electric heat and do your materials, tools and yourself a favor?

In high-humidity conditions with imperfect ventilation, I prefer electric heat. It doesn't create moisture, and the glowing element is safer than an open flame. Just raising the temperature will reduce the relative humidity of the atmosphere.

For overall warmth a 1,500w portable heater costing less than \$30 can slowly and safely warm your shop. I also use two 500w halogen lamps, which put heat right where I need it. They also work as my point sources of light while I prepare surfaces or apply finish. I think that the broad spectrum of light that they emit, as well as the heat, adds to the speed of the cure.

A footnote to sander article from Bosch

I read with interest the random-orbit sander article by Jim Tolpin (*FWW* #110, p. 112), which clearly describes the benefits of a pad-dampening or pad-braking feature. Mr. Tolpin said Bosch plans to introduce sanders this year with features equivalent to those discussed in the article. In fact, Bosch introduced pad braking to the market in 1990 with model 1370DEVS, and other manufacturers have since added their own versions of this innovation.

The term "soft-start" is generally applied to electronic devices that gradually increase motor rpms when the switch is

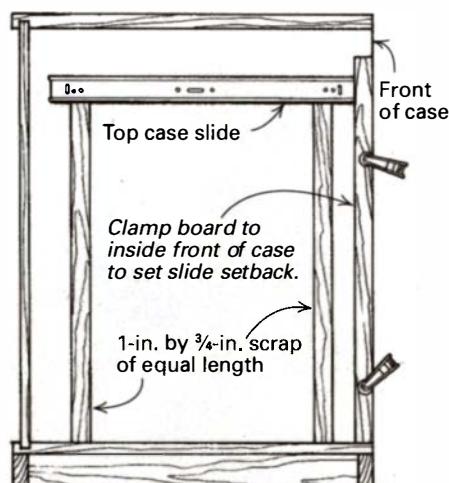
turned on to prevent the jerk of a motor that comes immediately up to full speed. The Bosch 1370DEVS random-orbit sander has this electronic feature as well as a mechanical pad brake for maximum control.

—Chris Carlson, Product Manager,
S-B Power Tool Co., Chicago, Ill.

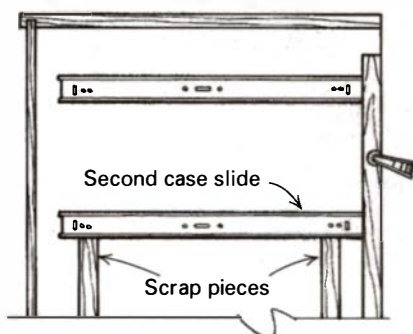
A tip on installing drawer slides—Your drawer-slide article (*FWW* #110, pp. 64-69) was interesting and past due. I've installed many slides in office furniture and workbenches, and I've developed a nearly fool-proof method. Here's how:

I attach slides to the drawer with one screw in the adjusting hole at each end of the drawer. To install the slide on the case, I start by cutting two scraps of wood 1 in. wide and ¾ in. thick so that the highest slide in the case sits on the boards at the correct height (see the drawing below). Both scraps must be exactly the same length. One board supports the front of the slide, the other supports the back. A scrap is clamped to the inside of the case to set the depth of the slide from the front of the case. When one slide is attached, use the same boards to set the slide on the opposite side of the case.

Installing drawer slides



Install first pair of slides on case side, and then cut scrap pieces to right length for the next set.



With the first set of slides in place, determine the height of the next case slides, and cut both boards to the proper length to support them. Repeat the steps, cutting the

boards each time a pair of slides is installed, until the bottom case slides are installed. Make any necessary adjustments on the drawer slides. When everything fits correctly, install the remaining screws in the non-adjusting holes in the drawer slides. This method is simple, easy and accurate. —Robert V. Ratts, Bedford, Texas

Waterloo makes drawer slides, too—

Your article on drawer slides (*FWW* #110) failed to mention that Waterloo Furniture Components is a key manufacturer of precision ball-bearing drawer slides. We've been in the business of manufacturing high-quality drawer slides since the early 1960s and have become a major supplier to office furniture manufacturers throughout North America and around the world. Waterloo drawer slides are distributed from Maulden, S.C., and Chino, Calif., to our distributor network throughout the United States.

—J. Owen Hennessey,
Market Development Manager,
Waterloo Furniture Components,
Kitchener, Ont., Canada

Attaching a mantel the right way—I've just finished reading Mario Rodriguez's fine article on mantels (*FWW* #110, pp. 44-48). I was particularly interested because this is a project I would like to tackle soon.

One thing that Mr. Rodriguez did not mention—whether by oversight or because he assumed the reader would know—was how the finished mantel would be secured to the face of the fireplace. One way is to drill holes into the brickwork, install lead or plastic anchors and then screw the mantel in place. But having never done this before, I would prefer to hear what the experts have to say.

—Carl R. Gebauer, Rockville Centre, N.Y.

MARIO RODRIGUEZ REPLIES: I apologize for leaving out such critical information. Your assumption about using #10 screws and plastic or lead anchors set into the masonry is the correct and accepted technique. The countersunk hole drilled in the mantel can be plugged easily, then sanded.

Often in the 18th century, a thick wooden lintel was set into the brickwork above the fireplace opening (primarily to support the chimney). In addition, wooden blocks were substituted for bricks in the masonry wall at key locations around the opening. These wooden members provided a secure ground for the mantel and other architectural woodwork, such as chair rails and paneling. The finished woodwork was then nailed to the blocks with common cut nails.

Don't varnish a cane seat—Your article on weaving a cane seat (*FWW* #111, pp. 45-47), informative as it is, contains a very

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mistaken piece of advice. It suggests that the cane can be stained or finished with shellac or varnish.

I tried this once years ago. I finished four freshly caned chair seats with spar varnish with the idea that the varnish would make them last longer. I thought the varnish would penetrate and lock the strands together (rather like epoxy saturation). Within a couple of months, all four seats were split and torn and had to be redone because they were so brittle.

Cane, being natural, needs to breathe. It will last for years if it is occasionally sponged with water, particularly in winter.

—John Elliot, Radnor, Pa.

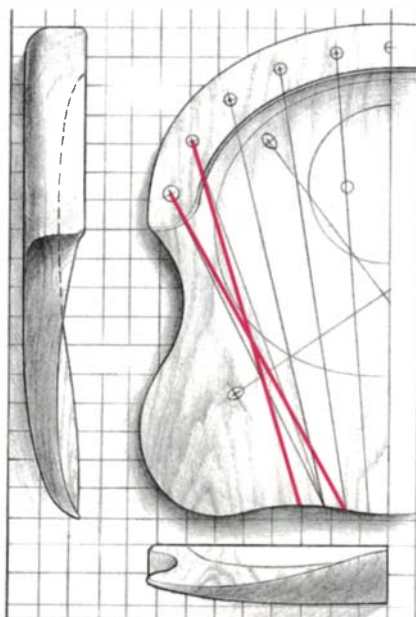
Solving the paint-can problem—An answer to the rust problem in latex paint I cannot give you (see *FWW* #111, p. 4). As to a faulty design for the cans that paints and stains come in, that's different.

As soon as you open a new can, take a 6d or 8d nail and punch three or four holes in the groove where the lid fits. As this groove fills with liquid, it will drain directly back into the can. When you're through painting for the day, a few swipes with your brush around the lid groove will clean out 99% of what's left. When the lid is hammered tightly into place, it won't

splatter over you or your finished projects.

—Desmond C. Gaudet, Warwick, R.I.

Errata—There was an error in one of the drawings that accompanied an article by Harriet Hodges on making a Windsor chair in *FWW* #109, pp. 91-96.



Two of the sight lines you would use to align your bit when boring holes in the

seat were shown incorrectly in the drawing. The correct lines are shown in color on the drawing at left.

Hodges would like to acknowledge Curtis Buchanan, Tennessee Windsor chairmaker, and David Sawyer, a Vermont maker, as the sources of the design for the chair shown in the article.

In the article "Picking a Detail Sander" (*FWW* #111, pp. 52-55), the warranty information on the Ryobi DS1000 and DS2000 models reads "2-year home use." Ryobi says that the warranty should simply read "2 years."

About your safety:

Working wood is inherently dangerous. Using hand or power tools improperly or ignoring standard safety practices can lead to permanent injury or even death. Don't try to perform operations you learn about here (or elsewhere) until you're certain they are safe for you. *If something about an operation doesn't feel right, don't do it.* Look for another way. We want you to enjoy the craft, so please keep safety foremost in your mind whenever you're in the shop.

—Scott Gibson, editor

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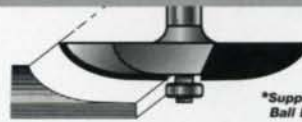
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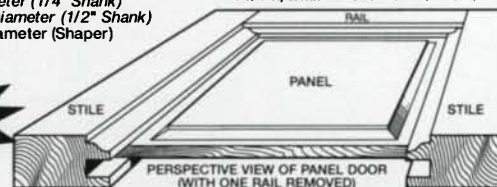
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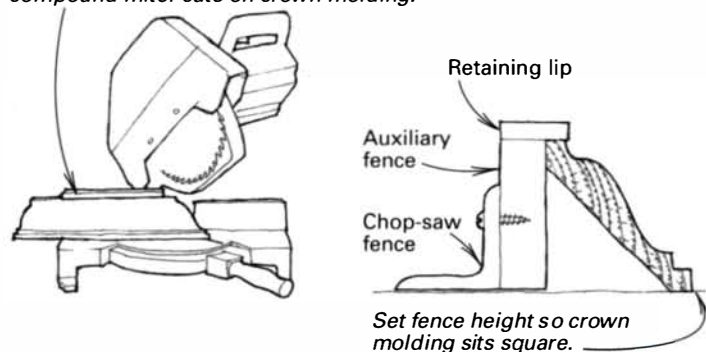
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EDITOR'S NOTE: April's "Methods of Work" column (issue #111, p. 10) shows an incorrect drawing and headline with Klaus Nielsen's method for using a high, lipped fence for cutting crown molding on a chop saw. The drawing actually showed Taylor Fain's laser-pointer cutoff gauge. Here are the corrected methods and drawings:

Saw fence accurately positions crown molding

Auxiliary fence guides accurate compound-miter cuts on crown molding.

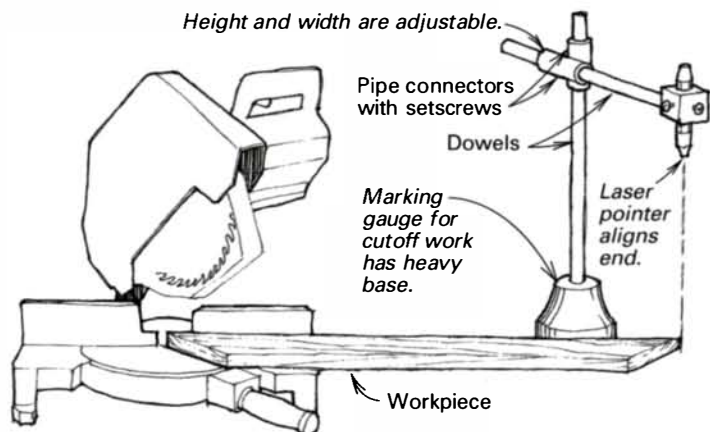


Making tight-fitting, precise joints on crown molding is a time-consuming and fussy task at best. The tall profile of the moldings combined with the low fence height on most chop saws make it nearly impossible to hold the molding in the correct cutting position. To solve this problem, I first added a taller fence to my saw, which helped considerably but did not eliminate the need for strong finger pressure to hold the alignment. Then I cut the fence's height to match the molding's height. This helped some more. But the last step, the addition of a little lip to the top of the fence, made the real difference. Now, light finger pressure suffices because the force from cutting pushes the molding securely into the fixture. I get accurate joints every time.

—Klaus W. Nielsen, Dunwoody, Ga.

Laser pointer makes an accurate cutoff gauge

Height and width are adjustable.



Here's a gadget that lets you set a reference point anywhere in your shop for extremely accurate measuring. This pointer is great for cutoff work when making lots of duplicate pieces. It uses a Radio Shack laser mounted on a homemade stand. Except for the laser pointer, which will set you back about \$50, you can make the rest of the gauge from stuff around the shop.

The spot projected by the laser pointer is about 1/8 in. dia. and remains so over 65 ft. Using the edge of the spot to position a piece, I obtain more than adequate accuracy. To use the gauge for making repetitive cuts, I measure and position the first piece in the saw and make the cut. Then I set up the gauge so that the laser touches the end of the piece. After that, I align each piece so that the tip hits the laser pointer and then I cut.

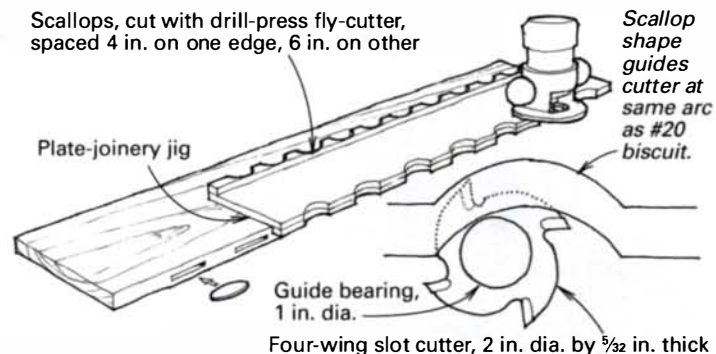
More expensive commercial laser gauges used in the furniture industry are available. But this version, though not cheap, costs much less and works just as well.—Taylor Fain, Clemmons, N.C.

Quick tip: If you're tired of using lung power or keeping a compressor running just to blow sawdust off a cutting line, use a rubber ear syringe. The molded rubber bulbs are about 2 1/2 in. dia. and have pointed nozzles. The syringes are available at most drug stores.

—E.S. Martin, Montrose, Ala.

Plate joinery with a router

Scallops, cut with drill-press fly-cutter, spaced 4 in. on one edge, 6 in. on other



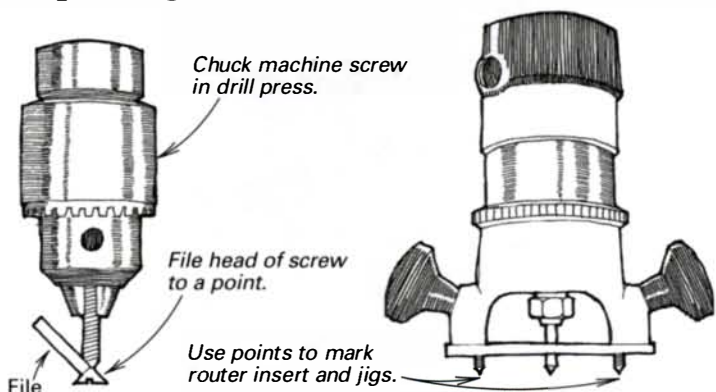
Richard Fryklund's budget-conscious plate-joinery jig (FWW #75, p. 12) inspired the jig shown above. This jig incorporates a series of scallops along both edges of a piece of Baltic-birch plywood to eliminate the tedious clamping and unclamping required when cutting a series of biscuit slots.

To construct the jig, start with a piece of plywood about 10 1/2 in. wide and 42 in. long. Using a fly-cutter in a drill press and a fence, bore a series of equally spaced 3-in.-dia. holes, just touching each edge. I spaced the scallops 4 in. apart on one edge and 6 in. apart on the other to provide a variety of slot spacings. Now glue and clamp 1/4-in. by 1-in. strips of plywood along the diameter of each line of holes on opposing faces of the jig. When the glue has cured, rip equal amounts off each side, leaving 5/8-in.-deep scallops and a fence on the edges. This size scallop, when used with a 2-in.-dia. wing cutter and a 1-in.-dia. guide bushing, will produce an arc that will cut a semicircular slot matching a #20 biscuit size.

To position the jig, line up the centerline of the jig with a centerline scribed on the edge of the workpiece.

—R. Brucken, Martinez, Calif.

Pinpointing router-mount and insert locations



Here's a simple method for marking the drill holes for mounting a router to a jig or router-table insert. For each threaded mounting hole in the router base, purchase a 1 1/2-in.-long machine screw. Install each machine screw in a drill press with the screw head down. Set the drill press to a slow speed, and use the edge of a flat file to remove the head of the screw and create a centered point. Use this same process to make an end mill

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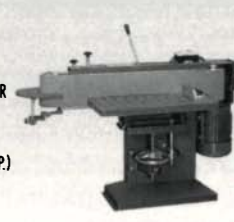
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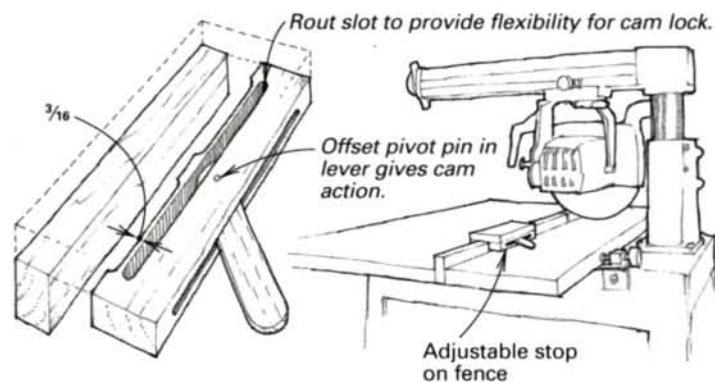
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for the collet using the unthreaded section of a 1/4-in. bolt. Screw in the threaded inserts, points down, and chuck the end mill into the collet, adjusting its height to match that of the threaded inserts. Now carefully place your router on the router-table insert, and press down. The collet and all the threaded inserts will leave a mark pinpointing the exact drill sites.

—Mike Mullin, Manhattan Beach, Calif.

Fence stop locks with a cam lever



When I decided to make a fence stop for my cutoff saw, I remembered Dave Flager's (*FWW* #71). I used Flager's concept, but I revised the cam-locking action to better fit a fence stop.

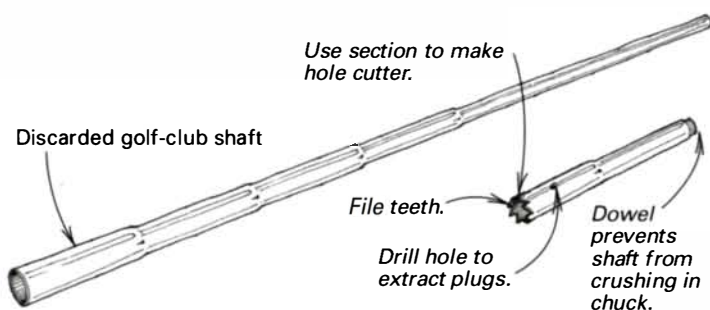
The stop consists of three parts assembled into a U-shape. The only tricky part is the piece that holds the cam. I handsawed the interior edge into a shape with three bearing surfaces, as shown. Then I cut a slot through the piece to give the middle of the stop the flexibility it needs to move away from the cam and lock against the fence. There are several ways to do this. You could plunge your tablesaw blade through the piece. But for safety, it's better to use a router. Leave about 3/16 in. of material. To assemble, clamp all the parts temporarily to the fence and mark positions. Screw the three parts together, and trim any overhang from the front or back. To complete the stop, install the cam. Fine-tune its position while the stop is on the fence. Then, when you have everything right, drill and install the pivot pin. I used a brazing rod for this.

—William A. Baker, Harpswell, Maine

Quick tip: To fit a tanged tool to a handle, drill a hole in the handle, heat the tool and push it into the hole. The tool will burn itself into the hole, making a solid, tight fit. No epoxy is required.

—Bob Dietz, Arroyo Grande, Calif.

Recycling broken golf-club shafts



Frequently, you can find stepped-down-diameter club shafts that have broken off at the head in golf-shop trash bins. These shafts are made from hardened, high-quality steel and can easily be recycled into useful shop tools. For example, to make a punch, just cut a section off the handle with a pipe cutter, and grind a bevel on the outside of the bottom end. Or to make a small-diameter hole saw, file several small teeth around the circumference, and then set alternate teeth with a pair of sharp

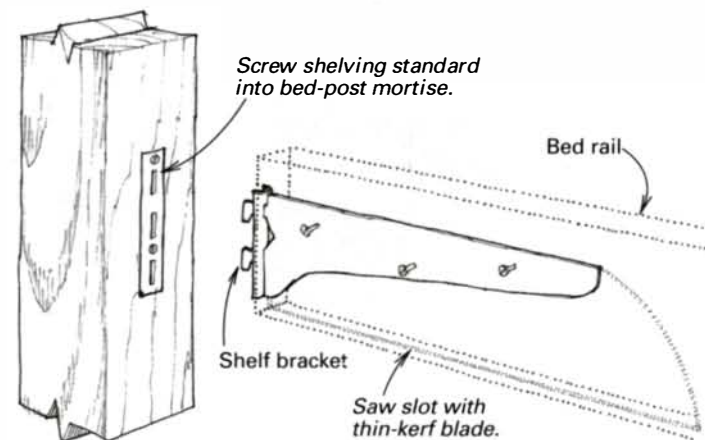
nose pliers. To avoid crushing the thin wall shaft with the drill-press chuck, drive a tapered dowel in the chucked end.

—G. Woody Ferguson, Norcross, Ga.

Quick tip: Protect your work from pipe clamp bruises by attaching scraps of leather to the clamps with spray adhesive. If you don't have an old belt, scraps of shoe sole leather can be obtained at little or no cost by visiting your neighborhood shoe repair store.

—R. Tara, Willow Grove, Pa.

Attaching bed rails with shelf brackets



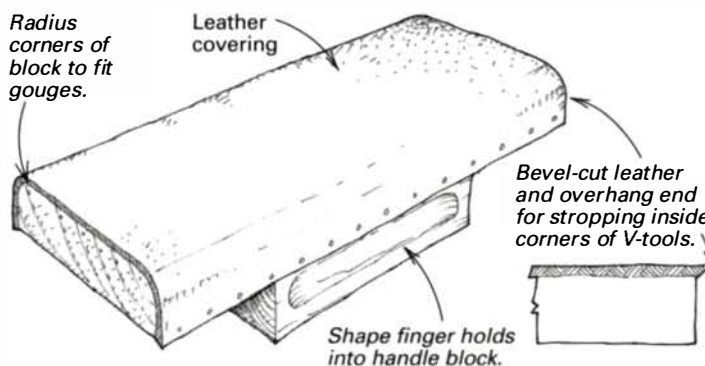
Ready-made bed-rail fasteners are expensive, so I designed this alternative using common shelf brackets. The brackets are designed for cantilevered book loads and aren't very stiff laterally. But, when captured snugly in a bed rail, as shown, they are significantly more rigid. Even so, you should not use this setup for bunk beds. It's really best for situations where you need a knockdown bed frame.

Start by fitting the shelving bracket into a sawkerf in the underside of the end of the bed rail. Most brackets are about the thickness of a thin-kerf sawblade and will fit snugly into the kerf. Align the end of the bracket to the end of the rail, and then pin in place with screws from the inside of the rail. Saw off a short length of the shelving standard (track), and screw it into a shallow mortise routed into the bed post.

The rail draws tightly to the post once the bracket is pushed into position. Because each rail attaches to the end post with two hooks, the bed cannot rock. A light tap on the underside of the rail disassembles the bed, and there are no nuts and bolts to lose during transport.

—Rick Officer, West Brunswick, Victoria, Australia

Strop gives mirror finish to cutting edges



For a really fine cutting edge, tools should be honed on a leather strop. To make one, cut a piece of scrap softwood about 3 1/2 in. by 7 in. Plane a small radius along one side and a larger radius along the other to fit the curve of your gouges. Cut a piece of

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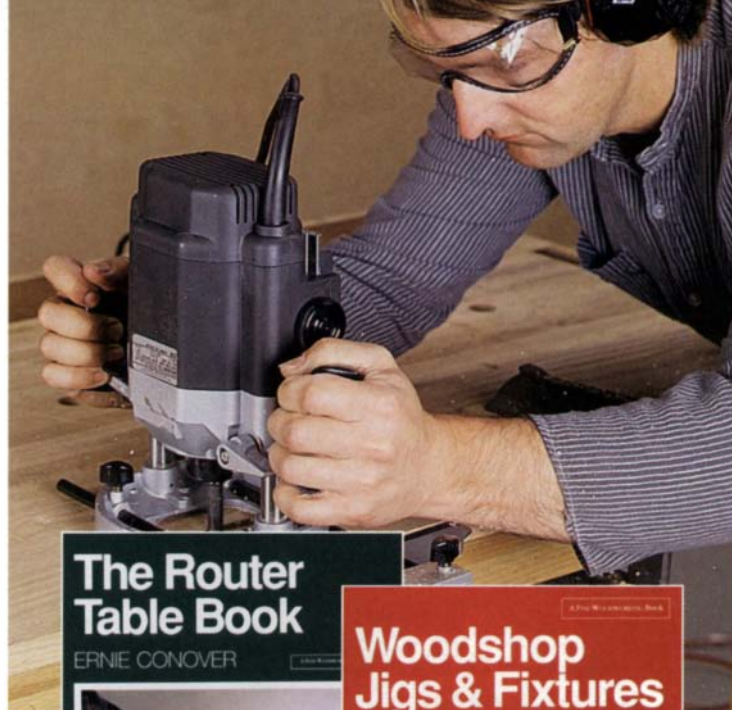
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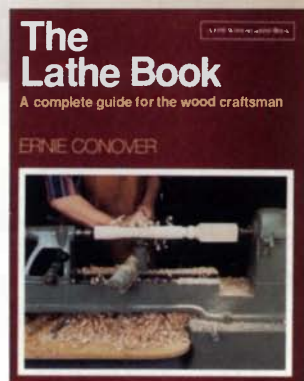
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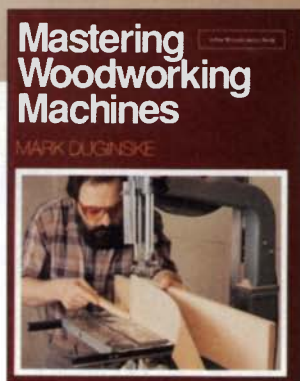
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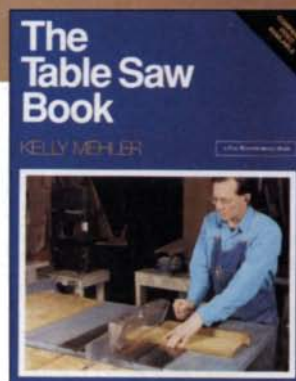
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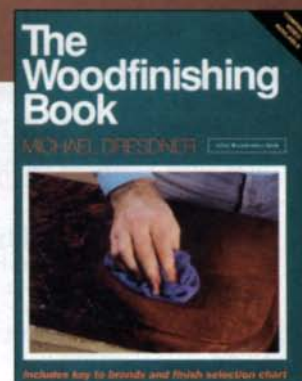
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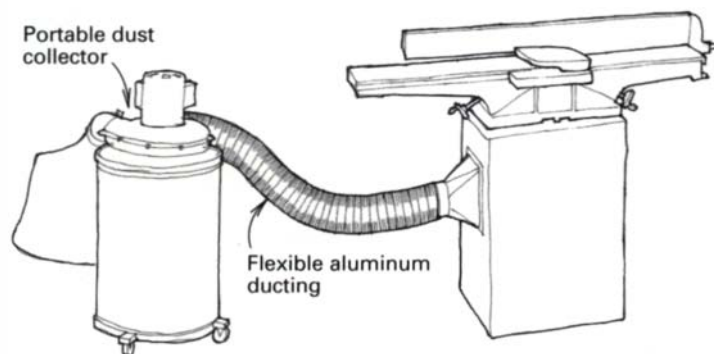
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smooth-surfaced leather to fit around the block with a bit of overhang off the end. Trim one end of the leather to a 45° bevel with a sharp knife. Glue the leather to the block, tack it along the bottom of the edges and attach a handle block to the bottom of the strop. Charge the strop by rubbing aluminum-oxide (fine abrasive) compound or chrome polish into the leather.

To use, always draw the tool's back across the strop, never push forward. Work the inside of gouges on the rounded edges and V-tools on the beveled overhang. The strop will put a mirror finish on your cutting edges, and remove even the smallest wire. Clean the leather with saddle soap every few months, and reapply the abrasive.

—Tom Riley, Baltimore, Md.

Flexible duct solves awkward dust hookups



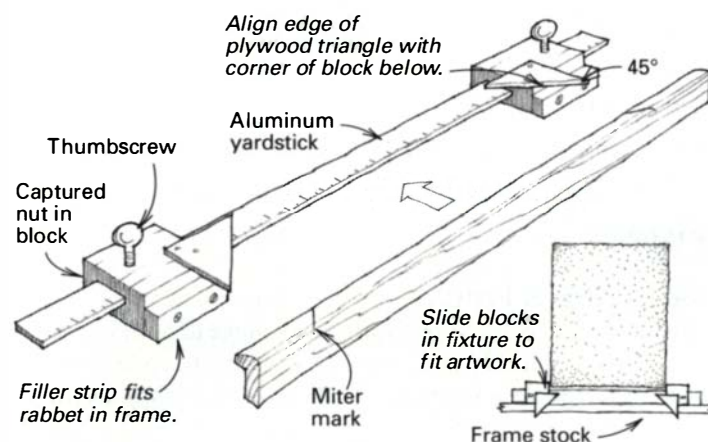
My dust collector is mounted on a dolly, which I roll around the shop, so I can hook it up to whichever machine I'm using. Flexible hose works well in this situation. I use flexible aluminum ducting, made by Dundas Jafine (available through your local

building supply dealer), which is spiral-wound from corrugated aluminum. The ducting comes in diameters from 3 in. to 14 in. Besides being flexible, it is much more durable than plastic film-over-wire drier duct. It also doesn't collapse under suction and is easy to cut to length.

Some flow capacity is lost because of the rough texture of this material, so I wouldn't run duct work for an entire shop from this product. But wherever you have a portable collector or need severe bends, it's ideal.

—Guy Lautard, West Vancouver, B.C., Canada

Picture-frame marking fixture is adjustable



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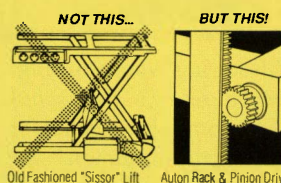
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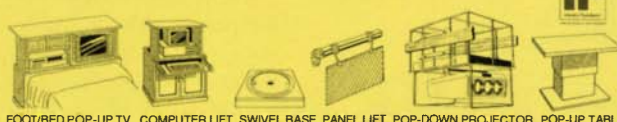
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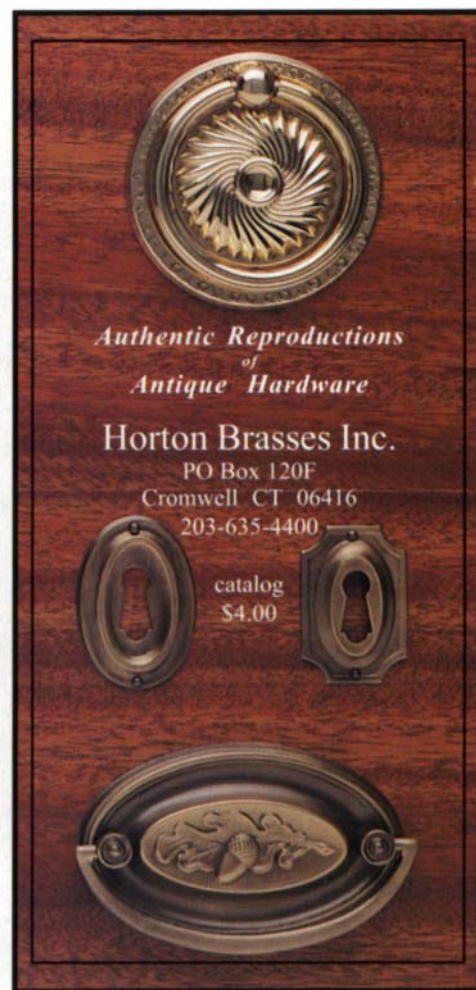
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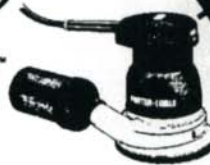
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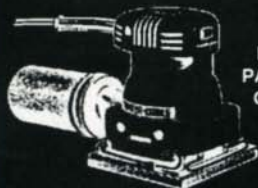
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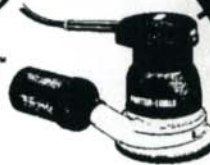
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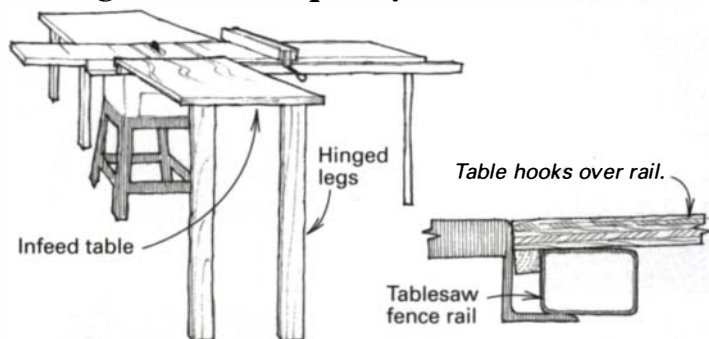
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you're framing, consists of an aluminum yardstick and two shop-built sliding blocks. Each is equipped with a thumbscrew for locking a 45° thin-plywood triangle to mark the miters and a replaceable filler strip cut to fit the rabbet in the frame. It's important to align the edge of the triangle over the corner of the block below for proper registration.

To use, adjust the sliding blocks to touch each edge of the artwork, and lock the blocks into position with the thumbscrews. Place the frame stock in the jig, so the rabbet fits over the filler strip, and adjust the stock position until you have the grain pattern you want. Now mark the miter line on both ends of the frame by scribing against the triangle.

—Warren Bender, Medford, N.Y.

Folding infeed table quickly dismounts from saw

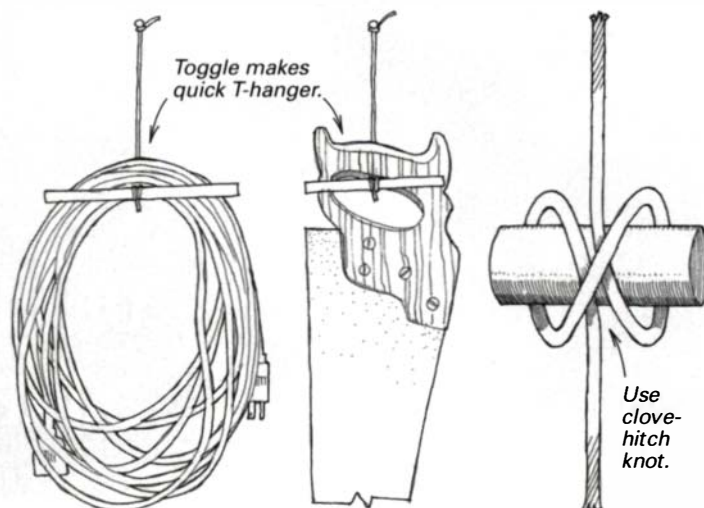


Because I'm older and work alone, I need all the help I can get when feeding big, clumsy sheets of plywood into my tablesaw. But I just don't have room in my cramped shop for another table. So I designed this folding table, about 2 ft. wide and 4 ft.

long, with hinged legs on one end and a ledge on the other end, which hooks over the rip-fence rail. The legs are a little longer than needed for a level table. The slightly upward slant seems to help hold the table in place. When I'm through ripping, I fold up the legs and lean the table against the wall.

—Cliff Nathan, Studio City, Calif.

Hanging tools with a toggle



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Dear Mr. Forrest:

What a pleasure it is to find a product that is even better than expected. I am a long time owner of a **Woodworker I (10"-60T)** which I use with your 4" stabilizer. It has consistently produced **cross cuts on my radial arm saw which look polished** and are far superior than any produced using any other blade I have tried, but it is not good for ripping. When I recently purchased a new Delta 10" Contactor's Saw, I tried it with a couple of premium blades, including a specialized rip blade, as my principal use was ripping 1" oak planks. Although everything checked out, and the blade was sharp, I was not satisfied.

Fortunately, I ran into one of your magazine ads and, despite the price, I purchased a new **Woodworker II (10"x1/8"-40T)** with a 5" stabilizer. The first thing I did when I opened the package was to nick my finger on one of the teeth. **I have never seen a saw blade so sharp!** I immediately had to test the new blade, now wearing gloves for the installation (doesn't take me long to look at a horseshoe).

The first cut was **ripping a three foot piece of 1" thick oak**. I thought that I had mis-set the fence and missed the wood. It was so quiet that I neither **heard** the cut over the machine noise, nor **felt** the resistance as I fed the piece into the blade at normal speed. **The cut edge was flawless** and could have been **edge-glued without jointing**. I then tried a **cross cut** on the same piece. It was every bit **as smooth** as the rip and every bit as quiet and effortless. I have since learned to hear **the whisper of the cutting** and to feel the almost **sensual touch** of the blade slicing through the wood. In over **40 years of making sawdust**, I have never worked with so fine a blade. I have heard all my life that no combination blade could equal both dedicated rip and cross cut blades, but the WW II proves that to be an "old saw," (pun intended).

As soon as I realized what a terrific tool my new WW II was, I immediately sent you the old WW I and the rip blade for re-sharpening. I have been using it for about six years, so maybe it has worn a bit.

Sincerely, Hank Meltzer Richardson, Texas

WOODWORKER I - For TABLE and RADIAL SAW

this trim and crosscut ALL PURPOSE blade gives scratch free POLISHED cuts on all materials RIP or CROSSCUT up to 2".

- All 60T and 3/32" THIN KERT 30 ATB and 5" face hook on 10" dia and under. 12" and 14" are 20 ATB 1/8" K.
- DOUBLE HARDER and 40% STRONGER carbide.
- THIN KERF:
- Saves 1/3 wood loss on each cut, radial or table. Feeds easy when used for moderate rip and crosscut on table saw. Reduces "JUMP IN" greatly for better "PULL CONTROL". Practically eliminates bottom splinter on RADIAL-CROSS CUT.
- Totally stops ALL bottom and top splinter on ply veneers in push-cut mode on RADIAL.
- Our STIFFENER STRONGLY RECOMMENDED AGAINST outside of blade only for best cuts.

Made and serviced in USA for your benefit.

	List	SALE
14" x 60T x 1" 1/8"	\$224	\$159
12" x 60T x 1" or 5/8" 1/8" K	198	139
10" x 60T x 5/8" 3/32" K	162	129
9" x 60T x 5/8" 3/32" K	156	119
8" x 60T x 5/8" 3/32" K	150	109
New 8-1/4" x 60T x 5/8" 3/32" K	150	109
New 7-1/4" x 60T x 5/8" 3/32" K	150	109

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Total Savings \$82 or more! Nine \$5 sharpening coupons supplied with blade or dado. Offer good through June 30, 1995. Must mention FWW mag. to receive coupons and extra bonus.

WOODWORKER II	List	SALE
14" x 40T x 1"	\$215	\$149
14" x 30T x 1"	195	139
12" x 40T x 1"	183	129
12" x 30T x 1"	162	119
10" x 40T x 1/8" or 3/32"	156	119
30T 1/8" or 3/32"	195	99
9" x 40T	146	109
30T	125	99
8-1/4" x 40T 3/32"	136	99
8" x 40T 3/32"	136	99
30T 3/32"	115	89
7-1/4" x 30T 3/32"	112	69
*NEW 6" x 40T 3/32"	136	89

*NEW For Sears & Makita Table Saws **For Saw Boss

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WELL - I WILL BE D----- READ YOUR STATEMENTS ABOUT YOUR BLADES AND ORDERED ONE EACH, WOODWORKER I & II. YOUR BLADES ARE AS ADVERTISED - WHICH IS A PLEASANT CHANGE IN TODAY'S WORLD, SINCE SO MANY CO'S ARE GOING OUT OF BUSINESS THESE DAYS - WILL PLACE THE FOLLOWING ORDER. DO NOT WANT TO BE WITHOUT YOUR BLADES, EVEN THOUGH I AM 71 YEARS OLD. (ORDERED 4 MORE BLADES & 1 STIFFENER).

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DURALINE Hi-AT

Note: Fine Woodworking Editorial Nov./Dec. 1988 No. 73, pg. 65, S.N. recommends high alternating top bevel (ATB) thin kerfs and large blade stiffeners for smoothest cuts on RADIAL SAW, etc.



Jim Forrest, President and designer microscoping cutting edge.

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SPECIAL SALE 10" ONLY \$159

	List	SALE
12" x 80T x 1" 1/8"	212	\$181
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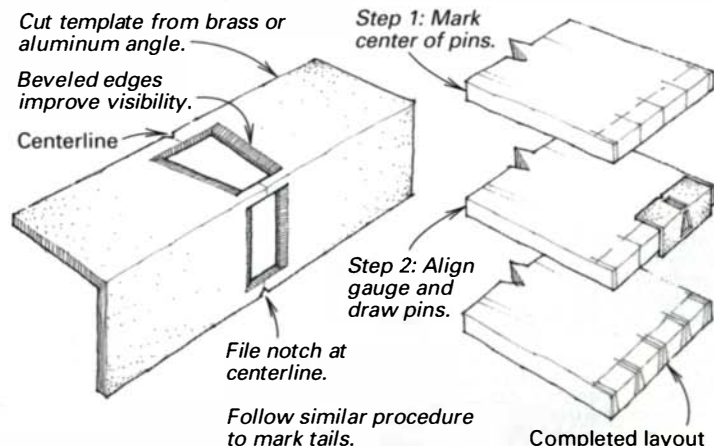
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—Sherwood Schwartz, Palm Harbor, Fla.

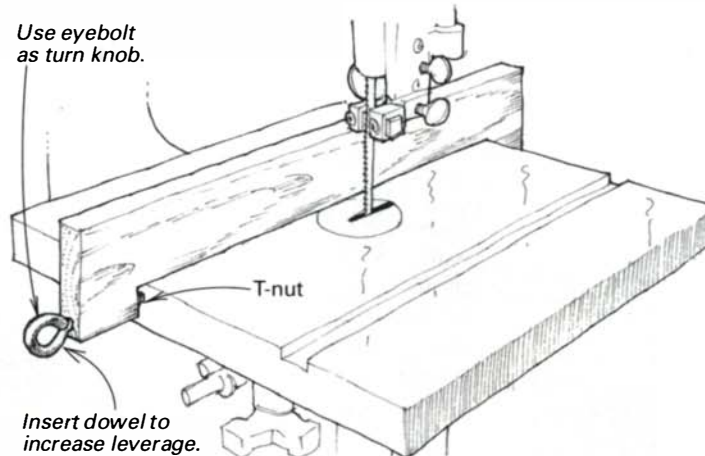
Dovetail marking template



This template simplifies the process of marking dovetails. Start with a 5-in. length of 1½-in. by 1½-in. brass or aluminum angle. Square up the inside corner of the angle with a file. Mark the centerline of the pin, and file two notches, one on each edge. Cut and file two openings, one angled for the pin profile and one straight for the base of the pin. Leave a bridge between the two openings for rigidity. The two openings should be exactly the same width at their base where they touch the bridge.

—Frank Norman, South Perth, Western Australia, Australia

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—Jeff Gyving, Point Arena, Calif.

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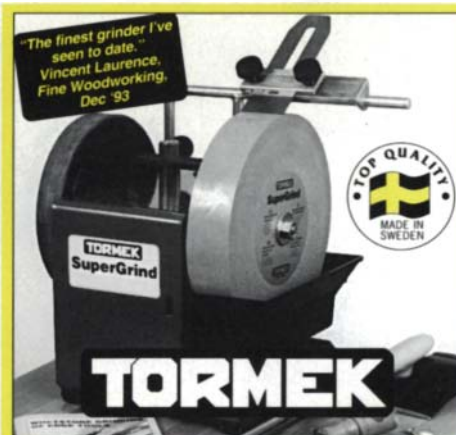
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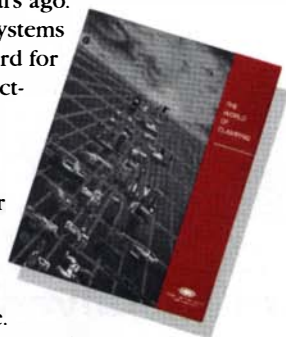
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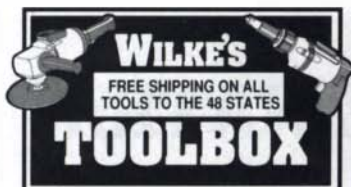
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333	#332 w/dust pick-up, H & L pad	\$ 74.
334	#333 w/ P.S.A. pad	\$ 74.
340	*New* 1/4 Sheet Finish Sander	\$ 53.
447	7 1/4" Saw - 15 amp w/electric brake	\$138.
843	*New* #447 Saw w/blade on left side	\$138.
505	1/2 Sheet Sander	\$120.
550	Pocket Cutter Kit w/steel case	\$183.
556	Plate Joiner Kit, tilt fence, case	\$109.
690	1 1/2 hp Router, 10 amp	\$145.
691	1 1/2 hp D-handle Router - 10 amp	\$158.
695	Router Table w/ 1 1/2 hp motor	\$222
696	Router Table only - no motor	\$128.
5116	16" OMNIJIG® Dovetail Machine	\$261.
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1552	DW615	1 1/4 HP V/S Plunge Router	\$157.
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1264	DW682K	Biscuit Joiner Kit	\$224.
2480	DW705	12" Comp. Miter Saw	\$358.
1085	DW962K-2	9.6V Cordless V/S Kit, 2-batt.	\$179.
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Regluing old joints

What is the best way to reglue wood joints that have been disassembled during refinishing and restoration? If I remove all the old glue from the mortise and tenon, I run the risk of having a sloppy joint when I reassemble it.

—Tony M. Melvin, Tallahassee, Fla.

Jeff Jewitt replies: Animal hide glue was used on furniture built before 1940. The nice feature of this glue is that you do not have to clean out the old glue (assuming that the joint is tight). Animal hide glue re-bonds to itself, meaning that the new glue melts the old glue to form a new, cohesive bond. To check which type of glue was used, put a few drops of hot water on the old glue. If it runs white, it is a polyvinyl acetate (PVA) type of glue and removal of all the old glue is in order. If the glue softens and gets tacky, it is animal hide glue. Also, keep in mind that all furniture may need some type of service in the future, and using hide glue will make life easier for some furniture restorer such as yourself.

I prefer to use hide glue made from dry powder mixed with water and heated in a glue pot or double-boiler. You can use premixed hide glue like Franklin's, but I suggest heating it before application to help melt the old glue.

On furniture that was assembled or repaired with another type of glue, such as PVA, the old glue will have to be cleaned out and fresh wood exposed to ensure good glue penetration. You can use PVA glue on furniture assembled with hide glue, but clean the joint with water and a soft brass brush before applying the PVA glue. If this cleaning results in a sloppy joint, I suggest building up the joint as explained below.

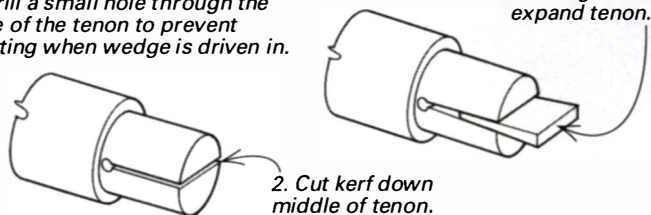
The most critical part to a well-executed joint is good wood-to-wood contact. This element is essential for aqueous wood glues, like hide glue and PVAs, to bond effectively. A joint that fits snugly with moderate pressure to seat it (either by hand or a mallet) is best. A joint that wiggles easily from side to side is too loose, and a joint that needs a sledge hammer to seat it is too tight, which results in a starved glue joint.

To make a mortise-and-tenon joint tight is relatively straightforward on square or rectangular tenons. Build up the tenon cheeks with veneer of the same species oriented in the same grain direction. This should be enough to increase the width of the tenon. If the tenon's too tight, file it down with a rasp.

Wedge enlarges tenon

1. Drill a small hole through the base of the tenon to prevent splitting when wedge is driven in.

3. Wedge will expand tenon.



On round mortise-and-tenon joints, you will need a different approach. You can try one of two techniques. If the joint is really loose, you should build up the mortise. Drill out the old mortise with a Forstner bit, and glue in a plug of the same species oriented in the same grain direction. Drill out the new plug to fit the old tenon. If the tenon is only slightly loose, increase the size of the tenon by cutting it down the middle and wedging it with a piece of wood to expand it, as shown in the drawing above.

Another technique, which Bob Flexner demonstrates in his video *Repairing Furniture* (The Taunton Press, P.O. Box 3506, Newtown, Conn. 06470-5506; 800-888-8286), is to glue and wrap a shaving from a handplane around the tenon to increase the diameter. Do this right before final seating and before the glue fully cures. If the glue saturates the thin shaving, it will prevent a good bond between the mortise and tenon.

[Jeff Jewitt specializes in the conservation and restoration of antique furniture in North Royalton, Ohio]

Spalt your own wood

I enjoy working with abnormal grain patterns, especially spalted woods and burls. How would one initiate these processes, and what conditions would be necessary to further their growth?

—Richard L. Colman Sr., Boscawen, N.H.

Jon Arno replies: Burl, bird's-eye, fiddleback and other grain patterns involving abnormal wood tissue would prove extremely challenging to produce on a grow-your-own basis. In fact, modern science is still not sure what stimulates living trees to produce these figures. But knowing the cause and being able to initiate the process wouldn't change the fact that it takes living trees literally decades to grow usable quantities of woody tissue, normal or otherwise.

But producing spalted wood certainly is an attainable objective. Wood spalts as a result of natural decay when fungi invade the wood and produce pigments as a by-product of their metabolism. Under favorable conditions, this process takes only weeks or, at most, a few months. The key to stimulating wood to spalt rests in providing the fungi with the kind of moist, warm environment in which they thrive. The moisture content (MC) of the wood should be kept at or slightly above 20%. Temperatures in the range of 70° to 80°F are about ideal in coaxing the fungi to reproduce. At MC levels below about 18% or as the temperature approaches freezing, the fungi go dormant, but they will quickly revive as more favorable conditions return.

Keep in mind that it is their natural niche in the cosmos to break down woody tissue through the process of decay. These voracious little microbes are not at all difficult to stimulate. The more taxing challenge is figuring out when to halt the process by seasoning the wood before the fungi decompose it to the point that it is no longer usable. Woods with relatively poor weathering properties, such as maple or ash, are the easiest to spalt, and an added benefit is that the natural light color of these woods causes the spaling to be more pronounced.

Although it offers little opportunity to monitor progress, the simplest procedure is to roll the logs into a shady ravine, cover them with dead leaves and hose down the pile periodically to keep it moist. For better control in processing small quantities, such as carving blocks or turning blanks, moisten and store the wood in plastic bags to allow for occasional inspection.

Fungi spores are so plentiful in the atmosphere that there is no need for inoculation and, unfortunately, no guarantees that the preferred fungi will prevail.

As an experiment, I tried inoculating box elder, *Acer negundo*, with *Fusarium negundo*. I placed a piece of box elder already infected with this fungus in a plastic bag along with freshly cut box elder. This particular fungus has an affinity for box elder and produces beautiful coral pink stains, but I was unable to culture it. The samples did in fact spalt, but the markings were dull gray. I guess, in the final analysis, spaling wood is an achievable objective, but a very chancy one.

[Jon Arno is a wood technologist and consultant in Troy, Mich.]

Adjusting planer cutterheads

I have a Parks planer that appears identical to one shown in a recent article ("Getting Peak Planer Performance" by Robert Vaughan, FWW #107, pp. 72-77). However, as I look at my planer, the cutterhead is not parallel to the planer bed by about .009 in. at one end. Can I adjust the cutterhead, or should I just make up the difference by setting the knife blades parallel to the planer bed?

—Alden C. Noble, Sioux City, Ia.

Robert Vaughan replies: The handwheel that raises and lowers the bed is on a 3/4-in.-dia. shaft that goes through the base of the planer. On this shaft are two miter gears. The miter gear on

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your left when facing the infeed side of the planer is held on with a setscrew. The miter gear on the other side of the shaft is pinned in place, if my memory serves me correctly, and can't be moved. By loosening the setscrew and turning the miter gear, which causes the bed screw to turn, you can adjust the position of the bed.

You may run into a problem turning the miter gear because the setscrew usually dimples the shaft. This is normal, but annoying. I have used a small pipe wrench to turn the gear, putting the jaws on the hub and not on the gear teeth.

There's a little fooling around to this job—you have to go back and forth from one end of the cutterhead to the other with your dial gauge to be sure that things are where you want them. But once done, the adjustment should last.

Setting the knives to compensate for the offset in the planer bed will work, but I don't like to do it that way because of the extra effort required to set the knives. By the way, if you need any parts for your Parks planer, they're available again through the D.C. Morrison Co. (Parks Repair Parts, 201 Johnson St., Covington, Ky. 41011; 606-581-7511).

[Robert Vaughan, a contributing editor to *FWW*, rehabilitates woodworking machinery in Roanoke, Va.]

Finishing an outdoor bench

I have been woodworking for several years. Lately, I have begun to explore the intricate world of wood finishing. I recently built an English garden bench out of pine (yes, I know there are better woods). The bench will be under a porch, but it will still have some sun and water exposure. I do not wish to paint the bench. I was planning to dye it with a water-based dye because of the uniform appearance it provides. But I'm concerned that a water-based dye will fade with exposure to sunlight. I was also going to fill any large defects with putty, but do I need to use a filler? Finally, would spar varnish be a good topcoat?

—Michael S. Niziol, Cortland, N.Y.

Pat O'Daly replies: You have certainly chosen a challenging project for your introduction to finishing! You do not specify what species of pine you used: eastern white, southern or other yellow pine. It is easy to confuse them but each has unique characteristics in terms of finishing. White pine, from your neck of the woods, is an excellent building and furniture wood. It is stable with fine texture, but it has a pretty unremarkable grain. Yellow pines are generally heavier with more resin, or pitch, and more distinct growth rings. Yellow pine, in particular, has distinctive hard and soft growth rings. The hard streaks resist the introduction of stain, and the soft parts suck it up with an embarrassing lack of manners.

The lack of uniform absorption can be controlled somewhat by sealing the softer parts with shellac washes, 50:50 solutions of turpentine and boiled linseed oil or commercial products that go under the name "wood conditioner." But be warned, pine is a difficult wood to stain evenly unless you use a dark color.

When making your stain selection, remember that the first color to consider isn't the stain but the wood. Pine does well with reds and reddish browns. Colors that lean toward the violet hue will help neutralize the natural yellow of pine.

Personally, I am not a fan of water-based anything on exterior furniture. Water-based dyes (I assume you mean anilines) are the least light-sensitive of the anilines. But they aren't bullet-proof. They will fade over time with such direct exposure. And I don't think they are going to give the uniformity you want because of pine's uneven absorption. You don't need to grain-fill pine either. The pores aren't large enough for filling.

Before applying any stain, wash down the surface with naphtha or alcohol to remove as much pitch or resin as possible. Then fill any defects with some proprietary builder's putty. If you can't find the right color, you can add stain to the putty. Like

everything else in finishing, it's an experiment. So check the color on a piece of scrap first. To fill checks or knots, use two-part epoxy and/or casting resin. Again, the epoxy can be colored with artist's oils if need be.

The next step, if you are concerned with the blotch potential of your pine, would be to seal the wood as mentioned previously. Use a thin coat, wipe it on, wipe it off and let it dry overnight in a warm place. Remember, the rags are flammable, so store them in a bucket of water until you can dispose of them properly. After the wood has dried, lightly scuff-sand with 150-grit garnet paper. Then apply an oil-based stain.

Oil-based stains offer a more uniform look because they deposit their color pigments on the surface of the wood as opposed to dyes, which can soak in unevenly. It may be worth considering some of the oil-based stains commercially available for doors and siding. The semitransparent ones let the grain show through and have a variety of colors. These exterior products are designed to let the wood react to extremes of temperature and humidity without cracking or peeling.

If you choose not to go that route, spar varnish is an excellent product that provides a tough surface film. There are also penetrating oil/varnish products. All of these products will degrade over time with exposure to ultraviolet light and water. After a few years, the penetrating oil finishes are easier to renew. Initially, I would apply at least three coats. You will have to experiment the first season or two. Spar varnish, though tougher, tends to darken and peel over time and is harder to remove. So I would recommend starting with the penetrating oil finishes, and if they give you no joy, switch to the spar varnish. It is easier than going the other way around.

[Pat O'Daly is a professional finisher. She operates a furniture and antique restoration business in Sonoma, Calif.]

Harvesting backyard trees

I have 10 black walnut trees that I planted in my yard about 20 years ago. I would like to sell them, but I really don't know how to go about it.

—Robert Clausen, Elmhurst, Ill.

Jon Arno replies: For several reasons, I suspect you are going to have difficulty landing a buyer for your walnut trees. Finding a logger willing to harvest suburban trees is only slightly easier than finding a sawyer willing to mill them into lumber.

Actually, city-grown timber is avoided in the trade and for some very practical reasons. From the logger's perspective, it doesn't pay to truck heavy equipment to the site to harvest only a few logs, not to mention the liability risks involved should the tree accidentally drop through the home owner's roof. Tree removal specialists, of course, avoid this hazard by taking the tree down in chunks, but removing a tree and logging it are two totally different propositions.

Similarly, sawyers don't like to see city-grown logs because they often contain nails or other imbedded metal objects that will destroy expensive blades. Despite assurances from the homeowner that the tree in question has been coddled since it was a sapling, most sawyers simply don't believe it.

Walnut trees, though, can be alluring enough to coax the pros into taking some risk. But the trees in question generally have to be magnificent specimens capable of yielding veneer quality logs. By that I mean logs that are branch-free for at least nine to 10 ft. and upward of 30 in. dia. Walnut logs of this caliber are now so scarce they can be worth thousands of dollars. In fact, there have been recent incidents where prime walnut trees have been rustled by unscrupulous loggers who were unable to convince the owners to part with the trees legitimately.

I don't think you'll have to post a guard. Walnut trees that are only 20 to 30 years old have limited commercial value. Even if your trees have grown with incredible speed and are already as much as 18 to 20 in. dia., they are simply not mature enough.



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[Jon Arno is a wood technologist and consultant in Troy, Mich.]

Jointer tapering table legs

I'm trying to taper a table leg on the jointer. The leg is 1 3/4 in. sq. with a 1/2-in. taper starting about 5 in. from the top of the leg. I realize I could do this on the tablesaw, but I wanted to take advantage of the jointer's smooth cut.

I've researched this in three separate books, and they all give essentially the same technique: First set the depth of cut to about 1/8 in. Next strike a line on the workpiece at the point where the taper is to begin. After starting the motor, position the line directly over the high point of the blade, and let the uncut piece touch the rear table. Then push the piece through.

All the pictures show exactly what I'm looking for in a cut, but my piece has a slight radius at the starting point. Apparently, no matter where I start the cut, I'll end up with this radius. What am I doing wrong? —Glenn Dahl, Hicksville, N.Y.

Chris Becksvoort replies: You can taper a leg on the jointer, but it works better in theory than in practice. You must reposition the outfeed table above its normal position so that the cutterhead is tangent to the stock at the starting point of the taper. This is quite time-consuming because it requires realignment of the outfeed table when you're through. For me, it is simply not worth it. What I do instead is lay out two lines for the taper: the finish line and one about 1/16 in. to 3/32 in. parallel to it on the

waste side. Cut to the waste line either with a bandsaw or table-saw and a taper jig. Then set the jointer to the same depth of cut as the offset in your layout marks, and take one cleanup pass to get rid of the sawmarks.

[Christian Becksvoort builds custom furniture in New Gloucester, Maine, and is a contributing editor to *FWW*.]

The best brush-on finish

I am going to build some kitchen cabinets with 3/4-in.-thick cherry plywood for the carcasses and solid cherry for the doors. What's the best finish for both the plywood and the solid cherry? I don't have spray equipment, so I'll have to brush or use rags to apply the finish. —Edward Jonke, Glen Arm, Md.

Chris Minick replies: Finishing, like life, is full of compromises, and there is no "best" finish for a particular project. "Best" means different things to different people. It depends on your past finishing experiences and your finishing abilities. My article "Choosing a Finish" (*FWW* #104, pp. 85-89) details the method I use to determine the finish for my varied projects. This article will help you narrow in on your own "best" finish.

In your case, I think a solvent-based polyurethane varnish would be appropriate. But don't just open the can and slap the stuff on. Used straight from the can, most oil-based varnishes are too thick to flow and level well on the work. I always thin my varnish to about the consistency of whole milk (actually 13 seconds with a Zahn #3 viscosity cup) before applying it to my project. The thinned varnish will brush on easier, flow nicely and dry flat. Thinned varnish takes more coats to build a substantial film, but I've found that it's easier to brush on a few extra coats than to sand off a thick one that has bumps, ridges and bubbles.

The extended drying time of oil-based varnishes is both a

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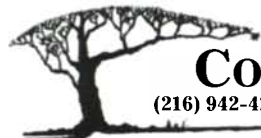
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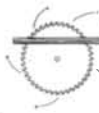


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blessing and a problem. A long drying time allows the finish to level evenly, but it also allows the finish to become more embedded with dust. The drying time can be shortened by adding Japan drier or, better yet, a small amount of cobalt drier to the thinned varnish. Be careful, though. Too much cobalt drier can cause brittle finish films and even slow down the drying process. Follow package instructions, and then test your concoction on scrapwood to be sure. I usually add about 10 drops of artist's cobalt drier (available in art supply stores) to one quart of thinned varnish. This mixture usually dries to the touch in about one hour.

Brush selection plays an important role in how nice the final finish looks. Cheap brushes are hard to use and produce a lousy-looking finish. Expect to pay about \$15 for a high-quality natural bristle brush, which is a good investment. With proper care, a good brush will last a lifetime and improve with age.

It wasn't clear from your letter if you plan to stain your cabinets before finishing. If you do stain, be aware that cherry is a blotch-prone wood. Special precautions must be taken to minimize this problem. My home-brewed pre-stain conditioner works well with oil-based stains. To make the conditioner, mix about 1½ cups of boiled linseed oil in 1 gal. of mineral spirits. Liberally apply this mixture to the raw sanded cherry, and let it soak in for five to 10 minutes, touching up dry spots as they appear. Wipe off the excess, and stain as usual.

Practice on scrapwood until you get the color right. Water-based gel stains like Smooth and Simple wood stain from Clearwater Color Co. (Highland Hardware, 1043 N. Highland Ave., Atlanta, Ga. 30306; 800-241-6748) also minimize the blotchiness of stained cherry. This stain is a good choice when lacquer, shellac or a waterborne topcoat is used on the project.

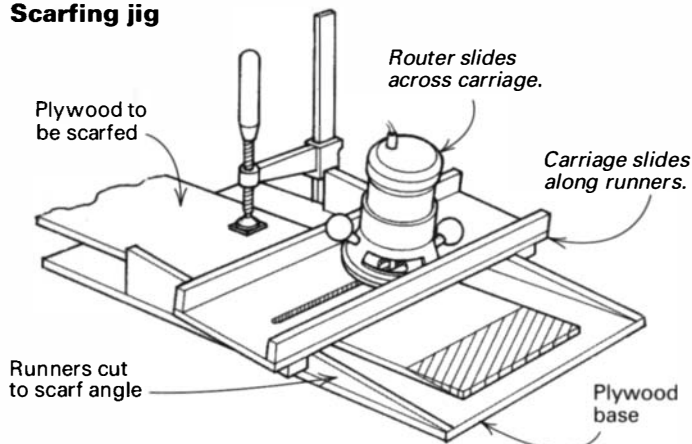
[Chris Minick is a product development chemist and an amateur woodworker in Stillwater, Minn. He is also a contributing editor to *FWW*.]

Routing a scarf joint

Could you suggest a jig or procedure to scarf the edge of ½-in. plywood to make large panels? I'd like to use my router to chamfer the edges at 8° to 12°.—S.J. Hetzel, Safety Harbor, Fla.

Chris Kulczycki replies: When scarfing plywood, an eight-to-one ratio is required if using epoxy glue. So a scarf in ½-in. plywood would be 4 in. long. If you use another type of glue, cut your scarfs at a 12-to-one ratio (6 in. in ½-in. plywood) to be safe.

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to use. It consists of two wedge-shaped runners cut at the same ratio as the scarf ratio required. These are mounted on a piece of 3/4-in. plywood or a workbench. A router fitted with a wide plunge bit rides on a carriage resting on those runners. The plywood to be scarfed is clamped between the runners. By sliding the board along the runners, the router cuts a perfect scarf.

The best discussion of scarfing plywood that I've read is in *The Gougeon Brothers on Boat Construction* (Gougeon Bros., Inc., P.O. Box 908, Bay City, Mich. 48707; 517-684-7286).

[Chris Kulczycki is a boatbuilder and freelance writer living in Arlington, Va.]

Removing water stains from teak

Please give us some advice on how to treat a water stain on teak wood. "Someone" placed a potted plant on top of a very expensive speaker, and it left a significant stain on the wood.

—I. Majer O'Sickey, Homer, N.Y.

Jeff Jewitt replies: The problem you describe is a common one. The cause of the stain is metallic salts in the water (usually iron) that react with chemicals naturally present in the wood to produce a color change in the wood.

Because the damage is to the wood, you need to remove the finish on the top of the speaker to treat the problem. I do not recommend stripping the finish with chemicals because it will be difficult to keep the stripper from dripping over the sides. Most speakers are finished with one or two coats of lacquer, so I find it far easier to sand the finish off. (Please wear a respirator.) Don't use a scraper, you'll chip the veneer at the top of the edge.

When the bare wood is exposed, you can try to remove the stain with oxalic acid (available at most paint stores and in many woodworking mail-order catalogs). Oxalic acid is sold in dry

crystals and must be dissolved in water. I suggest using a saturated solution, which is mixed by dissolving oxalic acid into warm water until no more crystals will dissolve. (Oxalic acid is extremely poisonous, so good woodworking practice dictates wearing gloves, a respirator and safety glasses. And be sure to keep the solution away from kids and pets.)

Brush on enough of this solution (after taping off the rest of the speaker) to wet the wood, and let it sit for several hours. Then apply a second coat, and let the piece sit overnight. The stain should have disappeared or at least lightened. Either way, you must neutralize the oxalic acid, and remove all traces of the crystals. To neutralize the acid, make a mild alkaline solution by dissolving several tablespoons of baking soda or borax into a pint of warm water. Brush the solution on, and remove it with a dry cloth. Do this several times, and then follow up by rinsing the wood with clean distilled water (don't use tap water because it will discolor the wood again).

If the stain is gone or lightened enough for you to live with it, finish the top by brushing or padding on several coats of orange shellac. I find the natural orange color of shellac replaces the color pulled out of the teak by the oxalic acid. If the stain is still there, you have two options: You can re-veneer the top and finish it to match or try "painting" out the stain, using dry pigments and shellac. This technique is difficult and shows up somewhat, so in my shop, we would probably re-veneer it.

[Jeff Jewitt specializes in the conservation and restoration of antique furniture in North Royalton, Ohio]

Have a question you'd like us to consider for the column? Send it to Questions & Answers, Fine Woodworking, PO Box 5506, Newtown, CT 06470-5506.



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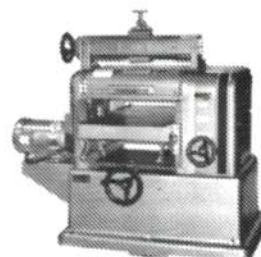
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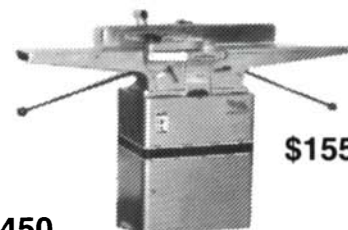
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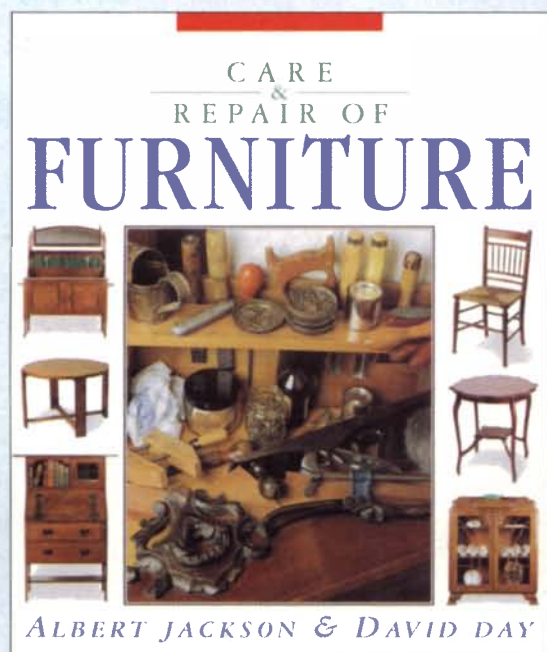
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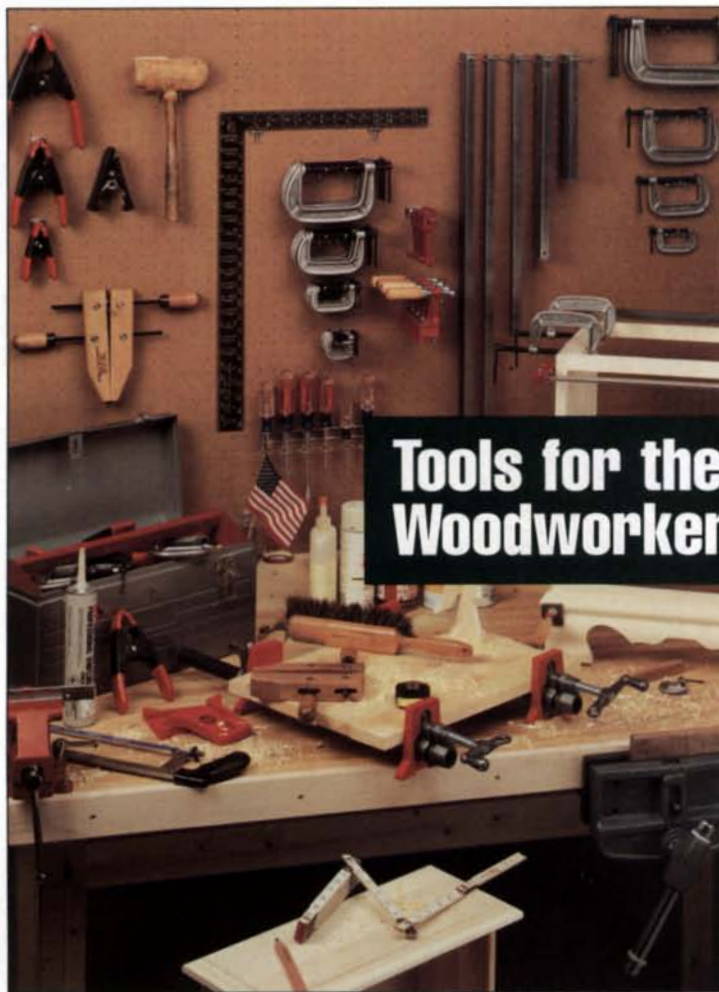
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Four Planes That Earn Their Keep

These quiet hand tools belong in any power workshop

by Sven Hanson



After 20 years of mechanizing and jigifying my woodshop, I have to admit that the four planes shown in the photo above are still my most cost-effective tools. Not all by themselves, mind you. But they work as part of a complementary system that capitalizes on the efficiency of machinery and power tools to do the bulk work quickly and on the versatility of hand tools, especially planes, to do fine detail work. The four planes that I use regularly—smooth plane, jack plane, low-angle block plane and bullnose plane—also happen to be my favorite tools to use, period.

The Stanley Co. refined the designs of their cast-iron planes back in the late 1800s. Stanley-style planes, which are now made by a number of manufacturers, still deliver the goods in 1995. Sure, they take some time to master, but so do power tools. You have to set up planes properly and maintain them (see the story on pp. 42-43), but investing a little time here will raise your work to a higher level. Even better, planes are quiet and don't make any



Handplanes complement power tools. Clockwise from left: a No. 4 for smoothing and flattening, a No. 5 for truing edges, a bullnose chisel plane for cleaning up rabbets and joinery, and a low-angle block plane for chamfering and trimming.

Two versatile workhorses. The author uses a No. 4 smooth plane to flatten and smooth boards. With its sole waxed and skewed to the work, the plane easily removes millmarks from a piece of padauk. To joint edges, he uses the No. 5 jack plane in the background.

dust. The joy of using finely crafted handplanes, woodworkers' mainstays since Roman times, just puts the frosting on the cake.

Integrating planes into everyday shop work

For serious stock preparation, I use a tablesaw, a bandsaw, a planer, a jointer and several routers. Then I turn to my arsenal of planes. I'm not talking about antique, wooden planes here. These are

modern, metal planes, carefully tuned to have flat soles with sharp, well-bedded blades set at the right depth of cut.

The Stanley Co. assigned numbers to their various planes. Bench planes started with a No. 1 (the smallest and least common) and ended with a No. 8 jointer plane, which is the largest. Numbers higher than eight just identify the type of plane and do not indicate size. In everyday shop work, I use a No. 4 smooth plane to level and smooth surfaces, a No. 5 jack plane to joint edges for glue-up and a No. 90 bull-nose plane to clean up rabbets and bevel inside corners.

I also use a low-angle block plane (Stanley No. 60½) as a utility player. It's great for one-handed jobs, like planing end grain, chamfering and truing. And it's great for getting into tight places. I like it for smoothing certain difficult woods, too. Here's the way I use each of the four planes in my normal work:

Use two smooth planes: one for flattening, one for smoothing—I once tried to save six cents per board foot by buying unsurfaced boards and planing them to the right thickness with a scrub plane. After my arms turned to rubber and I was soaked in sweat, I decided to skip the scrub plane. It's much easier to buy surfaced lumber that's already fairly flat and smooth and consistent in dimension, color and grain pattern.

I still use a plane to do a little hogging, though. Once in a while, I use my No. 4 Bailey (a high grade of Stanley) smooth plane fitted with a thick, spare blade that has its edge rounded, like the tip of an adze. (See the box at right to learn more about thicker irons.) I grind and hone this plane iron at the usual 25° to 30° bevel, and by moving the frog and the iron, I adjust the throat (the opening formed by the edge of the blade in the mouth of the sole) so that it's fairly wide.

For general planing, however, I use two planes: a "roughing" smooth plane, which has the throat ⅛ in. open and the cap iron set back ⅙ in. from the edge of the blade, and a "finishing" smooth plane, which has a ⅙ in. or smaller throat and the cap iron set ¼ in. or less back from the blade edge.

When making heavy cuts, like flattening a board, I skew the roughing plane to the grain to make a slicing cut. Because I slightly crown the edge of the blade in this plane, there's less contact with the wood. This, combined with the skew, makes for relatively easy work and minimal tearout.

I find smooth planes especially handy in two common situations. The first is where two pieces of wood intersect—as they do in a door frame. I plane the adjoining surfaces one at a time until they are flush. The other is when I'm taking down high spots to get an even surface. For both of these jobs, I use the finishing smooth plane, fitted with a blade set for a light cut. Because the frog is adjusted for a small throat, it supports the blade edge. Tak-

Buy a thick blade to stop chatter

More than one authority on hand-planes has said that the route to clean planing is paved by a thicker blade. After trying several of them, I have to agree. Even if a thick iron is poorly seated to the frog, the iron's greater thickness reduces vibration and, hence, the stuttering that you often get with a thin blade as it skips across the wood.

Thick blades used to be the norm. Some of the earliest ones were tapered in thickness over their length. Luckily, you can still get thick antique blades, which offer the advantage of laminated construction. Old blade forgers put a layer of very hard but brittle steel on the top of the blade over cheaper, softer and more flexible steel. This yields a heavy blade that holds its edge for a long time.

Hock Handmade Knives offers new, thick replacement blades in a variety of sizes (available from Garrett Wade, 161 Avenue of the Americas, New York, N.Y. 10013; 800-221-2942 or Frog Tool Co., 700 W. Jackson Blvd., Chicago, Ill. 60661; 800-648-1270). You can find thick antique blades at auctions, tool swaps and flea markets.

But antique blades usually need work, such as removing rust pits, flattening the backs and sharpening. Also, you may have to narrow the iron to fit a new plane body or extend the cap-iron screw slot. But boy, can these irons cut and last. —S.H.

ing the time to make these adjustments makes the plane easy to push and produces a smooth finish. The drawing on p. 42 shows what happens when the plane is adjusted correctly.

With the finishing smooth plane, I leave the cutting edge straight, but I round just the corners of the iron so they don't dig in. I skew the plane slightly and use shallow strokes in overlapping passes, which reduces tearout when I have to plane across or against the grain. I use slight pressure at the front of the sole during the start of a cut and shift pressure to the back as I finish. I do this to prevent rounding over the ends of the work. I'm actually lifting the heel and then the toe. To picture this, visualize the board from the side, and work as if you were planing a hollow in the middle by easing up on each end of the cut.

Regardless of which type of smooth plane I'm using, I hold the plane firmly without strangling it by the handles. Your hands can't feel what's happening if you use a death grip. Use a lighter grip, and let your fingers help guide the plane. To plane the edge of a board, wrap your fingers part way around the plane, and touch the sides of the wood. Use your fingers as a fence (see the bottom photo on the facing page). To plane wide surfaces, rest your thumb on one side of the plane and fingers on the other. You can point your forefinger in the direction you're planing. If you aren't getting a good shaving, then expose less blade or sharpen it.

A jack plane with a crowned blade is great for edge-jointing—The jack plane, slightly longer than a smooth plane, probably got its name from either jack-of-all-trades or a mule. From either origin, you get the idea that this tool is a hard worker.

Most furnituremakers take a No. 7 or No. 8 plane to joint edges because they are long (over 20 in.) and heavy. I prefer a No. 5, 14-in.-long jack plane for this task. It takes more trial fitting of the boards, but the jack is easier to handle. You could even substitute a smooth plane for jointing, but it is a bit short. In any case, you'll need a blade profile suited to jointing, not smoothing.

The blade for jointing should be crowned so that the middle of the edge is about .01 in. higher than the corners. I've tried other shapes and found that an iron without a crown wanders like a car without a steering wheel.

There's another reason to crown the blade. To correct the edge of a board that's out of square with a straightedge blade, you have to choose between angling the blade to the sole or tilting the plane to cut down the high side of the edge.

It's hard to tilt the tool freehand such a small amount. Likewise, it's not easy to angle the blade in the plane accurately (I angle it the wrong way half the time). But if you use a crowned blade, you can correct a beveled edge by planing with one side of the iron on the high side of the board. With practice, you can straighten a twisted edge in a pass or two. Once you learn the right body English, you'll

Five steps to tune your plane

A tune-up will improve any plane's performance. Sadly, many new planes need this more than old ones. Manufacturers often machine the sole before the casting is fully cured, which can leave the sole twisted or cupped. Most new planes don't have sharp blades either. Before using a plane, I correct these problems by following an easy, five-step tune-up procedure.

1) Flatten the sole: To check the sole for flatness, I install the blade $\frac{1}{64}$ in. short of the sole and tension the lever cap as if I'm about to plane. Then, with a strong light shining from behind, I drag a straightedge along the sole diagonally while looking along the bottom. Where light is peeking through, I draw lines across the sole with a permanent marker. Then I hold the sole to the platen of my 6x48 stationary belt sander. I use a worn 120- or 150-grit belt. If you don't have a stationary sander, you can make a fixture for a portable belt sander (see the photo at left on the facing page).

After less than a minute of steady pressure, I check my progress. The disappearing lines tell me how I'm doing. I make sure that, at the least, the area just in front of the throat is flat. By installing an ultra-fine belt, you can polish the sole.

2) Sharpen the blade: To sharpen my irons, I mount an old 150- or 180-grit aluminum oxide belt to my sander. Using a protractor, I check the blade's existing bevel for its proximity to 25°, so I know whether to adjust the angle when sanding. Don't worry about being exact. Sharpness is far more important than a bevel at exactly 25°. I darken the bevel with a marker and draw cross lines using a square on the blade's back, behind the edge. Now I can see where I'm working and which way to tilt the blade. While I'm set up, I bring out all my plane irons and sharpen them too.

After flattening the back of the iron and

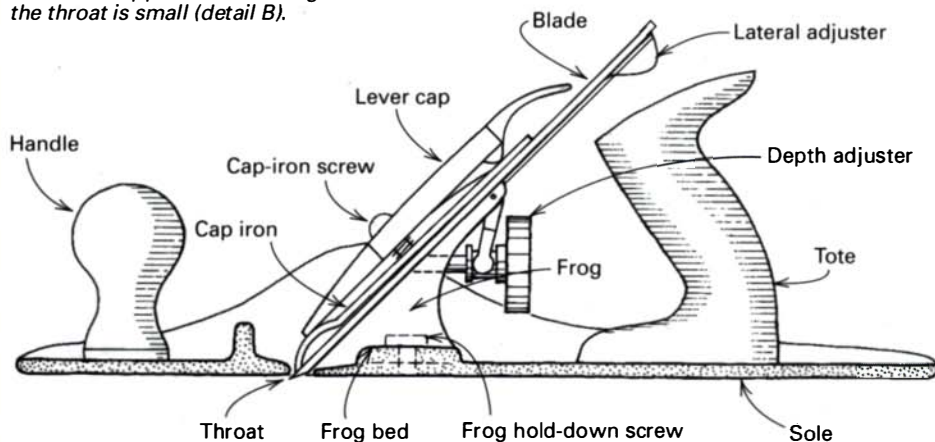
be getting joints that close as tightly as the doors to Scrooge's vault.

Other than having a crowned blade for jointing and a relatively open throat, I set the rest of my jack plane just like a finishing smooth plane. That is, the blade has a razor edge, the sole is flat and the frog is seated firmly in the sole. It's also important that the leading edge of the cap iron mate tightly to the flat side of the blade (see the story above).

To joint a pair of boards for glue-up, I first run the mating edges over the power jointer. This usually leaves a bit of snipe on the end. Next I clamp one board into the bench vise and balance the second on top to see how the two butt. I look for areas of no contact and mark high spots on the sides. Lifting the top board off, I draw pencil lines across the edge of the bottom board every inch

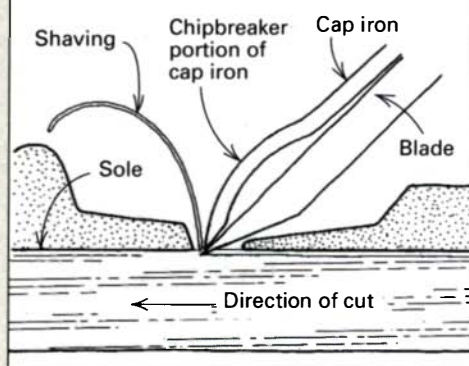
Bench-plane adjustments

A cutaway view of a Bailey-style smoothing plane shows what the cap iron does (detail A) and what happens to a shaving when the throat is small (detail B).



Detail A: Cap-iron function

With the cap iron set close to the tip of the blade, you can take a fine cut without tearout. The chipbreaker forces the shaving to curl, not tear out.

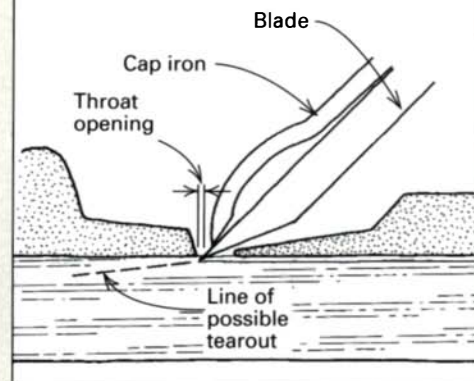


dressing the bevel, I grind both surfaces on a soft Arkansas stone that's lubricated with Neatsfoot or glove oil, which I get at a local Kmart or sporting-goods store. I can go directly to this step if I haven't let the blade get too dull.

To find the proper angle (see the center photo on the facing page), I touch the thick part of the bevel and then tilt the blade for-

Detail B: Planing with a small throat

Down pressure of throat's leading edge keeps wood from lifting and splitting out.



ward until oil squishes out from under the tip. I usually tilt up a bit more (about 5°) to create a microbevel. You'll hear a slightly higher pitch as you reach the tip. Following the Arkansas stone, I use a black oilstone. Alternating between the back and the bevel on the last strokes eliminates any wire edge.

An optional last step is honing. I rig up a fixture to hold my electric drill (see the

or so. The idea isn't to plane off the pencil lines, but to use them as indicators. I plane the high areas and leave the low ones. The disappearing marks let me know where and how deeply I'm cutting and whether the blade is sitting level.

A block plane is a great multipurpose tool—Block planes are little gems. If I were stranded on a desert island and could only own one plane, I'd have a block plane. They've been around a long time but were dormant in many tool chests for years—until British Arts-and-Crafts woodworkers reintroduced exposed joinery in furniture at the turn of the 20th century. Block planes are ideal for trimming the end grain of through-tenons and dovetails. A block plane's absence of a cap iron and its easy-to-remove lever



Belt sander dresses plane parts. A simple fixture allows Hanson to clamp his belt sander on its side with the trigger on. He trues up the leading edge of a cap iron, so it mates tightly to the blade, preventing shavings from clogging the tool.



To touch up blade edges quickly, Hanson uses oilstones lubricated with Neats-foot oil. Without losing much planing time, he can dress an edge before it gets dull. He uses a soft Arkansas stone and then a black oilstone for a surgical edge.



Power drill makes a portable honer—By clamping his electric drill to a worktable and chucking in a polishing wheel, Hanson creates a makeshift honing station. Used like a buffing wheel, the setup works well in the shop or at a job site.

photo at right). Holding the bevel of the blade to a polishing wheel, I make sure I'm at the correct angle. While honing, I apply buffing compound to the wheel occasionally and cool the blade with water from a spray bottle.

3) Seat the blade: Plane chatter usually is caused by poorly machined areas in the frog bed or gunk between the bed and the blade. On better planes, I unscrew and lift out the adjustable frog. If cleaning the bed doesn't seat the blade, then I grind the bed flat, like the sole. Other styles of planes are trickier. I have to reach inside with a bastard file and flatten the whole bed without rounding it at the back of the throat.

With the first three tune-up steps done, a plane can cut smoothly with the grain. But because I'm planing against the grain half the time, I usually take the tune-up two steps further to reduce tearout.

4) Dress the cap iron: A cap iron has a sinuous-looking chipbreaker that acts like a speed bump to prevent shavings from shooting up the ramp as the blade is shearing off wood. The leading edge of the cap iron should contact the flat side of the blade tightly to prevent shavings from getting clogged between the two. To dress the cap-iron edge (I undercut it a bit), I use a file and my belt sander (see the photo at left). I polish the chipbreaker, so the shavings will glide over it. And I ease the front of the lever cap with a file, so there's not an abrupt junction between it and the top of the cap iron.

5) Adjust the throat: On a bench plane, the front of the throat holds the shaving down and forces it around a sharp bend. The smaller the throat opening, the tighter the turn and the better the resistance to tearout. With a small throat, about the worst you will get is shallow, misdemeanor

damage instead of felony tearout.

On a block plane with an adjustable throat plate, I decrease the throat to the smallest opening that won't choke on chips. For bench planes, I experiment with moving the frog and setting the blade depth. The blade isn't supported as well when you move it away from the back of the throat. Because of this, thin blades often chatter. I fix that by using a thick blade. I can usually guess the right combination of adjustments to get a small throat. However, because I've reduced the depth of cut, I've incurred a multi-stroke penalty, meaning that the job will take longer to finish. That's why I set up a second smoothing plane with a larger throat for rougher work.

To reduce plane-to-wood friction, I wax the sole with a candle. When you're prepping wood for glue-up or finishing, though, clean off the wax with mineral spirits before you make the last few passes. —S.H.

cap make it the fastest plane to sharpen and put back into service. That makes it a good choice any time you think you might nick the blade on an embedded nail or gum up the blade with old paint.

A block plane's blade sits upside down in the plane—at a 20° slope in a standard block plane or a 12½° angle in a low-angle block plane. With the blade inverted, there's no place to fit a cap iron. To control tearout, you need to adjust the cutter depth and throat opening carefully and recheck it often. The better models have adjustable throats. Changing the direction of your strokes and the amount that you skew the tool also improves the cut.

Block planes work well as one-handed tools. When a workpiece needs a quick swipe and I can steady it with one hand and plane with the other, I use a block plane (see the top photo on p. 44). I

like the low-angle variety best because it cuts plywood, fiberboard, plastics and laminates cleaner than other planes. Freshly sharpened, a block plane can trim projecting plugs and tenons without fracturing the wood fibers below the surface. Block planes also can chamfer crisply (see the center photo on p. 44).

A bullnose plane refines joinery and gets into corners—

Once you're hooked on the first three planes, you'll soon add a bullnose plane, which is actually a shoulder plane with a short, stout nose. Because the body of this plane is square, it does a great job on tenon shoulders and cheeks, and in dadoes and rabbets (see the bottom photo on p. 44).

I prefer Stanley and Record models because they are a combi-

nation shoulder and chisel plane. You can buy other bullnose planes for around \$20, but they lack a removable front piece to make it easier to work in tight quarters, and they don't have a screw for adjusting blade depth for making ultra-fine cuts.

Like a block plane, a bullnose plane has its blade bevel-side up. But unlike a block plane, a bullnose plane is very demanding to set right. More than any other plane I own, the bullnose has to be adjusted carefully to coax out its peak performance. I hone the straight bevel of the blade razor sharp with perfectly square corners. The cutting edge and the sides of the blade must align with (or be just a hair over) the bottom and sides of the plane. Other-

wise, you'll get stepped cuts that will slowly drive you out of a corner and out of square. I grind about a 10° bevel on each side of the blade.

Bullnose planes are great for several things: truing up the rabbets in a carcass to receive the back of the cabinet, beveling an edge near an adjacent surface, trimming corners in mitered frames or shaving down fat tenons. Further, you can widen a rabbet or dado by extending the blade past the side of the body to scrape the sidewall lightly. Last, but not least, with the front shoe removed, you can plane right up to a corner or joint. It's like using a chisel in a steady jig. This is helpful for things like cleaning up the rabbet for the glass in a mirror frame (see the bottom photo).

A block plane is a handy trimming tool. Conveniently held in one hand, a block plane can pare the end grain of a stile in a frame and true up hard-to-get-at places.



Chamfer adds a finished look to pieces (below). With a block plane, you can relieve edges and corners to make them easier on the hands and on the eyes. Here, the author chamfers a cypress door frame.



A bullnose chisel plane cuts into a corner (right). After routing rabbets in a padauk mirror frame, the author uses a Record bullnose plane to clean up the rabbets inside the mitered corners. With the nose removed, it works just like a chisel.



Other handplanes worth honorable mention

Besides the four planes mentioned, I have another standby plane in my trusty collection: a Stanley Multiplane. Though I use it less often, it's handy for shaping moldings that router bits can't duplicate and getting into places that bits can't reach. Because a Multiplane (a No. 45 or the less-common No. 55) has a fence and rides on rails instead of a continuous sole, it is more involved to use than other planes.

It's also worth mentioning rabbet and dado planes, which do what their names suggest. Rabbet planes can have one or both sides of the blade flush to its sides, and, like a Multiplane, a rabbet plane comes with a fence and a depth gauge. By making their own paths, dado planes can work below a surface to plow a groove or dado. Good rabbet and dado planes are expensive. But because they do their jobs so well, it's worth hunting around for them at flea markets. □

Sven Hanson is a woodworker and professional carpenter in Albuquerque, N.M.

Further reading

The Antique Tool Collector's Guide to Value, Ronald S. Barlow, Windmill Publishing, El Cajon, CA 92020

Plane Basics, Sam Allen, Sterling Publishing Co., 387 Park Avenue S., New York, NY 10016-8810

FWW #14, #65 and #99 (tuning bench planes)

FWW #35, #98 and #99 (choosing and using bench planes)

FWW #39, #54 and #105 (block planes)

FWW #67 and #76 (shoulder and rabbet planes)

FWW #29, #61 and #81 (sharpening blades)



Pattern cutting is a shaper's strong suit—To pattern-shape small parts, the author uses jigs with handles and clamps. Pattern cutting is one of four jobs where the author says a shaper outperforms a router and router table.

Jobs a Shaper Does Best

Power and stability mean vibration-free cuts

by Lon Schleining

I'm convinced that a shaper—more than a router table—should find a home in every active woodshop. Sure, the shaper is well-suited for heavy work, like forming deep contours and complex profiles. In fact, I use the machine daily to make custom hand rails, balusters and other stair parts. But even straight moldings and ordinary light shaping (tasks normally delegated to a router table) can be handled safely and easily by the shaper, and with better results.

I use the shaper for four jobs: running straight molding, raising panels, pattern

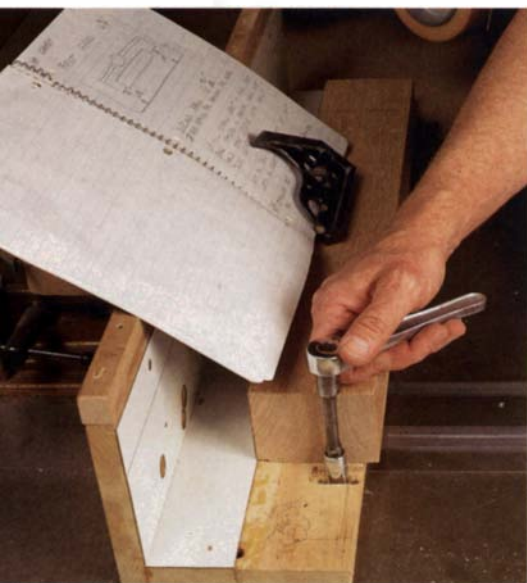
cutting (see the photo above) and doing radius work. Each job requires different tooling and setup. When the machine is molding, for example, you'd hardly recognize it as the same machine that raises panels. Spending time setting up each cut makes the shaper dependable and a pleasure to use.

I've gained confidence with the shaper because I do what it takes to make the machine safe (see the story on p. 47). I haven't skimped on tooling, accessories or jigs. And having an assortment of cutters, guards, jigs and a power feeder lets me

shape items that I would otherwise have to buy from a millwork shop. Jigs, in particular, are great for holding and guiding small or awkward pieces (see the box on p. 48).

Shaper anatomy: more solid than a router table

I've tried to do stairbuilding work using a heavy-duty router, but in the middle of a deep profile, I discovered that the router was straining to make the cut. It made me nervous routing with a 2½-in.-dia. bit that weighed several ounces. So I bought a shaper. When I put the same bit in the new



Tunnel-shaped jig is better than a standard fence for straight molding work. Lined with plastic laminate to minimize friction, the jig guides the work smoothly because there is only a few thousandths of an inch clearance. The author's checklist is in the background.

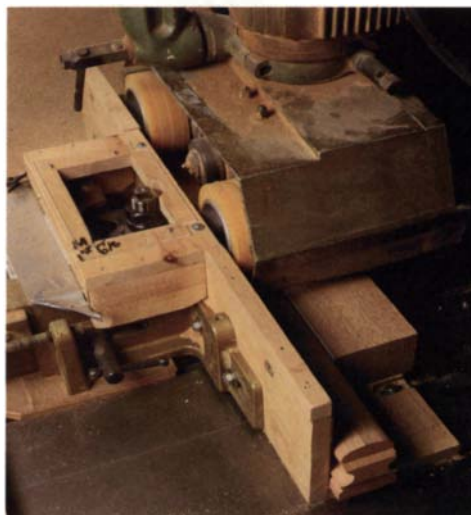
Power feeder improves straight molding—The author relies on a power feeder to run straight molding and hand rails. The feeder makes safe, even cuts. A Plexiglas guard over the cutter lets him see that the chips are being cleared out.

machine, the cut was effortless, vibration-free and just felt a lot safer. A big bit for a router turned out to be a small bit for a shaper. I still use a router from time to time, but the shaper is my tool of choice whenever possible.

Driven by a belt and dampened by lots of cast iron, a shaper just coasts through most lumber. Like a router table, a shaper has a cutter sticking up through a hole in a worktable. And many of a shaper's setups will be familiar to you if you've used a router table. But that's where the similarities end. A shaper is more solid and more powerful than a router table. Though a shaper turns at less than half a router's speed, the shaper produces a superb cut



Two ways to hold shaper cutters—The spindle with collet (left) holds standard 1/2-in.-shank router bits; the 1-in.-dia. spindle with nut holds stacked wing cutters. The carbide-tipped router bits and two-piece cutter were custom made.



because there is less vibration. There are two reasons for this. First, most shapers weigh almost as much as a cabinet-model tablesaw (about 450 lbs.). Second, in most shapers, the cutter is fixed to a 1-in.- or 1 1/4-in.-dia. spindle, which is much more rigid than a 1/2-in.-dia. router bit shank.

Unlike a router table, where a router is inverted, the shaper is designed to be used with the cutter sticking up. In a router table, the motor sits directly below the cutter where lots of dust goes.

In a shaper, the motor is off to the side. Both my router and shaper are rated at 3 hp, but the router motor will develop the rated horsepower only in a theoretical scenario where power is measured in terms

of wattage; the shaper delivers 3 hp at continuous speed and torque.

A shaper's spindle bearings, which are separate from the motor, are much larger than a router's, so the shaper will feel much more solid and stable. Another plus with the shaper is that the cutter rotation can be reversed, so cutters may be inverted in certain situations (I'll tell you more about that later). Also, with a shaper, you can move the spindle up and down with a handwheel and then lock the setting. This makes tiny height adjustments easy and precise—something that's difficult to do with a router table.

Accessories and tooling increase a shaper's capabilities

My Powermatic shaper has a single-phase 220v motor and two speeds: 7,000 and 10,000 rpm. The machine's 30-in.-wide table is thick enough that I can drill and tap holes in it to mount jigs and a power feeder. The shaper came with an adjustable fence with a dust port. The fence is split, so the outfeed and infeed sides can be offset, like a jointer's tables. This is essential when you're removing the entire edge of your material.

I rarely use the fence alone because I like to bolt on an auxiliary fence for most operations. The machine also came with a miter gauge that runs in a slot, like a table-saw's, but I never use the miter gauge because I prefer using a fence.

My shaper has three spindles: a solid 1-in. spindle and stub spindles, 1/2 in. and 3/4 in. dia. I use the 1-in. spindle for heavier work, the 3/4-in. spindle for smaller cutters and rarely, if ever, the 1/2-in. spindle. Wing cutters (with either three or four wings) or safety cutters (also called antikickback cutters) will slide over the spindle. I also can stack a combination of these cutters, spacers (collars) and shims to produce complex profiles. (For more on this, see *FWW* #69, pp. 51-53.) A keyed washer and a locknut hold the cutters on the spindle.

Changing cutters is more involved on a shaper than a router, but you can buy a collet for the shaper (see the top right photo on this page), which lets you run 1/2-in.-shank router bits that interchange readily. Despite the shaper's slower speed, I've found that router bits run fine. You also can use cutterhead tooling, or insert tooling, in a shaper, where the knives are locked in the head by a setscrew, an alignment pin or a V-groove. With cutterhead tooling, you can replace and swap knives, and you can grind a blank to make a custom profile. For my work, however, I'm only comfortable shaping with wing cut-

With a shaper, safety comes first

Not far from my shop there is a cabinetmaker who wears an oak apron when he's shaping. Even experienced woodworkers are edgy around shapers. But being cautious is wise. A hard thing to learn is taking enough time to be safe. When shaping, I put safety before speed and before cost.

Double-check the tooling:

The biggest fear with a shaper is thrown cutters. I spoke with a guy who had to duck behind his tablesaw when the piece he was shaping kicked a knife loose. As it enlarged the hole in the shaper's top, he said it sounded like a 747 coming in on its belly. Fearing a fire from all the sparks, he slithered back over to the machine to turn it off. From that story, I've learned to do three things to minimize the risk of loose tooling. First, I don't use slip knives. I use only wing cutters, safety cutters or router bits. Second, I recheck the tightness of every cutter I install. Third, and most important, I take light cuts while feeding the stock slowly.

Modifications add a safety net:

I added some extra safety features to the machine when it came out of the crate. I added a cord with a plug and did not wire the machine di-



A kill switch offers security, so the author built this foot-controlled off switch. He also keeps the spindle-reversing switch taped, so he doesn't change the cutter rotation inadvertently.

rectly to a circuit. I keep my shaper unplugged, except when I'm running it. When I'm changing cutters or have my hands in the shaper's innards, I drape the disconnected cord where I can see it.

I made a foot-operated kill switch, which is a hinged paddle that contacts the off button (see the photo above). I can hit the paddle while keeping both hands in position,

my body upright and my eyes on the cutter. Another improvement was tensioning the shaper's belt, so it will slip if a workpiece gets jammed.

Use the right setups and

stay focused: Making the job comfortable is one shaper-safety item that's frequently overlooked. Besides wearing eye and ear protection, I make sure I have good foot-

ing. I collect old rubber door mats to use as non-skid pads.

I always pick the appropriate spindle speed for the cutter diameter (large cutters require slower rpms). Where possible, I shroud the cutter with a guard or a power feeder. If I'm using the fence, I keep the gap in it as small as practical, and I use a table-insert ring sized to the cutter.

When shaping, I keep my hands well out of the cutter's reach. Because I always use either a jig or a starting pin, I am never free-handing work into the cutter. When feeding stock, I shape end grain first. I work against the cutter rotation (unless I'm climb-cutting with a feeder), and I stay out of the line of a kickback. I do not shape stock that has knots or pieces that are too short or too thin.

During shaper setup and use, I keep the shop door locked and the phone answering machine on. When my attention is drawn away from my work, I write down the next step and tape the note to the machine before I take care of the problem. When I return, I take a few extra moments to re-focus, and I don't hesitate to postpone a tricky or unfamiliar job if something doesn't feel right. That's usually when I'm about to make a mistake. —L.S.

ters, router bits and safety cutters.

In my shop, the shaper sits alongside a central work station, so I have ample in-feed and outfeed area. I built a platform for the shaper, so it is at the same height as the work station table. Because I don't use the miter gauge, I rotated the machine 90° clockwise from its conventional position. This orientation offers better access to the controls and makes changing tooling easier. I also bolted the machine to the floor and to the work station to reduce vibration. With the shaper secured, I can apply pressure without worrying that it will move. To keep the work area and my lungs clear, I have a 1,000-cu.-ft.-per-minute (cfm) dust collector that keeps up

with most of the waste. For every jig, I make a dust pickup boot from a coffee can or standard metal heating duct.

Checklists and other precautions

Pilots use checklists every time they land an aircraft or take off in one. I also use checklists when shaping (see the photo at left on the facing page). Remembering to tighten the spindle nut, just like remembering to drop the landing gear, is too important to leave to memory alone. In a quiet moment, I write down the sequence of an operation. I include everything from locking the height adjustment to counting the pieces after a run. Each time I make a setting that I plan to use again, I make

sketches and jot down the dimensions in my notebook. When I quit for the day, I mark where I have left off.

Make light cuts, and take your time—

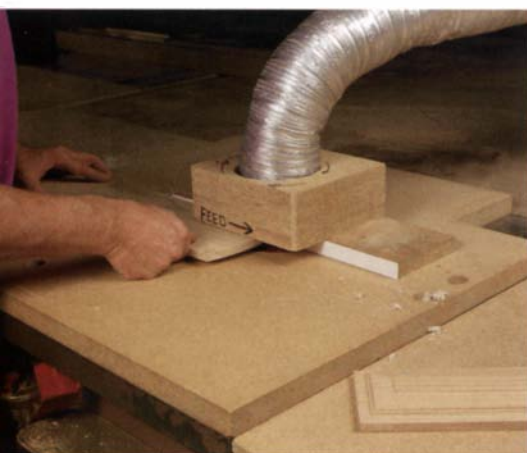
A shaper is capable of cutting in a single pass, but I only do so when I'm using a power feeder and forming relatively modest profiles. For most shaping, I use a series of light cuts, which are easier on the machine, and they get me used to the process. Instead of taking a chance of ruining a piece by hogging all the way in one pass, I take an initial pass and then clean up with light subsequent passes.

My shaper fence adjusts outward for progressively deeper straight-run cuts (see



Use jigs for safe and consistent shaper work—Schleining built a jig to shape a profile on the side of a hand-rail piece. Secured vertically in a holder, the piece is rotated with a handle past the cutter. The shaper is turned 90° from its normal position.

Inverted panel raising is safer—Because Schleining likes to keep work between his hands and the cutter, he prefers to raise panels with the bevel facing down. The auxiliary table and guard also shield the cutter.



the photo at left on p. 46). For raised panels, I elevate the cutter into the piece in stages. When pattern cutting and doing radius work, I also increase the depth of cut in steps. First I handsaw close to my lines to minimize how much the shaper has to cut. Then I use a flush cutter followed by the profile cutter. Graduated bearing sizes let me make deeper and deeper cuts.

Straight runs: shape with a fence and a power feeder

For straight shaping runs, I always use a power feeder. To me, a shaper isn't complete without one. The immediate benefit of the feeder is that the stock moves past the cutter at a constant rate. Chatter and

Shaper jigs put you in control

Shapers require more hold-downs, guides and stops than other machines. I've spent half a day setting up an operation that takes just a few minutes.

To build jigs, I use Finnish birch plywood because it wears well and is strong. I use 3/4-in. plywood to make jig bases. To hold a workpiece, I prefer toggle clamps because they grasp and release easily, and the tension can be adjusted. I integrate a cutter guard and a dust hookup into most jigs.

For small pieces, I make the jig oversized and put handles on it (see the top photo). I also make the part longer than it needs to be. To keep the work from being yanked out, I screw the end of the piece where it won't be near the cutter.

I never get tired of seeing perfect contours emerge from jigs. When I'm done with a jig, I hang it on the wall, where it's always handy. —L.S.

burn marks are gone because the stock feeds without hesitation due to changes in hand positions, which are harmful, repetitive motions anyway.

A power feeder offers other advantages. When the feeder is set slightly askew, the stock will hug the fence. Because the wheels apply constant down pressure, there is little chance of a kickback, and boards that are bowed stay flat on the table. The power feeder hovers over the cutting area, so it shields me from flying chips (see the bottom right photo on p. 46). Most important, though, is that a power feeder keeps my hands far away from the cutting action.

The jig I use to form straight molding (see

the photo at left on p. 46) resembles a tunnel. Its opening is two or three thicknesses of paper wider than the stock I'm running. This allows .010 to .015 in. clearance, so the stock slides without binding. I line the tunnel with plastic laminate, and I lubricate it with TopCote. The key here is to have all the blanks milled consistently. I use a portable planer to thickness the stock, and I mill a couple of pine blanks at the same time so that I can test the shaper's setup. The roof of the jig is the power feeder.

Panel raising

The conventional way to raise panels on a shaper is to run the panel face up (see the drawing on the facing page). Panel-raising cutters are designed to run above the work. There are several reasons for this. First, a panel tongue will always fit its intended groove in the frame. Even if the panel is cupped, the thickness of the tongue will be cut just undersize, which means that it will still fit. Second, with the panel facing up, it won't get scratched on the table. Third, the operator can watch the cutter do its work.

Despite all these good reasons, however, I prefer to raise panels face down when I can. With the cutter below the work, I feel safer. Here's how I do it:

I invert a panel-raising wing cutter and set it up so that most of it is below the surface of the shaper table for the initial pass. If the hole in the table is too small to allow the cutter to descend below the surface, I put down a plywood auxiliary table.

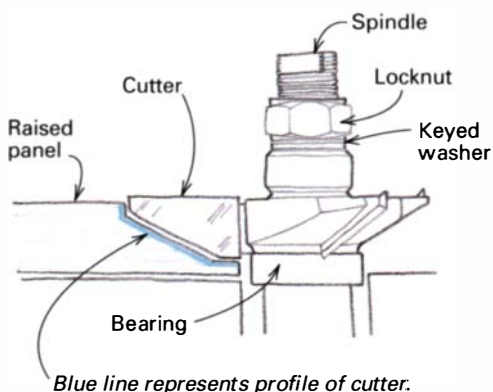
With the cutter inverted, the shaper must run in reverse, which means I take a few extra precautions. I position a guard well over the cutter. And I draw arrows on the jig to show feed direction and rotation (see the photo at left). There also is the possibility that the spindle nut could loosen due to the rotation, but I prevent this by using a keyed washer under the nut. I check the nut occasionally just to make sure. Finally, I loosen the red tape I keep over the reversing switch and drape it to remind me that the cutter is turning opposite its normal way.

Pattern cutting

For contouring curved parts, it's hard to beat a pattern-cutting jig and a shaper. Pattern cutting requires a guide bearing or rub collar above or below the cutter to ride along a pattern. The pattern can be the stock itself or a plywood or scrapwood template (see the photo on p. 45). As for the cutters, I usually start with a flush-cutting bit. Next I use a profile cutter and shape in stages of depth.

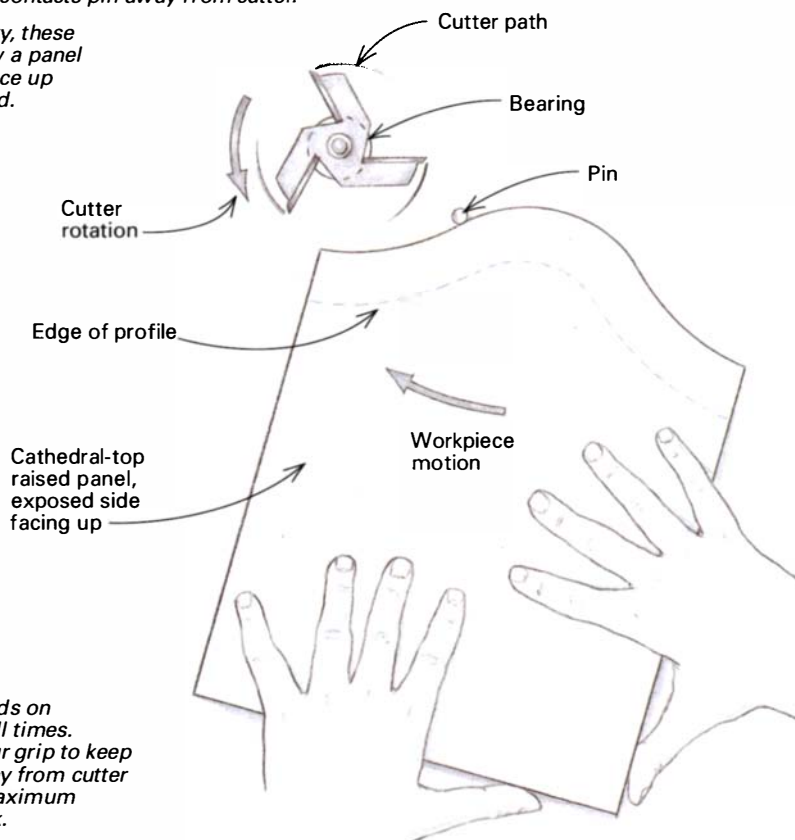
Shaping with a starter pin

A shaper makes short work of cutting the profile on a raised panel. To start the cut, the workpiece is held against the pin (see Step 1) and rotated gradually into the cutter. The panel stays in contact with the pin (Steps 2 and 3) as it moves into the bearing. When the bearing supports the work and is no longer spinning, the workpiece may be pivoted, so it's free of the pin (Step 4).



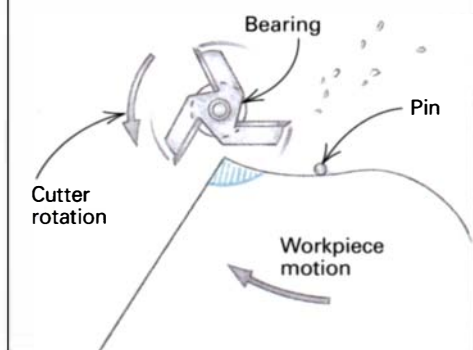
Step 1: Panel contacts pin away from cutter.

Note: For clarity, these drawings show a panel being raised face up without a guard.

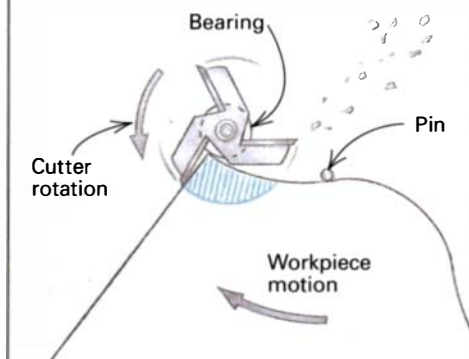


Keep both hands on workpiece at all times. Reposition your grip to keep fingers far away from cutter and to have maximum control of work.

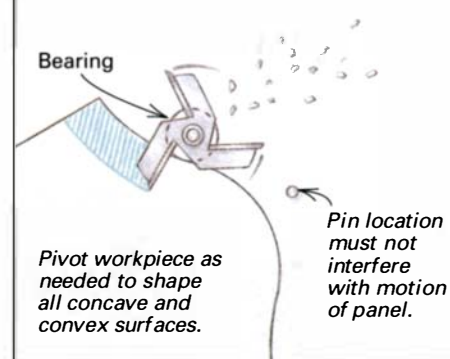
Step 2: Panel is held against pin. Gradually begin shaping by pivoting workpiece into cutter.



Step 3: Panel moves into cutter until it hits bearing. Then panel pivots free of pin.



Step 4: Panel contacts bearing and cutter only.



Using on-ramps, off-ramps and starting pins—Usually, when I use a guide bearing, I make the pattern-cutting jig with an on-ramp and an off-ramp. The ramps are just extra pieces of wood that contact the bearing before the work and stay in contact after the work has exited the cut. The ramps allow the cutter to ease into the work and exit it smoothly without abrupt transitions. Often, I'll build the on-ramp into the end of the actual workpiece. Both ramps need to project far enough to contact the bearing while leaving the work clear of the cutter. If I can't use a jig, I use a starting (fulcrum) pin to control the cut. This pin is inserted into a hole in the table close to the cutter. The drawing above

shows how a curve-top panel for a cabinet door is run using a starting pin.

Radius work

Shaping a radius is easier than it looks. For large vertical-axis radii, I use a jig that looks like a segment of a wagon wheel laid flat on the shaper. I rotate the jig about a pivot point, so the workpiece moves past the cutter.

The setup for a horizontal-axis radius is shown in the top photo on the facing page. The jig sits upright on the table, and the pivot point is actually above the cutter. I have slotted holes in the workpiece holder, so I can slide it closer to the cutter for gradually deeper cuts. An outboard fence

on the right side of the jig prevents the work from being pulled out of its holder.

The pay off

One day, when I was using a horizontal radius jig, the cutter somehow dislodged the piece of oak I was shaping. The motor was running, even though the cutter had stopped. I held onto the jig with both hands. Reaching out with my left foot, I hit the paddle switch, turning the machine off. I breathed again. The jig and my safety precautions had paid off. □

Lon Schleining builds custom staircases in Long Beach, Calif., and teaches woodworking at Cerritos College in Norwalk, Calif.

Build a Harvest Table

*A quick, satisfying project with simple lines
and loose-tenon joinery*

by Gary Rogowski

I invited the entire family over for Thanksgiving dinner last year. Parents, siblings, spousal units, kiddings and significant others—all were welcome. Unfortunately, I had no table that was large enough to seat everyone. A small detail in the greater scheme of things, but an important one nonetheless if we were all to sit together as we dined.

I set out to design and build a table that was handsome, sturdy and serviceable. And the table would have to take only a couple of days to make. I wanted it to have a clean and simple look, so I decided on tapered legs and a painted base, with a clear finish for just the top (see the photo below). I also decided on loose-tenon joinery to help simplify the construction.

Because time was of the essence, I decided to try a new approach to preparing the piece for a finish. For years, I've sweated over successively finer sanding grits of sandpaper as I ground



Details make the difference.
Circular cutouts in the rail centers and contrasting dowels are simple touches that add visual interest.

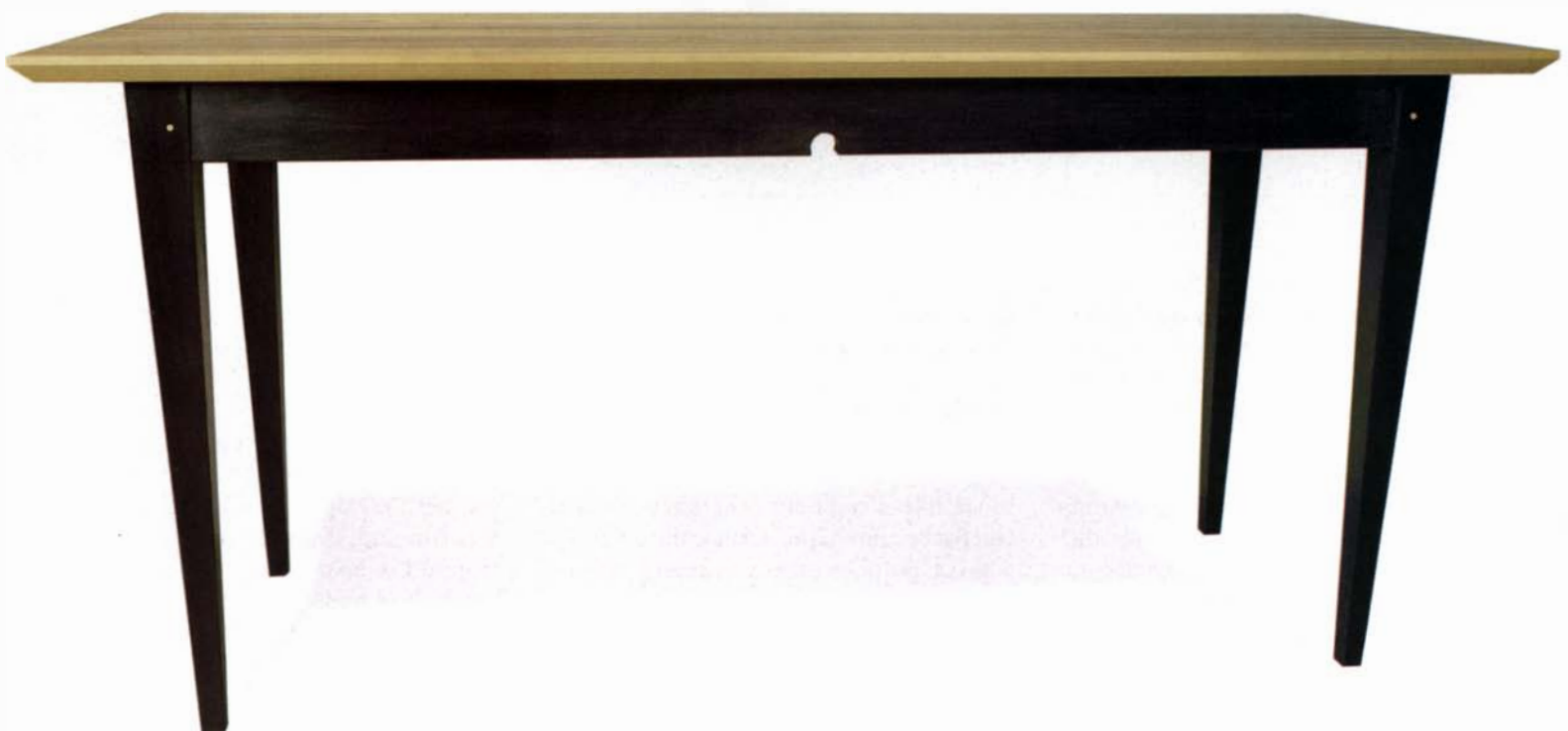
down acres of wooden surfaces. This table was going to be different. There was to be no sanding of any sort on this piece—just handplaned surfaces and edges. “Why not?” I thought. “That’s how it used to be done.”

So I needed a wood that planed nicely without too much effort. Fancy figure or nice color wasn’t really important because the base would be painted. I checked with my local hardwood dealer and found he had 12/4 poplar in stock.

That clinched it. I didn’t want to spend time laminating the leg blanks from thinner boards, so poplar it would be.

Tapering the legs

I tapered both outside faces of the table legs from their tops down to the floor. To get a taper I liked, I experimented with patterns made of hardboard until I was satisfied. I ended up with a leg that tapered from 2½ in. at the top to 1 in. at the floor.



Simple lines and a neutral, painted finish on the base make this table versatile. Though built as a dining table, it also could be used as a side table or as an extra worktable in an office, den or child’s room.

To cut these tapers, I used my tablesaw and a taper jig I built specifically for these legs (see the box on p. 53). The jig took only about 10-15 minutes to build and ensured consistent tapers.

I cut the first taper and then rotated the leg so that the cut face was face up in the jig, so the leg would fit snugly in the jig for the second cut. I then made the second taper cut. I cleaned up the sawmarks by passing the legs over the jointer, which was set for a light cut—less than $\frac{1}{16}$ in.

Mortising legs and rails

After tapering the legs, I routed the mortises for the loose tenons, which are separate pieces of tenon stock that are inserted into a pair of mortises (in the leg and rail, in this case). The beauty of using loose tenons is the speed with which you can join a piece of furniture.

For all the loose-tenon mortises, I used a plunge router outfitted with a $\frac{3}{4}$ -in. template guide, a $\frac{1}{2}$ -in. up-spiral bit and a basic shop-built fixture. The fixture consists of a piece of hardboard with a slot for a router template guide, screwed to a squared piece of hardwood that serves as a fence (for a complete description of how to make and use the fixture, see *FWW* #108, p. 86). I used the wedge-shaped offcuts from the tapering operation for pads on the legs to prevent them from being marred by the clamp heads and to simplify clamping the fixture to the legs.

I used the fixture for both the legs and the rails. But because these pieces are of different thicknesses, I built the fixture to accommodate the wide legs. Then I used a spacer to reposition the slot in the fixture when I routed the rail mortises (see the top photo at right). I clamped the rails in my vise and marked their ends. Then I put the spacer between fixture and rail, positioned the fixture, clamped the whole assembly and mortised the rail.

For a little flair, I added a detail in the bottom edge of each of the rails. I drilled a $1\frac{1}{4}$ -in. hole into the rails at the bottom edge, creating something a bit fuller than a half-circle (see the top photo on the facing page). I bored these holes with a Forstner bit on my drill press.

Preparing for a finish with a handplane

I like to prepare all surfaces for finishing before glue-up. This usually means sanding for days on end (or at least it seems that way), going through sheets of sandpaper and a dust mask or two. For this project, though, I had decided that any smoothing I was going to do would be with a handplane. So I sharpened the blade on my smoothing plane, adjusted it for a tissue-thin shaving and planed all the legs and rails in a matter of hours. The swoosh of the blade against wood was the only sound in the shop. Then I beveled all the corners of the pieces with my block plane and turned to making tenon stock.

Making and fitting tenon stock

I stuck with poplar for the loose tenons, but you could use almost any scrap you had lying around. It's a good idea to mill up some extra stock, just in case. Besides, once you're set up, the process goes very quickly.

I milled the tenon stock a hair thicker than my mortise, leaving the stock fairly long (each piece about a foot), so I could rout the edges of the stock with a roundover bit on my router table (see the center photo at right). A $\frac{1}{4}$ -in. radius bit set to the right height will give your tenon stock an edge that will match the rounded corners of a $\frac{1}{2}$ -in. mortise nicely. Experiment on scrap planed to the same thickness until you get it right. Once I'd rounded the tenon stock, I cut it to length in a crosscut box on my tablesaw.

I used a handplane to fit the loose tenons to their respective mor-

LOOSE-TENON JOINERY



Simple router mortising fixture works for leg and rail. A slotted piece of hardboard screwed to a hardwood block provides all the guidance you'll need for routing accurate mortises. A spacer inserted between fence and rail correctly positions the template for the rail mortises.



A $\frac{1}{4}$ -in. roundover bit puts a good edge on $\frac{1}{2}$ -in. tenon stock. Experiment on scrap to get the bit height right, and keep the tenon stock long until you round it over.



A couple of passes with a handplane take the tenon stock down to size. The author mills the tenon stock a hair thick, so he can get a precise fit for each joint with a plane.

Gluing and clamping up one assembly at a time makes the job a lot less harried. After gluing the tenons into the long rails, the author glues and clamps the rail and two legs together to make one side of the table. Offcuts from the tapering operation make good clamping blocks.



Two short rails connect the long-rail assemblies to complete the base. Adjust the clamping pressure above and below the tenon locations to keep the shoulders tight against the legs.

tises. Setting them in a bench hook, I took a shaving or two off each until they fit snugly into their mortises (see the bottom photo on p. 51). The tenons shouldn't be so tight that you have to hammer them into the mortises, but you shouldn't be able to pull them out of the mortises easily either.

Gluing up in sections

I glued up this table in sections (see the top photo): the loose tenons into all the rails, the long rails into the legs and, finally, the two long-rail assemblies connected with the short rails. This method made gluing and clamping relatively easy. Trying to glue up the whole table at once is much more hectic.

I glued the loose tenons into the rails and then drilled 1/4-in. holes about 3/4 in. from the ends of the rails on the inside, pegging the

tenons with sections of dowel. I dry-fitted the long-rail assembly to make sure the tenons weren't too long, and I checked the legs to see that they remained square to the rail when I clamped the joints. Then I glued the long rails into the legs. I clamped the assembly together and checked the legs again to make sure they hadn't twisted under clamping pressure.

After giving the glue time to dry (four hours or so), I planed the tops of the rails flush with the tops of the legs. It's pretty simple to put the long-rail assemblies in a vise and then plane the rails flush. Waiting until the base is completely assembled makes it a little tougher.

Before I glued the two long-rail assemblies together, I dry-fitted the joints, so there would be no surprises. Then I put some glue in the mortises and a little on the tenons and pulled the rails home, making sure the shoulders of the rails fit snugly against the legs (see the photo at left). I measured the diagonals of the table to see whether it had clamped up square. It was within 1/16 in., so I didn't have to clamp across the table diagonally.

Once the joints were dry, I planed the tops of the short rails flush with the tops of the legs and made sure the table sat flat on the floor. I decided to use metal tabletop fasteners to secure the top to the base, so I used a biscuit joiner to cut small recesses in the rails about 1/2 in. down from the top edge.

Finishing the base and pegging the tenons

The clock was still ticking away, so I needed a quick finish for this piece. I decided on milk paint for the base. This centuries-old finish dries quickly, is easy to apply (and clean up after) and, with a clear coat over it, resists water spotting. It's very durable.

Because I had handplaned all surfaces, I didn't need to wet sand before painting. Planed surfaces aren't abraded, so even a water-based finish like milk paint doesn't raise the grain appreciably. I put on two coats of milk paint, lightly sanding, I mean, *rubbing* each down after they'd dried (okay, so I sanded, but with 400-grit and only for a couple of minutes). After waiting overnight for the second coat to dry thoroughly, I gave the base a coat of Danish oil. This tends to darken milk paint significantly, so make up a sample piece first to see if you like the color change.

I wanted to peg the loose-tenon joints in the legs with a pin that contrasted with the paint, so I used a natural birch dowel against the black paint. I made up a drilling guide to use with a hand-held drill. This guide is simply a piece of hardwood scrap with a 1/4-in.

Taper jig is simple, safe and ensures consistent results

I make my living as a woodworker, so I need to spend more time making furniture than making jigs or fixtures. My approach to jig making is no-nonsense: What's going to give me accurate, consistent results, safely and quickly? Which brings me to my taper jig.

It's a dedicated jig (that is, it's for one taper only; it's not adjustable), so it isn't as versatile as it might be. But it more than makes up for that in safety. The leg is captured front and back rather than just in the back as is the case with most adjustable jigs. I've made three more harvest tables since the first one, and I've been able to depend on this jig for consistent tapers.

To make the jig, I ripped a piece of plywood about 6 in. wide (the width isn't important, but this feels about right to me) and about 3 in. longer than the leg I'm tapering. At the back edge of this plywood, I screwed a fairly wide block of wood, so I'd have a sturdy back stop. I made sure this block was flush with the bottom edge of the plywood and was sticking out far enough from the edge of the plywood to act as a stop for the leg (see the drawing). The top of the leg will fit against this stop.

The leg bottom is the first part to enter the sawblade. It needs to be set out away from the plywood base of the jig a distance equal to the amount you want to remove. For this table, I wanted to taper the legs from 2½ in. at the top down to 1 in. at the bottom, so I needed to push the leg bottom out 1½ in. from the edge of the plywood.

To do this, I made another stop that positively located the leg 1½ in. from the edge of the plywood. I cut two rabbets in this stop at 90° to each other, one indexing against the plywood and the other securing the bottom of the leg. I screwed this stop onto the plywood.

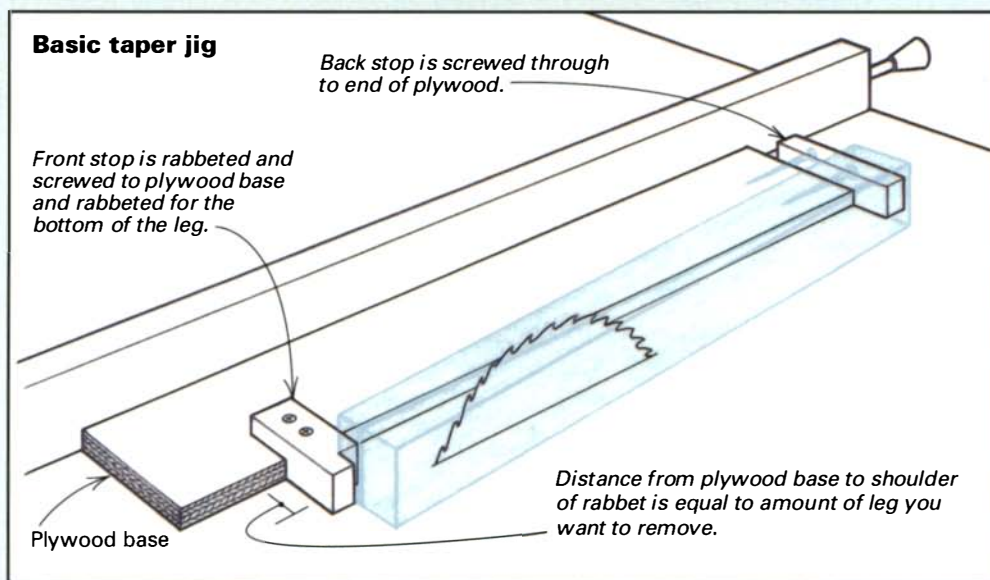
If the leg doesn't fit snugly between these stops, glue on a piece of sandpaper or some other shim to make sure it does. When you run those legs through the blade, with over 2½ in. of blade protruding from the table, you want to know the leg is positively captured in the jig, not vibrating around. —G.R.



Dedicated taper jig ensures safe, consistent results. With stops both front and back, this jig captures the leg snugly, keeping it from vibrating or moving as it's cut.



After the first taper cut, turn the leg so the cut faces up. This keeps a jointed face on the saw table and a square end against each stop for the second cut.



hole in it at the proper distance from an edge. Setting the guide against the leg put the hole right where I needed it. I cut dowels to length, drove them nearly home (I left them slightly proud) and chamfered their ends.

Making, finishing and attaching the top

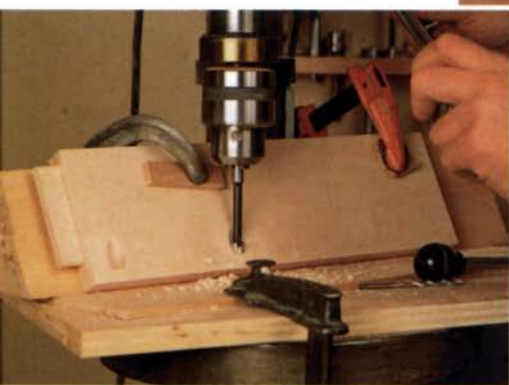
I made the tabletop of poplar, as well, saving the best boards for where they would be seen and appreciated. I beveled the edges of the top on the tablesaw and then handplaned the top, taking care to plane in the right direction so that I didn't get any tearout.

I also eased all the sharp edges on the top with a block plane.

I wanted a durable, clear finish for the top, so I brushed on three coats of a water-based polyurethane, waiting two to three hours between coats, as the manufacturer recommends.

The harvest table was completed with hours to spare. Of course, I had to borrow a few chairs, but another holiday, I'll come up with another quick project for that. □

Gary Rogowski designs and builds custom furniture and teaches woodworking at Oregon School of Arts and Crafts in Portland, Ore.



Simple fixture accurately positions rail for boring pocket holes. The author's fixture consists of a length of softwood, its face angled at 10°, screwed to a plywood base.

A good connection for period furniture. A V-shaped cut on the inside of a table rail seats the screw attaching the top and is a nice visual touch.



Attaching Tabletops

Five ways to connect base with top while allowing for seasonal wood movement

by Garrett Hack

I've repaired quite a few antiques, many of them tables with cracked tops. And the reason for the crack is always the same: The top had been attached to the base without any allowance for the wood to move.

Properly attached, a tabletop can expand and contract with changes in humidity while staying flat and firmly connected to its base. Tables that are properly connected gain strength from their connections, the top lending rigidity to the base and the base reinforcing the top.

Of the five common methods of connecting tabletops to their bases covered here, four of them are shopmade and one of them relies on commercially available metal clips. Which of these methods is appropriate depends on the size of your table, its construction and, perhaps most important, on your tastes and preferences.

Each has its place and, in some instances, a combination of them may be the best solution.

By the way, these methods have applications beyond connecting tabletops to bases. They're just as useful for attaching tops to chests of drawers, desks and other case pieces.

Accounting for wood movement

Wood moves. Sometimes it moves a lot. Most of the expansion and contraction takes place across the grain, whether the boards have been flatsawn or quartersawn. On average, quartersawn wood moves a little less than half as much as flatsawn. Wood hardly moves at all in length. (For a good discussion of wood movement and other properties of wood, see *Understanding Wood: A craftsman's guide to wood technology* by R. Bruce Hoadley,

The Taunton Press, 1980.)

If you're making a leg-and-apron table with a solid-wood top, this means that you have to allow the top to move independently of the base. On small tables (say, 18 in. or less in a relatively stable wood, like cherry), the movement of the top is slight and can almost be ignored. On wider tables, however, you need to allow for some significant movement—especially if you live in a part of the country with big swings in humidity.

To help me gauge how much movement I can expect, I keep a few short, wide boards around. Every three weeks or so, I'll mark the date and width of these boards right on the boards. This gives me a running record of actual wood movement (not theoretical movement) in my part of the country on some of the species that I use most often. I've been doing this for a few years now, so I have a pretty good idea of how much movement to allow for when I build a piece.

For the sake of clarity, I'll explain these attachment methods on a simple table of legs and rails, but the methods work just as well on more complex structures with internal cross rails or strongbacks. I often use more than one kind of attachment on the same piece, taking advantage of each method's strengths to suit my particular design.

Whichever method I choose, I attach the top to the side rails (the side perpendicular to the grain in the top) every 4 in. to 8 in., starting quite close to the leg. For the front and back rails, I generally use only about half as many attachments. That's because the movement in most rectangular tops is across the grain, front to back. By attaching the top at more points along the side rails, I can keep the top from curling or cupping. Fewer attachments at front and rear mean that those rails can bow slightly, if necessary, as the top moves with seasonal changes in humidity.

Pocket holes: a simple solution for small tables

Pocket holes are holes bored at an angle, usually about 10°, through a rail for a screw that connects the base and the top (see the top photo). Actually, two holes are drilled. One provides a seat for the screw head, and the other, a pilot hole, prevents the screw from splitting the rail or the top.



Pocket holes are great for small tables. But because they allow so little cross-grain wood movement, they're not well-suited to tables with wide tops.



Three-faceted pocket holes can be made quickly with a sharp chisel and some practice. The V-shaped hole provides a good seat for the screw head.



Screw blocks make a secure connection. Glued to the rail and screwed to the underside of the tabletop, screw blocks can be attached after the whole base is finished.

Pocket holes are easy to make and provide a positive connection between top and base. Their biggest liability is that they don't allow the top to move much. Pocket holes are best suited to smaller or shallower tables where the top isn't wide enough to produce much movement.

Pocket holes can be made to allow for more movement by drilling slightly oversized pilot holes or by making the holes oval in the direction of movement. I use a small round or rat-tail file to do this. I often attach the front edge of a top securely with a couple of screws through pocket holes and then progressively enlarge the screw holes the farther away from the front rail I go. On other table designs, where I want the movement roughly equal on either side of the center of the top, I fix the top securely in the middle of the two short rails. Half the movement of the top will be

Wooden buttons look nice and are simple to make. They also allow for a good deal of movement. To ensure the buttons won't break, make sure that their grain runs perpendicular to the rails.



Dovetail blocks allow the most movement but are the hardest to make. Screws attach the pin block to the underside of the table; the slot block is glued to the side of the table, just like a screw block.



Screw blocks: quick and convenient

Screw blocks are small blocks of wood glued to the rails, flush with the upper edge, and then screwed to the top (see the bottom photo on p. 55). They work like pocket holes, so on wider tabletops, the hole through the block should be oval on the side of the block against the top. Screw blocks, like pocket holes, make very secure connections.

One of the main advantages of using screw blocks is that they can be made, fitted and installed near the end of the construction process; most of the other methods require that you either drill or mortise the rails before gluing up the base.

Screw blocks sometimes work in situations where drilling pocket holes is awkward or impossible—for example, where a large drawer fills most of the space between rails. Screw blocks actually can strengthen the whole structure if they're glued between the drawer guides and the table's rails. I've used screw blocks successfully with extension tables by placing them between the rails and extension slides.

Also, screw blocks can allow greater movement than pocket holes. To do that, cut a slot all the way through the blocks

toward the front of the table, the other half toward the back.

Another drawback to using pocket holes on wider tabletops is that oversizing or "ovalizing" the screw holes in the back rail can be quite time-consuming and will weaken the back rail as well. The rail can be strengthened by gluing another rail to it, or you can avoid the problem altogether by just using another kind of connector here.

On shallow tables with long rails, I have sunk one or more screws through pocket holes in the back rail, well away from the legs. This allows the rail to bow in and out slightly with the changes in humidity.

I usually drill my pocket holes on the drill press, using a simple fixture that positions the rail at about 10° off vertical (see the photo at left on p. 54). I drill the pocket with a Forstner bit and then follow up by drilling the screw hole with a twist bit of appropriate size. You can buy bits that do both operations simultaneously, but they don't do the job as cleanly.

For a nice touch, especially on a period table, the seat for the screw head can be cut with a chisel by making a V-shaped cut into the apron at an angle and leaving a small flat at the bottom for the screw head (see the photo at right on p. 54 and the center photo on p. 55). First efforts aren't usually great, but you'll get it down if you do a few trial cuts on a piece of scrap.

in the direction of wood movement in the top, and use a round-head screw and steel washer instead of a bugle-head-style screw. With their holes elongated, screw blocks are useful for wider tops that move a lot seasonally.

Buttons: elegant solution for tables large and small

Buttons are small blocks of wood tenoned on one side of one end, creating a half-lap joint that engages a slot cut into the rail. The buttons are screwed to the tabletop (see the top photo).

Buttons are my preferred method of attaching tabletops because they're easy to make and install. They work well in many situations, and they make a secure connection. Their major advantage over other methods is that they allow a lot of movement in two directions, both along the rail and perpendicular to it. I avoid using them only when there is too little space, such as where a drawer uses the back rail as its stop.

When I use buttons, I locate and fix the top either at the front edge or in the center, depending on what kind of table it is, using a pocket hole or screw block. This helps me control where the seasonal movement of the wood will occur.

Buttons can be made from most any hardwood, but maple, birch and ash are my favorites because of their strength. I cut the tenons on buttons to roughly half the button's thickness and about ¼ in.

to $\frac{3}{8}$ in. long. Overall, the buttons are approximately $\frac{3}{4}$ in. thick, 1 in. wide and $1\frac{1}{2}$ in. to 2 in. long, with the grain running the button's length.

I cut the button mortises in the rails before assembling the base, either by hand with chisels or, more often, with a slot mortiser. You also could use a plunge router or cut the slot mortises after assembly with a router and bearing-guided slotting bit by running the router along the top of the rail. This method works particularly well on curved rails because it lets you cut the mortises after the leg-and-rail assembly has been leveled and trued.

I position the mortises slightly lower on the rail than the space between the top of the button and the top of the half lap would indicate. This causes the buttons to fall slightly below the top of the rail so that when the buttons are screwed to the top, the connection is very tight. I've seen buttons engage a groove the length of the rail, but this can weaken the table. I also keep the buttons slightly away from the legs, so the leg-to-rail joint won't be weakened.

If I've secured the tabletop at the front so that all movement is to the back of the table, I make the mortises in the rear rail slightly deeper and the corresponding tenons slightly longer than those on the sides. Then I position the shoulders of the buttons' half laps away from the rail a bit, and I take care not to seat the end of the buttons' tenons. This allows for more movement where it's most needed.

Dovetail blocks: best method for lots of movement

Dovetail blocks are two-part connectors. A dovetail-shaped piece is screwed to the top, and a block with a corresponding slot is glued to the rail (see the bottom photos on the facing page). Their primary advantage over other methods is that they allow for a great deal of wood movement, making them best-suited to wide tops on tables with straight rails. They're fairly time-consuming to cut, fit and install, but they work well and make a good connection.

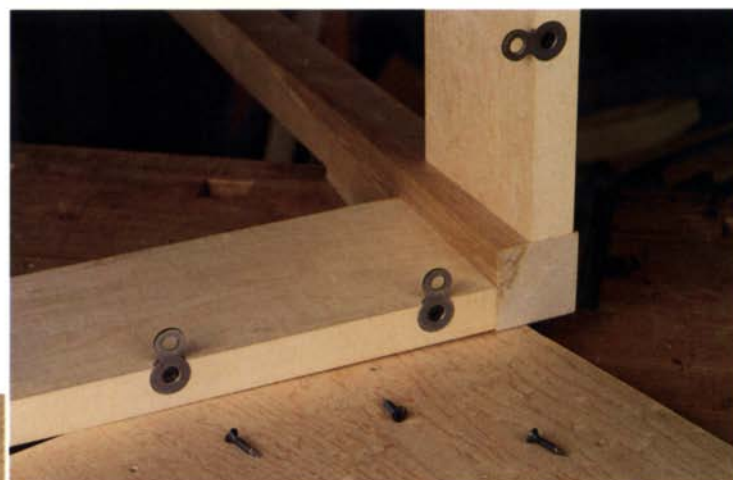
When I cut dovetail blocks, I make sure I have a good fit between the pin blocks and slot blocks. The blocks shouldn't bind or be sloppy. I cut the slot on a router table and then cut the stock into 2-in.- to 3-in.-long pieces. I rip the pin blocks slightly oversize on the tablesaw and then handplane them to get a perfect fit. I secure these blocks to the top with two screws and then glue the slot blocks to the side rails. For the front and back rails, the slot blocks are mortised into the rails or another type of connector is used, such as screw blocks or buttons.



Figure-eight clips can be installed after the base is complete. With these clips, you drill only one shallow, flat-bottomed hole in the rail. Screw the other half of the "8" into the underside of the tabletop.



Metal fasteners are inexpensive and easy to install. All you need to do is slot your rails. The clips allow for plenty of movement in all but the largest tables, but they don't have a refined look.



Metal fasteners: simple, not elegant

Two types of metal fasteners are widely available. One is a figure-eight style (see the bottom photos on this page), and the other is a clip that looks like a squared-up "Z" (see the top photo on this page). Both fasteners are inexpensive, easy to install and plenty strong for most applications.

The Z-clip functions exactly like a wooden button, with one offset leg into a sawkerf near the top of the rail and the other screwed to the top. These clips allow for a great deal of wood movement. My only problem with using them is aesthetic: I just don't think they belong on fine furniture. I prefer using the more elegant shopmade buttons on any but the most utilitarian projects.

For the figure-eight style, one part of the "8" is set flush into a hole drilled with a flat-bottomed bit in the top of the rail, with the center of the fastener just out from the rail. The other end is screwed to the top. This allows the clip to rotate through a small arc to accommodate wood movement. One advantage of using these connectors is that you can install them late in the construction process. They're best suited to modest-sized tables because of their limited range of movement. □

Garrett Hack is a furniture designer, maker and one-horse farmer in Thetford Center, Vt.

Clamping Panels the Easy Way

*An inexpensive vertical press saves space
and makes aligning boards a snap*

by Jim Tolpin

Large panels can be clamped easily in a vertical press. Wedges along the joint keep the boards aligned. Other wedges at the top, as well as pipe or bar clamps, provide the edge-clamping pressure.



When I need to glue up small panels, I just gather up a few pipe or bar clamps and work right on my bench. When I have everything clamped, I take the assembly and set it against a wall, taking care not to rack it when I set it down.

Large panels, like tabletops, and large glue-ups, like full-sized entry or interior doors, aren't so easy. Moving heavy pieces like these can be more than a little unwieldy, making racking much more likely. And leaving the whole assembly on my bench until it dries isn't a good solution either. That's why I built a vertical press (see the photo on the facing page).

Awhile back, I saw a professionally made vertical press in an industrial cabinet shop and realized that the press was the solution to my problem. But the press cost a lot more than I was willing or able to spend. So I designed my own and made it from 2x4s and 2x6s and common hardware (see the drawing at right).

Besides keeping my bench free when I'm doing large glue-ups, the vertical press virtually ensures that the panels will be flat and correctly aligned. And because the press is made from 2x stock, it's light, easily movable and priced right.

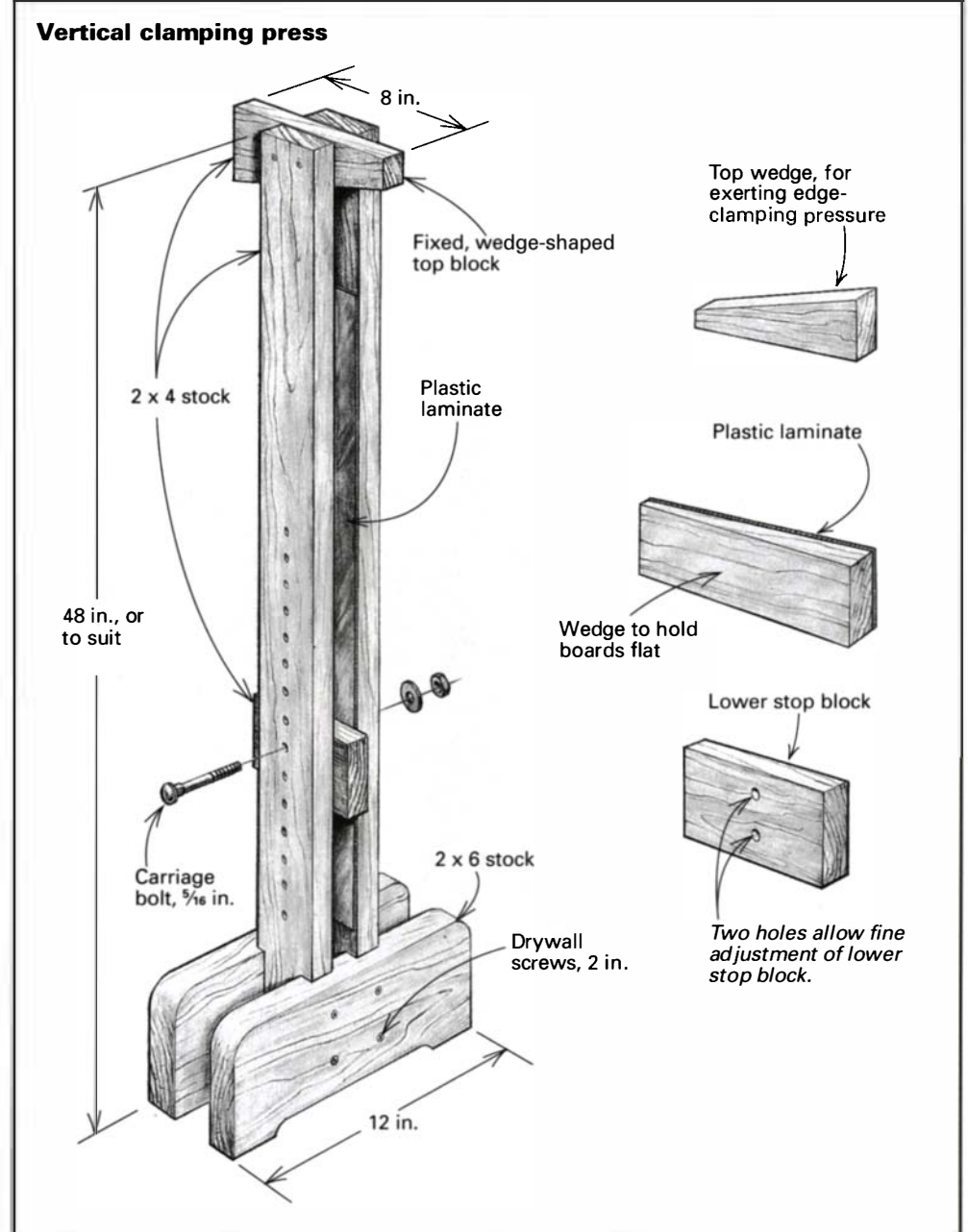
There are other advantages to my vertical press. Both sides of the assembly are readily accessible, making it easy to inspect the joints front and back and to remove any excess glue. Because the press is inexpensive, I can afford to build a number of them. And plastic laminate on the inside face of the back 2x4 of each upright keeps the boards I'm edge-gluing from becoming part of the press.

Using the press

To clamp up a panel or a flat assembly, such as a door, I start by measuring the overall width of the panel or assembly. Then I add a little space for a wedge at the top, maybe 2 in. or so. I bolt the lower stop block in place at this distance from the fixed top block.

Then I run the first board of the panel between the uprights and spread out the individual presses, spacing them from 12 in. to 16 in. apart. I tap a wedge or wedges (also faced with laminate to prevent them from adhering to the panel) between the face of the board and the front upright to hold the board in place. I apply glue to the edge of this first board as well as to the mating edge of the next board, which I then slide into the press.

Once the second board is in the press, I reposition the first set of wedges, so they're right on the joint between the first two



boards. The wedges keep the boards flush. I add more near the top of the second board to hold it against the back upright.

I continue in this way to the last board and then drive wedges under the top blocks to press the lamination together. These wedges get the panel or assembly together quickly and also provide a good amount of clamping pressure.

To ensure that clamping pressure is uniform over the full length of the boards, I insert pipe or bar clamps across the boards, as shown in the photo on the facing page. I use wood scraps or clamp pads to protect the outer edges. I make sure the joints are flush across their faces and drive additional wedges wherever necessary to get the whole panel flat. □

Jim Tolpin is a writer and woodworker in Port Townsend, Wash.

Padding on Shellac

A durable finish that's quick to apply, easy to repair

by Jeff Jewitt



Padding on shellac doesn't require lots of fancy equipment. You can get a beautiful finish with a minimum of materials: shel-

lac flakes, solvent, boiled linseed oil and wax. The author finished the tabletop in the background by padding on shellac.

Padding shellac is a low-tech process that is perfectly suited to the professional and amateur finisher. The advantages of shellac are numerous. It is a nontoxic, Food and Drug Administration-approved natural resin. The carrier for shellac, ethanol, is relatively nontoxic (ethanol is the same kind of alcohol that's found in liquor), and the fumes are not unpleasant. Shellac dries quickly, so dust does not pose a great problem, and finishes can be done in two to three days.

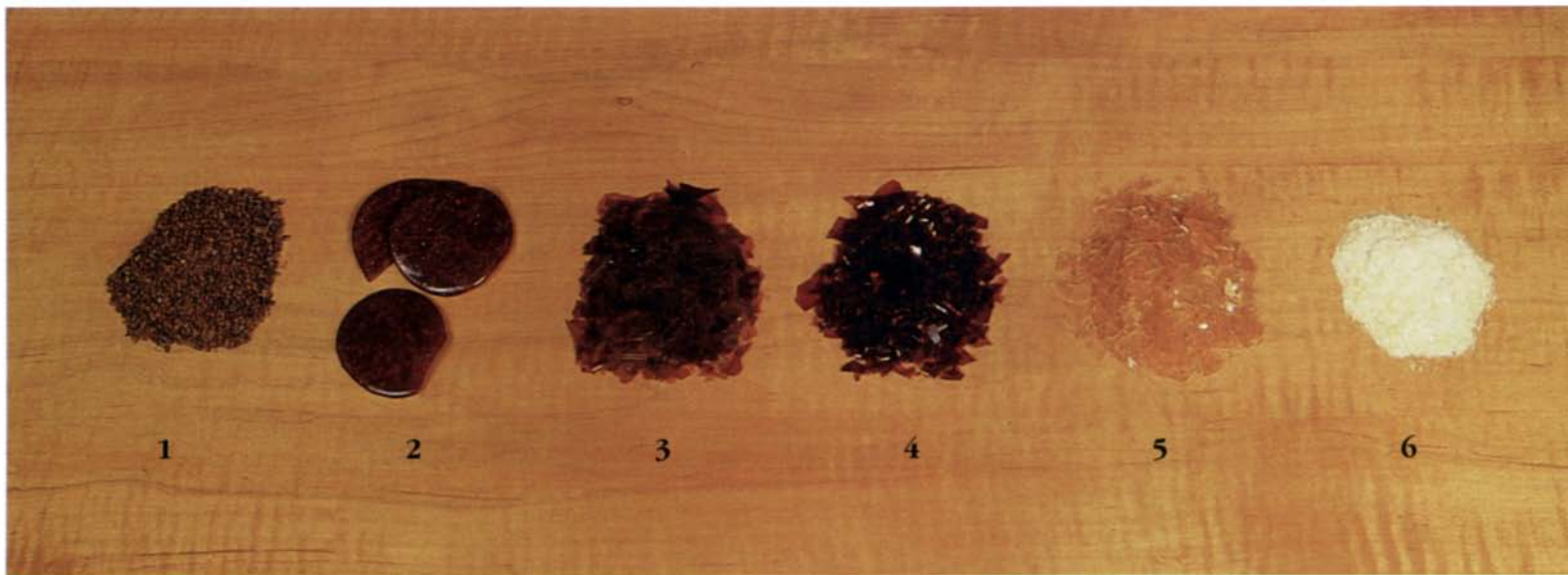
Applying shellac by padding it on is an easy technique to master. I rub on a freshly dissolved shellac solution over a sealer coat of oil, which increases the finish depth. I let each coat dry overnight and continue rubbing on shellac until I've achieved the desired

depth and gloss I'm after. Shellac is a good-looking, durable finish that can easily be repaired if damaged. But because shellac can be dissolved by alcohol, this finish is not a good choice for a bar top.

The materials for padding shellac are inexpensive and easy to obtain through most finishing companies (see the sources of supply box on p. 62). They consist of shellac, denatured alcohol, padding cloth, a drying oil such as boiled linseed oil or tung oil, sandpaper and synthetic steel wool.

The materials

I prefer to make my own shellac solution of 2 lbs. of dry shellac flakes dissolved in a gallon of alcohol (a 2-lb. cut; for more on this,



Shellac in dry form is available in a variety of grades. Seedlac (1) and buttonlac (2) are among the least refined forms of shellac. The most common shellac is #1 orange (3). The next two

are more highly refined dewaxed shellacs, available in dark-golden brown (4) and pale amber (5). Bleached white shellac (6) yields a colorless solution.

see the story at right). Using fresh shellac will help you avoid one of the classic complaints against shellac as a finish—it won't dry. Shellac is made up of organic acids that react with alcohol in a process called esterification. This gradual reaction produces esters, gummy substances that inhibit drying in old shellac.

Although it's possible to use premixed shellac, any liquid shellac older than six months should be tested for drying problems (Wm. Zinsser Co. makes shellac with a longer shelf life). To test shellac, place a drop or two on a piece of glass. If it's not dry to the touch in five minutes, don't use it. Premixed shellac is available only in orange or white (chemically bleached) varieties; there are more choices if you buy it in dry form (see the photo above). And if you mix your own shellac, you are guaranteed a fresh solution.

There are four alcohol solvents for shellac—methanol, ethanol, butanol and propanol. Methanol is an excellent solvent, but it's extremely poisonous. The fumes will pass through organic vapor respirators, so I avoid using methanol in my shop. Ethanol is far better because of its low toxicity. Butanol has an odor I find disagreeable, so I don't use it as the main solvent. I do add it occasionally to ethanol-reduced shellac as a retarder because butanol's higher molecular weight makes it evaporate slightly more slowly than ethanol. Propanol, the alcohol in rubbing alcohol, can be hard to get in chemically pure form. Don't use rubbing alcohol to dissolve shellac; it is 30% water and will cause problems in the shellac film.

An excellent product made specifically for reducing shellac is a Behlen product called Behkol (see the sources box on p. 62), which is 95% anhydrous ethanol and 5% isobutanol. The isobutanol slows down the drying time slightly.

The best cloth for applying shellac is manufactured from bleached, 100% cotton and is sold as padding, trace or French polishing cloth. Whatever cloth you use, it should be clean, not dyed, lint-free and absorbent. Avoid old T-shirts or cheesecloth because of the lint. My favorite cloth comes in 12-in. squares and has a rumpled texture similar to surgical gauze, as shown in the photo on the facing page.

Use either boiled linseed oil or tung oil to seal the wood and to give greater depth to the finish (only a small amount is needed). I have not been able to discern a difference between the two under the shellac finish. Make sure the linseed oil is boiled, though, because raw linseed oil contains no driers and never really hardens.

What's shellac, and how is it used?

Shellac is derived from a natural resin secreted by a tiny insect called *Laccifer lacca*. This insect alights on certain trees indigenous to India and Thailand and feeds off sap in the twigs. The insects secrete a cocoon-type shell, which is harvested by workers shaking the tree branches. In this form, the resin is called sticklac and contains bits of twig, insect and other contaminants. The sticklac is then washed to remove impurities. At this point, it may be refined either by hand or machine. The next step up is buttonlac, which is processed in India. It is reddish-brown and is sold in 1-in.- to 2-in.-wide buttons.

Seedlac is another impure form of shellac and is processed further in India for better-quality lacs or exported to other countries for further refining. White shellac is made in the United States by Wm. Zinsser Co. from imported seedlac that's dewaxed and bleached by bubbling chlorine gas through it.

Shellac grading is complex because it is a product with wide commercial applications. But the most important characteristics for woodworkers are those based on color and wax content. The best grades of shellac for finishing have less than 1% wax and are light-amber in color. Wax in shellac decreases its moisture resistance and makes it less transparent.

The most common shellac is industry-graded as #1 orange, which usually is 4% wax and is a brownish-orange color. Dewaxed shellacs can range in color from a dark-golden brown to a pale amber, as shown in the photo above. Fresh shellac is always better, so I mix my own, making just enough for the job at hand. For padding, I prefer a 2-lb. cut, which means 2 lbs. of shellac flakes dissolved in a gallon of alcohol. For most projects, a pint (¼ lb. of flakes in 1 pint of alcohol) is sufficient.

I mix shellac in a clean glass jar. Avoid metal cans because they will discolor the solution. Periodically shaking the jar prevents a jelly-like mass from forming at the bottom. Most shellacs take about a day to dissolve, so plan ahead. If it takes longer, the shellac may be bad. After dissolving in alcohol, lower-grade shellacs like buttonlac and seedlac always should be strained through a medium-mesh or fine-mesh filter to remove impurities. —J.J.

After the oil dries for a few minutes, charge the pad with a squeeze bottle to get just the right amount of shellac. The pad should be a lint-free cloth folded so that there are no wrinkles or seams on the bottom of the pad.

First apply a primer coat of oil for a deep finish. The author rubs in a light coat of oil, either boiled linseed or tung oil, to seal the wood. Shellac can be padded on after the oil has dried for several minutes.



Preparation

No finish can hide sloppy surface preparation. On new wood, I plane, scrape and sand to 220-grit on highly visible surfaces. I also do as much surface preparation as I can on the project before it's glued up. For new work, I'll even apply the oil and the first coat of shellac before assembling a project. Applying at least the first coat of shellac before the piece has been glued up makes it much easier to get an even finish, even in hard to reach places.

I generally tape off tenons and other joints so that oiling doesn't contaminate the wood. If the wood is to be colored, I use water-soluble dyes before the oil sealer coat. These dyes raise the grain, so I knock down the raised fibers with maroon synthetic steel wool (equivalent to 00 steel wool or 320-grit sandpaper) after the dye dries. I prefer synthetic steel wool because it's not as likely to cut through the dye on the edges. After the wood is smoothed down, you're ready for the first finishing step.

Oiling

Oil seals the wood and gives it greater depth. On refinished pieces, you can omit this step. Oils will accentuate the figure and deepen the color of wood, particularly curly maple and cherry. I have used a variety of oils, but I like linseed and tung oil the best. Apply just enough oil to make the surface of the wood look wet (about a thimbleful per square foot), as shown in the photo at left. Do not flood the surface with oil. Apply the oil with a clean, soft cloth, and rub the surface briskly. It will penetrate quickly. After several minutes, begin applying the shellac.

Padding shellac

Fold the padding cloth into a rolled ball, as shown in the top photo. There should be no creases or seams on the pad bottom. Pour about 1 oz. of alcohol into the pad and work it in. Then pour about ¼ oz. to ½ oz. of a 2-lb. cut shellac into the bottom of the pad. I keep my shellac in round squeeze bottles to simplify dispensing into the pad. Use just a little; you shouldn't be able to squeeze shellac from the pad.

To apply the shellac, start at the top, right-hand edge of the board, and work across the board with the grain. Bring the pad down lightly, drag it across the board and right off the opposite

Sources of supply

The following companies manufacture or supply dry shellac flakes in various grades, padding cloth, alcohol solvents, oil and other finishing products.

H. Behlen & Bros., Route 30 N., Amsterdam, NY 12010; (518) 843-1380

Garrett Wade Co., Inc., 161 Avenue of the Americas, New York, NY 10013; (800) 221-2942

Homestead Finishing Products, 11929 Abbey Road, Unit G, North Royalton, OH 44133-2677; (216) 582-8929

Olde Mill Cabinet Shop, 1660 Camp Betty Washington Road, York, PA 17402; (717) 755-8884

Padding shellac

Shellac is padded on with the grain from edge to edge in an alternating pattern until the piece has been covered. The stroke should start off the edge of the board, continue across the board and off the opposite side. Stop when the finish becomes tacky, and the pad begins to stick.



edge, as shown in the drawing. Reverse directions, working back from left to right. Continue down the board, applying the shellac in alternating stripes. When you've reached the bottom, start again at the top; the board will be dry enough to repeat the process.

When the pad dries out, recharge it with more shellac. The amount of shellac you'll use depends on the size of the piece. A 24-sq.-in. piece should take about 10 or 15 minutes and will use three or four charges of shellac. On tops, do the edges first, and then continue the same sequence as above. If there is a complex molded edge, make the pad conform to the shape of the molding. The other parts of the piece (aprons, legs and sides) get the same padding coat of shellac. When the board is tacky and the pad starts to stick, stop. Store the pad in a jar with a screw-type lid.

The first application of shellac should be dry enough to scuff-sand in approximately 1 hour. Using 320-grit, steared sandpaper (aluminum oxide mixed with zinc stearate as a lubricant), lightly scuff-sand the surface. Scuff-sanding is applying just enough pressure to barely scratch the surface. After this, smooth out the surface with maroon synthetic steel wool. Then apply shellac to the other sides of all surfaces, such as the undersides of tops and the insides of carcasses in the same way you did on the top.

When this coat of shellac is dry, after about an hour, scuff-sand and rub these surfaces with synthetic steel wool. After the first coat of finish has been applied, it's time to glue the project together. Be careful to avoid excess glue, and make sure that clamps are properly padded. If any glue squeezes out, you can pull it off like scotch tape after 30 minutes to an hour. Don't let the glue dry completely, it may pull off the finish when you try to remove it.

The next day, once the piece is glued up, the finishing sequence is repeated. The pad should glide easily over the surface, and you should have an even coat of shellac on the surface. As the pad starts to dry out, you can switch from polishing in a stripe pattern to a circular pattern or a series of figure eights to get even coverage on the board. Stop when the finish is tacky and the pad sticks. At this point, the surface should have an even shine, indicating a surface build of shellac. Put the pad back in the jar, and let the finish dry overnight.

The next day, examine the finish. You should have an even coating of finish on the surface. If you are working with open-pored

woods like walnut or mahogany, you'll see crisp outlines to the open pores. This level of finish is appealing to some. If so, you can stop applying shellac; simply go on to the rubbing-out stage, which I'll explain in a minute, and you're done.

For surfaces that will receive a lot of wear and tear, you may want to apply several more coats for maximum protection. If so, repeat the procedure until you've built up the finish to the film thickness that you want, allowing each coat to dry overnight. You don't gain any added protection after four or five applications, but there is an aesthetic difference. After the final padding application, let the project dry for several days before rubbing it out.

Rubbing out

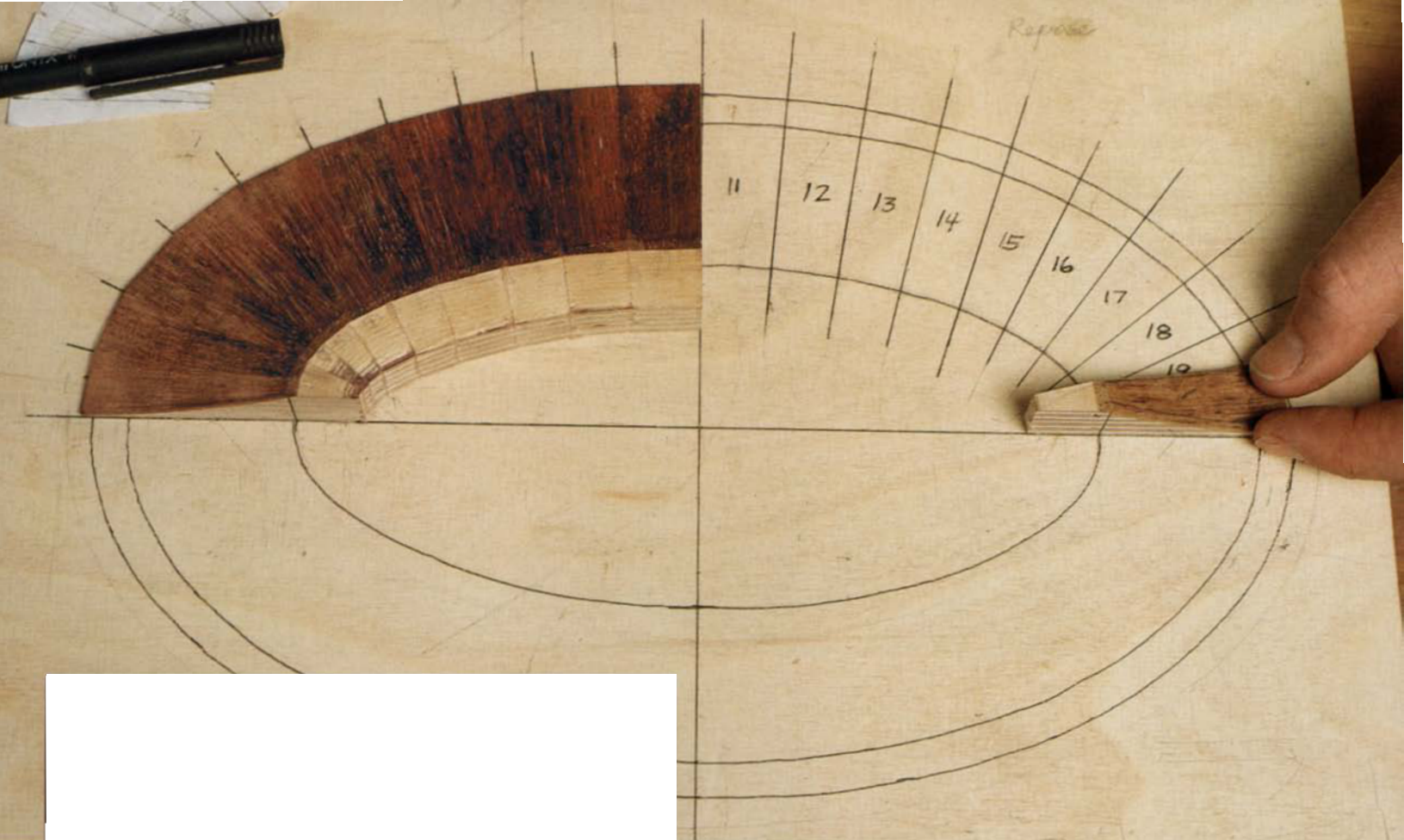
Rubbing out the shellac finish results in a smoother, better-looking surface. The beauty of the padding application is that there are no brush marks or other surface irregularities to level, so this step usually goes quickly. The first step is to level the surface of the finish with 400-grit, wet-or-dry silicon carbide finishing paper. Then switch to 0000 steel wool, squirting mineral spirits onto the pad and dipping it into a can of paste wax.

I prefer steel wool for rubbing out because it has a better bite and leaves a better-looking finish. My favorite wax is Behlen's Blue Label paste wax, available in brown for darker finishes and natural for lighter finishes. Working with the grain, I bear down fairly hard with the steel wool and rub the wax on the surface. I wait until it begins to haze, wipe off the excess and buff to a satiny sheen. If a higher gloss is desired, rub the surface with rottenstone mixed with mineral spirits before waxing.

Maintenance

If the piece is not subjected to a lot of wear and tear, a yearly re-waxing keeps it looking great. For tables, chairs and other high-wear items, you can rejuvenate the finish by removing the wax with mineral spirits and rubbing with maroon synthetic steel wool. Then apply a light coat of shellac, let dry and re-wax. □

Jeff Jewitt runs J.B. Jewitt Co., Inc., specializing in restoration and conservation of period furniture. He owns Homestead Finishing Products in North Royalton, Ohio.



A curved top made in segments. The elliptical lid for the box (11½ in. long, 2⅓ in. high) is built from wedge-shaped pieces of veneered plywood. The lid is laid out on a piece of plywood (above).

Veneering a Compound Curve

Wedge-shaped pieces form a delicate, elliptical box lid

by John Gallagher

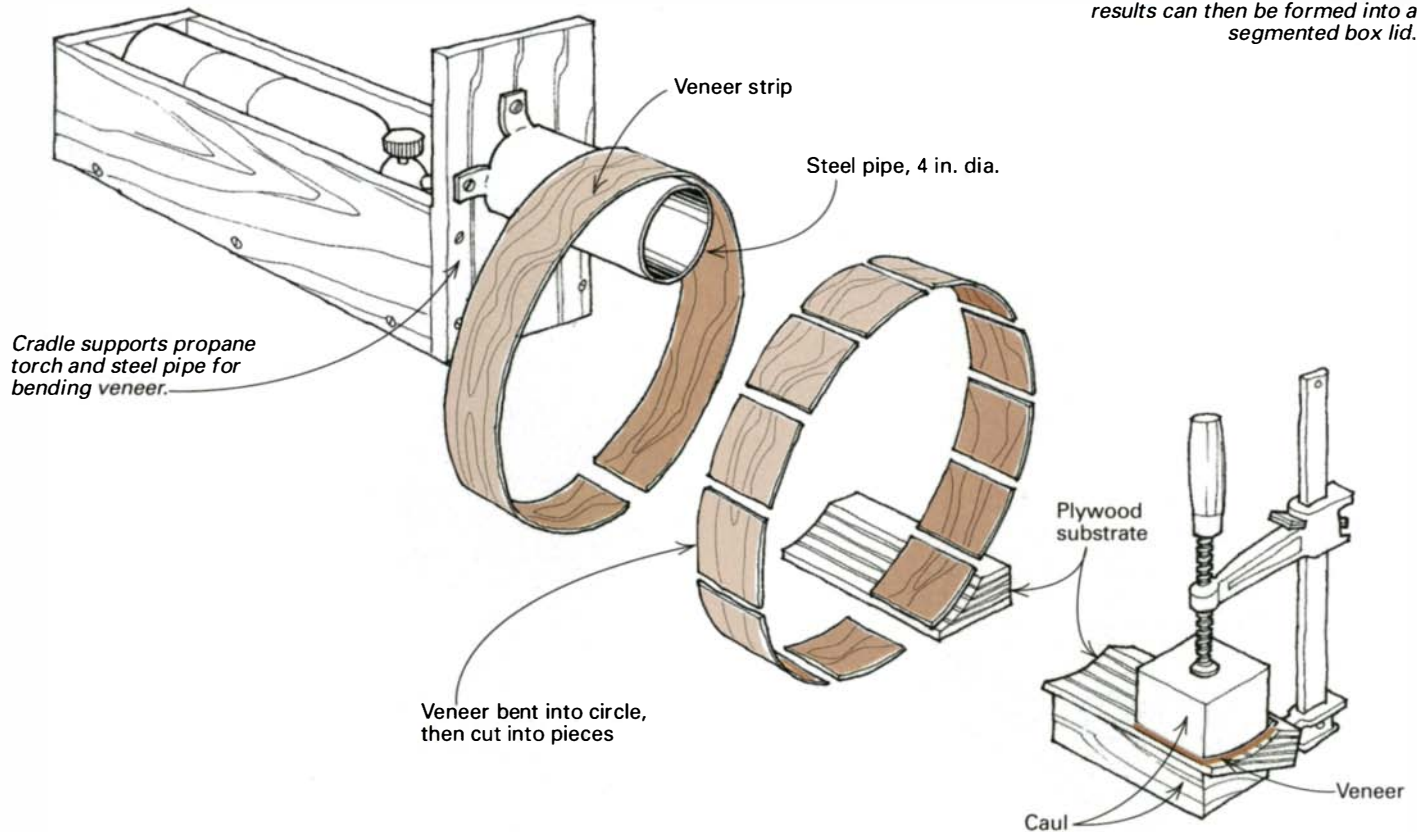
The unexpected is one thing I can count on whenever I make objects intended to please the hand and eye. I enjoy the unpredictability. It seems like an essential ingredient in creative work, and it played a part in the creation of the box in the photo at left. Once I was content with the design, I began to think about the pragmatic problem-solving that goes along with construction. The box held promise as an elegant and challenging project, with an element of uncertainty in exactly how it might be built.

The centerpiece of this box in kwila wood is its elliptical lid. I considered carving the lid from solid wood. But something of the original spirit of the piece would have been lost. My design sketch showed a radiating grain pattern in the top, nothing like the effect I would have achieved from a solid piece of wood. That pushed me toward a veneered lid, which would allow the grain to flow outward from the top toward the edge. A veneered top would be less susceptible to seasonal change, which seemed like an advantage, and veneering a compound curved surface intrigued me.

The curved sides of the box were fairly simple—thin laminations glued up around a form. But how do I veneer the lid, a surface that curves in not one but two planes? I doubted the joints would hold if I edge-joined pieces of veneer with a handplane and pressed them to fit a curved substrate. The answer that held the most promise was building the curved lid from a number of small wedge-shaped pieces. If the pieces, viewed in section, had a curved, tapered shape, they would produce a form of curved facets something like a Victrola speaker, which is close to a compound curve. By cutting a sweeping cove in one face of a piece of narrow stock and gluing the veneer to it, I'd have the rough stock

Fig. 1: Heat-bending veneer to fit a curve

A section of metal pipe heated by a propane torch coaxes veneer strips into curved shapes. Cut into smaller pieces, the veneer is glued to a plywood substrate. The veneered material that results can then be formed into a segmented box lid.



for the lid pieces. Then it was a matter of cutting the stock into pie-shaped pieces and gluing them into an elliptical shape.

Cutting a cove in the substrate

To make the substrate, I started with $\frac{5}{8}$ -in. Baltic-birch plywood about 7 in. wide. I ripped it to the correct width, $2\frac{5}{8}$ in., after cutting the cove. Plywood is more stable than solid wood, and the high-quality Baltic ply is of uniform thickness and without voids.

Cutting coves on the tablesaw usually involves running the stock flat on the table over the blade (for more on this technique, see *FWW* #102, pp. 82-85). But to approximate the cove I wanted, I had to mill the material running on edge, with the top slightly shimmed away from the top of the fence (see the photo at right). The advantage was that the material was registered on the side opposite the one being cut, providing an unchanging reference point. Any variations in the thickness of the ply didn't show up in the thin edge of the cove. The usual method would be to run the stock flat over the sawblade, but removing most of the material on one side would have left little wood for support.

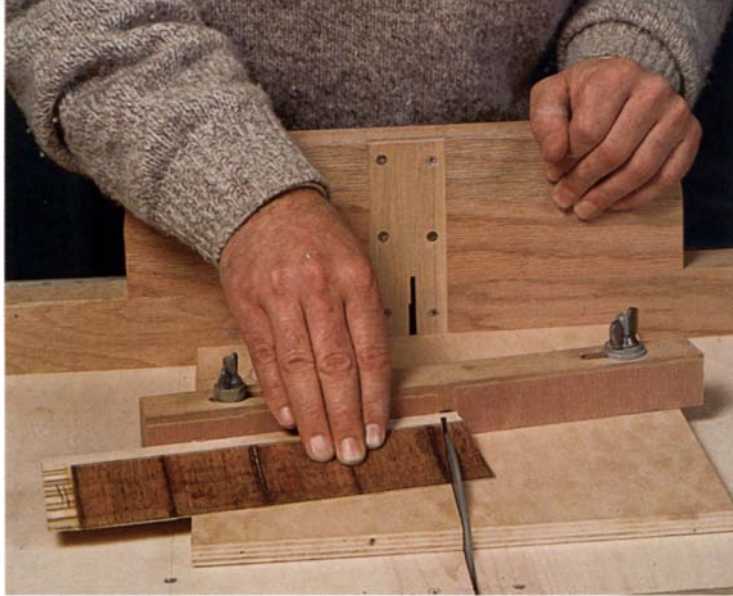
I set a fence at 90° to the blade on the tablesaw and made a series of light passes to produce a symmetrical cove with a 5-in. radius. To keep as much of the blade out of the way while I cut the cove, I put a sawkerf in a piece of 2x4 and clamped that to the saw table over the blade.

A hot pipe to bend the veneer

To form the curved pieces of veneer for the lid, I borrowed an idea from luthiers. I made a hot pipe bending jig from a piece of 4-in.

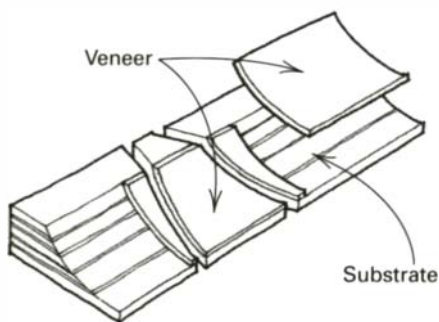


This cove needed a long, sweeping profile. The plywood used to make the lid pieces required a graceful cove on one face. To get it, the author ran the material across the tablesaw blade on edge and tilted away from the fence. An extra piece of 2x4 covers most of the blade during the cut.



Small cutoff jig makes lid pieces. After laying out the segments, the author cut them to size on a small jig with an adjustable fence that fits on a tablesaw.

Fig. 2: Making lid pieces



Fine adjustment for fit. A plane and a shooting board helped the author trim pieces, so they conformed exactly to the elliptical plan he worked from.

steel pipe (see figure 1 on p. 65). After setting up the pipe on a cradle, I trained a ½-in.-long blue flame from a propane torch on the inside top of the pipe until water sprayed on the pipe quickly boiled off. If water just sits there and steams, the pipe is too cool. If water bounces off the pipe, it's too hot.

I handsaw my own veneer, so I can control wood tone and grain. I sawed everything I needed for the box from the same stock. For the lid pieces, the veneer strips were ½ in. thick, 2 in. wide and 18 in. long, and I bent them over the pipe into circles. I checked the curve against a cardboard template to make sure it would fit against the plywood and then cut the circles into 2½ in. lengths. I glued the pieces onto the substrate using curved clamping cauls (see figure 1 on p. 65).

Cutting parts to shape the lid

I drew a full-size plan view of the lid on a piece of plywood. Actually, I drew two ellipses, one inside the other. The larger, outside line represented the outer edge of the lid. The smaller ellipse inside the first one represented the upper edge of the cove where it meets the flat center portion of the lid (see the top photo on p. 64). Working by eye and with a straightedge, I began experimenting with the layout of the individual segments to be glued to make the lid. The lengths of the pieces were longest near the minor axis and shorter as they approached the tight curves of the major axis.

To achieve the radiating grain pattern I wanted in the finished

lid, I tried different numbers of segments. At first, I tried five pieces in each quadrant of the ellipse, but this resulted in an unsettling V-pattern in the grain where they met. Eventually, I settled on 10 pieces in each quadrant. Having the grain nearly parallel to the edges of each segment looked better. The major and minor axes became my reference lines throughout the project. I made a paper template of one-quarter of the ellipse and divided it into the 10 segments. I transferred the shape of each segment onto the veneered cove stock while carefully aligning the grain. I cut the pieces on a modified cutoff box on the tablesaw (see the photo and drawing above left). I had extra veneered stock in case of error.

Lid pieces are planed to fit, laid like bricks

I had to fit 40 pieces around the lid outline. All were trimmed with a plane on a shooting board to fit correctly (see the photo above right). Beginning with a piece adjacent to a centerline of the ellipse, I planed one edge square and planed the edge of the following piece square to match it. Then I laid both pieces on the plan. Each segment has vertical lines drawn on its sides defining the points where the cove meets the flat top. These lines keep each segment following the ellipse. As I laid each segment on the plan and pressed it against the previous one, the vertical lines had to land directly on the smaller ellipse. If the lines missed the ellipse, planing the edge corrected the angle and solved the problem.

When I had a good dry-fit, I glued and clamped each successive

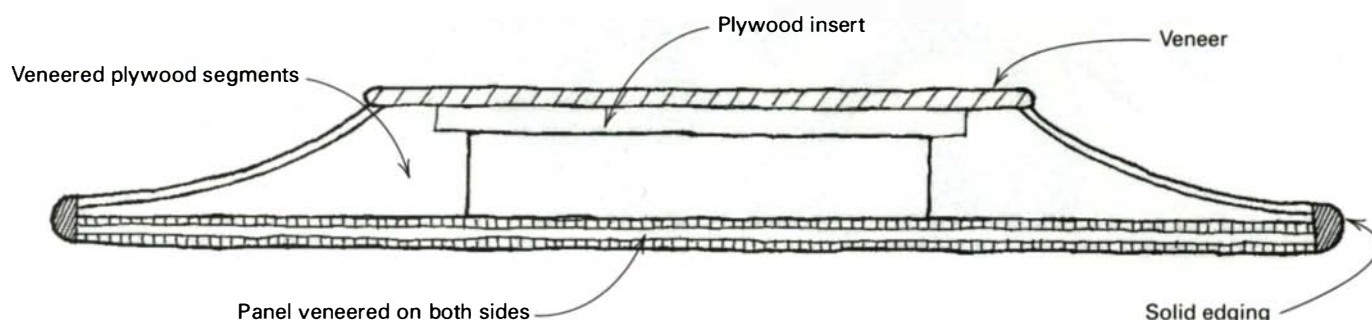


Glue-up is one piece at a time. Pieces were glued together to form quadrants, or quarters, of the ellipse. These pieces could be glued into halves and, finally, into a completed ellipse.



Bending forms for the box sides. Only $\frac{3}{8}$ in. thick, the sides of the box are made up of five laminations glued together to form half-elliptical shapes.

Fig. 3: Veneered panels reinforce lid



piece to the preceding one. I held the work on a flat piece of plywood and clamped each piece between a stop on one side and a block and wedge on the other (see the photo above left). Clamping the block to the plywood, I tapped the wedge between the block and the workpiece for pressure. Secondary blocks kept the work from sliding, and clear packing tape on the plywood prevented accidental gluing of the segments to the plywood.

I flattened the bottom side of the work regularly on sandpaper taped to a piece of plate glass. That kept the lid from getting twisted as I glued up the pieces one at a time. After all four quadrants were glued up, I joined two quadrants to make halves and then two halves to make a whole.

Setting in the top, making the case

Once all segments were glued together, the lid looked like a ring with a hollow center. The lid needed some kind of reinforcement, so I used a router to cut a rabbet around the top inside edge of the ring. That ledge received a plywood insert that tied all the segments together and provided a substrate for the top veneer (see figure 3 above). I glued a thin, veneered panel on the underside of the lid, further strengthening everything. The top veneer went on next, and a pre-bent banding finished the edge.

The $\frac{3}{8}$ -in.-thick box sides are made of five laminations of material, pre-bent on the heat pipe and glued around a wooden form, with a band clamp (see the photo above right). I made two half-

ellipses. Bent laminations usually spring back slightly after they come out of the form, depending on their thickness and the type of glue. But very tight bends will spring forward, becoming more pronounced. This slight tightening didn't affect the fit of the box.

I joined the two halves of the sides and the small ellipse inside the box with loose tenons. Posts on the front and back sides, which improved the appearance, were applied in halves from each side and glued into shallow grooves. The veneered bottom of the box fits into a slot that was plowed out with a slot cutter and bearing on a shaper. I adjusted the depth of the slot by making a bushing from $\frac{1}{4}$ -in. hardboard to fit snugly on the bearing. The bigger the bushing, the shallower the groove.

The base of the box gave me some problems at first. In the original drawing, I found feet attractive. Drawings can be deceptive, though. Once I made a mock-up from rigid foam and looked at the piece from different perspectives, I saw an awkward, cantilevered effect that was unavoidable regardless of how I repositioned the feet. The rounded molding at the bottom of the box worked without the feet, giving visual weight and defining the base. Mock-ups and three-dimensional sketches can reveal oversights before a commitment to solid wood is made (for more on making models, see *FWW* #111, pp. 66-69). The marquetry pattern on the top of the box, by the way, is just a design I drew and liked. □

John Gallagher is a furnituremaker living in Fort Bragg, Calif.

Decorative Hardware Sources

Where to find the right hardware to complement your work

by Vincent Laurence



Whitechapel, cast-brass lid hinge

Vinyl siding wouldn't look right on a 17th-century Colonial. And you wouldn't put mag wheels on a Model T. Similarly, Chippendale hardware is not going to do anything for an Arts-and-Crafts sideboard. Each furniture style has a signature look that extends to the smallest details, including the hardware.

The most difficult part of choosing the right hardware for a piece is often finding it in the first place. Readers of *Fine Woodworking* have called many times looking for everything from hardware for tansu (Asian storage cabinets) to hand-forged iron strap hinges. The hardware makers and suppliers listed on these pages should make it easier for you to find exactly the hardware you need.

If you still can't find what you want from stock items in any of these suppliers' catalogs, many of them also will do custom work for you, from casting or forging to refinishing existing hardware. And blacksmiths, jewelers and machinists in your area are often willing to quote a price for just about any piece of hardware you can design. Some will even help with design services.

I've listed only those manufacturers, distributors and retailers whose business is visible decorative hardware—hardware that's at least as important for how it looks as for how it works.

The list is still long, but the decision to limit it to suppliers of visible decorative hardware means that I've left out all those busi-

nesses that deal primarily with drawer slides, European cup hinges, shelf-pin systems and the like. Some of the companies listed also carry these items (or other merchandise like lamps, fireplace tools or other household accessories), but that's beyond the scope of this article.

I mention "architectural" hardware frequently in this list. By architectural hardware I mean full-sized door, window or shutter hardware or other pieces you wouldn't consider for furniture.

On the facing page, I have included a glossary of hardware-related terms that may not be familiar but are mentioned in the list. You'll also find a visual guide to most of the hinge styles mentioned in the list (see pp. 70-73).

Finally, there's a discussion of the different methods of manufacture used to produce hardware and what difference it makes in the finished product (see the box on p. 71). Not all hardware is created equal.

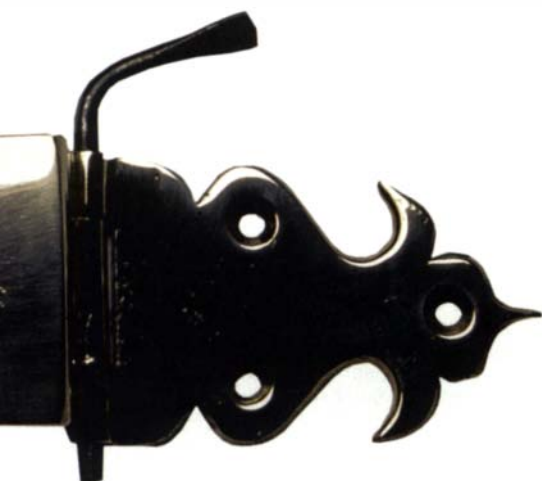
Unless otherwise noted, each of the companies listed has a free catalog. Though I've listed nearly 50 hardware sources, there are many more for which there wasn't space. This list recognizes the companies with the best hardware or selections I could find. □

Vincent Laurence is an associate editor for Fine Woodworking.

Hardware sources

A Carolina Craftsman, 975 S. Avocado St., Anaheim, CA 92805; (714) 776-7877

Two catalogs (one in color) for \$5, refundable with first order. Wide range of styles and methods of manufacture, including Early American, Victorian, Campaign style and some Chinese, in stamped, wrought, cast and extruded brass.



Antique Restorations, *The Old Wheelwright's Shop, Brasted Forge, Brasted, Kent, TN16 1JL, England*

Reproduction antique hardware only. Catalog costs £19.50 (plus shipping and handling) and includes free annual updates. The designs are copies of original hardware, minor imperfections and all. Catalog updates reflect whatever new reproductions were made in the previous year. Selection is extensive, including a huge range of pulls, knobs and escutcheons, as well as esoteric items such as French mounts (or ormolu) and capitals and finials for tall case clocks. Custom work is available.

Ball and Ball, 463 W. Lincoln Highway, Exton, PA 19341; (800) 257-3711

Manufacturer and retailer of high-quality reproduction hardware, mostly Early American, but also some Victorian. All hardware is either brass or iron, and some of the iron pieces (blanket-chest strap hinges, for example) are entirely hand forged. Extensive selection (over 2,700 items), including full line of clock fittings, casters and feet for table legs. Great variety of Early American pulls. Custom work available.

J.D. Beardmore & Co. Ltd., 3-4 Percy St., London, W1P 0EJ, England

Manufacturer and retailer of reproduction

Glossary of hardware-related terms

Cast. Formed by pouring a molten material (like iron or brass) into a mold, usually ceramic or sand, and allowing it to cool until solid.

Escutcheon. Plate around a keyhole that is primarily ornamental but also serves to prevent excessive wear at the edges of the keyhole. Escutcheons may be made of metal, wood or a variety of other materials.

Extruded. Forced through a shaped die to yield a part of consistent dimensions—just like squeezing toothpaste out of the tube.

Finial. A decorative tip on a hinge. On case clocks or atop a breakfront or secretary, an ornament at the top of the case. Sometimes carved of wood, sometimes cast in brass.

Forged. Formed by heating metal and hammering it into shape. Traditional smiths forged hardware by hand with hammers of various shapes. Today, large mechanical treadle hammers are used as well.

French fittings, French mounts. Extremely ornate hardware, known more formally as ormolu. Made from an alloy of copper and tin and usually applied to the knees of 18th-century French tables and desks.

Ormolu. See French fittings.

Pressed. See stamped.

Stamped. Shaped and often cut by means of formed dies and massive pressure. Presses capable of exerting as much as several hundred tons of pressure are used by industries to stamp out metal parts.

brass and iron hardware. Founded in 1860. Fair-sized selection of knobs, escutcheons and pulls. Also carries some hinges, casters and finials. Catalog is £5.

Brassworks, 379 Charles St., Providence, RI 02904; (401) 421-5815

Both a manufacturer and a distributor of a number of other manufacturers' products. Styles range from Early American to contemporary. Custom services include casting and refinishing.

Larry and Faye Brusso Co., 4865 Highland Road, Suite J, Waterford, MI 48328; (810) 674-8458

A small manufacturer that sells directly and through a number of woodworking catalogs. Brusso is the only manufacturer of high-grade knife hinges. And its other products are made to the same standards—milled from thick brass sheet stock, hand fitted and finished. Products include box hinges, knife hinges, butt hinges, lid supports, jewelry box feet and door/drawer handles.

Buffalo Studios, 1925 E. Deere Ave., Santa Ana, CA 92705; (714) 250-7333

Reproduction Arts-and-Crafts hardware in hand-hammered copper. Handsome hardware, but expensive. Gustav and L & J.G. Stickley lines. Custom services, too.



Cirecast, cast-brass drawer pull

Cirecast Inc., 380 7th St., San Francisco, CA 94103; (415) 863-8319

Manufacturer and retailer of beautiful reproduction Victorian hardware, primarily architectural in scale (full-sized door hinges, knobs and so forth), but Cirecast's line also includes cabinet knobs, drawer pulls and escutcheons. All items are cast in molds made from original pieces of hardware designed between 1870 and 1885.

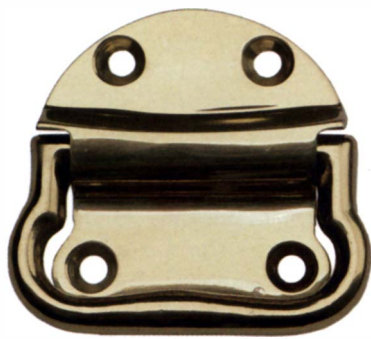
Constantine, 2050 Eastchester Road, Bronx, NY 10461; (800) 223-8087

Small but broad selection of furniture hardware. Carries most of Brusso line, a sampling of Early American-style pieces and a few Victorian and contemporary pulls. Emphasis on brass but also carries wood, plastic, porcelain and glass hardware.

Crown City Hardware, 1047 N. Allen Ave., Pasadena, CA 91104; (818) 794-1188

Its 370-page catalog is \$6.50 (\$9.50 with express shipping). Includes a glossary and primer on various types of hardware it carries. Emphasis is on architectural hardware, but there's lots here for furniture makers, including hand-forged, cast-iron hinges, cast-brass trunk handles in several styles and cast-iron bin pulls. Mostly reproductions but also some antique pieces. Another 200-page catalog (this one's pricey—\$25), in a three-ring binder, features over 1,000 pieces shown in actual size, most of them of European origin and difficult to find elsewhere. Custom services are available.

(continued on next page)



Crown City, chest handle

Dimestore Cowboys, 614 Second St. S.W., Albuquerque, NM 87102; (505) 244-1493 Manufacturer and retailer of knobs, pulls, hinges, handles and latches featuring contemporary and traditional Western motifs. All items are of hand-forged iron except some pewter knobs and handles. Many finishes are available.

DuChamp's Irreverent Guiding Spirit Inc. (D.I.G.S.), PO Box 2064, New York, NY 10013-2064; (212) 966-7352 D.I.G.S. manufactures and retails a small line of unique, organic-looking furniture and cabinet hardware called Primaltech. There are five designs, all cast. Each is available in three materials: bronze, brass-bronze and nickel-bronze.

18th Century Hardware Co., 131 E. Third St., Derry, PA 15627; (412) 694-2708 Mid-sized selection of Early American and Victorian hardware in brass and iron. Items include pulls, escutcheons, some knobs, a few latches and hinges, as well as casters and French fittings. Catalog provides short, informative discussions of furniture periods (Chippendale and so forth) associated with each style of hardware carried.

Fagan's Forge, PO Box 964, Dayville, CT 06241; (203) 963-0130 (Fax only) Small company offering authentic, hand-forged iron hardware reproductions. Mostly architectural, but H- and H-L hinges are available, and custom work is done.

Faneuil Furniture Hardware, 163 Main St., Salem, NH 03079; (603) 898-7733 No-frills catalog of 160 pages packed with hinges, pulls, knobs, escutcheons, bedpost, bolt-hole covers and specialty items like clock finials, corner reinforcement plates and French fittings. Lots of stuff you won't see anywhere else. Largest selection of Chinese-style hardware I ran across.

Garrett Wade Co. Inc., 161 Avenue of the Americas, New York, NY 10013; (800) 221-2942

Its 46-page color hardware catalog shows each piece of hardware in actual size. Nice selection of high-quality, classic brass hardware. Hinges, pulls, handles, knobs, latches, lid stays, casters and more.

Hardware Concepts Inc., 3728 N.W. 43rd St., Miami, Fla. 33142; (305) 638-5922 Contemporary knobs and pulls in plastic, brass and other materials.

Hardware+Plus Inc., 701 E. Kingsley Road, Garland, TX 75041; (214) 271-0319 Retailer and commercial supplier of a wide range of hardware. Mostly architectural, but two catalogs within its three-ring binder deal primarily with furniture and cabinet hardware. One of these catalogs is identical to that of A Carolina Craftsman (see p. 69). The other catalog contains a good deal of Victorian, Oriental and high-style French brass hardware. Also available are wooden Mission-style pulls, brass Arts-and-Crafts cabinet pulls and glass knobs and pulls.

Harper Hardware Inc., 1712 E. Broad St., Richmond, VA 23223; (804) 643-9007 Small selection, but includes good variety of items, from Victorian bin pulls to bronze-coated, cast-zinc, Mission-style pulls.

HEWI Inc., 2851 Old Tree Drive, Lancaster, PA 17603; (717) 293-1313 Large European manufacturer of nylon architectural and cabinet hardware and other architectural products. Sleek, contemporary knobs, pulls and handles in bright pri-

mary colors, as well as more muted shades, and black and white. Sold through independent dealers. Ask for name of dealer nearest you, and request the cabinet hardware brochure from customer service.

Hida Tool & Hardware, 1333 San Pablo Ave., Berkeley, CA 94702; (510) 524-3700 Primarily a tool dealer but also supplies hand-forged and machine-made tansu pulls (both single and double post) in iron, brass, steel and copper. Materials vary with the style of pull. Catalog is \$4.

Horton Brasses, Nooks Hill Road, PO Box 95, Cromwell, CT 06416; (203) 635-4400



Horton, various Hepplewhite-style escutcheons, all in brass

Small, family-owned manufacturer and retailer of reproduction hardware. Primarily Early American pieces but also some Victorian. Mostly brass hardware but also some hand-forged iron pieces and wooden knobs. Good selection, high quality.

Imported European Hardware, 4320 W. Bell Drive, Las Vegas, NV 89118; (702) 871-0722 Importer and retailer of hardware from many countries, including Spain, France, Italy, England and Taiwan. Materials include iron, brass, glass, porcelain and wood. Not a huge selection, but some unique pieces and a wide variety of styles.

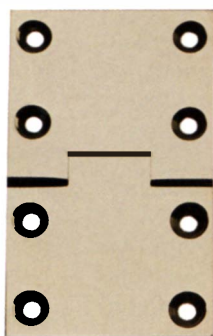
Iron Art, 2227 Filbert St., Suite 12, San Francisco, CA 94123; (415) 441-4633 Small manufacturer and distributor of hand-

A hinge for every situation and style

Box hinge



Butler-tray hinge



Butt hinge



Butterfly hinge

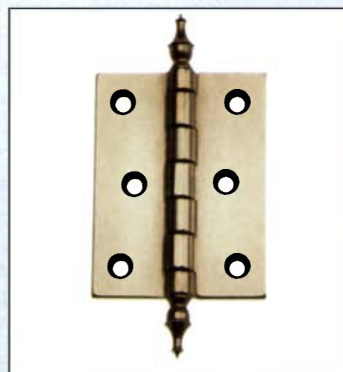


Method of manufacture determines look and function of hardware

Hardware is made in a number of ways. It may look the same at a distance. But when you look more closely, the subtleties begin to reveal themselves.

On utilitarian cabinets, inexpensive, stamped hinges may be fine or exactly what's called for. But it doesn't make sense to put cheap hardware on a project you've labored over for weeks. So here is a visual comparison of five hinges—one stamped, one extruded, one milled, one cast and one forged. The methods used to produce these hinges are the same for other types of decorative hardware as well.

—V.L.



Milled

Milled hinges start out as thicker stock and are machined down to precise tolerances. The hinge-pin hole is drilled and reamed for a perfect fit. The only readily available milled hinges being made today are by Larry & Faye Brusso. The finish used on their hinges is a brushed or matte finish. Not all milled hinges have finials like this one.



Stamped

Stamped hinges are generally thinner than other hinges. Note the rough surface texture, especially where the leaves wrap around the hinge pin, and the distortion at the outside edges of the leaves next to the screw holes. Stamped hinges often are too tight or too loose because it's difficult to tune a press to make a perfect fit around a hinge pin.



Cast

Cast hinges are perhaps the least precise type of hinge. But looks are the real reason to use cast hinges or cast hardware. Cast hardware has a softer feel. The edges aren't as sharp as with the other manufacturing methods; often there are little pits where grains of sand shifted in the mold. These imperfections give cast hardware its antique look.



Extruded

Extruded hinges are thicker than stamped hinges, and they are much closer to a consistent thickness over their whole surface. They're also usually better finished, with a more precise fit between hinge leaves and pins. Extruded hinges generally are reasonably priced, making them a good value. Extruded hinges are sometimes called drawn hinges.



Forged

Forged hinges vary in quality and precision depending on the blacksmith's skill. Price is generally a fair indication of quality. As with cast hinges, you don't use forged hinges for their performance, but rather for their character or appearance. A set of hand-forged butterfly or strap hinges on a painted Early American piece just looks right.



Blanket-chest strap hinge



Card-table hinge, flush (top) mounted



Card-table hinge, side mounted

forged iron hardware. Pieces are all primitive or rustic. Small selection of handles and pulls. Available in a variety of finishes including natural, unfinished iron, rust, verdigris, antique copper and painted black.



Iron Art, iron pull

Lamp brand hardware from Sugatsune America, Inc., 221 E. Selandia Lane, Carson, CA 90746; (800) 562-5267

Sleek, contemporary hardware in a variety of metals (including brass, stainless steel, aluminum and zinc alloy), plastics and phenolic-impregnated wood. Pieces include a wide variety of hinges, knobs, pulls, latches, casters, lid stays and more. Sold through independent dealers. Call for catalog and location of nearest dealer.

Lee Valley Tools Ltd., 1080 Morrison Drive, Ottawa, Ont. K2H 8K7, Canada; (800) 267-8767

Lee Valley has a small selection of generally high-quality brass hardware, much of it imported from Europe. Brass knobs, pulls, hinges, escutcheons, handles and more.

Liberty Brass Turning Co. Inc., 38-01 Queens Blvd., Long Island City, NY 11101; (718) 784-2911

Liberty Brass manufactures all manner of items from brass, including pulls and finials with a modern, space-age kind of look. Standard finishes are polished and lacquered brass, polished chrome and satin chrome. Other finishes (including gold, silver or oth-

er precious metals) are available at extra cost. Custom work is available.

Liz's Antique Hardware, 453 S. La Brea, Los Angeles, CA 90036; (213) 939-4403

No catalog, but a resource nonetheless if you need to match existing hardware or want authentic antique hardware. Send a photo, a template and a check for \$10 (handling fee), and the staff will try to find what you need. Emphasis is on late 19th, early 20th centuries (Victorian, Eastlake, Art Nouveau, Art Deco and Arts-and-Crafts styles).

Melting Pot Studio, 25 Eagle St., Suite 303, Providence, RI 02908; (401) 453-5639

A small foundry making unusual pulls and knobs in shapes, such as starfish, sea shells, nuts and maple seeds. Available in brass, red bronze and silver bronze. Color photocopy and price sheet available.

Minumet Italy, distributed by AIM Tools and Accessories, 91 Niagara St., Toronto, Ont. M5V 1C3, Canada; (800) 665-0900

Italian manufacturer of brightly colored, nylon and ABS plastic hardware.

D.C. Mitchell, 8E Hadco Road, Wilmington, DE 19804; (302) 998-1181

Small forge and foundry. Hand-forged iron and cast-brass hinges, knobs, pulls, handles and escutcheons are its stock in trade. Iron is available with linseed oil or black paint finish. Brass is available in bright, highlighted antique or antiqued finishes.

Montebello Smithy, 31 Newlands Ave., Newlands, 7700 Cape Town, Republic of South Africa

Small forge supplying curvaceous handles and pulls in mild or stainless steel. Finishes include polished, semipolished and black. Ask for catalog and price sheet.

Nathan's Forge, 3476 Uniontown Road, Uniontown, MD 21158; (410) 848-7903

Mostly accessories for the home, but there are iron H- and rat-tail hinges in the catalog and custom work is accepted.

Old World Hardware Co., 103 N. Texas, DeLeon, TX 76444; (817) 893-3862

Victorian (including Eastlake and American Oak styles) and Queen Anne hardware in cast and stamped brass. Mostly pulls, knobs and escutcheons, also a few hinges. Wooden knobs (oak, maple, walnut and cherry), as well.

Paxton Hardware Ltd., PO Box 256, Upper Falls, MD 21156; (410) 592-8505

Retailer of traditional iron, brass, wood, glass and porcelain hardware. Fairly broad selection of styles including Federal, Chipendale, Victorian, Campaign and Arts and Crafts. Items include pulls, knobs, handles, escutcheons and lid stays.

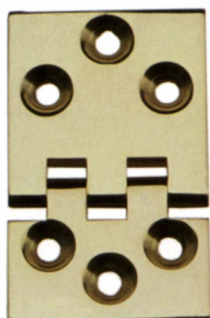


Smith Woodworks, tenoned Shaker-style knobs and Mission-style pull

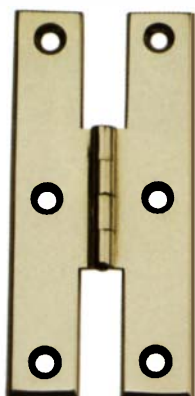
Period Furniture Hardware, 123 Charles St., PO Box 314, Charles Street Station, Boston, MA 02114; (617) 227-0758

Retailers of brass, iron, wood, plastic, glass and porcelain hardware in a wide range of primarily traditional styles including Chipendale, Victorian, Sheraton, Hepplewhite, Campaign and Oriental. Pieces include pulls, knobs, escutcheons, clock finials, bed-bolt hole covers, corner reinforcements, casters, cast claw feet, lid stays and more.

Drop-leaf hinge



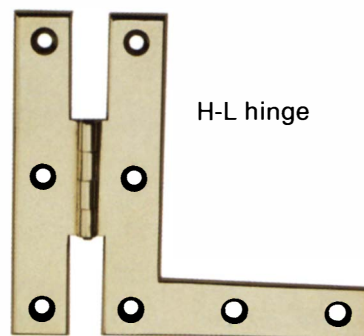
H-hinge



Frog-leg hinge (also called snake, serpentine and cock's-head hinge)



H-L hinge



Reid Tool Supply Co., 2265 Black Creek Road, Muskegon, MI 49444-2684; (800) 253-0421

More a machinist's than a woodworker's supplier, but all the more interesting for that. Knobs and handles in various shapes and materials (including zinc, steel, aluminum, phenolic, ABS plastic, polypropylene). Hardware is not intended to be decorative, but it could be perfect for shop furniture, industrial-looking kitchens or wherever a utilitarian aesthetic is desired.

Wm. J. Rigby Co., 73 Elm St., Cooperstown, NY 13326; (607) 547-1900

Small-scale retailer of old and antique hardware. Catalog costs \$7, which includes updates, additions and "spur of the moment offerings of items of limited quantities." Primarily architectural, but cabinet pulls, knobs, catches, handles, hinges and escutcheons are also in the catalog. Also, you can send a self-addressed, stamped envelope with a request, and Rigby will try to find what you're looking for. Almost all of the hardware is old but unused; 5% is cleaned-up salvage.

Smith Woodworks & Design, 101 Farmersville Road, Califon, NJ 07830; (908) 832-2723

Crisply turned wooden knobs and Mission-style knobs (face grain) in maple, cherry, walnut and oak. Excellent prices.

Tremont Nail Co., 8 Elm St., PO Box 111, Wareham, MA 02571; (508) 295-0038
Strap, butterfly, H- and H-L hinges in iron.

Van Dyke's, 4th Ave. & 6th St., PO Box 278, Woonsocket, SD 57385; (605) 796-4425

A supplier of materials for upholstery, cabinetmaking, woodworking and antique restoration. Cast brass claw-and-ball feet, claw feet and claw-foot casters, regular cast-brass casters, feet, finials, pulls and knobs. Pulls and knobs also available in glass, porcelain, marble and combinations of brass and wood and brass and porcelain. A few hinges and escutcheons.

Wayne's Woods, Inc., 39 N. Plains Industrial Road, Wallingford, CT 06492; (800) 793-6208

Wayne's Woods has mostly Victorian brass pulls and escutcheons. Some handles and brass, glass, porcelain and wood knobs.

Whitechapel, Ltd., PO Box 136, 3650 W. Highway 22, Wilson, WY 83014; (800) 468-5534



Whitechapel, brass rosette pull

Good-sized catalog of excellent reproduction hardware from all over. Emphasis is squarely on traditional furniture, with Early American and older European hardware making up most of the offerings. High-quality cast-bronze Arts-and-Crafts pulls, too, as well as hand-forged Oriental iron pulls and corner (and other joint) reinforcements. Some Victorian and Edwardian pieces. Materials used are brass, iron and wood. Pieces include virtually any kind of decorative hinge you can imagine, knobs, pulls, escutcheons, finials and other clock hardware, lid stays, casters (claw foot and plain) and bed-bolt hole covers.

Windy Hill Forge and The Cast House, 3824 Schroeder Ave., Perry Hall, MD 21128-9724; (410) 256-5890

One-man shop doing primarily custom work in hand-forged iron and brass and cast brass. Strap hinges available with 21 different endings. A lot of Early American as well as Mission-style, Oriental and even modern pieces.

Woodbury Blacksmith & Forge Co., PO Box 268, Woodbury, CT 06798; (203) 263-5737

Three smiths making beautiful, historically

authentic, hand-forged iron hardware. Pieces include strap, H- and H-L, butterfly and rat-tail hinges. Custom work accepted.

Woodcraft, 210 Wood County Industrial Park, PO Box 1686, Parkersburg, WV 26102-1686; (800) 225-1153

Small selection of generally high-quality hardware including most of the Brusso line, a few brass pulls, escutcheons and hinges. Also, wooden and porcelain knobs, some specialty jewelry-box hardware and stamped-brass Mission-style hardware.



Whitechapel, Arts-and-Crafts pull

The Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374-9514; (800) 279-4441

The Woodworkers' Store carries a mid-sized selection of inexpensive brass hinges, lid stays, latches, pulls, knobs and escutcheons. Also, some commercial-style pulls, wooden and porcelain knobs and pulls and most of the Brusso line.

Woodworker's Supply, 1108 N. Glenn Road, Casper, WY 82601; (800) 645-9292

Woodworker's Supply has wooden knobs and pulls, various brass and brass-plated steel hinges, hasps, latches and pulls. □

Knife hinge



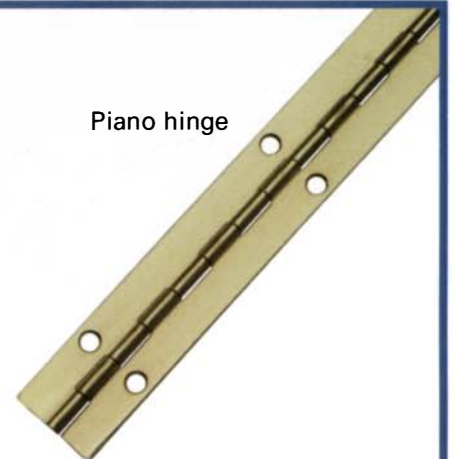
Counter hinge



Rat-tail hinge



Piano hinge



Choosing a Tablesaw

Buy the saw that fits your needs and your budget

by Robert M. Vaughan

In many small shops, no tool is more important than the tablesaw. Whether you're looking for your first 10-in. tablesaw or satisfying an upgrade itch, you're more likely to get the saw you want if you start by defining your needs—and your budget. By knowing where to look and what to look for, you'll stand a good chance of buying the right one.

For cutting 3/4-in.-thick pine, almost any saw will do. But if you're ripping 2-in. hardwood, the more power you can get, the better. So the first step is to analyze the type of material you usually work with.

If you work with a lot of plywood, bolt-on table wings and an outfeed table will be very helpful. And a hefty saw with a long, sturdy rip fence will make working with heavy panels easier.

Also, consider your skill level. An accomplished woodworker can do good work on almost any machine. If something goes wrong, a beginner may have trouble figuring out if the problems are due to a lack of craftsmanship or the machine. Starting out on a good machine shortens the woodworking learning curve, assuming the saw has been set up correctly.

Shop size also will factor into your decision. Do you have space for a machine in the middle of the floor? Or will you need

to push it off to the side when not in use? For the truly tiny shop, a small, lightweight machine that can be stored under a workbench might be just the ticket.

Where to look for new machines

I strongly recommend seeing the machine before making any buying decisions. Hardware stores and home centers are good places to find medium-to-low range machines. Higher-quality machines are sometimes found at home centers and large hardware stores but more likely at industrial distributors. The biggest problem with looking at any new machine on a showroom floor is that you may not be able to try it out.

One way to get around this problem is to finagle an invitation to someone's shop. A manufacturer or distributor may know a customer who is willing to show off his equipment. Once in the shop, you should be able to see firsthand where the machine throws dust, how loud it is and how convenient the controls and switches are. Be sure to ask the owner about the saw's weak points as well as its strengths.

Weigh mail orders carefully

I'd rather buy a new tool from a local dealer than from a mail-order company. For



There's a saw for every budget, as shown in this display of saws at Lowe's, a Roanoke, Va., store. To get the right saw, define your needs first. After that, it's easy to find a saw with the right combination of power, quality and precision.

one thing, I get to see the tool before I buy it. I also want to help keep local retailers in business. A local dealer may help set up a new tool or at least provide advice if I run into trouble. And if I don't like the tool, it's a whole lot easier dealing with a local retailer than a mail-order company hundreds or thousands of miles away. A mail-order house will sell you a machine, but the company sure can't service it.

But there are advantages to buying mail order, too. Mail-order prices are often (but not always) lower. Your choice of brands is likely to be much wider. If you shop locally, you may have to settle for a tool that isn't your first choice. With so many mail-order houses to choose from, buying by mail means you get exactly what you want. If you do shop by mail, though, make sure parts will be available.

How to look at a tablesaw

A pocket flashlight, a nickel (yes, a nickel), a tape measure and a piece of string are helpful when looking at tablesaws. The flashlight will help you investigate the guts of the machine. Check out the gauge of the sheet metal, thickness of the cast iron (you don't want thin, tinny parts) and overall heft of the machine. Shake anything you can grab: the motor, the drive belt, the trunnions, even the blade. (Make sure the saw's unplugged, and take care not to cut yourself on the sharp teeth.) Parts that rattle easily may fall off later or indicate the saw isn't well-made. Listen to the machine when it's running. Are there vibrations, rattles or other suspicious sounds?

Vibration in a tablesaw can cause ragged cuts and can contribute to operator fatigue. If you are able to test the saw before buying it, check for vibration by balancing that nickel on the saw's table, with the machine running but no blade attached. If the nickel doesn't fall over, good. If the nickel won't stay up, look at a different saw.

Measure the machine's footprint, including anything that sticks out, such as switch boxes or motors, to see if the saw will fit your allocated space. Check to see that the miter-gauge slots are parallel. Pay particular attention to this detail on less expensive machines.

The string is used as a gross check of the tabletop's flatness. Stretch the string across the top in several places, and look for any dips or humps.

What you get for your money

To better define what a buyer might expect to get for his money, I've divided tablesaws into five different classes based on price. Class A saws range from \$1,500 to \$2,000

and include saws such as Delta's Unisaw, the Powermatic 66 and the General 350, as shown in the photo below. These 10-in. saws set the standards by which all other saws are judged. The class B saws cost between \$1,000 and \$1,500 and are stripped versions of Class A saws. The \$500 to \$1,000 Class C saws are the contractor-type saws, as shown in the bottom right photo on p. 76, and the Taiwanese versions of Class A saws, as shown in the top photo on p. 76. The \$300 to \$500 Class D saws are mostly lightweight saws or imported contractor saws (see the bottom left photo on p. 76). Under \$300 buys hobby- or home-owner-grade machines.

Class A tablesaws: \$1,500 to \$2,000—

The strength and purity of the highly refined cast iron and steel used in these saws

help make them the smoothest running and most durable 10-in. saws on the market. Standard equipment includes a \$300 fence, a \$300 motor, a \$60 miter gauge and often a \$150 magnetic starter.

But the internal framework is the real strength of these machines, as shown in the bottom left photo on p. 77. The trunnion brackets are large and strong. The worm gears and machined teeth are large and made from high-quality metal. Hand wheels are large and easy to use. The enclosed base of a Class A saw houses the motor, which reduces the machine's footprint and makes dust collection a lot easier.

Service and tune-up on a Class A saw is easiest of all 10-in. tablesaws. By removing only three or four bolts, the table can be taken off to expose the internal workings of the saw for bearing or belt changes, lubrication and cleaning. Parts are readily available and will continue to be available. And there are lots of after-market accessories made for these saws. Because of their desirability, these saws maintain a high resale value.

Though Class A saws are powerful, smooth and accurate, they aren't perfect. Two-inch oak still bogs things down unless a rip blade is used. The power these

Starting out
on a good machine
will shorten
the woodworking
learning curve.



Top-quality saws cost between \$1,500 and \$2,000. These saws, what the author describes as Class A machines, have solid cast-iron tables and extension wings and a full-length fence. These heavy-duty, smooth-running machines form the backbone of many small professional and serious amateur woodworking shops.

saws use will require a separate circuit. Because they're so heavy, a roll-around base is helpful if the saw will be moved frequently. And, because of their power, kickbacks tend to be a little more forceful.

Class B tablesaws: \$1,000 to \$1,500—

Stripped-down versions of Class A saws, these saws often have lower-powered motors (1½ hp or 2 hp instead of 3 hp, for example), inexpensive electrical controls or short fences. On the low end of this price range, you'll find some saws with Class C contractor-saw inner workings dressed up like Class A saws, complete with fence and accessories.

Parts and service for Class B tablesaws are the same as the Class A saws, and resale values, while not quite as good, are still relatively high.

Class C tablesaws: \$500 to \$1,000—

This is probably the most popular price range of tablesaws found in nonprofessional shops because of the balance between quality and price. At the upper end are the Taiwan-made copies of the Class A saws and at the lower range, the lighter saws made from high-quality cast iron and steel, such as the Delta contractor's saw.

I've heard mixed reviews from owners of the half-priced copies of Class A ma-



Imports mimic high-end machines. Imported imitations of more expensive machines offer woodworkers many big-machine advantages for less than \$1,000, but expect some compromises in quality.

chines. Schools or professional shops probably won't be completely satisfied with a saw in this price range. Nonprofessional woodworkers don't seem to be as sensitive to the consequences of quality compromises because they don't use their saws as much. The problems usually start with the motor or motor controls.

The internal workings of these saws are similar to those in better grades but aren't up to the same standards, as the price clearly reflects. The fences on these ma-

chines seem to be satisfactory but, again, not of the same caliber as more expensive saws. Parts and service records are spotty, with some importers better than others. Predictably, the resale value of these Taiwanese machines isn't as strong as it is with more expensive saws.

The internal components of the contractor-type saws are somewhat lightweight, as shown in the top photo on the facing page. But the full-sized table, combined with a low price, has made this saw a hobbyist's favorite for years.

The lightweight design, though plenty strong because of the quality of the metal, transmits more vibration than the Class A saws, particularly when using a dado set or a molding head. The motor is suspended out the back of the machine, and the long-drive belt contributes to the vibration. The suspended motor also may interfere with an outfeed table, and without an outfeed table, cutoffs drop on the motor and could get wedged in or damage some of the mechanical components.

The bottoms and backs of these saws are open, thus presenting a challenge when hooking up a dust collector. Motors, usually 1½ hp, and electricals on these machines are adequate.

The tabletop is full-sized, so most of the accessories that fit the Class A machines al-

Contractor's saws are one of the most popular options for the home shop (right). Also found in many professional shops, the contractor-type saw usually sells for \$500 to \$1,000.



Imported copies of the contractor-type saws appeal to occasional woodworkers (above). Saw like these are available for \$300 to \$500.



so will fit contractor-type saws. And parts are readily available. Servicing the machine is a bit of a pain because everything bolts to the bottom of the tabletop and requires flipping the machine upside down for some precision blade adjustments. The standard fence works quite well when adjusted properly. The resale value of these machines remains good.

Class D tablesaws: \$300 to \$500—This group is the most popular for entry-level purchases. In this group are Taiwan-made copies of contractor-type saws and direct-drive, motorized saws.

The Taiwanese contractor-saw copies have all the inherent problems of the relatively lightweight contractor-type saws plus a few new problems. The motors and switches don't have the same longevity as those on the better-made machines. Many of the motors are advertised as totally enclosed, fan cooled (TEFC), but they aren't, as removal of the fan cover and fan quickly shows.

Bearings can be another problem with Taiwanese saws in general. Sawdust contamination of the shielded or open bearings found in most Taiwanese saws can result in premature bearing failure.

Another type of saw in this class are Class E saws with minor upgrades, such as



Photo: author

Working parts of mid-range contractor's saws are lighter than top-of-the-line saws and transmit more vibration. But the parts of these Class C saws are plenty strong due to quality cast iron and steel.

better tables and fences. Expect a lot of soft aluminum extrusions on these models. Handwheels and handles are generally made of plastic. These parts are more susceptible to breakage than those on better-quality machines. The face surfaces of fences and miter gauges often are not as flat, straight or perpendicular to the table surface as they are on higher-quality saws.

Service is spotty, and many parts are difficult, if not impossible, to install, such as brushes and tiny cogged internal drive

belts. Resale value on these machines is not as good as previous classes.

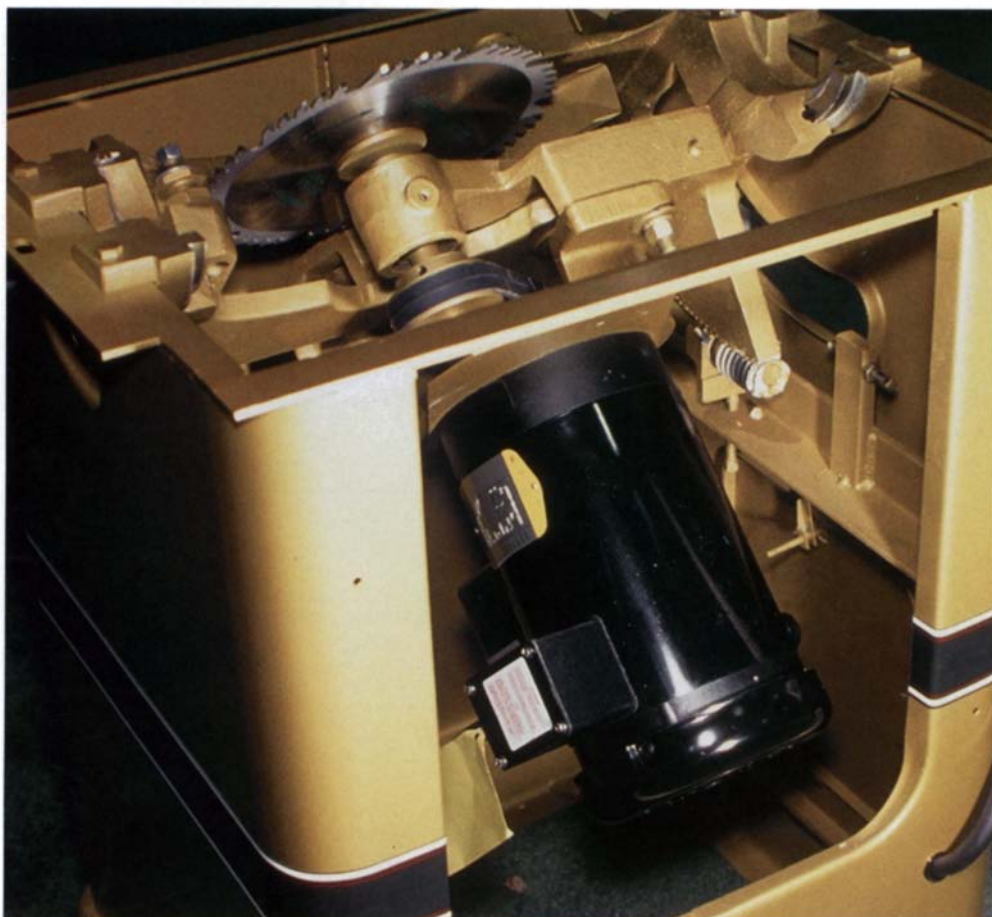
Class E tablesaws: under \$300—These saws are least-suited for the beginning furnituremaker. The beginner often blames himself for imprecise work that is directly attributable to the saw. These saws are usually small, benchtop models that are light enough to be portable.

The tilt and raise mechanisms are usually lightweight, as shown in the bottom right photo below, and get sticky and imprecise with the introduction of sawdust and use. The accessories usually are flimsy. These saws generally are considered disposable because of the expense and difficulty involved in major repairs.

Buying a used machine

A second-hand tablesaw may be the ticket if you are looking for a Class A machine at a Class C price. This option will challenge your scavenging talents and your mechanical abilities, but you'll learn a lot about tablesaws. And you can end up with a machine that you'll never outgrow. But that's the subject of another article. □

Robert Vaughan is a contributing editor to Fine Woodworking. He rehabilitates wood-working machines in Roanoke, Va.



Internal framework is real strength of top-of-the-line saws (left). Heavy-duty trunnions, gears and bearings make for easy adjustments and vibration-free operation in saws costing \$1,500 to \$2,000.

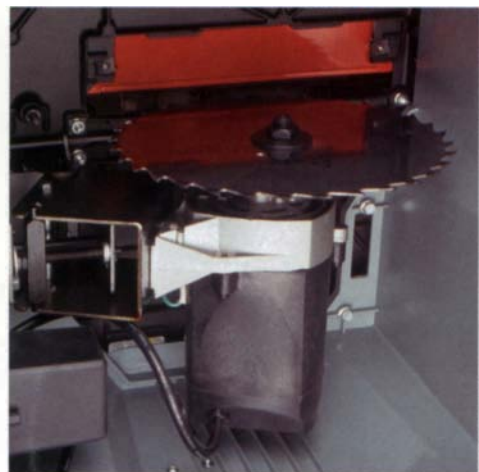


Photo: author

Lightweight tilt and raise mechanisms are typical of low-end saws (above). Less powerful, direct-drive motors also are common in these Class E saws.

Shop-Built Roller Extension Table

Roller balls and vertical adjustability help this unit handle sheet goods with ease

by Bob Gabor

Roller extension table

A shop-built extension table makes cutting large panels on the tablesaw a safer, easier operation.

Space so roller balls are flush with saw top when roller assemblies are in the lowered position.

Roller assemblies

Spacer block

Support, $\frac{1}{2} \times 3 \times 24$

Roller balls, 1 in. dia., evenly spaced

Carriage bolts, $\frac{3}{8} \times 2$

Cross braces, $\frac{7}{8} \times 2 \times 25$

Leg width, 2 in.

Roller support top, $\frac{3}{4} \times 2\frac{1}{4} \times 28$

Baltic-birch plywood, $\frac{1}{2} \times 1\frac{1}{4} \times 25$

Flat-head machine screws, $\frac{5}{16} \times 18$

Dado, $\frac{1}{2}$ in. wide by $\frac{1}{4}$ in. deep

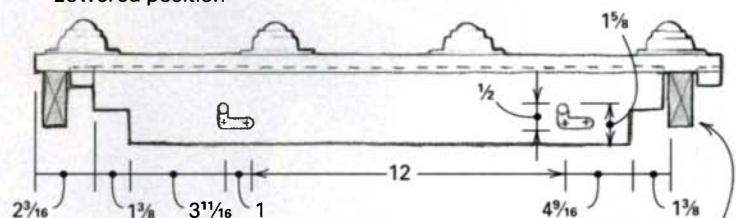
File groove to accept hinge pin.

Hole, $\frac{7}{16}$ in. dia.

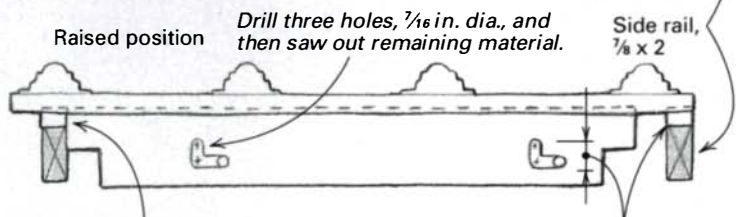
Hinge

Roller assembly detail

Lowered position



Raised position



Spacer block is $\frac{3}{4}$ in. high for a crosscut box with a $\frac{1}{2}$ -in.-thick base.

Adjust spacer block and height of L-slot according to crosscut box base thickness.

I was tired of wrestling big sheets of plywood across the top of my tablesaw. I already had an outfeed table on the back of the saw, but what I really needed was a side extension table to support the heavy panels going into the saw. I didn't want to give up too much valuable floor space to an accessory that I wouldn't be using most of the time.

My solution was a fold-away extension table that uses rows of roller balls to support the workpiece. I chose roller balls instead of long, tube rollers because the balls won't pull stock off-line as it is fed through the saw. Normally, the roller balls are even with the saw's tabletop, but they also can be raised to support long panels that overhang the end of my crosscut box. This straightforward shop fixture is easy to build and use. It sets up and drops back out of the way in a matter of seconds, and it makes cutting plywood on the tablesaw safer and more manageable.

Utility and economy in a shop tool

I'd rather make furniture than shop tools, so I designed the extension table to be as simple as possible. The top frame and the leg assemblies, as shown in the drawing on the facing page, are inexpensive and easy to assemble with a biscuit joiner. Yet they're light and strong. The length of the top-frame assembly and the leg assembly is determined by the distance between the floor and the top of the saw.

The top frame needs to be sized to just clear the floor in the folded position. The legs must be long enough to make the roller balls level with the saw top when the frame is in the raised position.

The extension table also supports long stock in my sliding crosscut box because the rollers are adjustable by the thickness of the crosscut box's bottom. Mounting the rollers on T-shaped assemblies, which adjust easily after loosening a few knobs, was a simple and reliable solution.

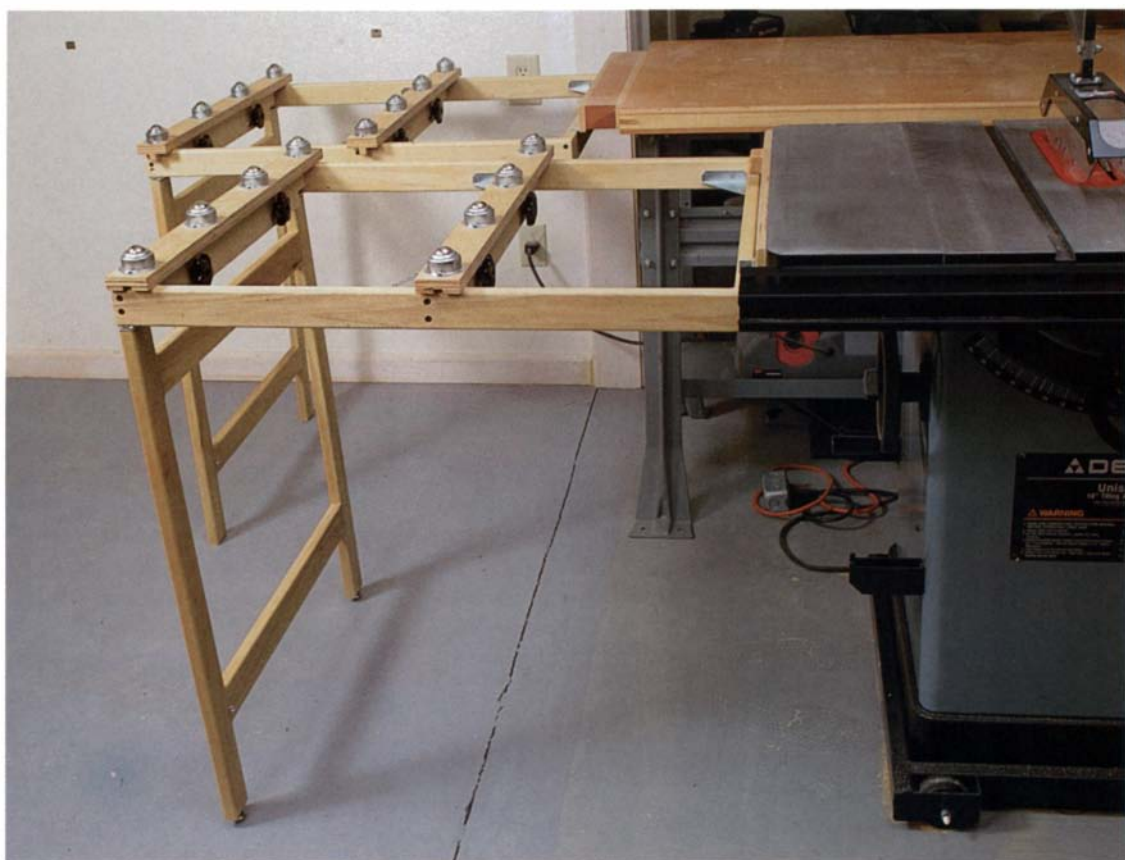
To fold the unit for storage (see the top photo), I hinged the legs to the top frame and also hinged the top frame to the tablesaw top. When folded down, the table doesn't take up much room in my shop. By adding adjustable levelers to the leg assemblies, I made it easy to fine-tune the height.

Finally, I added a piece of lightweight chain to limit the leg travel and a screen-door hook to keep the leg assembly folded for storage. I've been so pleased with the roller extension table that I've built another and attached it to the side of my outfeed table. □

Bob Gabor is an amateur woodworker in Pittsboro, N.C., and a member of the Triangle Woodworkers Association.



The extension table drops into its stored position in seconds and takes up no floor space. Adjustable roller assemblies can be raised so that the table also works with a sliding crosscut box.



A roller-ball extension table makes cutting large panels safer and easier. Unlike long tube rollers, roller balls won't pull stock out of line as it goes through the saw.

Marquetry Step by Step

Double-bevel cutting makes the process easy and accurate

by Gregg Zall

Flawless marquetry may be easier than you think. The marquetry detailing across the drawers on the author's cabinet uses the natural colors of wood to paint a picture. The technique he uses ensures that pieces fit together correctly.



Tilt the table, not the saw. A plywood cutting table tilted at 8° creates the beveled edges of inlay and background pieces. The author moves a jeweler's saw straight up and down, not at an angle, and pulls the work into the saw to cut the patterns.

At woodworking school, I was given the time and the confidence to stretch my cabinetmaking skills to the limit. I challenged myself to include graphic arts in my cabinets, which would combine my love of drawing and furnituremaking. Painting surfaces seemed a shame, though, because paint covers up the wood. Instead, I decided to use the natural colors of wood to create pictures with marquetry.

After a lot of trial, error and advice, I came across a method called double-bevel cutting, which gave me the small, accurate details that I wanted on my cabinets, like the birds across the drawer fronts in the cabinet shown above. There are no distracting gluelines in the finished piece.

How is it done? First tape two pieces of veneer together like a sandwich, and then cut out your design, as shown in the photo at left. The trick is that you cut the hole for the inlay and the inlay piece itself simultaneously, so any deviation in the cut is mirrored in both the inlay and the hole.

Because the cut is made at an angle, the inlay piece on the bottom of the sandwich comes out fractionally bigger, taking up the sawkerf and making a perfect fit when glued in, as shown in figure 1 on the facing page. The bevel-edged inlay piece snugs down into the bevel-edged cutout just like the underside of a flat-head screw fits into a countersink. It's really not that hard to do. So if you're game, I'll walk you through it step by step.



No need to buy veneer. By cutting his own veneer, the author controls the figure of the wood used in the inlays and uses scrap that otherwise might be thrown out. He runs one face of a board over the jointer before cutting the 1/16-in.-thick veneers on a bandsaw.

A palette of natural woods

Natural wood colors, not stain or dye, offer plenty of variety for eye-catching marquetry.

Darks

Ebony
Walnut
Wenge
Imbuia

Reds

Bloodwood
Pernambuco
Pear
Bubinga

Greens

Olive
Lignum vitae
Greenheart
Tulip poplar

Lights

Pear
Holly
Maple
Madrone

Yellows

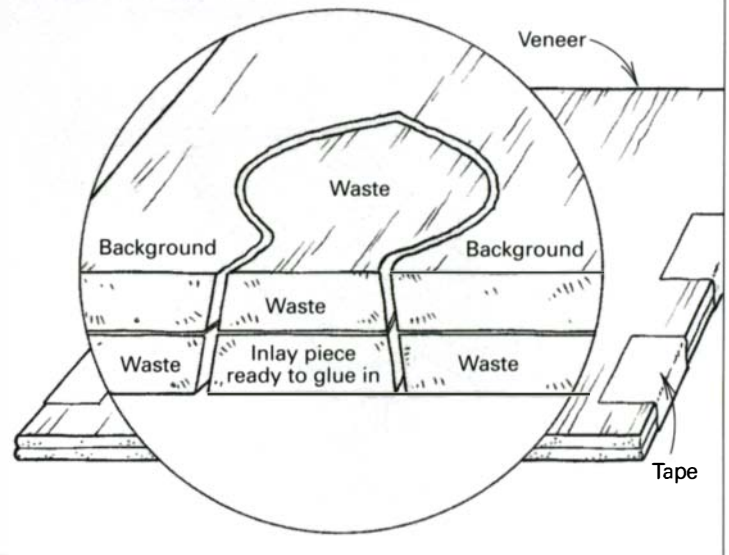
Osage orange
Satinwood
Boxwood
Lignum vitae
Nutmeg

Browns

Fir
Lacewood
Mahogany
Yew
Walnut

Fig. 1: Cutting technique makes a perfect fit

Background and inlay pieces are stacked together and cut at the same time. Because the edges are beveled, the process ensures a tight fit between adjacent pieces and no visible gluelines in the finished marquetry.



Sawing your own veneer

I use my own hand-cut veneers for marquetry. One advantage is that I can pick the wood and figure. All the odd scraps of wood I couldn't bear to toss out are suddenly usable. I have my own favorites, which I've listed by color group in the chart above. Another advantage of cutting my own veneer is that the extra thickness makes the glue joints, and thus the work itself, stronger. I use a bandsaw equipped with a high fence to cut my veneers 1/16 in. thick, as shown in the photo above.

I joint one face of the stock before sawing and then use the veneer just as it comes off the saw. The veneers need to be pretty consistent. Because every bandsaw blade cuts at a slightly different angle, it's essential to clamp a fence to the bandsaw table parallel to the natural drift of the blade. (For more on how to cut your own veneers on the bandsaw, see *FWW* #107, pp. 44-48.)

Setting up a saw and angled table

If you want to try this marquetry technique and you don't have a scroll saw, try a jeweler's saw with an 8-in.-deep throat (available from Frei and Borel, 126 2nd St., Oakland, Calif. 94607; 800-772-3456). A saw this size allows you to do a 6-in.-sq. design, and this saw is more than capable of producing beautiful work. I fitted mine with a longer handle, like the ones found on Japanese saws. And you'd better buy a few dozen blades because they break often.

There's a little trick to installing blades in a jeweler's saw. First insert one end of the blade in the collet by the handle. The teeth should point down toward the handle. Adjust the saw's frame length so that the top collet is 1/8 in. beyond the end of the blade. Then butt the top end of the saw against the workbench, and flex the frame until the blade fits in the collet. If it's tight enough, it should make a musical note when you pluck it.

A scroll saw would be the next logical step in choosing a tool for marquetry. I use a 20-in. electric scroll saw, which gives me more accuracy and allows me to do bigger designs. For blades, whether you choose a jeweler's saw or a scroll saw, use size 2/0 (2/0, *not* 2).

An angled table is the key to double-bevel cutting. If I'm cutting 1/16-in.-thick veneer on a scroll saw, I tilt the table 8°, but the angle might have to be adjusted for veneers of different thickness. If you're using a jeweler's saw, you'll need to make a simple angled table, as shown in figure 2 on p. 82. I made mine from 3/4-in. plywood and tilted the top at 8°. I cut a notch, or bird's mouth, in the front edge of the table, as figure 2 shows, so the work is supported all around the sawblade. I clamp the table to my bench when I need it and stow it underneath when I don't.

When you're using the jeweler's saw, move the work into the blade, just as you would with a scroll saw. The table holds the work at the correct angle, so keep the saw vertical. You'll probably find it relatively easy to keep the blade from tilting left or right,

Carbon paper for the design. To transfer patterns to the workpiece, the author starts with tracing paper and then uses carbon paper to reproduce the pattern on the veneer he intends to cut.

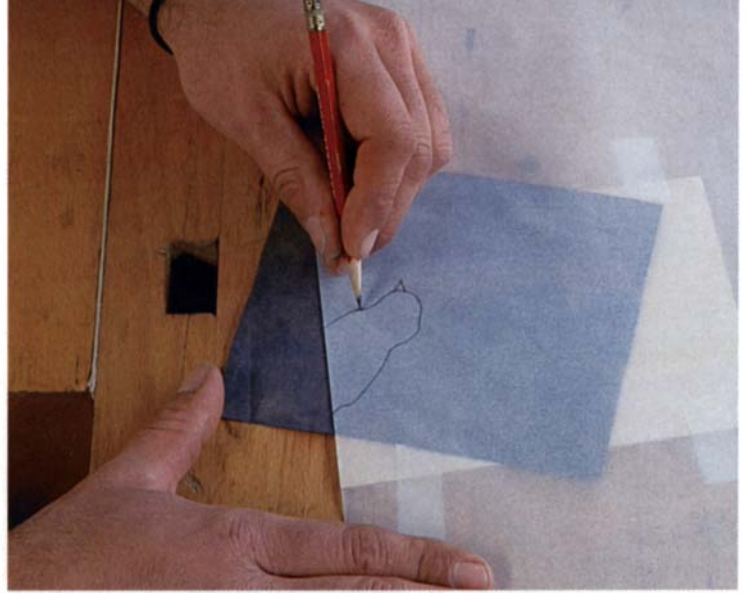
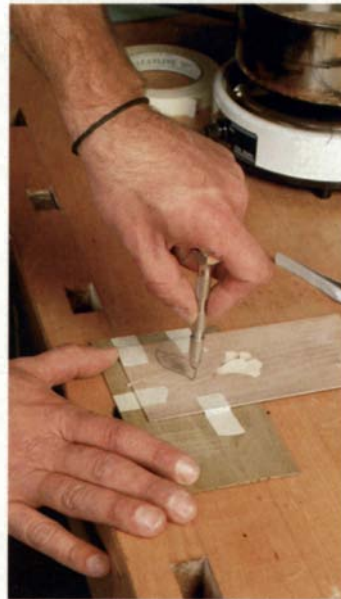
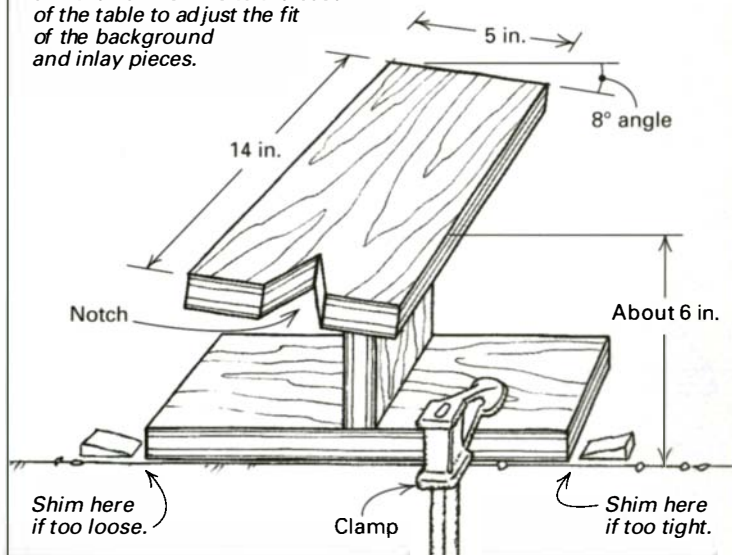


Fig. 2: Build the cutting table at an angle

When cutting the beveled pieces by hand, results are more accurate when the saw is held straight and the workpieces are at an angle. The author uses a plywood cutting table with a canted top. For veneers $\frac{1}{16}$ in. thick, try an 8° angle, and then add shims to the base of the table to adjust the fit of the background and inlay pieces.



A drill can help get a cut started. When an inlay must be dropped into the middle of a piece, the author starts the cut with a tiny drill bit.



No tape and no clamps. After pieces have been cut out, the author glues the inlay into the background material from the back side.

but you might have to fight the tendency to let the handle of the saw tilt toward you. If your curves consistently come out looking sloppy, this is probably the cause. Make your saw a consistent, smooth, slow-cutting machine that stays in one place at one angle. If your inlay pieces are consistently too tight or too loose, try changing the tilt angle of your table. With the jeweler's saw table, a shim will do the trick. With either the handsaw or scroll saw, keep an eye on any small pieces of veneer. It's easy to lose them.

Start with a simple design

It's time to do some marquetry. First choose a background veneer and a contrasting veneer to inlay into the background. Make a sandwich of the two pieces with the background veneer on top. Tape the veneers together with masking tape. Tape them securely, creasing the tape into the corners with your fingernail. Any movement will distort the final fit of the inlay, so don't reuse the tape.

Draw a design on your background veneer. Except for the simplest designs, I use tracing paper to copy the original. Then I lay the tracing on the veneer with a sheet of carbon or graphite paper between the two and retrace the design, as shown in the top photo.

For a start, try something easy like a little blob. I always cut counterclockwise. Because the teeth on the scroll saw face me as I'm

cutting, tilting the table down from right to left produces the correct bevel. With the jeweler's saw, the teeth face away from me, so I built the table with the opposite tilt—running downward from left to right.

When you feel more confident, try cutting multi-curved blobs and other simple patterns. Now try a point. At the tip of the point, keep your saw moving gently in one spot as you bring the work all the way around. You'll be grinding a small hole, but with practice, the parts will fit correctly.

I need a bunch of clamps, right?

Gluing in the inlay pieces requires no tape and no clamping. Just place the background veneer face down on any flat surface, spread glue on the edges of the inlay piece and press it in from the back (see the bottom right photo). The bevel-to-bevel fit provides the only pressure you need. By the time you get the next piece of inlay veneer taped to the background, the glue will have set enough to let you proceed with the sawing.

Overlay and piercing

Marquetry comes alive when one piece is inlaid over another. This is overlay. You can learn the basics of overlay by cutting a bird's



First the beak, then the head. Crisp boundaries are achieved by overlaying one part of a pattern into another, as the author is doing with this bird's beak and head. The scroll-saw table is tilted at 8°.



Hot sand for subtle shading. The finished flower at right gets a sense of visual depth from the shading between adjacent petals. To achieve the effect, the author uses hot sand to scorch the edges of some of the pieces. But be careful—too much heat on large pieces of veneer will change the fit.



Petals are cut in one at a time. Crisp boundaries between individual petals in this sample piece enhance the image's three-dimensional feel.

head. First draw the outline of a bird's head on your background, and then inlay a beak into the background. Spread glue on the edges, and press the beak in from the back. Then make the cut for the head through the beak piece, giving a nice crisp edge where the head overlaps, as shown in the top photo.

Piercing involves drilling a tiny hole to slip the sawblade through. It's easiest to start all your cuts from an edge of the background, but inevitably, you'll have to drop a piece into the center of a background. Or you'll want to go back to add a piece after completing a design. That's where piercing comes in.

First I tape the pieces together. Then I use a tiny drill bit in a hand-held pin vise to pierce both veneers. Drill at one tip of the piece to be cut out (see the bottom left photo on the facing page). Release the blade from the top of your saw, and gently slip the blade through the hole in the underside of the bottom veneer. Reattach the blade, and cut out the design. This leaves a small hole in one corner of the pattern. It can be well-hidden with a mix of sawdust and glue.

Shading with hot sand

This last trick—sand shading—really adds depth and shadow to your design, as the flower in the photo at right shows. Wash some

fairly fine sand, and heat it up on a hot plate. Pick up the inlay piece that needs a little shading with a pair of tweezers. Then dip an edge of the piece into the sand, as shown in the bottom left photo.

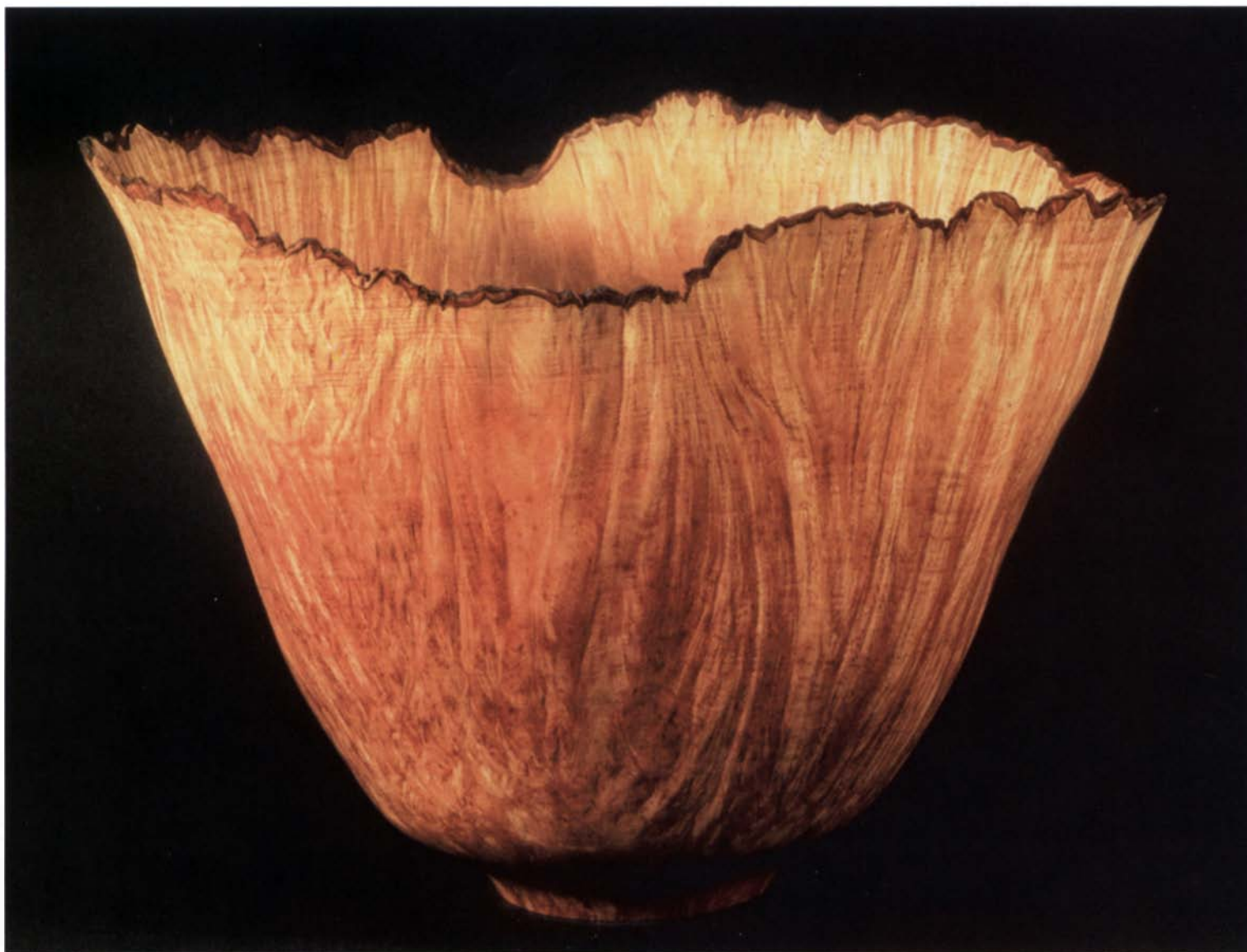
Check the inlay piece constantly because once the wood starts to toast, it darkens quickly. Be careful not to toast large pieces of veneer for too long because they have a tendency to shrink in the heat and distort the fit.

Finishing up

When your marquetry is finished, glue it down to a plywood core at least 1/8 in. thick. And always glue veneer to the back of the core simultaneously to keep the stresses balanced and the core flat. I put a layer of cardboard on the marquetry and stack a few inches of particleboard on top when I clamp the veneer. Then I use as many clamps as I can fit.

After sanding, I finish with shellac because it doesn't distort the color of the wood too much. It's magic when you put on the first coat and the contrasts jump out at you. In this medium, you get textures, pores, colors and light reflections. That is really what makes marquetry so special. □

Gregg Zall is a woodworker living in Petaluma, Calif.



Emperor of Poppies by John Whitehead. Madrone burl, 13 in. high and 18½ in. wide.



Winged Series: Emerging Pyramid Variation by Todd Hoyer. Apricot, with wood burning, 13¾ in. high, 16 in. wide and 9½ in. long.

American Turnings on Tour

Exhibit takes five-year trip through Europe

by Scott Gibson

Last we heard, the work of 24 contemporary American woodturners had just opened in Prague and was headed for Bratislava. That's somewhere in the Slovak Republic for anyone who's not up to date on east European geography. After that, it's Rome, Luxembourg, Athens, Thessaloníki, Paris, Copenhagen, The Hague and Ottawa. Late in 1997, after nearly five years on the road, the 61-piece collection of turned bowls, vessels and

bottles is due back in the United States.

The show, called "Out of the Woods," was put together by the Fine Arts Museum of the South in Mobile, Ala., and is sponsored by the U.S. Information Agency, a government foreign affairs office. The exhibition is part of the Agency's Arts America program, which showcases American artists by sponsoring tours like this one.

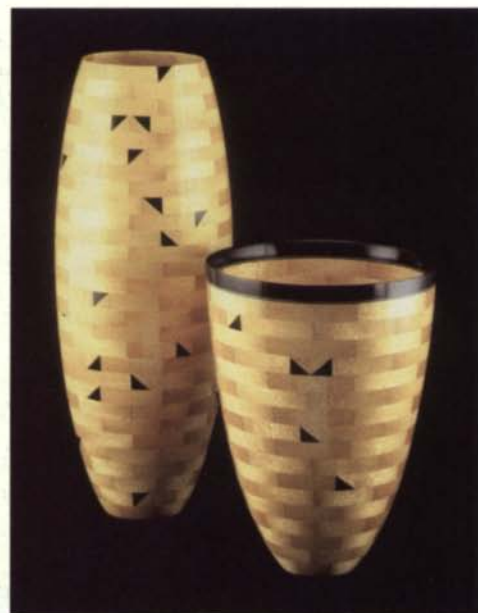
As the photos on these two pages suggest, the work is diverse. It ranges from



Nagare by Dale Nish (above). Wormy ash, 13 in. high and 10 in. wide.



Segmented bowl #457 by Michael Shuler (above). Macassar ebony, 5 in. high and 12 in. wide.



Triangles Series by Bud Latven (above). Pau cetim, ebony and veneers, 6 in. high, 4½ in. wide, and 10 in. high, 3½ in. wide.

Untitled by David Ellsworth (left). Red-wood lace burl, 16½ in. high, 14¾ in. wide.

tiny bottles to vessels more than 3 ft. tall in a variety of woods.

The woodturning techniques cover everything from lamination and segmenting to resin impregnation, multi-axis turning and sculptural carving, according to the Agency.

Turners in the exhibition include Fletcher Cox, Virginia Dotson, Addie Draper, David Ellsworth, Giles Gilson, Michelle Holzapfel, Robyn Horn, Todd Hoyer,

William Hunter, John Jordan, Ron Kent, Stoney Lamar, Bud Latven, Mark Lindquist, Melvin Lindquist, Edward Moulthrop, Philip Moulthrop, Dale Nish, Rude Osolnik, Stephen Paulsen, Michael James Peterson, Wayne Raab, Michael Shuler, Alan Stirt, Bob Stocksdale and John Whitehead.

The Agency said all the turners are active and that their turnings were completed within the last five years. Martha Connell, owner of Connell Gallery in Atlanta, Ga.,

and Joe Schenk, director of Fine Arts Museum of the South, chose turners who played "a fundamental role in shaping the American woodturning movement."

The opening of the show in Bulgaria in January 1993 coincided with the Year of American Craft in the United States. Sponsors were hopeful that the work would cross political and language barriers. □

Scott Gibson is editor of FWW.

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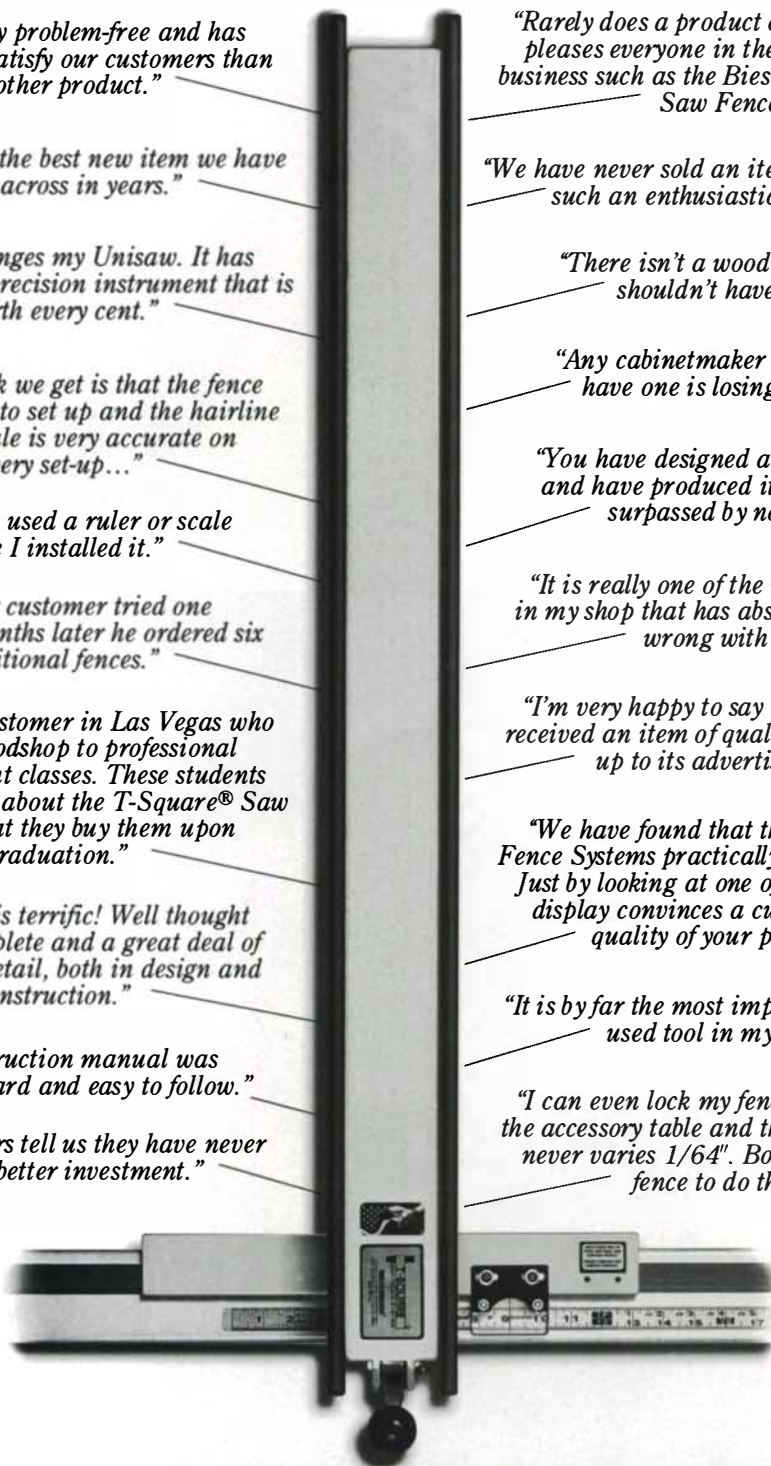
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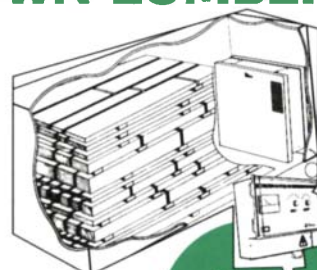
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Portable planer knife-setting device

“A blessing on the house of anyone who makes changing planer or jointer knives quick and easy.” I’m sending this thought out to the engineers at Magna-Set who’ve come up with a simple device (actually a pair) they call Planer Pals.

Planer Pals are a pair of precisely formed fiber-reinforced polycarbonate castings, each with three powerful embedded magnets (see the photo on p. 96). They were designed to set the knives on portable planers, most of which have a 1 $\frac{7}{8}$ -in.-dia. cutterhead. The whole operation is supposed to take no more than five minutes.

I don’t own a planer that fits these things, but I tried them on my vintage Delta 4-in.

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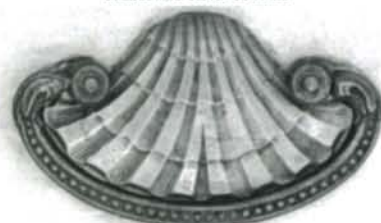
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jointer, which has the same-size cutter-head as the Asian portable planers for which the Planer Pals were designed. It *did* take only about five minutes. This jointer predates lifter springs and jack screws. And for those of you who have been there, you know that the only way to speed things along prior to these Planer Pals was salty language—and even that didn't always help.

To make sure this wasn't a fluke, I tried the Planer Pals on the 4-in. Delta in the university shop where I teach. Sure enough, five minutes later, the job was done. The surface left by both jointers after changing the knives was as good as I've obtained using a dial indicator and magnetic base.

The concept is simple and foolproof.

Two outer magnets grab the cutterhead while the middle magnet lifts and suspends the knife at its correct height. A nub on the underside of the casting registers each Planer Pal against the rear of the knife slot. There are no moving parts and no adjustments. One of the devices is placed at one end of the knife and the other at the other end.

The literature that came with the Planer Pals promises accuracy of .001 in. I didn't quite get that when I checked my results with a dial indicator. But then the gizmo is designed for 12-in. planer knives, not 4-in. jointer knives.

On the downside, Planer Pals are available in only one size, and one size doesn't fit all. They do fit many Asian "lunchbox,"

or portable, planers and, oddly enough, the old 4-in. Delta jointers. Planer Pals do not work with the Ryobi AP-10, which comes with its own knife-setting system. To be sure the Planer Pals will work on your machine, check your cutterhead size or call before you buy.

At \$30 for the pair, Planer Pals seemed a bit pricey at first, considering they're just a few ounces of plastic with six magnets. But then is \$30 a lot to spend on a fail-safe product that easily and accurately performs one of the woodshop's more difficult and distasteful jobs? Not in my book.

Planer Pals and other Magna-Set products are sold by Woodstock International Inc. (P.O. Box 2309, Bellingham, Wash. 98227; 206-734-3482). —Bernie Maas



Quick, accurate knife changes on portable planers. Planer Pals, a pair of polycarbonate castings with embedded magnets, take the hassle out of setting knives on many portable planers. It takes no more than five minutes to use Planer Pals.

Briefly noted

Watco survives with new owner

Woodworkers with a serious Watco habit can relax. Watco Danish oil finish and satin finishing wax won't be disappearing from store shelves and catalogs after all. Minwax Co. announced late last year that it was dropping the Watco line. Just three months later, The Flecto Co. of Oakland, Calif., said it had picked up exclusive rights to manufacture, market and distrib-

ute Watco in North America. Flecto, which makes Varathane wood finishes, said it would use the same basic formula as the original. For now, though, Flecto won't produce Watco's teak oil finish, wood floor finish or rejuvenating oil.

100th anniversary of the power tool

Fein Power Tools Inc. announced that 1995 is the 100th anniversary of its invention of the world's first portable electric power tool, a 3/32-in. drill for boring holes

in steel. The drill had a cast-iron housing and weighed a hefty 16½ lbs.

Elmer's Weather-Tite wood glue

Last year, Borden Co. removed labels from its Elmer's Weather-Tite wood glue that claimed the glue met ANSI (American National Standards Institute) Type II adhesive specifications. To qualify as Type II, an adhesive must pass a battery of tests. One of the tests requires that a joint remain sound after a 48-hour immersion in water.

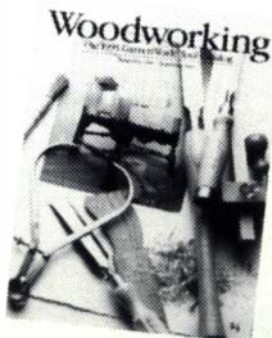
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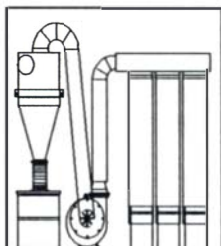
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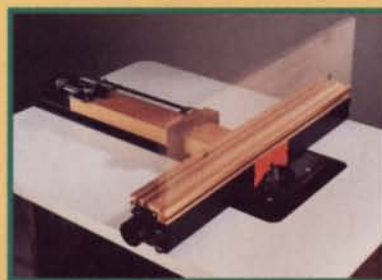


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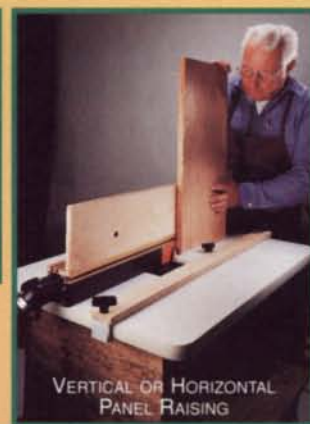
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A company official said that the formulation hasn't changed, but the original data indicating that the Weather-Tite wood glue met all Type II tests was not supported by later tests. The glue is still being sold, and Borden maintains that it is suitable for outdoor use.

American-made machinery hotline

The Wood Machinery Manufacturers of America announced that it is sponsoring a toll-free hotline for information on American-made woodworking machinery. The hotline operator will make recommendations and send both an information sheet on each company that has a product that fits the caller's needs and a buyer's guide and directory.

All the information is free. Only companies that are members of WMMA are listed through this service. The hotline number is (800) 289-9662. —Vincent Laurence

Where to find it

A source for antique English woodworking tools

If you're a fan of Sheffield steel, wood-infilled (Norris-style) planes or just want to get an eyeful of beautiful old tools, you should know about Bristol Design (Tools) Ltd. Bristol mostly sells antique British woodworking tools. Bristol is a British company but was founded by and is still run by an American, Charles Stirling.

Bristol sends out a catalog about four to five times a year (\$20, U.S. funds, for a one-year subscription). Prices on the tools are about the same as they are through U.S. antique tool dealers, but the selection of English tools is much better than anything I've seen this side of the Atlantic.

Bristol also sells new Norris-style planes and kits. Many different styles are available, including smoothers and jointers. For

more information, contact Bristol Design (14 Perry Road, Bristol, BS1 5BG, England).

Wild woods

Blue burls? Red fiddleback maple? Yes, they're wild woods, and that's just what Woodcraft is calling them. Because they are available only in small dimensions, Wild Woods are intended for projects, such as pens and pencils, small platters or bowls and knife handles, as well as inlays, small boxes and furniture details like pegs and pulls.

Maple burls and curly maple are impregnated with dyes and acrylic resin to produce hard, stable woods in shades that Mother Nature never dreamed of. The dyes and resin go all the way through the wood. For more information, contact Woodcraft (210 Wood County Industrial Park, P.O. Box 1686, Parkersburg, W.V. 26102; 800-225-1153). —V.L.

First Lie-Nielsen bench plane available

Those of you familiar with Tom Lie-Nielsen's planes will be excited about the introduction of his No. 2 Bedrock smoothing plane (see the photo at right). And if you're not familiar with Lie-Nielsen planes, this is a great time for an introduction.

The Lie-Nielsen No. 2 is a nearly faithful copy of the Stanley No. 602 Bedrock, a small (7½ in. long) smoothing plane. The "Bedrock" designation refers to Stanley's old line of the same name, its top-of-the-line bench planes.

The most significant difference between the Bedrocks (Stanley's or Lie-Nielsen's) and the standard smoothing planes made by Stanley is that the frog on a Bedrock seats on a milled, inclined plane. The frog is supported over its full length, rather than just fore and aft, which is the case with standard planes. What this means in practical terms is that the plane is virtually chatter-free.

The other big difference between standard planes and the Bedrocks is that the mouth on a Bedrock can be adjusted without removing the blade assembly. Because the mouth can be adjusted to a very fine opening, I often use it as a polishing plane on shelf and carcass edges and on narrow furniture parts. The finish it leaves is glass-smooth, even on hardwoods like white oak or huinga.

As a teacher of woodworking, I often recommend this plane to novice woodworkers instead of the larger No. 3 or No. 4 smoothing planes. Its smaller size makes mastering planing techniques a little easier.

The Lie-Nielsen No. 2 is available either



Bronze bench plane by Lie-Nielsen is better than Stanley original. Lie-Nielsen's first bench plane, a No. 2 Bedrock, is heavier and more precisely milled than its Stanley forebear. And the plane offers better seating between the frog and the plane body.

in cast iron (like the Stanley original, but with a bronze lever cap) or in manganese bronze. The cast-iron version weighs 3 lbs. (¾ lb. more than the Stanley original); the bronze version weighs in at 3¼ lb. This added heft is a virtue. It contributes to the plane's stability and to the plane's chatter-free performance.

The cast-iron No. 2 sells for \$180; the bronze version is priced at \$195. A Bedrock No. 4 is in the works now and will be the next bench plane brought out by Lie-Nielsen. I can hardly wait!

For more information or to buy a plane, contact Lie-Nielsen Toolworks (Route 1, Warren, Maine 04864; 800-327-2520).

—Mario Rodriguez

Sandor Nagyszalanczy is a contributing editor to Fine Woodworking. Bernie Maas is an instructor of computer-aided design and woodworking at Edinboro University of Pennsylvania. Vincent Laurence is an associate editor at Fine Woodworking. Mario Rodriguez is a contributing editor to Fine Woodworking.

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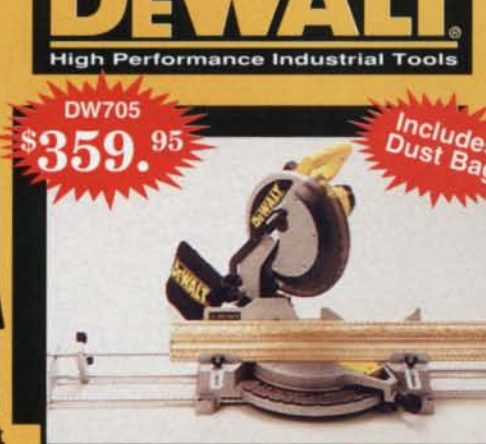
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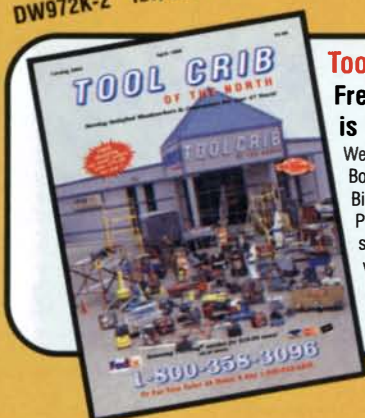
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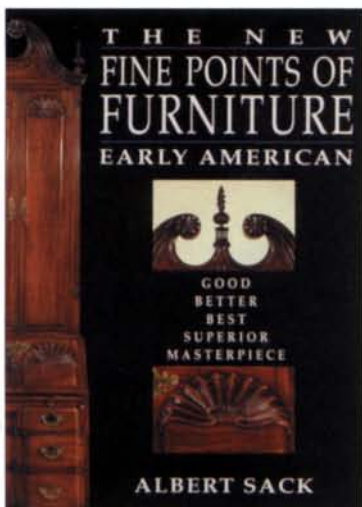
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The New Fine Points of Furniture: Early American by Albert Sack. Crown Publishers. Distributed by Random House Inc., 201 E. 50th St., New York, N.Y. 10022; 1993. \$50, hardback; 320 pp.



Since 1934, the firm of Israel Sack has advanced the idea that American furniture deserves to be evaluated on a par with the great art of the world. It was a revolutionary idea back then, but it helped attract owners of fine furniture who were looking to sell and affluent collectors looking for high-quality furniture.

The Fine Points of Furniture was published in 1950 by Israel Sack's son, Albert. This book, which introduced the "good, better, best" approach to comparing furniture, ranked American chairs,

tables, desks, mirrors and clocks. *Fine Points* was unique among books on antique furniture. Rather than presenting the author's interpretation of a specific period and its furniture, Sack invited readers to reach their own conclusions.

Forty-three years later, *The New Fine Points* takes the premise even further. It uses the "good, better, best" format to help students of American furniture develop the ability to discriminate between pieces of furniture on the basis of beauty, not origin. This new and improved version adds the classifications "superior" and "masterpiece" to help draw even finer distinctions.

At every page, I was impressed with Sack's vast knowledge of and passion for American furniture. He has a great eye and an innate sense of grace and rhythm. *The New Fine Points* is lavishly illustrated with hundreds of spectacular color photos.

—Mario Rodriguez

New Mexican Furniture 1600-1940: The Origins, Survival, and Revival of Furniture Making in the Hispanic Southwest by Lonn Taylor and Dessa Bokides. Museum of New Mexico Press, Santa Fe, N.M. 87504; 1987. \$60, hardback; 336 pp.



This is, first of all, a picture book, big and glossy. The dramatic, informative photos showcase nearly 300 pieces. But *New Mexican Furniture* is not just a picture book—it also manages to make a fascinating story out of what could have been dry research into the furniture's social and historical context.

The authors catalog the furniture into three periods. The first, the Hispanic Tradition, deserves and receives the most attention. It stretches from the colonization of New Mexico around 1600 until

1850 or so. Dominating this section are three dozen large, framed chests on legs. They were constructed with a clever and unexpected combination of joints and were decorated with bold chip carvings done with a mortising chisel.

In the second section, the authors document the increasing in-

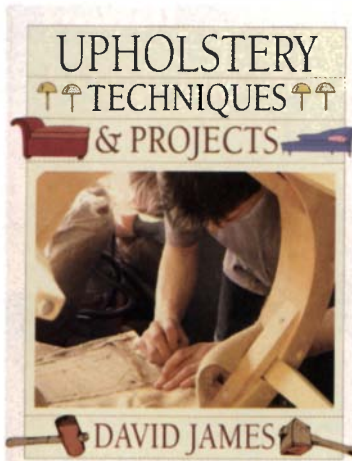
fluence of Anglo-American design motifs and tools over the last half of the 19th century. Eventually, factory-produced furniture, brought in by train, displaced most of the local furnituremaking.

The authors add an interesting third section, the Spanish Colonial Revival, to showcase some of the excellent reinterpretations of the original traditional designs executed in the 1920s and '30s. This furniture, crafted mostly by Anglo-Americans caught up in a preservation movement sweeping through Santa Fe and Taos, did not copy the original designs exactly but modified them with touches from the Arts-and-Crafts movement.

Although you can learn much of what you need to know from the photos, *New Mexican Furniture* was never intended to be a how-to book. Woodworkers looking for detailed plans, exploded views and step-by-step instructions will want to look elsewhere. In fact, the dovetails are backward in one small pen and ink illustration of a chest. Despite this, the book belongs on the bookshelf of any woodworker reproducing New Mexican or Southwestern-style furniture. What it lacks in woodworking specifics it makes up in inspiration.

—Jim Richey

Upholstery Techniques & Projects by David James. Guild of Master Craftsmen Publications Ltd. Distributed by Sterling Publishing Co. Inc., 387 Park Ave. S., New York, N.Y. 10016-8810; 1994. \$19.95, paperback; 256 pp.



This book is a departure from the usual how-to-upholster manual. *Upholstery Techniques & Projects* is more like a visit to a top upholsterer's workshop, where the upholsterer shows you some of the odd and challenging pieces he's working on at that moment. Each piece is discussed as a case study, accompanied by a cut-away diagram, noting points of interest or difficulty.

Although intended for the more experienced upholsterer, there is much to inter-

est the non-upholsterer. James provides useful information on frame construction, including some basic measurements, cross sections and angles; he also shows how the upholstery will affect the final appearance of the piece. James' line drawings are good and do the job—he has a wonderfully clear explanation of the 18th-century tacking stitch, for example. However, the splashy coloring of the graphics is distracting and cheapens the presentation of the book.

James is a British upholsterer who has long experience in the trade and has taught in one of England's best furniture colleges. American readers will encounter some different terminology: what we call burlap, for example, is referred to as hessian by the British. Also, some of the furniture depicted will be unfamiliar to Americans, such as the Napoleon chair, with one scroll arm higher than the other.

James includes information on using modern synthetic materials, but the emphasis is on traditional upholstery. His guidance on many of the finer or more unusual aspects of upholstery, rarely covered so thoroughly, is a much needed resource for those re-upholstering antique furniture.

—Diane Welebit

Mario Rodriguez is a contributing editor to Fine Woodworking. Jim Richey is the "Methods of Work" editor for Fine Woodworking. Diane Welebit apprenticed in England and now runs Barset Upholstery in West Townsend, Mass.

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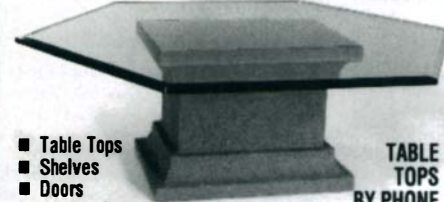
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Listings of gallery shows, major craft fairs, lectures, workshops and exhibitions are free, but restricted to happenings of direct interest to woodworkers. We list events (including entry deadlines for future juried shows) that are current with the time period indicated on the cover of the magazine, with overlap when space permits. We go to press three months before the issue date of the magazine and must be notified well in advance. For example, the deadline for events to be held in March or April is January 1; for July and August, it's May 1, and so on.

ALASKA: Meetings-Alaska Creative Woodworkers Association meets at 7 p.m. on the fourth Monday of each month at the Anchorage Museum. No meetings in June or July. For more info, call (907) 345-3077.

ARKANSAS: Meetings-Woodworker's Association of Arkansas meets the first Monday of each month at 7:00 p.m. at Woodworker's Supply Center, 6110 Carnegie, Sherwood, 72117. For more information, call (501) 835-7339.

CALIFORNIA: Workshops-Woodworking for women. Furnituremaking with hand tools using traditional joinery, weekends. San Francisco. For more info, contact: Debey Zito (415) 648-6861.

Workshops-Classes on woodfinishing and decorative painting for furniture and cabinets. For schedule, write Studio 1829, 1829 Stanford St., Santa Monica, 90404. (310) 453-0230.

Workshops-Shaker bench, sofa table, Mission lamp table, Adirondack chair, more. Saturdays and Sundays. No experience necessary. Private instruction available. For more information, contact the Woodworkers Place at (818) 952-3177.

Workshop-Woodworking and carving. Martin Pierce Furnishings, 5433 W. Washington Blvd., Los Angeles. For more info, call (213) 939-5929.

Exhibition-Woodturnings by Bruce Mitchell, during the month of May. The Banaker Gallery, Building for Contemporary Art, 251 Post St., #310, San Francisco, 94108. For more info, call (415) 397-1397.

Symposium-American Association of Woodturners 9th National Symposium, July 6-8. University of California, Davis. For more information, call (612) 484-9094.

Show-Wildlife Art Show and Carving Competition, Sept. 30 thru Oct. 1. The Radisson Hotel, 18800 MacArthur Blvd., Irvine, 92715. For more information, contact Patrick Kennedy at (909) 785-6267.

Exhibition-College of the Redwoods Fine Woodworking Program, May 20 thru June 11. Highlight Gallery, 45052 Main St., Mendocino. For more information, call (707) 961-1001.

Workshops-Various workshops including Japanese woodworking, joinery and sharpening. For further information, contact the Hilda Tool Co., 1333 San Pablo, Berkeley, 94702. (415) 524-3700.

COLORADO: Classes-Woodworking and related classes, year-round. For more info, write Red Rocks Community College, 13300 W. 6th Ave., Lakewood, 80401. (303) 988-6160.

Show-Colorado Woodworking Show, May 5-7. National Western Complex, Expo Hall, Humboldt St. & E. 47th Ave., Denver, 80216. For info, contact The Woodworking Shows, 1516 S. Pontius Ave., Los Angeles, CA 90025. (310) 477-8521.

Workshops-Beginning thru advanced woodworking workshops, June thru Aug. Call or write for free catalog, Program Director Gail Fredell, Anderson Ranch Arts Center, P.O. Box 5598, Snowmass Village, 81615. (303) 923-3181.

Call for entries-Juried fairs: Vail Arts Festival July 8-9; Beaver Creek Arts Festival, Aug. 12-13. All arts media. For a prospectus/application, send an SASE to Vail Valley Arts Council, PO Box 1153, Vail 81658, or call (303) 476-4255.

CONNECTICUT: Exposition-38th Annual Guilford Handcrafts Exposition, July 20-22. For more information, write Guilford Handcrafts Exposition, PO Box 589, Guilford, 06437, or call (203) 453-5947.

Classes-Winter schedule available for hands-on woodworking and furniture finishing classes. Call or write Bob Van Dyke at Harris Enterprise Corp., 80 Colonial Road, Manchester, 06040. (203) 649-4663.

Call for entries-Woodworking Show, Oct. 1-31. Deadline: July 15. For information, send an SASE to Gallery-12, 29 Whitfield St., Guilford, 06437. (203) 458-1196.

Classes-Wooden spoonmaking, decoy carving, green woodworking, veneering, May thru June. Brookfield Craft Center, Route 25, Brookfield. (203) 775-4526.

Call for entries-Celebration of American Crafts, Nov. 11 thru Dec. 24. Deadline: June 15. For prospectus send SASE to The Celebration, Creative Arts Workshop, 80 Audubon St., New Haven, 06510. (203) 562-4927.

Call for entries-1995 Holiday Festival of Crafts. Deadline: Sept. 1. For application write to Artistry, 17th Annual Guilford Handcrafts Holiday Festival of Crafts, P.O. Box 589, Guilford, 06437. For more information, call (203) 453-5947.

DISTRICT OF COLUMBIA: Exhibition-Washington Wood '95, May 4-28. Washington Woodworkers Guild. Rock Creek Gallery, 2401 Tilden St., N.W. (202) 244-2482.

FLORIDA: Show-Florida Woods, May 12-June 23. For more information, contact Dunedin Fine Art Center, 1143 Michigan Blvd., Dunedin, 34698.

Meetings-South Florida Woodworking Guild meets every second Monday at 7 p.m. Constantine, 1040 East Oakland Park Blvd., Ft. Lauderdale. For further information, contact Woody McLane at (305) 565-2729.

Meetings-Central Florida Woodworkers Guild meets the second Thursday of each month at 7:30 p.m. Woodcraft Supply Corp., 246 E. Semoran Blvd., Casselberry. For more information, contact Roger Lovell at (407) 841-6155.

Meetings-Palm Beach Country Woodturners, monthly meetings. For more info, call Steve Blank (407) 747-7035.

Meetings-St. Petersburg Woodcrafters Guild meets the 4th Thursday of every month at 7 p.m. at Montgomery Electric and A/C, 1200 19th St., N., St. Petersburg, 33713. For more information, contact Don Montgomery at (813) 898-0569.

GEORGIA: Meetings-Woodworkers Guild of Georgia meets the second Monday of every month. Upcoming meetings include basic veneering, furniture design and construction and router techniques. Meetings are held at Southern College of Technology, 1100 S. Marietta Pkwy., Marietta. For more information, call (404) 8892-2487.

Workshops-Japanese woodworking by Toshihiro Sahara. One Saturday each month. For further information, contact Sahara Japanese Architectural Woodworks at (404) 355-1976.

ILLINOIS: Exhibition-Illinois Valley Woodland Expo, The Pleasure, Profit and Products of Good Woodland Stewardship, Aug. 26. Marshall-Putnam County Fairgrounds, Route. 29, Henry. For more information, contact Prairie Rivers RC&D (309) 364-3979.

INDIANA: Classes-Carving, designing furniture, marquetry, veneering, joinery, turning, chairmaking, thru October. Marc Adams School of Woodworking, Route 2, Box 121A, Franklin, 46131. (317) 535-4013.

KENTUCKY: Workshop-Chairmaking workshop with Brian Boggs, two consecutive weekends, June 2-4 and June 9-11. Deadline: May 17. Contact the Lexington Art League, Clari Talmadge, 209 Castlewood Drive, Lexington, 40505. (606) 254-7024.

MAINE: Workshops-Two-week basic and intermediate furnituremaking courses. Faculty includes Peter Korn, John McAlevy. For more information, contact the Center for Furniture Craftsmanship, 125 W. Meadow Road, Rockland, 04841. (207) 594-5611.

MARYLAND: Show-Shaker Forest Festival, Sept. 9-10, 16-17, 23-24. Seneca Creek State Park off Clopper Road, Gaithersburg. For more information and application, contact Connie Paulovich, Shaker Forest Festival, 275 Pleasantview Drive, Midland, PA 15059. (412) 643-8604.

MASSACHUSETTS: Classes-Woodworking classes held throughout most of the year. For information, contact Boston Center for Adult Education, 5 Commonwealth Ave., Boston, 02116. (617) 267-4430.

Instruction-Full-time program in fine furniture construction. Complete facilities. For more info, contact Wm. B. Sayre, Inc., One Cottage St., Easthampton, 01027. (413) 527-0202.

Call for entries-Boxes, containers with lids (one of a kind or limited edition), Aug. 26-Oct. 1. Deadline: May 15. The Society of Arts and Crafts. Submit slides, descriptions, prices, resume and SASE to SAC, 175 Newbury St., Boston, 02116. For more info, call (617) 266-1810.

Classes-July summer intensives, woodworking, turning, carving, furniture design, finishing, hand tools and more. One Cottage Street School of Fine Woodworking, One Cottage St., Easthampton, 01027. (413) 527-8480.

Workshops-Toolmaking for woodworkers, the first three weekends of each month. Registration limited to two students per weekend. For more information, contact Ray Larsen, Genuine Forgery, 1126 Broadway, Hanover, 02339. (617) 826-8931.

Workshops-Summer intensives. Hand spoon making and carving, faux finishing, chair basics. Horizons, The New England Craft Program, 108 N. Main St., Sunderland, 01375. (413) 665-0300.

Workshops-One week woodworking and related workshops throughout the year. For further information, contact The Heartwood School, Johnson Hill Road, Washington, 01235. (413) 623-6677.

MICHIGAN: Workshops-Woodwrighting, blacksmithing. Tillers International, 5239 South 24th St., Kalamazoo, 49002. For more info, call (616) 344-3233.

MINNESOTA: Classes-Woodcarving classes year-round. For information, contact the Wood Carving School, 3056 Excelsior Blvd., Minneapolis, 55416. (612) 927-7491.

MISSISSIPPI: Classes-Various woodworking classes. For more information on the classes, contact Allison Wells School of Arts & Crafts, Inc., Canton. (800) 489-2787.

MONTANA: Show-The Good Wood Show, Sept. 22-24. Elk's Club, 934 Lewis Avenue, Billings. For info, contact Dick Torbert, 1119 11th Ave., Laurel, 59044. (406) 628-7447.

NEBRASKA: Meetings-Omaha Woodworkers Guild meets at 7 p.m. the third Tuesday of every month. Westside Community Center, Omaha. Contact John Cahill at 334-5550.

NEW HAMPSHIRE: Classes-Fine arts and studio arts. Manchester Institute of Arts and Sciences, 114 Concord St., Manchester, 03104. (603) 669-2731.

Classes-Various woodworking classes. For more info, contact The Hand & I, PO Box 264, Route 25, Moultonboro, 03254. (603) 476-5121.

Auctions-Antique and craftsman's tool auctions, year-round. Contact: Richard A. Crane, Your Country Auctioneer, 63 Poor Farm Road, Hillsboro, 03244. (603) 478-5723.

Workshops-Week-long Shaker-style furniture and chair-making workshops, year-round. For more info, contact Mary Sweet, Dana Robes, Wood Craftsman, Lower Shaker Village, Enfield, 03748. (603) 632-5385.

Classes-Make a Windsor chair with Michael Dunbar. For info, contact: Michael Dunbar, PO Box 805, Portsmouth, 03802. (603) 431-4676.

Show-Wood Day, May 6. Canterbury Shaker Village, 418 Shaker Road, Canterbury, 03224. (603) 783-4403.

NEW JERSEY: Show-Waterloo Arts and Crafts Festival, May 6-7. Waterloo Concert Field, Waterloo Road, Stanhope. Contact: Stella Show Management Co. at (201) 384-0010.

Show-Peters Valley Craft Fair, July 29-30. Peters Valley Craft Center, 19 Kuhn Road, Layton, 07851. For more information, call (201) 948-5200.

NEW MEXICO: Classes-Woodworking classes. For more information, contact North New Mexico Community College, El Rito, 87520. (505) 581-4501.

Classes-Fine woodworking classes. For info, write Santa Fe Community College, Santa Fe, 87502, or call (505) 438-1361.

Exhibition-Santa Fe Furniture Expo, June 30 and July 1-2. Sweeney Center, Santa Fe. For more information, call The Mayfair Group, Inc. at (505) 255-4271.

NEW YORK: Classes-Traditional 18th-century woodworking techniques with Mario Rodriguez. For more info, contact Warwick Country Workshops, PO Box 665, Warwick, 10990. (914) 986-6636.

Meetings and classes-New York Woodturners Association meets bi-monthly. YWCA, 610 Lexington Ave. (53rd St.) New York City. Contact Howard Alalouf (914) 337-0226.

Classes-Woodworking, traditional and contemporary; turning and finishing with Maurice Fraser and Bill Gundling. All levels. The Craft Students League at the YWCA, 610 Lexington Ave., New York City. For more info, call (212) 735-9731.

Classes-Introduction to Woodworking, June 12 thru July 26; Intermediate Woodworking and Furniture Design, with Dennis Fitzgerald, thru May 9. For more information, contact the Division of Continuing Education, SUNY, 735 Anderson Hill Road, Purchase, 10577-1400. (914) 251-6500.

Show-Marriage in Form: Kay Sekimachi & Bob Stocksdale, July 12 thru Oct. 8. American Craft Museum, New York. For more information, call (415) 329-2605.

Show-Crafts Festivals '95, July 7-9 and Aug. 11-13. Bestor Plaza, Chautauqua Institution, Chautauqua. For more information, contact Kay Collins, Festivals Director, Chautauqua Crafts Alliance, PO Box 389, Fredonia, 14063-0389.

NORTH CAROLINA: Meetings-North Carolina Woodturners meet the second Saturday of each month. For more information, contact North Carolina Woodturners, PO Box 1833, Hickory, 28603. (704) 324-5960.

Call for entries-The Chair Show, October thru Nov. 36. Juried exhibition. Folk Art Center, Asheville. Deadline: Aug. 7. For more information, contact Katherine Duncan, Southern Highland Handicraft Guild, PO Box 9545, Asheville, 28815. (704) 298-7928.

Workshop-North Carolina Woodturners demonstration/workshop with Robert Sondag, June 10. Hickory. Reservation required. Call (704) 298-0306 after 6 p.m.

Classes-Bent laminations, basic woodworking, design and more, May thru September. Penland School of Crafts, Penland, 28765-0037. (704) 765-2359.

OHIO: Meetings-Cincinnati Woodworking Club meets from 9:00 to noon on the second Saturday of January, March, May, September and November at Reading High School, 801 E. Columbia Ave., Reading. For more information, contact the Cincinnati Woodworking Club, 5974 Gaines Road, Cincinnati, 45247.

Classes-Turning and carving, January thru May. Contact: The Hardwood Store, 1695 Dalton Drive, New Carlisle, 45344. (513) 849-9174.

Workshops-Windsor chairs, taught by Joe Graham. For more information, contact Lenox Workshops, 1192 Webster Road, Jefferson, 44047. (216) 576-0311.

OREGON: Meetings-Cascade Woodturner's Association meets every third Thursday. For information, contact the Cas-

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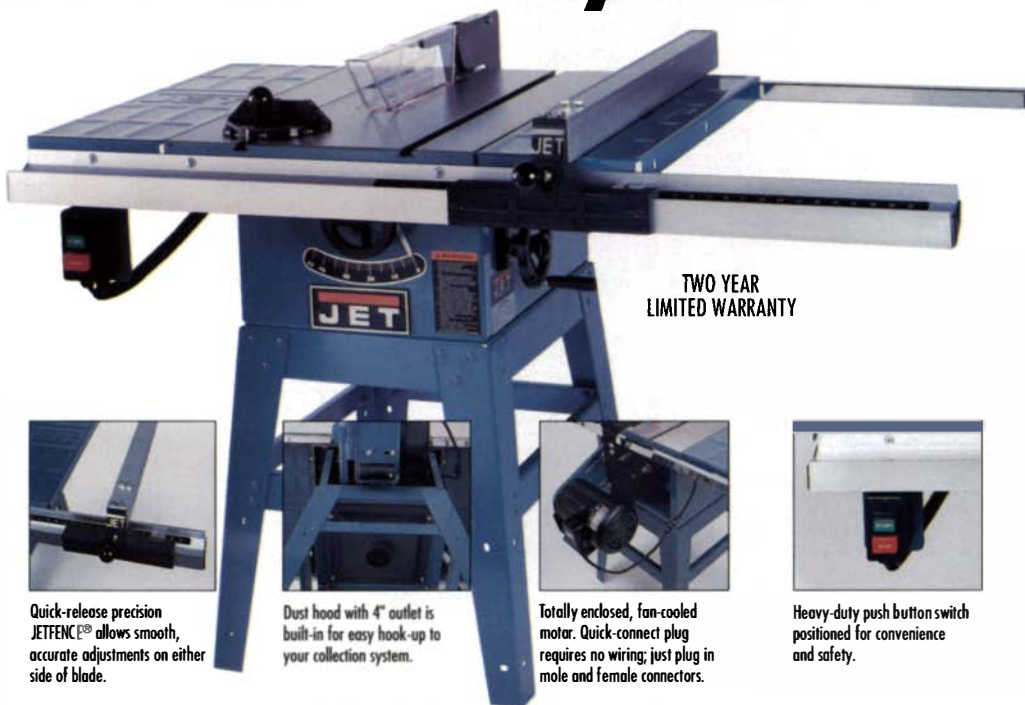
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cade Woodturners, PO Box 91486, Portland, 97291.

Classes-Oregon School of Arts and Crafts, 8245 S.W. Barnes Road, Portland, 97225. (503) 297-5544.

Show-The Port Orford Arts Festival '95, May 12-14. Port Orford. For more information contact the Port Orford Arts Council, PO Box 771, Port Orford, 97465. (503) 332-0045.

Exhibition-With The Grain: Works In Wood, thru May 22. Featuring Rick Cook, Donna Goss, Hugh McKay, more. For more info, contact Cook Gallery, 705 Oregon St., Port Orford, 97465. (503) 332-0045.

PENNSYLVANIA: Call for entries-2nd Annual Wharton Escherick Museum Woodworking Competition and Exhibition. Deadline: Aug. 1. For more information, send an SASE to Wharton Escherick Museum, PO Box 595, Paoli, 19301-0595. (610) 644-5822.

Classes-Windsor chairmaking, weekly and weekends. Contact Jim Rendi, Philadelphia Windsor Chair Shop, PO Box 67, Earlville, 19519. (215) 689-4717.

Call for entries-The Hazleton Art League. Open juried exhibition of works in clay, glass, wood and metal. Entry deadline: July 20. For more information and application, write to Jayne Persico, 50 N. Vine St., Hazleton, 18201, or call. (717) 454-3789.

Meetings-Black Hills area woodworkers interested in organizing for purposes of sharing information and working toward a show. To be on mailing list, call (605) 343-1878.

Classes-Furnituremaking, joinery, chip carving, restoration, woodturning and more, April thru December. For schedule and exact dates of classes, contact the Olde Mill Cabinet Shoppe, 1660 Camp Betty Washington Road, York, 17402, or call (717) 755-8884.

Symposia-The Woodturning Center sponsors the how and why of wood turning, June 24-25. Bucks County Community College, Newtown. AllTurnatives: Form & Spirit, Aug. 4-6. Philip and Muriel Berman Museum of Art at Ursinus College in Collegeville. For more information, contact the Wood Turning Center, PO Box 25706, Philadelphia, 19144 or call (215) 844-2188.

Workshops-Week-long woodcarving workshops, June thru November. Sawmill Center for the Arts, PO Box 180, Cooksburg, 16217. (814) 927-6655.

Workshops-Various workshops held throughout the year. Conover Workshops, 18125 Madison Road, PO Box 679, Parkman, 44080. (216) 548-3491.

RHODE ISLAND: Exhibition-Chair Fair, June 3-4. South County Center for the Arts, Route 138 West Kingston. For more information, call (401) 782-1018.

SOUTH DAKOTA: Classes-Various classes and workshops for beginning and experienced woodworkers. Iron Mountain Wood Shop, 4302 S. Highway 79, Rapid City, 57701. (605) 343-1878.

TENNESSEE: Workshops-Turning, carving, coopering and more. Workshops held throughout the year. Arrowmont School of Arts and Crafts, PO Box 567, 556 Parkway, Gatlinburg, 37738-0567. (615) 436-4101.

Workshops-Woodturning, utensil carving, dulcimer making, wood and the turned vessel, June thru July. Tennessee Technological University, Appalachian Center for Crafts, 1560 Crafts Center Drive, Smithville, 37166. (615) 597-6801.

Classes-Lumber selection, grading, stacking, drying, kiln operation, forest management, logging sawmilling. Tennessee Valley Authority, 17 Ridgeway Road, Box 920, Norris 37828-0920. (615) 632-1656.

TEXAS: Meetings-North Texas Woodworker's Association meets the third Tuesday of each month. Contact Bruce May, North Texas Woodworker's Association, PO Box 831567, Richardson, 75083. (214) 271-0125.

Classes-Woodworking classes year-round. Bowl turning basics to advanced furniture and cabinetry. For info, write to the Woodshop, Inc. Woodworking School, 1225 West College, Suite 612, Carrollton, 75006, or call (214) 466-3689.

Meetings-Woodturners of North Texas meets the last Thursday of every month, 7:30-10 p.m. For more information, contact the Paxton Beautiful Woods Store, 1601 W. Berry St., Fort Worth, 76110. (817) 927-0611.

Classes-Carving classes every Thursday, 6:00-9:00 p.m. Classes are taught by Don Schol. For more information, contact the Paxton Beautiful Woods Store, 1105 Sixth St., Carrollton, 75006. (214) 245-1192.

Show-North Texas Woodworking Show, May 12-14. Tarrant County Convention Center, East Hall, 1111 Houston St., Fort Worth. For more information, contact The Woodworking Shows, 1516 South Pontius Ave., Los Angeles, CA 90025. (310) 477-8521.

Show-Houston Woodworking Show, May 19-21. Astroarena, Hall B, Fannin at the 610 exit, Houston. For more information

on the show, contact The Woodworking Shows, 1516 South Pontius Ave., Los Angeles, CA 90025. (310) 477-8521.

VERMONT: Courses-Yesterday Design and Building School. For more information, contact the school at Route 1, Box 97-5, Warren, 05674. (802) 496-5545.

Workshop-Lightweight boatbuilding, June 17-23. Shelburne Craft School, PO Box 52, 5 Harbor Road, Shelburne, 05482. (802) 985-3648.

VIRGINIA: Exhibition-Revolutions in Wood: Retrospective of the work of Mark Lindquist, Sept. 15-Nov. 12. The Hand Workshop, Virginia Center For The Craft Arts, 1812 West Main St., Richmond, 23220. (804) 353-0094.

Call for entries-Beads on Target, Oct. 26-Nov. 25. Contemporary beadwork. Deadline: July 8. For more information, contact Friends of the Torpedo Factory Art Center, 105 N. Union St., Alexandria, 22314. (703) 683-0693.

WASHINGTON: Workshops-Build a sea chest, small boat construction, handplane repair and construction, paddle carving, woodturning. Northwest School of Wooden Boat Building, 251 Otto St., Port Townsend, 98368.

WISCONSIN: Workshops-Furniture design, cabinet construction, picture frames, planing, finishing, guest speakers, May thru December. The Wisconsin Woodworkers Guild. For more information, call Matthew Bohlmann at (414) 258-3132.

CANADA: Workshops-Traditional Windsor chairmaking. Weekly courses. For more info, contact David Goodwin, Village Chairmaker, Sparta, Ont., N0L 2H0. (519) 775-2751.

Association-Canadian Woodturners Association. Markham, Ont. For info and quarterly newsletter, call (905) 479-0755.

Meetings-West Island Woodturners Club (Montreal) meets every Tuesday, Sept. thru May. Contact: Dennis Brown, 8817 Cure Legault, Lasalle, Que. H8R 2V9. (514) 366-6071.

Show-The 12th Annual Wood Show, Aug. 1-13. Durham Arena, Durham. For more information, contact The Wood Show, Box 920, Durham, Ont., N0G 1R0. (519) 369-6902.

SCOTLAND: Workshops-Ongoing workshops. For more information, contact the Myreside International School of Antique Furniture Restoration, Myreside Grange, Gifford, East Lothian, EH41 4JA. (062 081) 0680.

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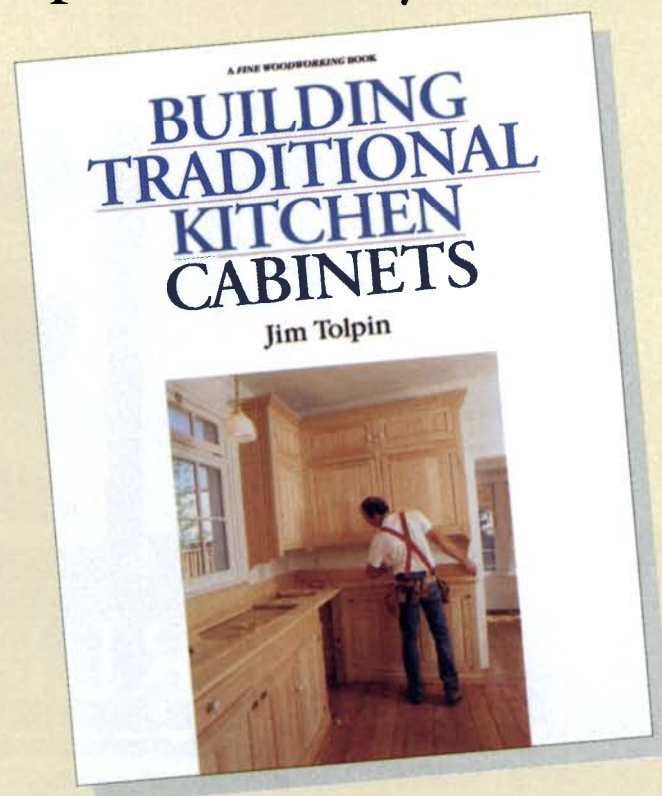
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A desk truly fit for a king

If you think your woodworking takes a lot of shop time, consider a piece needing the attention of 20 craftsmen working 17,500 man-hours over a span of 67 months. They included specialists of all kinds: a carcase maker, a joiner/assembler, a veneer sawyer, a marqueteur, an engraver, a finisher, a leather worker, a sculptor, a wood carver, a bronze carver (not to be confused with the bronze chaser and the bronze fitter), a gilder, a clock maker, a ceramic artist and a mechanic/machinist. Even so, the production team broke a record set by makers of the best earlier copy of the work a century ago. It had taken them 22,250 hours.

The object of all this attention was a copy of the Bureau du Roi (see the photo at right), a cylinder-top work desk with pigeonholes, many drawers and secret compartments, ordered by King Louis XV of France in about 1760. Court artisans, under Jean-Francois Oeben and Jean-Henri Riesener, took nine years to design the piece, check it in miniature and construct the full-sized desk.

The latest copy of this masterpiece, pictured here and on the back cover, is by the firm of Ets. Daïdé, 3 Avenue Roquefort, 31250 Revel, France. René and Pierre Daïdé, renowned for their reproductions of French court furniture, had wanted to make their own copy of the King's Desk for a long time. Their dream came true when a Michigan client of the firm gave the go-ahead.

Then the fun began. The curator at Versailles, who was reluctant to have secrets of old French craftsmanship revealed, refused to let the Daïdés study the original desk. They could only take the usual guided tour of the palace, with one glimpse of the desk per visit.

Details had to be found in various books, in the national archives and in the Louvre. A skilled marqueteur, Pierre Ramond, was able to inspect the desk and transmit information to the Daïdés, and they were able to obtain 19th-century marquetry patterns that had been taken from the original. Two 19th-century copies of the desk provided information on dimensions, woods, joinery, contours, veneers, bronze fittings and desk mechanisms.

The desk is 57.09 in. high, 71.65 in. long and 38.19 in. deep. Joinery and contouring were done by hand. Details were scrupulously reproduced: the curve of lower-drawer sides (no sharp corners to bang the royal knees!), dimensions of inside drawers and secret compartments. Sawed veneers were used throughout, and the



Twenty craftsmen, 67 months. A labor-intensive desk like this one, a copy of a piece originally commissioned by King Louis XV of France, could be yours for about \$462,000.



Cast panels start with a wooden pattern. A Daïdé craftsman, one of 20 specialists who worked on the desk, carves a panel used to fabricate a finished part.



Same panel, now in gold. The wooden pattern is used to cast a panel in bronze, which is then gilded in 24k gold and installed on the back of the desk.

colors of dyed woods were faithfully rendered. Marquetry lines match exactly from one cylinder segment to the next or from upper to lower drawer fronts. As in the original, a central mechanism unlocks both the rolltop and the bottom drawers. The center panel of the writing surface lifts

one way to form a lectern and the other way to reveal the secret drawers. Like the rest of the carcase, the cores of the original cylinder-top segments were of oak, but the Daïdés used tulip poplar instead to minimize wood movement.

Bronze fittings, including figures of Cal-

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lio and Apollo, were made from scratch: drawn, sculpted, cast, hand-chased, fitted to the wood and then dismantled for heavy, 24k gilding. Smooth areas of the gilding were burnished to create a sense of depth (see the bottom right photo on p. 110). And the clock on top has two faces, run by a single gear train, so time can be read from either side.

Like Riesener, the Daïdés made two copies at once (the second for a client in Monaco), for one desk would have taken almost as long.

If you're in the market for one of these desks, the Daïdés figure they could deliver one in 30 months, for about \$462,000 at current exchange rates. The first copies, more a labor of love than income-producing, gave everyone involved an unforgettable artistic experience. In the process, all at Daïdé came as close to perfection as we are likely to see.

—Abram Loft, Rochester, N.Y.

Not really for the birds

A few years ago, I set out to make a simple birdhouse. But I guess that one shouldn't expect a woodcarver or lathe enthusiast to be satisfied with a simple project. As I began work, I realized this project was not just for the birds. It required that I place myself mentally on the same scale as the bird for whom I was carving.

I found myself content with this new adventure. I carved a stairwell up the side of this house, as you can see in the photo at right. As I carved, wooden shingles, twisted trees, rows of bricks and a spiral perch unfolded. To give the living quarters more light, I added an ornate, cathedral-like window. The pedestal, turned on the lathe and carved by hand, is embellished in Gothic style and in the likeness of a vine. It holds the birdhouse at just the right height for an imaginative mind to explore.

—Mark Phenicie, Grabill, Ind.



Not headed for the backyard. This carved birdhouse, complete with a staircase and roof shingles, probably won't spend much time housing a family of sparrows in the author's yard.



In search of a bargain

Several years ago, while prowling the flea markets that abound in and around Uniontown, Pa., I spotted a magnificent woodworker's vise. It was sitting on a pile of metal odds and ends, apparently thrown there without regard for its latent value. I took out my pocket rule and took stock: It was 10 in. wide and had a 12 $\frac{3}{8}$ -in. opening. The steel guide rods were $\frac{7}{8}$ in. thick, and the substantial 1 $\frac{1}{4}$ -in.-thick screw, I discovered upon flopping over the 50-lb. mass, was of the coveted quick-release type. It was a treasure.

I put on my I'm-not-really-that-interested face and offered the old fellow temporarily in possession of my treasure \$5 "for that scrap vise over there." Maybe it was the drool on my chin that gave me away or perhaps the cooing sounds I had been making during my inspection of the vise, but the man knew I was hooked. "That there scrap vise will cost you \$55," he said. There was no counter offer.

I knew that the vise was worth far more than \$55, but we flea marketeers have a code: Never let them think you're a duffer. So I walked away.

The following spring, I was rounding a table at a parking lot sale when I spotted The Vise again. It was still sitting atop that identical pile of junk (for all I know, that pile of metal had been welded together as a kind of display table for The Vise), and the old fellow spotted me before I could un-rivet my gaze from it.

"How much for that old scrap vise," I asked nonchalantly.

"It's still \$55," he said through a half

smile that could pass for a sneer.

Now, I might have bought the vise right then and there if he had not used the telling word "still" and if he had not worn that crooked grin, for we marketeers have another code: Don't let them sneer at you. So I walked away a second time.

It was late the following summer when I finally caught up with the vise again. It was still sitting on its display table of junk, and the old fellow was irreverently sitting on it, eating a sandwich. He slid aside as I approached, silently accepted the \$55 I laid in his outstretched hand, and graciously helped me carry it to my truck.

"I think that I came out ahead on this deal," I said, once the vise was safely stowed away.

"How's that?" he asked without apparent interest.

"You forgot about the three years of rampant inflation since you first put a price on this vise."

"There ain't no inflation on a scrap vise," he said, resuming the ingestion of his sandwich, "rampant nor otherwise."

It took me most of a day to mount the vise to the end of my workbench, a few hours more to make and attach a wooden face to the moving jaw, and yet three more days to finish the wood properly, but the final result told my woodworker's eye that it was all worth the trouble. The oak jaws of the vise reached across the full 24 in. of my workbench and gleamed in the light under three coats of varnish, all but begging to be used.

I mounted a pine board in its jaws, tightened down on the screw and, well, nothing happened. The vise handle spun around as smoothly as a propeller on a



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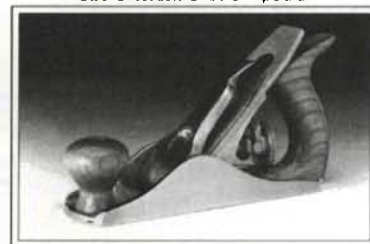
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wind vane. It was stripped out. It was scrap.

It took several hours to remove the vise for inspection. I unscrewed the bottom cap and found the cavity to be dismally barren of anything resembling a take-up nut. All I could see in there were a few pieces and shavings of what appeared to be lead. More scrap.

Replacement parts for my vise were not available. The situation was desperate and demanded desperate action. So I decided to call Max.

Max has a small sawmill in a hollow in the Uniontown Mountains. He is what is known around those parts as an Old Timer. He is a loner and a man of few words. He is often short-tempered, but he seems to know almost everything there is

to know about woodworking, and I took my vise over to him.

When I got there, Max had a large fire going in a pit. He looked the vise over, and he began to tear it apart. He removed the bottom cap, retaining clips, screw and mounting hardware. All that was left was the cast-iron top cap, which he threw into the fire.

Over a beer (three, actually), Max explained that the manufacturer, Desmond Stephan Manufacturing Co., did not use a steel take-up nut on this particular vise. Instead, it used lead to form a kind of half-nut in the upper cap that gave the screw firm purchase over several threads but permitted the screw to slide freely when turned away from the soft metal threads.

When Max judged everything ready, he fished the top cap from the fire and threw it on the ground, hollow side up. Then he began throwing in pieces of lead. When the cap was about ¼ in. from being full of molten lead, he squirted oil onto the screw, dropped it into place in the cap, and screwed down the bottom cap. A few beers later, everything was cool enough to handle, and I was on my way.

Of course, the vise functioned perfectly and is still the pride of my workbench. If there is a lesson to be learned from this story, I don't know what it is, unless it's what the old fellow implied when he sold me the vise. That is, more often than not, you're likely to get what you pay for.

—Jack Danilchak, Monessen, Pa.

More than a place to hang your hat

Just where do you get the inspiration for a mummy case that serves as a closet? For Tom Cooper, it might have been television programs he watched as a kid. More likely, it was Cooper's fascination with Egyptian history, coupled with a belief in functional art. Cooper is a self-taught woodworker in Weiser, a crossroads community in western Idaho, with a background as a machinist, fisherman, framer and carpenter. The mummy case (see the near right photo) is quite a departure from the clean-styled pieces he usually makes.

As Cooper researched Egyptian symbols and art, he became increasingly impressed with the extensive knowledge of glues, joinery and carving evident in early Egyptian furniture. There was ample evidence of this in Egyptian burial practices. One of the nesting coffins inside Tutankhamen's sarcophagus was cut from a single log of Lebanon cedar. The intricately carved lid represented the person within the innermost, gold coffin.

Lacking hammered gold or Lebanon cedar, Cooper chose traditional Honduras mahogany and black walnut for the case, which he steamed and laminated in strips. The mahogany door is laminated to 3 in. thick for the low-relief carving. All carved symbols and figures are drawn from Egyptian artifacts. Carved maple asps serve as handles—one of them opens the door. Inside, walnut coat hangers are carved into the shape of ducks (see the far right photo). At the bottom of the case, a tapered shoe compartment has a self-closing door. Aromatic cedar lines the interior, and the piece is finished with linseed oil and paste wax. It took Cooper about eight months to complete the case.

—Cort Conley, Boise, Idaho



A place for coats and shoes. The cedar-lined closet includes a couple of walnut coat hangers and a self-closing drawer in the bottom for shoes.

A closet for an Egypt buff. Tom Cooper's mahogany and walnut closet reflects his research as well as his woodworking skills. Symbols and figures are taken from Egyptian artifacts.

Notes and Comment

Got an idea you'd like to get off your chest? Know about any woodworking shows, events or craftsmen of note? Just finished a great project? If so, we would like to hear about them. How about writing to us? And, if possible, send photos or transparencies to Notes and Comment, Fine Woodworking, PO Box 5506, Newtown, Conn. 06470-5506.

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READER SERVICE NO. 57



A DESK FIT FOR A KING

If you really wanted to, you could look at this desk, created by craftsmen at the French firm of Ets. Daïdé, as a weekend project. But only if you had mastered a dozen different disciplines, from gilding to carving, and you could set aside an unbroken chain of round-the-clock weekends for seven years. The desk is a copy of the famed Bureau du Roi, a masterpiece ordered by King Louis XV of France in 1760. That

one is now at Versailles near Paris. An authentic copy had long been the dream of Ets. Daïdé, but it took a client from the United States to actually launch the project. The job was



made all the more complicated by the museum curator's refusal to allow inspections or measurements of the original. Still, 67 months later, the desk was done. For more on how it was built, turn to "Notes and Comment" on p. 110.