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Fine WoodWorking

June 1997, No. 124
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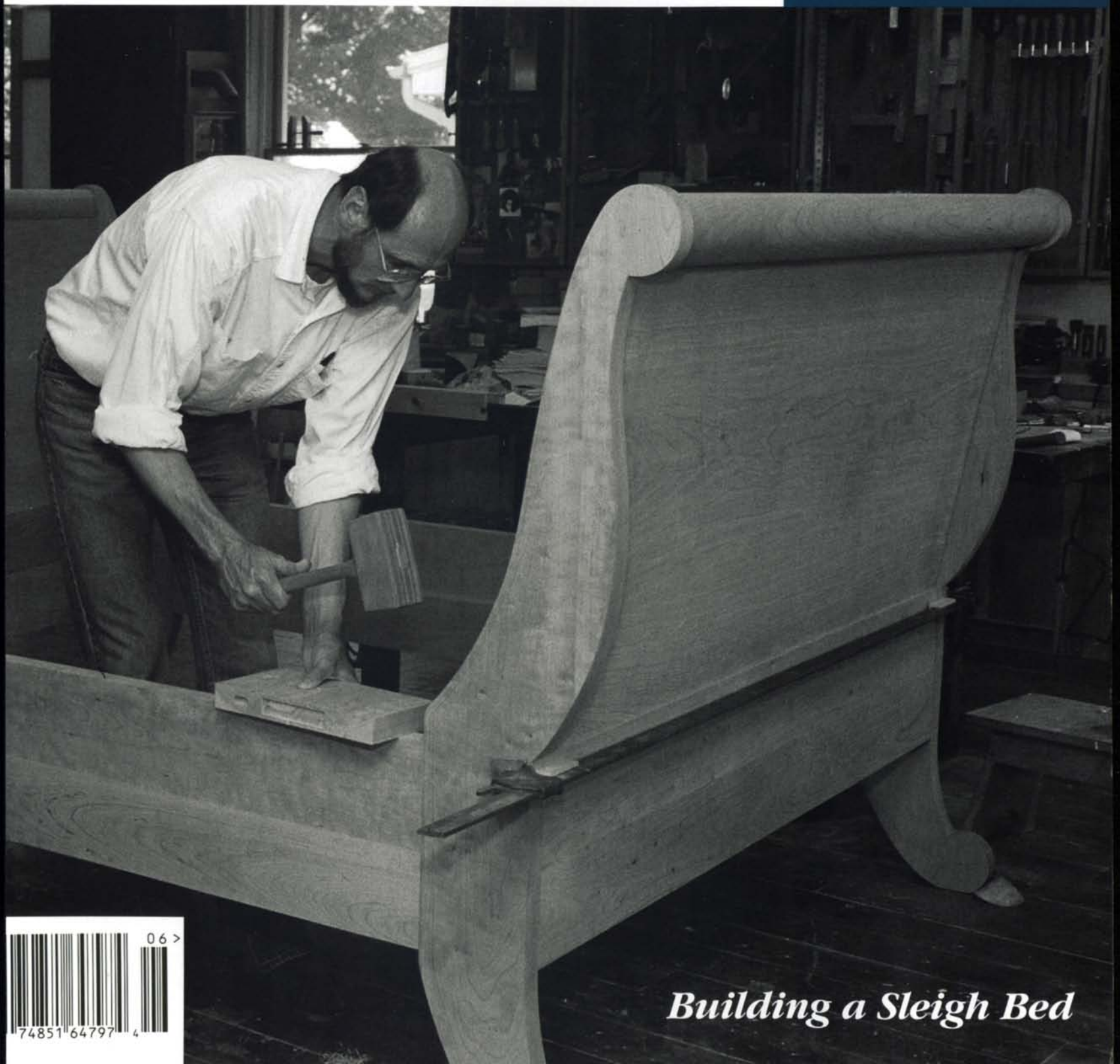

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On the Cover:
Asked to build a sleigh bed for the first time, Christian Becksvoort came up with a design that captured the grace of this furniture form without bankrupting his client, p. 54. Photo: Vincent Laurence

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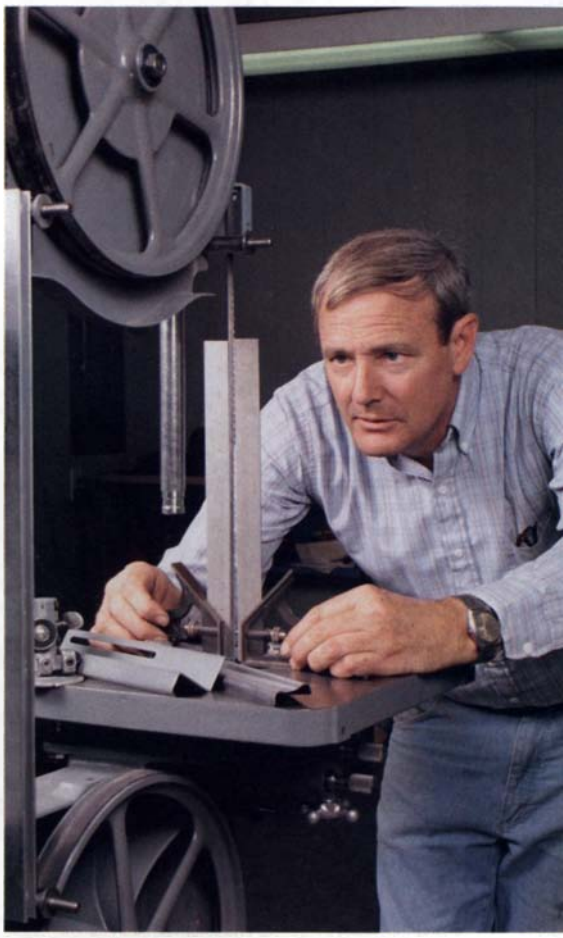
May/June 1997 No. 124

ARTICLES



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Surveying contractor's saws—I found your article on contractor's saws very interesting (*FWW* #123, pp. 54-61). I purchased a Powermatic Model 64 tablesaw last year. My experience with the assembly of the saw parallels yours right down to the missing setscrews.

When I sent in the registration cards for the machines, I took the time to write Powermatic about the problems. They never so much as replied, and from your similar experience, it is obvious that nothing has been done to correct the problems with the assembly.

—Victor H. Hanson, Bozeman, Mont.

I was quite disappointed with your review of contractor's saws, both because of the method of testing and reporting by your staff and by the unimaginative, copy-cat attitude of manufacturers other than Ryobi.

Your conclusion that none of the saws would be right for those who cut thick stock regularly is unwarranted. For either crosscutting or ripping, the combination blade you used is a poor choice. I use a Freud thin-kerf, Teflon-coated rip blade on my two Powermatic Artisans. The saws have never thrown a breaker and seldom show signs of bogging down even in oak. A 1½-hp motor is perfectly adequate for a 10-in. tablesaw.

I keep the elevation and tilt mechanisms clean and lubricated, and they run easily and smoothly. I have not seen in any of my fellow woodworkers' shops a cabinet saw that will perform any function better (or even as well), and I would not trade my two contractor's saws for one cabinet saw.

—Eugene C. Hise, Oak Ridge, Tenn.

I have a Delta contractor's saw that I recently retrofitted with a Vega fence. It's true that the fence lifts at the far end when you're locking it into place, but this can be avoided if you install the little hold-down device that Vega includes and that they perversely insist on calling "optional." They didn't predrill the holes for it, which is annoying, but once you've installed it, the fence works beautifully.

I also recommend the Vega accessory called the Finger Saver. This is an ingeniously designed stock feeder that keeps your hands well away from the sawblade. I think its inventor deserves a medal. *—Reynolds Dodson, Water Mill, N.Y.*

The splitter/guard on my Delta contractor's saw was a pain until I made two simple modifications. The nut under the table that holds the assembly down can be left just loose enough so that the assembly can be moved up or down.

When swung back all the way, though, the assembly stuck up enough above the level of the table to interfere with cutting grooves on any boards longer than about 16 in. To solve this problem, I ground out a semicircle from the edge of the plate so that it fits over the capacitor of the motor. Now the splitter gets entirely out of the way. *—Trevor Robinson, Amherst, Mass.*

It would be better without a glove—Featured in April's "Methods of Work" column was a tip for using a lathe and sandpaper to generate dust for wood filler (*FWW* #123, p. 32). Though an efficient means to an end, the operation should be performed without a glove. A bit of discomfort might result from the heat generated by friction, but that's preferable to getting tangled up on a spinning machine that doesn't know you're there.

—Dave Pepalis, Downers Grove, Ill.

Finding a safer way—I was chagrined to find a photograph in *Fine Woodworking* of how to injure yourself seriously and permanently while using the tablesaw (*FWW* #123, p. 50).

Here we have a piece of 6-in. stock that, as the kerf is being cut, becomes totally unsupported from the outside of the blade to the inside of the fence. In the event of a kickback (very likely), the operator will immediately have three or more fingers in the blade.

The cure for this situation is the use of either two push sticks or a push stick and a featherboard. I am surprised that a magazine with as long and fine a tradition

Writing an article

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as *Fine Woodworking* can contain such grossly irresponsible photojournalism.

—Stephen F. Lacey, Milwaukee, Wis.

EDITOR REPLIES: You're right: Using a push stick and featherboard would have been safer, and we should have thought twice about using the photograph. *Fine Woodworking* editors frequently see shop practices that would not be safe for everyone. It really is true that no one should attempt any woodworking procedure that appears unsafe, even if it works for someone else.

What readers want to read—Though I haven't been a subscriber for as long as Michael Bitsko (*FWW* #123, p. 10), I, too, am having a problem with your magazine. Having started woodworking at the tender age of 7, I spent the next 57½ years learning in school and later as a professional model maker, patternmaker, display builder and now as a custom woodworker on commission. I have developed an immense ego. I've had my work featured in various publications and received many, many compliments. I tend to believe I am something extraordinary.

But every two months, your magazine arrives and blows my ego all to hell. In most issues, I find myself completely humbled by the quality and workmanship of the pieces you feature.

The recovery period is very painful. I look in the mirror and see an ordinary human. So far, I have always recovered fully. But this roller coaster ride is beginning to wear on me. Maybe you could do an article on whirly-gigs or lawn figures now and again so that the trauma won't be so bad.

As Robert Browning put it: "Ah, but a man's reach should exceed his grasp,/Or what's a heaven for?"

—Kenneth N. Oakley, St. Cloud, Fla.

Ouch! You don't deserve the comments by Mr. Bitsko. He seems to want instant gratification. I find the joy of woodworking is in the working with wood. Worthwhile projects usually take several months to complete.

I read *Fine Woodworking* because it challenges me to improve my skills. Over the years, I've progressed beyond toys and simple projects. I've completed a Queen Anne-style slant-front desk with full bonnet, ogee feet and three carved shells. I'm currently building a Philadelphia-style piecrust table, which I'll be proud to display in my house.

Please don't change the *Fine* in your magazine. It's the best magazine I read.

—Ken Napior, Foster City, Calif.

I, too, feel *Fine Woodworking* is slipping. I have subscribed or purchased it from the newsstand since your magazine was first published. Lately, the contents lack substance.

I am interested in what the name implies: *fine* woodworking. Period. Furniture construction alternatives, sources of patterns, authorities on techniques and tool comparisons are my major interests. Advertisements are better if the product being sold relates to an article that describes how the product can benefit me. I get tons of Harbor Freight-style catalogs and it is disappointing to find similar advertisements cluttering up what I consider to be a high-quality reference magazine.

—Earle W. Connell III, College Park, Ga.

Nothing wrong with a bronze mallet—I just finished Ian Agrell's article on woodcarving tools (*FWW* #122, pp. 80-83). I, too, am a professional carver and have been carving for 19 years. I was trained by individuals who came from European traditions. I congratulate Mr. Agrell on his efforts to promote the enthusiasm and training of wood carving in this country. However, his insistence on wooden mallets vs. bronze mallets is both misinformed and misguided.

Physics states that no matter how it is achieved, force is force. The transfer of momentum from the mallet produces force on the chisel. It then becomes your preference as to whether you want to strike your chisel with a feather or strike with something that conserves your creative energy.

Historically, the bronze mallet has replaced the fatiguing swing of the light wooden mallet with a controlled, weighted tap, a dead strike that offers the carver an unmatched sensitivity as he moves his way through the wood.

The mallet I market and use is a refined version of the mallets my European predecessors used. Many woodworkers and carvers have taken the time to write to me and express their fondness for it.

—David Calvo, Gloucester, Mass.

Best router for a table—Gary Rogowski indicates that he uses a fixed-base router rather than a plunge router in his router table because it is lighter (*FWW* #123, pp. 44-47). It would seem that a fixed-base router is the only type needed for a router table; a plunge router would appear to possess far more features than are necessary for the table. Are there uses of a plunge router on a table that would

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make one the better choice? In addition, it would seem to me that the most powerful fixed-base router would be preferred.

—David P. Shover, Briarcliff Manor, N.Y.

GARY ROGOWSKI REPLIES: Fixed-base routers have some distinct advantages over plunge routers when used in a table. Their lighter weight means less sag in a table or table insert, over time. With a table insert attached to the router base, changing bits becomes more difficult if not problematic with a plunge router. The features of a plunge router are lost in this arrangement: It was designed to plunge down, not raise up. The one advantage they seem to have is their soft-start, variable-speed motors, which are a must for the large-diameter bits now available.

Power is a matter of personal preference. I have found that my 1½-hp router is perfectly capable of all the jobs I want done on a router table. As you suggest, even more powerful fixed-base routers can be used. But if you're using a router table as a shaper and asking a router motor to perform like a continuous-duty, 3-hp motor, you might want to think about actually buying a shaper.

Don't forget the other spokeshaves— I was happy to see the article on spokeshaves by Mario Rodriguez (*FWW* #122, pp. 69-73). He omitted two very fine spokeshaves that are readily available. The spokeshave developed by Brian Boggs is an excellent tool with nice balance and weight. Another alternative are the Japanese-style spokeshaves.

The Japanese tools are good, but they need a little work when first purchased. I inlaid a brass piece in front of the blade to take the wear. The blade must also be fitted to the wooden body. This is an advantage because one can determine the throat opening. Most metal-bodied spokeshaves come with an opening unsuited for finish work. The low-angle Western-style spokeshave with a wooden body generally has a more acceptable throat opening for finish work. But repeated sharpening makes it wider and wider.

The wooden body of the Japanese spokeshave makes it easy to alter the shape of the sole slightly to fit the work. The laminated blade holds an edge well and is easy to sharpen freehand because of its thickness. The plain wooden handles do not dictate the placement of the hands on the tool as much as the metal-bodied spokeshave does. The lightness in weight of the wooden Japanese spokeshave means it will not carry as much momentum through the cutting action. This makes the tool more sensitive, requiring the user to develop greater hand skills.

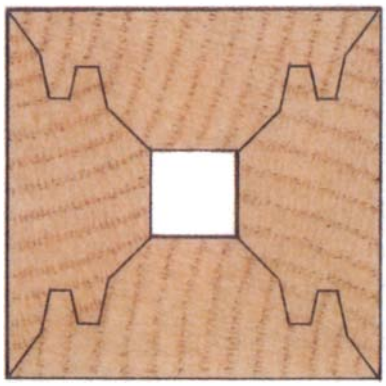
—Carl Swensson, Baltimore, Md.

Another way to make Stickley legs— Regarding Patrick Nelson's method of making Stickley-style legs (*FWW* #121, pp. 54-57), there's an easier way.

If the machining is done as shown in the sketch below, a single, conventional clamping operation will squeeze up the whole shooting match. The pressure blocks should be a little narrower than the leg.

—Albert Treadwell, New Haven, Conn.

Making Stickley legs: A lock-miter router bit can be used in more than one way to create Stickley-style legs. This method simplifies clamping by requiring only two cauls that are placed on opposite faces.



Steel can be overheated— I very much appreciated Ernie Conover's article on turning gouges (*FWW* #123, pp. 70-73). The article states that high-speed steel can be heated to 1,800°F without loss of temper. This is not true. Heating a tool above about 1,100°F during grinding will result in loss of temper. The 1,800° temperature is even above the annealing temperature used to soften high-speed steels so they can be machined before hardening. *—Carl Dorsch, Pittsburgh, Pa.*

A rose by any other name— I must waste a moment of my time to comment on someone else's wasted time and effort. A letter writer was appalled that your staff has used the incorrect term *bit* to refer to a twist drill (*FWW* #123, p. 6).

My company distributes twist drills and also the items more properly referred to as bits, but we have never lost a sale by referring to a "twist drill" as a "drill bit." Also worth noting is that of five different manufacturers from whom we buy such products, only one uses the terminology *twist drill* in its catalog.

In the past, the correct term for a personal motorized conveyance was *horseless carriage* and later *automobile.* But I will wager that most people today drive *cars.* My point is that we should just get on with it, enjoy our woodworking, try not to refer to a tablesaw as a router and try not to be distracted by insignificant matters.

—Byron Guyer, San Antonio, Fla.

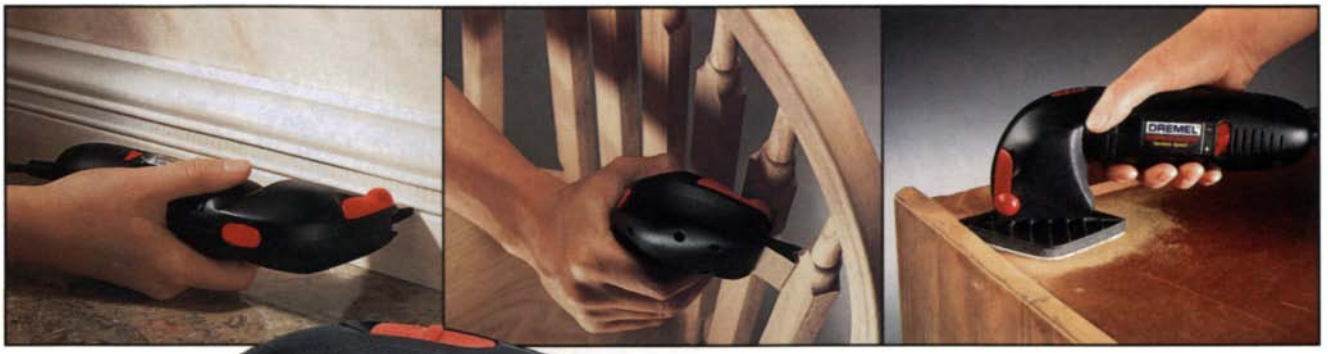
There are Shaker classes— Your response to Nick Barratt's question on schools for Shaker furniture building was curious to me (*FWW* #123, p. 16). You stated you had no knowledge of a specialized school, but on p. 93 of the same issue is an advertisement for a class in Shaker furniture given by Dana Robes Wood Craftsmen in Enfield, N.H.

—William Seaton, Mechanicsville, Va.

Erratum— A photo appearing with an article on birch (*FWW* #121, p. 69) was incorrectly credited to David Gidmark. The photo was taken by Henri Vaillancourt.

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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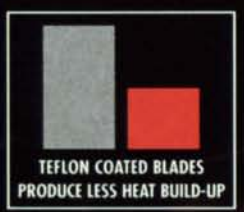

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Identifying a rabbet plane

I have a rabbet plane that once belonged to my grandfather who was a ship's carpenter. Can you shed any light on this item? It appears to be in good shape, but it is probably missing a fence or two. Are parts available? And what's the three-pointed cutter in the side for?

—Kevin Ibbetson, Courtenay, B.C., Canada

Garrett Hack replies: Your plane is a Millers Falls No. 85 rabbet and fillister plane, introduced in January 1935. It was typical for companies such as Millers Falls to reproduce successful Stanley planes after the Stanley patents had expired. This one is identical to the Stanley No. 78. It is one of the most useful shop planes, capable of a wide range of rabbeting work. The bullnose or forward position of the iron adds to its versatility.

As is typical of a plane with removable parts, yours were unscrewed and lost some time ago. Luckily, Stanley still makes this plane, and parts are available (Stanley Parts; 800-262-2161 ext. 55839). You may also be able to find parts through a tool dealer or at a flea market. You're missing a depth stop, fence and guide arm.

The depth stop rides in a shallow V-groove between the two blade beds and is secured by a screw (see the drawing detail). Threaded holes on both sides of the plane just ahead of the rear plane bed accept the fence guide arm and allow the fence to be used on either side of the plane (see the drawing below).

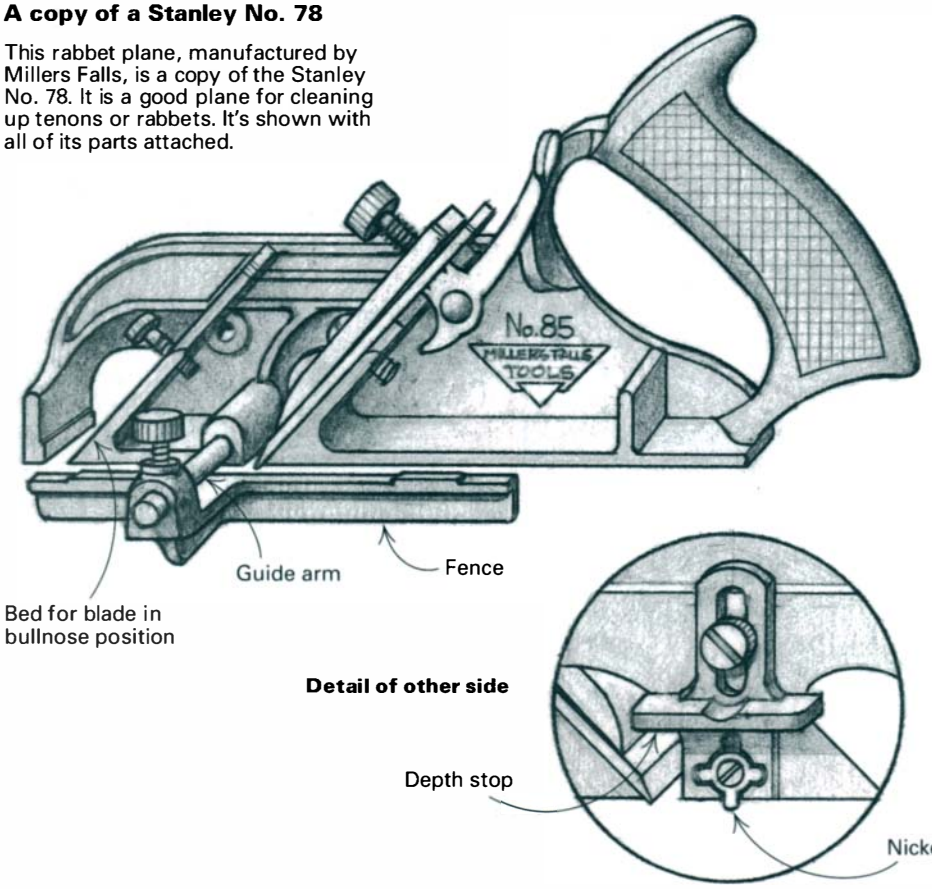
The three-pointed cutter is a nicker that scores the fibers ahead of the cut when the plane is used to cut across grain. It's useful to have one spur for rough work and another for finish work. Sharpen them on the inside only, like little knives.

I use a No. 78 most often for the final fitting of rabbets cut with a tablesaw or router. For this purpose, neither fence nor depth stop is needed.

[Garrett Hack farms, writes and designs and builds furniture in Thetford Center, Vt. He is the author of *The Handplane Book* (The Taunton Press), due out in August.]

A copy of a Stanley No. 78

This rabbet plane, manufactured by Millers Falls, is a copy of the Stanley No. 78. It is a good plane for cleaning up tenons or rabbets. It's shown with all of its parts attached.



Can Shaker box bands be steamed?

I'm interested in making some Shaker boxes. Most of the information I've seen on this shows the bands being soaked in hot water. Because I already have a steambox set up, is there any reason I couldn't steam the bands?

—David Nimberger, San Antonio, Texas

John Wilson replies: There is no major reason for not using the steambox you already have. But you're right—both historically and today, a hot water bath has been the favored technique, though I'm not sure why. Personally, I have always used hot water for bending Shaker boxes.

I spoke with another boxmaker recently, Charles Harvey of Berea, Ky., about his experience. He started out using steam. Only when his equipment was delayed on return from giving a demonstration in Japan did he use hot water. He never returned to using steam and now favors hot water for both box and chair parts.

Apparently, the ends of the box bands didn't check so readily coming out of the hot water bath. Also, bands left in the bath could be reheated and bent successfully. Bands that have been steamed and inadvertently allowed to cool (perhaps because of an interruption) generally cannot be bent successfully, even after being steamed again.

[John Wilson has been teaching Shaker boxmaking for 15 years. He also makes Shaker boxes and sells the supplies from his shop in Charlotte, Mich.]

When to resharpen carbide router bits

I use my router mostly on plywood with carbide flush-trimming bits. How can I tell when they need resharpening? And how do I do it?

—Theodore Fitzgerald, Clayton, N.C.

Jeff Greef replies: The first sign that a carbide bit needs resharpening is that it's harder to push the router through a typical cut than it was previously, and the motor will sound like it's straining.

The second thing to check is the quality of the cut. A dull bit will usually (though not always) have a few ugly looking nicks in it that leave bumps on the cut. A dull bit may also burn the plywood.

Carbide router bits were developed for

Drawings: Vince Babak

the work that you are doing—cutting sheet goods with a high adhesive content. For that reason, the bits will hold up for a long time before they need sharpening. Bits used only occasionally may never need sharpening.

When they do, send them out to be sharpened professionally. It's conceivable that you could sharpen the flutes with a diamond stone (other stones aren't hard enough), but the carbide is still so hard that you'd have trouble getting a sharp edge. Professional sharpening services have tooling made for the purpose. But it may be cheaper to throw an inexpensive bit away and buy another one.

Care when using the bits will help them last longer. Woods with high mineral content, like teak, will dull cutters faster than other woods. If you're routing plywood edges and you have a lot to do, move the bit up or down slightly after cutting a few hundred feet. Glue dulls carbide faster than wood, so if the same section of the bit is always hitting the glue line, you'll wear away the carbide prematurely and soon have little nicks in the edge.

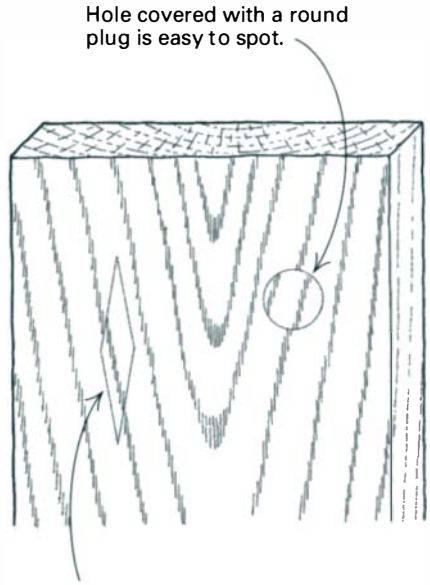
Finally, the manufacturing quality of the bit has much to do with how long it stays sharp. Though many factors are involved, the most important is the quality of the grind. Rough grinding leaves a jagged, serrated edge that will dull quickly. A fine grinding will create a clean edge that will hold up longer. Inspect the edge of the flutes on a new bit before buying it. If a pencil tip scrapes along its edge, rather than slides, the grind is on the rough side.
[Jeff Greef is a writer and woodworker in Davenport, Calif.]

Making plugs disappear

When using plugs to cover a screw hole, I find that no matter how smooth it feels to the touch, after it's painted or finished it still looks like it's proud of the surrounding wood. How can I correct this? ***—Howard Jackson, Laguna Niguel, Calif.***

Jim Tolpin replies: It's not easy to make a plugged hole disappear completely from sight. It helps greatly if you cut the plug from an offcut of the same wood in which the hole was made. As the humidity rises or falls, the plug will then move at the same rate as the surrounding wood.

A better plug To make an inconspicuous repair or cover a screw hole so it's not obvious, use a diamond-shaped patch instead of a round plug. The human eye will readily pick out a circle but is less likely to notice a piece whose edges almost follow the grain.



This will help keep the plug flush with the surface. It also helps if you select the grain for the plug carefully and orient it to match the surrounding grain. The plugged hole will almost disappear, but not quite.

Unfortunately, the roundness of the plug is a problem. Our eyes easily pick out a round outline in a flat field, no matter how well it might blend in otherwise. If I really want to hide a plug, I use the same technique I employ when replacing a damaged section of wood: I make a graving piece—also called a dutchman (see the drawing above). Because a graving piece has the shape of a long diamond, its edges can be oriented to run nearly parallel to the surrounding grain. By carefully selecting the grain and color of the graving piece, I can cover a screw hole or make a repair that's almost impossible to detect.
[Jim Tolpin is a writer and woodworker in Port Townsend, Wash.]

Flattening a warped tabletop

Late last winter, I completed a small cherry table with an 18-in.-wide top made of two boards edge-glued with the growth rings facing in opposite directions. Before fastening the top, I decided to set it aside for a week to make sure that there was no wood movement. It was fine.

Unfortunately, I delayed varnishing the table for several months, and the tabletop developed a noticeable 3/16-in. cup. I know from other projects that if I can reduce the humidity to its old level and apply several coats of varnish to both sides, the top will be flat and stable. I've considered placing a 100-watt lamp under the table for a while to do this. Do you have any suggestions?

—Brent Longtin, Natick, Mass.

Bruce Hoadley replies: If the gradual change to humid weather caused cup in both boards regardless of growth ring placement, I would conclude that the bottom surface picked up more moisture than the top surface. Could this mean that only the top surface had been finished? If this is the case, then the light bulb routine might help re-flatten the top before you varnish the whole piece. But if the warp resulted from differential shrinkage of the wood as it picked up moisture, I would be inclined to wait until the lower winter humidity returns to see what happens.

If all else fails, the application of battens (with slightly crowned faces to counteract the warp) to the underside of the top might be effective in pulling out a bit of residual warp.
[Bruce Hoadley is a professor of wood technology at the University of Massachusetts at Amherst and the author of the book *Understanding Wood* (The Taunton Press, 1980). He is a contributing editor to *Fine Woodworking* magazine.]

What causes spontaneous combustion of oily rags?

What conditions most easily lead to spontaneous combustion? I keep rags impregnated with linseed oil and wax in a glass jar with a screw top to exclude most of the air. Still, I've often wondered if the small amount of air is sufficient for an explosion, which could break the jar and eject burning rags into my workshop. What's your advice?

—Frederick Trapp, Pinhalzinho, Brazil

Chris Minick replies: I'm uncertain

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about the safety of your glass-jar and oily-rag storage system, but my gut feeling says you've just been lucky so far. Wadded-up, oil-soaked rags contain the three ingredients needed for spontaneous combustion: an ignition source, fuel and oxygen.

For an oil to change from a liquid to a solid, it must first absorb oxygen from the atmosphere. This oxygen absorption phase takes several hours, which accounts for the long drying time associated with oil finishes. Once sufficient oxygen has been absorbed, an exothermic (heat-producing) reaction begins. Normally, this heat dissipates harmlessly into the surrounding atmosphere as the oil dries.

When trapped inside a ball of oil-soaked rags, however, the heat produced by this reaction sort of feeds on itself—often with predictably disastrous results. A basic rule of chemistry is that the higher the temperature of a chemical reaction, the faster it proceeds. The heat trapped inside the rag ball causes the reaction rate to increase, producing more heat, which increases the reaction rate, which produces more heat and so on. Eventually, enough heat is produced to ignite the oily rag ball—spontaneous combustion.

Avoiding disaster is easy. Don't store oil soaked rags in your shop. I spread my oil soaked rags flat on my shop floor or across a lumber pile to dry. Once they are dry, I either toss them in the regular trash or keep them for reuse as oil applicator rags.

[Chris Minick is a finishing chemist and woodworker in Stillwater, Minn. He is a contributing editor to *Fine Woodworking* magazine.]

What's the best adhesive for a butcher block?

I have been asked to build a butcher block. What kind of glue and finish should I use?

—Ken Shoemaker, Alma Center, Wis.

Chris Minick replies: Butcher blocks are subjected to frequent cleaning and a lot of pounding. Therefore, the adhesive that holds the blocks together must be both water-resistant and shock-resistant. Common woodworking adhesives are not designed to take such punishment, but there are several industrial adhesives well-suited for this application.

My first choice would be a slow-set, toughened epoxy (also called flexible or shock-resistant epoxy). I use this adhesive to bond rosewood, cocobolo and wenge when I stack-laminate necks for the guitars I build. I've also used toughened epoxy adhesives to patch wooden boat hulls and to repair the trunnion on my bandsaw. (Don't ask!)

The newer type II latex wood adhesives (such as Titebond II) also possess good water- and shock-resistance. They also may be suitable for your project, especially if the block is through-bolted, as is usually the case.

As far as finish is concerned, if the block is to be used to chop meat, then it is best to leave the chopping surface entirely unfinished. The rest of the block can be coated with pure walnut oil—the kind sold in grocery stores as gourmet salad oil. Walnut oil dries slowly, about five days or so, and does not form a surface film. Walnut oil is also easy to renew, and best of all, it is totally edible. I use it on all my wooden cooking utensils.

Avoid film-forming finishes. Inevitably, they chip off and contaminate the meat.

Making walnut look like rosewood

I do some restoration work on antique furniture and have found some pieces that are made of walnut that have been made to look like rosewood. I read of a technique (discovered by a cabinetmaker named George Henkels) for "removing the acrid oils," but the description of the technique was very vague. Can you tell me how the rosewood graining of walnut was originally done or direct me to more detailed information?

—Dr. Ivus H. Crouch, Ledbetter, Ky.

Jeff Jewitt replies: In addition to being a well-known cabinetmaker, George Henkels was a prolific writer. A compilation of articles that he wrote for *The Bulletin*, a daily newspaper in Philadelphia, titled *Home Economy* was published in 1867. I was able to get a microfilm copy of the book but was unable to find any reference to the process you describe. He does state a preference for finishing walnut with shellac or spirit varnish to let the natural figure and color speak for themselves.

When researching old finishing techniques it is important to understand that processes were described in the context of what scientists and chemists knew at the time. I think the "removal of acrid oils" is somewhat misleading in this regard because walnut does not contain significant amounts of volatile oils like cedar or rosewood does.

What most likely is being described is a treatment of the walnut with various chemicals that initiate a chemical reaction in the wood, by-products of which produce a coloring change within the wood. Chemical coloring was a popular technique in Henkels' time. In fact, he mentions one such material, iron buff, which is made by soaking rusty nails in vinegar. When applied to woods containing tannin (oak, mahogany, cherry and walnut), this solution will ebonize them, or turn them black.

Walnut can be colored to look like the deep chocolate of rosewood by sponging it with potassium dichromate dissolved in water or with natural or synthetic dyes. But the inky black grain of Brazilian rosewood is another matter.

I can think of no one-step process that would magically produce this type of graining in walnut—that was probably done by hand. The most common technique would involve graining with a goose feather dipped in an ink such as India ink, which is composed of lampblack mixed in water or oil.

These black grain lines are permanent and will not come out with stripping or sanding. Any furniture refinisher who has tried to remove an ink stain from a desk will attest to that.

[Jeff Jewitt restores and conserves furniture in North Royalton, Ohio.]

Can plastic pipe be adequately grounded for dust collection?

I enjoyed Sandor Nagyszalanczy's article on dust collection (FWW #117, pp. 66-70), even though I had bought a small system the week before. I was quite surprised, however, to see that there was virtually no reference to static electricity and grounding. This would seem to be a pretty important subject.

I had not given it any thought until the salesman mentioned it. When I

asked what I needed to know, he replied "static buildup in the plastic ducting could cause an explosion." (That got my attention!) "You need to run a grounding wire in the plastic duct back to the machine and ground it to the housing." Is there anything else I need to know? —Joe Ponessa, Moorestown, N.J.

Curt Corum replies: I am not convinced that plastic pipe can be adequately grounded when it is used to convey wood dust. People attempt to ground plastic pipe because dust particles constantly rub against the interior surface of the pipe, generating static electricity. Because the plastic pipe is nonconductive, a substantial electrical accumulation may result, which can discharge into the mist of fine dust particles. These conditions are ideal for an explosion or fire.

To ground a plastic dust-collection system adequately, you'd have to have a reliable internal ground and an external ground. Unfortunately, system abrasion will most likely break any internal ground over time. And there's no guarantee (it's unlikely, in fact) that built-up static electricity would arc to the external ground rather than into the dust particles when the internal ground broke down. If a safe, reliable grounding method was available for this situation, I am sure it would be both expensive and complex.

Even if plastic pipe systems could be properly grounded, they're not designed for dust-collection use: Plastic pipe elbows have a very short radius and contribute to an inefficient dust-collection system, and fittings are limited.

My suggestion would be to convert to a metal piping system. You wouldn't have to worry about static electricity. Because the metal is a conductor, static electricity doesn't have a chance to build up. Also, because the elbows and other fittings are properly designed for conveying dust, they'll maximize the efficiency of your dust collector.

[Curt Corum is the technical sales manager of Air Handling Systems in Woodbridge, Conn.]

Reader exchange

Does anyone know of a source or have parts for a Comet Cub radial-arm saw? It was manufactured by Consolidated Machinery and Supply Co., Ltd. of Los Angeles, Calif. Although the saw is of 1950s vintage, it is well-made and gives outstanding performance.

—Roger B. Smith, Box 352-12, Kanab, UT 84741

I have the opportunity to purchase a barely used Scheppach dust collector (HA-26) for a low price. However, it lacks a shavings bag and belt. I have been unable to obtain a phone number for the manufacturer.

Do you know where I can get parts and accessories?

—Art Wilson, 2336 Thornwood Lane, Memphis, TN 38119

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D1232-2	32'	29'	53#	249.95
D1236-2	36'	32'	62#	279.95

ALUMINUM FLAT STEP TYPE 1- 250# RATED EXTENSION

D1324-2	24'	21'	39#	209.95
D1328-2	28'	25'	50#	239.95
D1332-2	32'	29'	62#	268.95
D1336-2	36'	32'	77#	328.95
D1340-2	40'	35'	85#	369.95

ALUMINUM FLAT STEP TYPE 1A- 300# RATED EXTENSION

D1520-2	20'	17'	37#	199.95
D1524-2	24'	21'	45#	234.95
D1528-2	28'	25'	56#	259.95
D1532-2	32'	29'	66#	299.95
D1536-2	36'	32'(250# rating)	79#	339.95
D1540-2	40'	35'(250# rating)	89#	389.95

FIBERGLASS FLAT STEP TYPE 1A- 300# RATED EXTENSION

D6216-2	16'	13'	34#	209.95
D6220-2	20'	17'	40#	228.95
D6224-2	24'	21'	53#	264.95
D6228-2	28'	25'	60#	298.95
D6232-2	32'	29'	74#	379.95

FIBERGLASS FLAT STEP TYPE 1A- 300# XTRA HEAVY DUTY EXTENSION

D7116-2	16'	13'	37#	259.95
D7120-2	20'	17'	43#	289.95
D7124-2	24'	21'	58#	319.95
D7128-2	28'	25'	66#	359.95
D7132-2	32'	29'	79#	409.95

Buy any 3 ladders (can be asst) deduct additional 5% Prepaid freight and best prices too!

STABILA LEVELS

Model	Description	List	Sale
24740	24" Angle Setter Level	Sale	14.95
24640	24" Level w/ hand holes	62.20	43
24670	48" Level w/ hand holes	79.70	55
24680	72" Level w/ hand holes	145.45	99
27170	48" Level w/o hand holes	71	49
27000	78" Level w/o hand holes	146	105
80LMS	Laser Level System	532	365

RECORD WOODWORKING VISES

Model	Jaw\Width	Opening	List	Sale
53E	10-1/2"\15"	Quick release	248	109
52D	7"\8"	Quick release w/dog	169	85
52-1/2D	9"\13"	Quick release w/dog	231	95

KRAUSE MULTIMATIC LADDERS

Model	Description	List	Sale
121482	12' Aluminum Multi Purpose	264	128
121499	16' Aluminum Multi Purpose	286	148

HITACHI TOOLS

Model	Description	List	Sale
C8FB2	8-1/2" Slide Compound Saw	1169	489
998862	8-1/2" Carbide blade - 60 tooth Sale		44.95
C10FS	10" Slide Compound Saw	1627	739
C7SB	7-1/4" Circular Saw	Sale	105
M12V	3 HP variable speed Router	541	259
TR12	Plunge Router 3 HP	377	189
SB-75	3 x 21 Belt Sander w/bag 2 spd	315	158
DH24VBK	15/16" SDS Rotary Hammer	298	179
C10FC	10" Mitre Saw	533	199
C15FB	15" Mitre Saw	1346	659
DN10DYK	9.6V Right Angle Drill Kit	370	159
G12SA	4-1/2" Grinder 6.9 amp	177	95
FDS10DVA	9.6V Drill Kit w/flashlight	Sale	99
DV14V	3/8" Hammer Drill with case	230	115
NR83A	Framing Nailer 2- 3-1/2 Full Head		389
NR83AA	Framing Nailer 2- 3-1/2 Clip Head		369
NT65A	16 ga. Brad Nailer 1 - 2-1/2	749	365
NV45AB	Coil Roofing Nailer 7/8 - 1-3/4	935	399
N5008AB	7/16" Stapler-16 ga. 1 - 2 lgth	679	325
EC6B	1 HP Oil Compressor	540	279
EC6C	1 HP Oil-less Compressor	580	295

WAGNER PAINT & SPRAYER PRODUCTS

959	Power Roller	140	109
255	Airless Kit	180	135
375E	Airless System	195	164
404	Airless Painter & Roller	320	265
505	High performance Airless Painter	440	369
HVLP	Fine coat finishing HVLP System	195	159
CS2000	Profine finish HVLP System	339	278

DAVID WHITE INSTRUMENTS

Model	Description	List	Sale
LP6-20	Sight Level package - 20x	329	215
LP6-20XL	LP6-20 with 9056 tripod & 7620 rod	409	269
L6-20	Meridian Level - 20x	309	199
LT8-300	Level Transit - 26x	739	489
LT8-300P	above Level with optical plum	869	565
LT6-900	Level Transit - 20x	419	269
LTP6-900	Above Level with tripod & rod.	615	389
ALT6-900	Automatic Level - Transit - 18x.	666	429
ALTP6-900	above Level with tripod & rod	799	499
ALP6-18HD	Auto. Level-18x with tripod & rod	599	395
AL8-22	Automatic Level - 22x	583	339
AL8-26	Automatic Level - 26x	854	379
ALP8-26	above Level w/ tripod and rod.	977	499
ML100I	Laser Level	1099	945
ML100	Laser Level w/detector	1249	1075
ML200	Visible Beam Laser	979	799
ML200I	ML200 w/o detector & bracket.	749	625
LL100	Finish Line Laser Level	199	135

QUAL-CRAFT JACKS

Model	Description	List	Sale
2200	Pump Jack	79	58
2201	Pump Jack Brace	30	20
2203	Pump Jack guard rail holder	31	21
2204	Work Bench & rail holder combo	53	39
2500	Adjustable Roofing Bracket	9.95	7.95
	Buy any 6 (can be assorted) deduct additional 10%		
2601	Wall Jack	167	108
	Lots of 4 deduct additional 10%		

PASLODE IMPULSE GUNS

Model	Description	List	Sale
IM250	Trimpulse Finish Nailer Kit complete drives 3/4" - 2-1/2" brads	1130	548
IM325	Impulse Framing Nailer Kit complete drives 2" - 3-1/4" nails	1130	548
CT325SS	Cordless Framing Nailer Kit complete drives 2" - 3-1/4" nails	1120	495

SENCO AIR NAILERS

Model	Description	List	Sale
SFN1+	Finishing Nailer 1" - 2" w/ case	448	345
SFN40	Finish Nailer w/case 1-1/4"-2-1/2"	569	389
SN325	Nailer 1-7/8" - 3-1/4"	665	419
SLP20	Pinner w/cse 5/8" - 1-5/8"	422	279
SKS	Stapler 5/8" - 1-1/2"	390	279
M2	Stapler 1-3/8" - 2" length	535	375
SN70	Framing - Clip Hd 2" - 3-1/2"	725	449
SN60	Framing - Full Hd 2" - 3-1/2"	708	459
SN65	15% more power than SN60	709	465

JAMERCO AIR NAILERS

Model	Description	List	Sale
JTBN1832	Brad Nailer - 5/8" -1-1/4"	96	69
JTSO61825	Narrow Crown Finish Stapler 1/2" - 1"	96	69
JTFN1650	Finish Nailer - 3/4" - 2"	245	139
JTAFN1464	Angle Finish 1-1/4"-2-1/2"	360	225
JTFN1664	Finish Nailer 1" - 2-1/2"	360	225
	Above nailers come with case!		

AIRY AIR NAILERS

Model	Description	List	Sale
0241SK	Brad Nailer 3/8" - 1-9/16"	180	98
0250SK	Brad Nailer 3/4" - 2"	296	164
0626SK	1/4" Crown Stapler 3/8" - 1"	194	104
0645	1/4" Crown Stapler 3/4"-1-9/16"	310	175
EZ-2	NEW Multi-purpose nailer & stapler	240	139
	Above nailers come w/cese, fasteners, oil & wrenches		
0565T	Angle Finish Nailer 1" - 2-1/2"	386	205
8290	Framing Nailer 2" - 3-1/2"	475	315
	Airy nailers use Senco brand fasteners		

DUO-FAST AIR NAILERS

Model	Description	List	Sale
LFN-764	Finish Nailer 1" - 2"	611	329
CN-350	Framing Nailer - Full Head	702	369
CN-325	Framing Nailer - Clip Head	682	369

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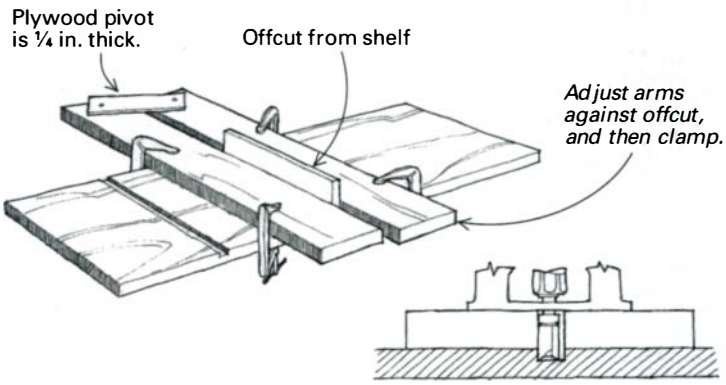
edited and drawn by Jim Richey

Easily aligned jig for routing shelf dadoes



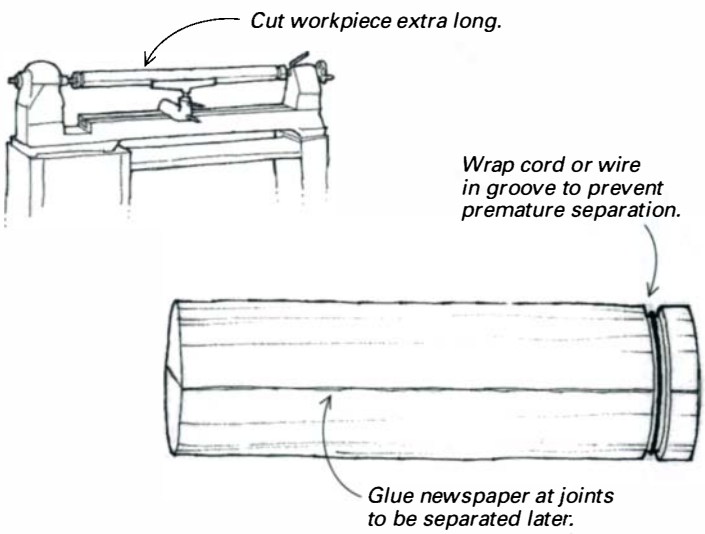
Recently, I had to rout lots of dadoes in cabinet sides for ¾-in. plywood shelving. I came up with a method built around a ⅝-in. patternmaking router bit (with the bearing located above the bit) and a simple jig made from two pieces of 1-in.-thick plywood about 6 in. wide. The two pieces of plywood are joined by a small piece of ¼-in. plywood at one end that pivots.

To use the fixture, clamp one side to the cabinet side along the index line you have drawn for the shelf location. Position an offcut of the same material you will be using for the shelf between the two parts of the jig. Swing the second fence toward the first fence so that it sandwiches the offcut, and clamp it in place. Now remove the offcut, and rout the dado, running the bit's bearing against the sides of the jig's arms.

This system is more accurate than any other method I've used. It even adjusts for minor variations in sheet thickness.

—Robert R. Knights, Woombye, Australia

Safer split turnings



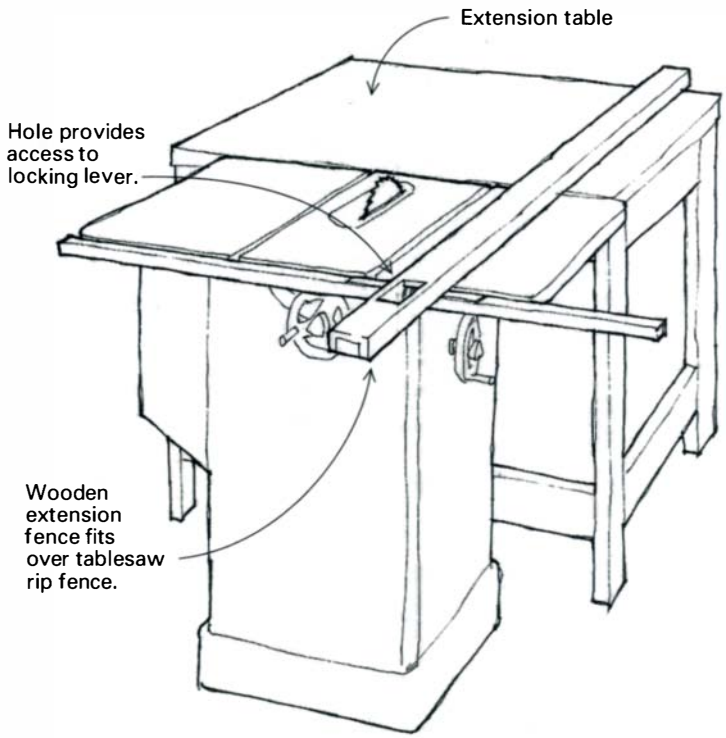
When a half- or quarter-section of a turned spindle is needed for a project, the usual method is to glue up sections of stock with a sheet of newspaper between them. The newspaper layer allows the sections to be easily separated later. This approach works fine, but it is mighty disheartening—and sometimes scary—to have the turning come apart at the newspaper joint before it's finished. To avoid this, I make my blank extra long and turn a deep groove with my parting tool at each end of the stock. Then I wrap stout cord or wire around the groove and tie it off to prevent the pieces from flying apart. Once the turning is done, I cut the grooved ends off and separate the sections at the newspaper layer with a sharp chisel.

—Ken Picou, Austin, Texas

Quick tip: Kerosene is a great lubricant for sharpening stones. It is inexpensive, commonly available and has a slightly oily quality that lubricates well. I use it on my water, oil, ceramic and diamond stones. In addition, kerosene is a great brush-cleaning solvent, safer than gasoline and cheaper than mineral spirits.

—Robert E. Steele, Allegan, Mich.

Tablesaw extension fence



This wooden extension fence slips over the tablesaw's regular fence and more than doubles its length. It is an indispensable accessory when extended contact with the rip fence is necessary. Mine is sized to fit my tablesaw's Biesemeyer fence, but the concept could be adapted to other rip-fence designs.

To make the fence, build a U-shaped channel that fits neatly over the rip fence. Add pieces to close off both ends. Add baffles on the inside for strength and to lock the extension in place over the rip fence. Assemble the extension with glue and plenty of screws. I cut an access opening directly above the locking lever of the rip fence so that I can operate it from above or below. Two coats of varnish will protect the fence for years. To use the extension, just slip it

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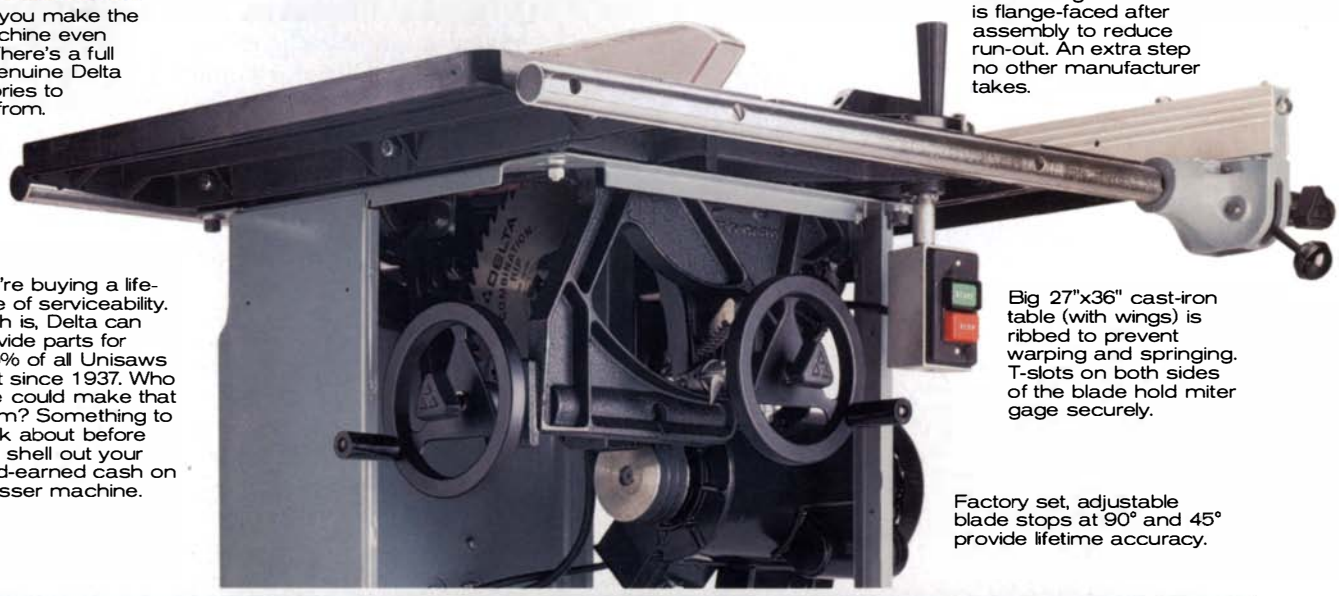

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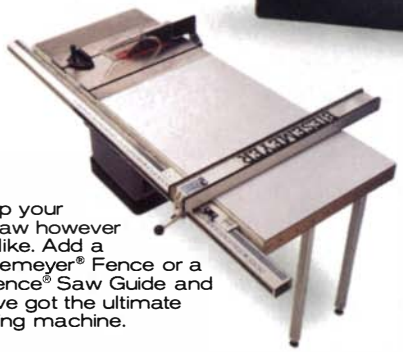

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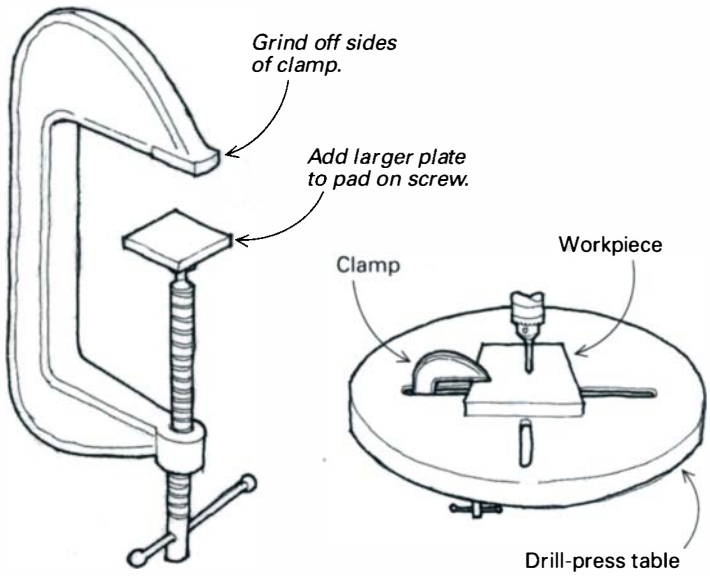
over the regular fence when you need it. Add an outfeed table at the back to support the extension fence and the workpiece.

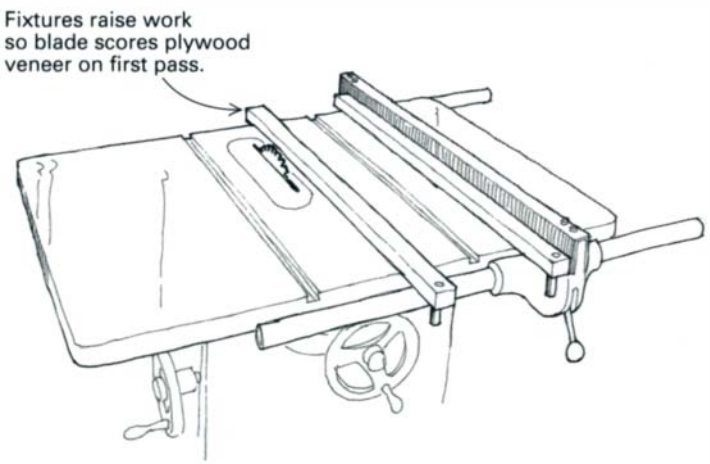
—Dick Dorn, Oelwein, Ia.

Quick clamps for the drill press



If your drill-press table has slots that go all the way through, you can make a quick clamp for securing smaller work to the table by grinding down the sides of a C-clamp. You will also need to enlarge the pad on the screw of the clamp. To use, simply slip the clamp through a slot, and tighten the workpiece. This approach is more convenient than trying to clamp the workpiece from the outside edge of the table. *—Dennis R. Brock, Rawson, Ohio*

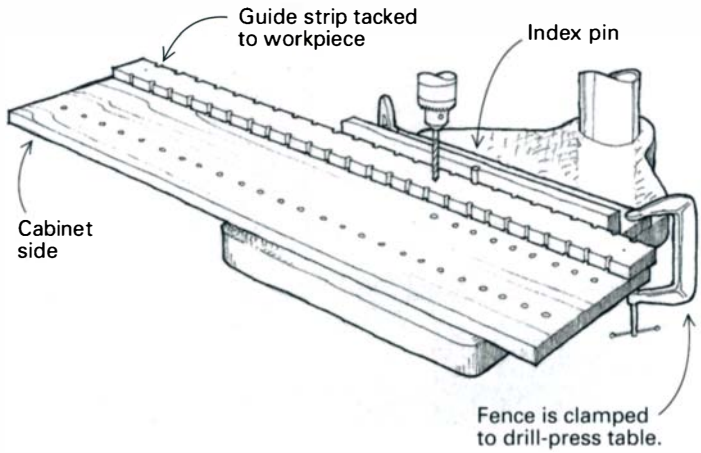
Plywood scoring fixtures



You can greatly reduce the fuzzing and tearout that goes with ripping plywood across the veneer grain by first scoring the lower side of the plywood with a shallow cut of less than ⅛ in. But this requires lowering the blade to make the scoring cut then raising it again to make the finish cut. These fixtures allow you to make a scoring cut without all this fuss. Just put the two fixtures in place, one against the fence and one near the blade, and push the panel through to make the scoring cut. Then remove the fixtures to make the finish cut. Dowels on the ends of the fixtures prevent them from sliding forward during a cut. *—M. Dugan, Bohemia, N.Y.*

Quick tip: It's hard to see pencil lines on darker woods like walnut or bubinga. I found a perfect solution in my drawer of computer supplies: Avery brand laser printing labels. I cut a portion of the sticky-backed paper from an 8½-in. by 11-in. sheet and stick it to the workpiece. A pencil line shows up well on the paper. And the paper can be easily removed after cutting or machining the workpiece, without leaving residue. *—James L. Hall Jr., San Francisco, Calif.*

Jig for drilling cabinet shelf holes



Here's a method for drilling the holes in cabinet sides for adjustable shelves. The jig consists of two parts: a guide strip temporarily tacked to the workpiece and an index pin in a fence clamped to the drill-press table. To make the guide strip, start with a length of ¾-in. plywood about 3½ in. wide. Drill two parallel rows of ¼-in. holes about 1¼ in. apart and spaced at the desired shelf-adjustment intervals. Take care at this stage to align and space these pilot holes accurately because they will determine the accuracy of the final shelf holes in the cabinet. Rip the guide strip through the holes so that half the holes remain on each side. The two outer rips are scrap.

To make the index-pin fence, attach a length of 2-in.-wide plywood to a base that can be clamped to the drill-press table. Now drill a half-hole in the face of the fence by temporarily clamping a scrap piece to the front of the fence and drilling a hole that's half in the scrap and half in the fence. Remove the scrap, and glue a short piece of ¼-in. dowel in the half-hole to produce an index pin.

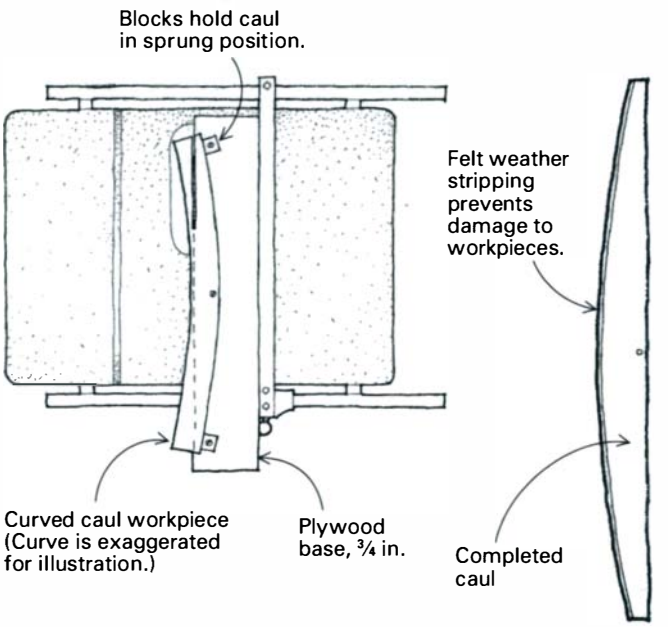
To use, clamp the fence at the appropriate distance from the bit, and set the bit depth stop. Tack the guide strip to the workpiece with the top of the strip flush with the end of a cabinet side. The guide strip should overhang the side of the cabinet slightly more than one-half the diameter of the hole. This setup will allow the half-holes in the guide strip to mate with the index pin and position the workpiece correctly for each hole. One hand operates the

drill press and the other alternately holds and then advances the workpiece. When you establish a rhythm, you can drill a hole about every two seconds. *—Robert A. Loos, Medford, N.J.*

Quick tip: Methyl ethyl ketone (MEK) will soften aliphatic-resin glues (like Titebond). Use a long-point squeeze bottle, and wet the joint from all edges for five to 45 minutes. If necessary, work a chisel in from an edge, and wet the resultant void, repeating that process frequently. With patience, the glue will soften, and you will be able to disassemble the parts at the glue joint.

—Chip Minck, La Mesa, Calif.

Making curved cauls on the tablesaw



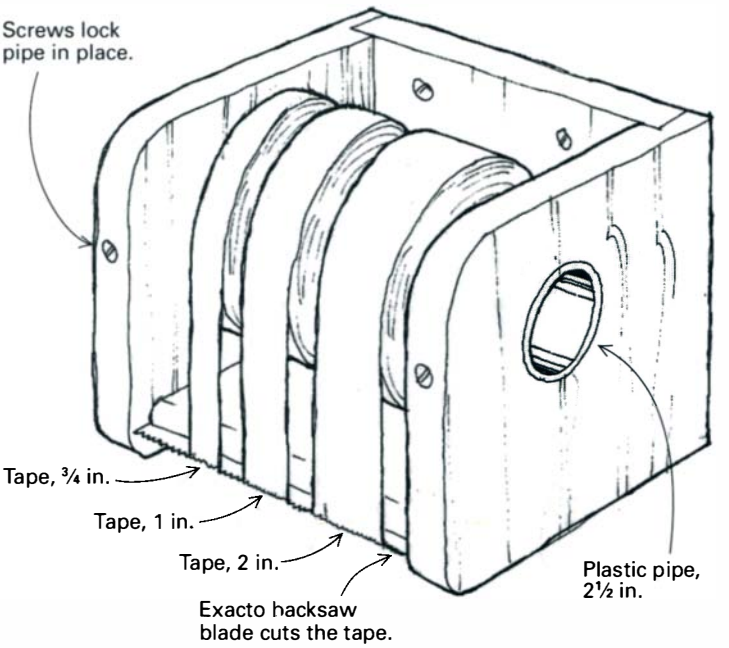
Recently, when I needed a dozen or so curved cauls for gluing solid wood banding to plywood shelves, I came up with this jig. The base is simply a strip of ¾-in. plywood a few inches longer than the longest caul you want to cut. Rip the strip to 6 in. or so. Select the caul material. I used 1-in. by 1½-in. oak. Ash or hickory would also work well.

Mount the caul material to the jig with one screw at its center point, placing it on the jig so that one edge is flush with the plywood edge. Move one end of the caul so that it overhangs the edge of the jig about ⅛ in. per foot of the length of the caul, and screw a scrap block in position behind it. Spring the opposite end to an equal amount of overhang, and screw another block in place. Now run the jig with the caul attached through the tablesaw to rip off the overhang. The fence is set to the width of the jig.

When the caul is removed from the jig, it will spring back to a gentle natural curve that provides uniform pressure when clamped down. Cauls of any length can be made by repositioning the stop blocks. This method is so quick and easy that I now have cauls in many sizes. To provide a cushioned pressure surface, I glue on weather-stripping felt to the face of the caul.

—Rick Hodges, Deer Park, Wash.

Masking tape dispenser

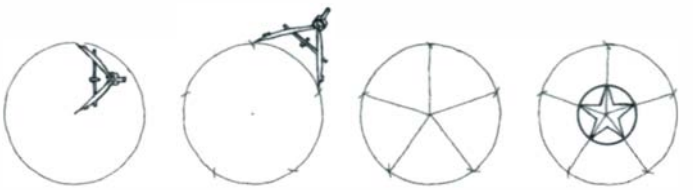


I use a lot of masking tape in my work, often in different widths. Not being the neatest woodworker, I used to spend a lot of time looking for a misplaced roll of tape just to tear off one little piece. So I built this wall-hanging tape dispenser to hold the widths of tape that I use. The axle is a length of 2½-in.-dia. plastic pipe held in place with screws. I experimented with other tape cutters—an old jointer knife and a hacksaw blade—before discovering that an Exacto backsaw blade works best. I fixed the backsaw blade into the rounded edge of a piece of wood and set that about ½ in. from the front of the dispenser. This way, the blade does not stick out in front. To use, I just pull down on the tape and tear at the blade.

—Bob Gleason, Hilo, Hawaii

Quick tip: Cover bar or pipe clamps with split-plastic shower-rod covers to prevent those black stains you get when iron contacts wet glue on the wood. *—Davis G. Durham Jr., Landenberg, Pa.*

Simple star construction



1. Draw circle with a 4½ in. radius. *2. Set compass to 5 in.; step off arcs.* *3. Connect the five points to the center.* *4. Draw any size circle to define points of a star.*

Here's a simple way to construct a five-pointed star. It's easy to remember, and it doesn't require a protractor or a math degree. Draw a circle with a radius of 4½ in. Set the compass to 5 in., and

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Hitachi 8-1/2"x60Tx5/8"	$179	$109
DeWalt 8-1/2" & Ryobi 8-1/2"x60Tx5/8"	$179	$109
Delta 9"x80Tx5/8"	$204	$119
Ryobi–Makita & all 10"x80Tx5/8"	$207	$129
DeWalt, Makita, B&D, Hitachi 12"x80Tx1"	$229	$139
Ryobi–Makita 14"x100Tx1"	$266	$179
Hitachi 15"x100Tx1"	$277	$189

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10"x60Tx5/8" 3/32"K	$162	$129
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8-1/4"x60Tx5/8" 3/32"K	$150	$109
7-1/4"x60Tx5/8" 3/32"K	$150	$109

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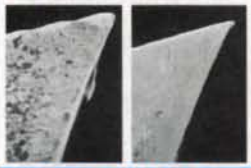

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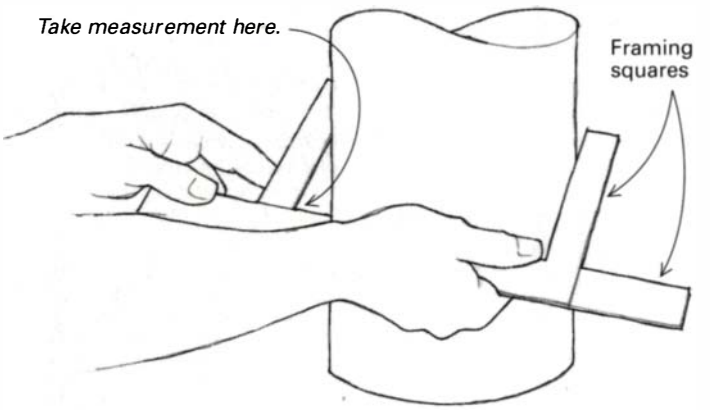
step off arcs around the circumference. That's it. The arcs will divide the circle into a perfect pentagon. Draw lines from the center point through these arcs. Where any circle cuts these lines, you have the five points for a star or pentagon.

—Bruce Revell, Magill, South Australia

Framing-square calipers



This may be an old trick, but I thought of it myself and was smiling the rest of the workday. My spring calipers measure only up to 6 in. One day, I needed an exact measurement of a wooden column that was several inches larger than that. It occurred to me that I had two small framing squares the same size. I mated the bodies together, as shown in the sketch, and took the measurement where the tongue of one square intersected the interior scale of the other one.

—Mark Dichiara, Atlanta, Ga.

The last lap: honing steel with aluminum

After 60 years of sharpening chisels and plane irons, I thought I'd achieved the ultimate edge when I finished off the job with an 8,000-grit Japanese waterstone and a leather strop. That was before I discovered that I could achieve an even finer edge by lapping the blade on aluminum.

Start with a section of extruded structural aluminum about the size of a benchstone. Apply a little mineral spirits to the flat, and stroke the tool on the aluminum just as you would on a regular whetstone. The aluminum will lap a tiny amount of steel from the cutting edge.

The resulting edge is incredibly sharp—so much so that I almost feel as if I'm working without a blade in the plane.

—James R. Thomson, West Vancouver, B.C., Canada

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Fine WoodWorking

Pennsylvania Spice Box

Highly figured wood and hand-cut joinery make this chest a showpiece of craftsmanship

by D. Douglas Mooberry

When I started a woodworking business, my biggest obstacle was me. Though I was 22 years old, I looked 16. When making house calls, potential clients would eye me with an annoyed expression that seemed to say, "What, your father couldn't make it to our appointment?" To convince them that *I* was the craftsman and did indeed know something about woodworking, I started bringing a spice box that I had made. Once they saw the hand-cut joinery, pleasing design and incredibly figured wood, they felt more comfortable.

Thanks to spice boxes, I am still woodworking 15 years later. Building one involves a variety of joinery, including hand-cut dovetails—lots of dovetails—machined joints and moldings, raised-panel construction and precise drawer fitting. A spice box, or valuable chest, is a great way to learn, practice or show off your woodworking skills (see the photo below).

Spice boxes have a heritage that goes back several centuries. The term *spice box* is really a misnomer. These small chests originally may have been used for storing rare spices, but they were usually filled with valuables such as jewelry and documents.

Because spice boxes don't demand a lot of wood, use the best you can find. The more figured the wood, the better. The box I designed for this article has bracket feet, a tombstone raised-panel door and a typical interior drawer layout. The primary wood, meaning everything you see without pulling out the drawers, is walnut. The secondary wood is poplar. The hardware includes a pair of brass butt hinges, a lock and nine drawer pulls.

***A piece of furniture to show off—** Spice boxes come in many styles (above) and deserve beautifully figured woods. The author (right) designs some boxes with decorative inlays.*

Photos: Anatole Burkin

The carcase is more complex than it appears

Don't be misled by the size of a spice box when setting a timetable for building one. Although it's about as big as a portable television, it's going to keep you busy for some time.

You'll need at least 12 bd. ft. of walnut and 6 bd. ft. of 4/4 poplar or some other secondary species. I begin by milling out the wood for the two sides, top and bottom. You'll need stock that can finish out at 9⅞ in. wide and ¾ in. thick. I always surface the face on the joiner to get it flat and then plane it to get consistent thickness. I look at what my board will yield and determine how best to use it. This lets me center a beautiful flame pattern or stay away from a hidden crack or a knot.

The sides are joined to the top with through dovetails. The pins are in the sides, the tails on the top and bottom. Because the molding will cover up the tails on the sides, you could use half-blind dovetails, but I find that cutting through dovetails is faster. The pattern I use, four 2-in. tails, equally spaced, is typical of the 19th century.

The joinery between the sides and the bottom requires careful layout. Although the outside dimensions of both sides are the same, they are milled differently. The right side is notched to accept the door, and the left side has a rabbet for the door recess.

Begin by standing the right side on edge against the miter gauge, and cut the ¾-in.-deep crosscut for the notch (see the drawing on p. 38). Then, using the rip fence, trim the bulk of the notch with a stopped cut. Trim the top section, where the tablesaw couldn't reach, with a bandsaw or handsaw, and clean up any ragged edges with a chisel. The left side of the carcase receives a stopped rabbet, ¾ in. wide and ¼ in. deep, for the door.

The bottom is constructed differently from the top. Because the foot molding

■ Although they're called spice boxes, these elegant small chests were used by Pennsylvania settlers to hold valuables. Hand-cut dovetails join the walnut case, and the molding and feet are glued and nailed on with traditional, square-cut nails. The chest contains nine drawers.

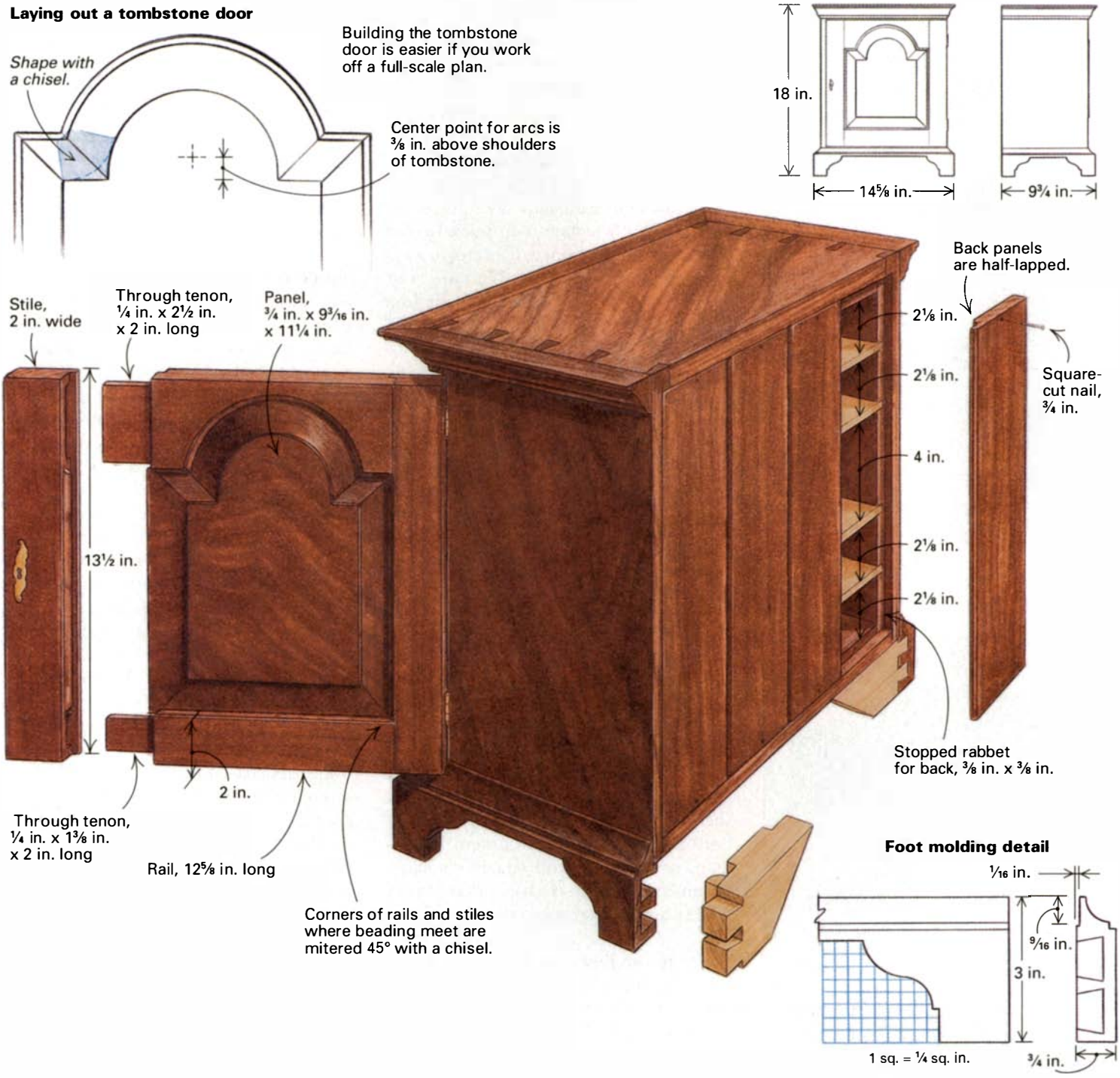
doesn't reach high enough to cover full, ¾-in. through dovetails, the tails, once cut, are shaved down to half thickness, which is a variation on the half-blind concept. But before trimming the tails, use the bottom pieces to mark the pins on the sides. It's easier to do this while the tails are still at full thickness. (When you cut your matching pins, be sure to cut them only ⅜ in. deep.) You can trim the tails on a router table or with the router on top of the workpiece, using an auxiliary fence.

The side panels and the bottom of the case require ⅜-in. by ⅜-in. rabbets to accept the back panel. The rabbets in the sides are stopped ¾ in. from the top. The rabbet in the bottom is full length. Additionally, you'll have to trim ⅜ in. off the corners of the bottom rabbet so that the bottom fits to the sides. The front left corner of the bottom, where the rabbet for the door meets, is also notched. I build the box this way to avoid sections of short grain, which are weak spots.

The top doesn't need a back rabbet because a subtop is glued inside the box and recessed ⅜ in. from the back. Cut the subtop out of a piece of ¾-in. walnut to fit snugly inside the case. The grain must run in the same direction as the top. This piece acts as a kicker for the top drawers and offers a reveal just below the molding.

Once all the dovetails and rabbets have

Drawings: Bob La Pointe



been cut, dry-fit the case, and mark off the stopped dadoes where the drawer dividers will go. When doing your layout, don't forget the subtop. You want to end up with drawers 2⅛ in. high in the top two rows and bottom two rows. At 4 in., the center drawers are the highest.

Using a ¼-in.-wide router bit, cut the stopped dadoes for the drawer dividers ¼ in. deep and 6¾ in. long as measured from the back rabbet. It's a good idea to assemble the box after the dadoes are cut. The faster you get it glued up, the less chance there is of something warping.

The back of the spice box is finished and, therefore, needs to be made of primary wood. I use four ⅜-in.-thick walnut boards that run vertically.

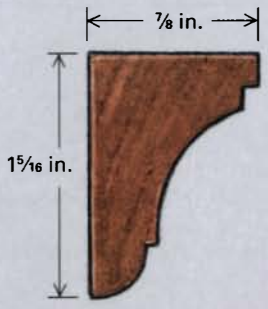
The edges where the boards join each other are molded with half-lap joints. Don't fasten the back to the case until you've completed the dividers and drawers. I use ¾-in. Tremont (508-295-0038) square-cut antique nails on the back. I don't use glue.

Milling the drawer dividers

The dividers are joined to each other with V-grooves. I make up the dividers into a single unit, and then I slip the unit in the dadoes cut into the sides of the case. The fronts of all the dividers are rounded over.

I make dividers using two species of woods edge-joined together, walnut for the

THREE-STEP TOP MOLDING



Use a ½-in.-radius cove bit for first cut. *For support, keep the stock for the molding at least 3 in. wide.*

The reveal is machined next. *Turn stock on its side, switch to a straight bit and align fence for desired reveal.*

Finish by cutting the bead. *Flip molding on its other face; use a ½-in.-dia. beading bit to shape the edge.*

fronts and poplar for the rest. You could use all walnut and save yourself the extra work of gluing up these pieces.

At my shop, we use these two species because poplar mills easier. It has less tearout, sands faster and when making several boxes, it saves us time. Using walnut and poplar is also the traditional way of making these boxes.

If you make a box the traditional way, edge-join 1 in. of walnut to poplar, using ¾-in. stock. After the glue dries, resaw the boards, and plane them ¼ in. thick. Lay out the marks for the grooves (see the drawing on p. 38), and use a router table and a ⅛-in. V-groove bit to make the cuts in the four horizontal pieces. The fronts of these pieces are notched where they extend past the stopped dadoes in the case.

The vertical members also are cut on the router table. Use some scrap stock to set up your fence to get a perfect V-shape. Then round over all the divider fronts using a ⅛-in.-radius roundover bit. I assemble the dividers using glue and a few nails to help hold them together while I clamp them with strapping tape.

Milling the molding and shaping the feet

I use a variety of moldings for my spice boxes, and you can create one from router bits that you have on hand. For this one, I used a cove bit, straight bit and beading bit (see the photos at left) for the top molding and ran it from a piece of ⅞-in. stock (see the drawing above). When the stock is shaped, I rip it to width, cut it in three sections and miter the front corners. It's fastened to the box with square-cut nails. Because the box is so small, I don't worry about cross-grain construction.

Shaping the feet and lower molding— The bracket feet and lower molding are all one piece, mitered at the front corners (see the drawing detail on p. 39). The back of the case has two stub feet, made of poplar, and these are joined to the molding with half-blind dovetails.

Start by cutting the molding profile. On your router table, cut the cove using a ½-in. bit, and finish off by cutting the 3⁄16-in. reveal with a straight bit. Flip the piece over, and cut a 1⁄16-in.-deep by 5⁄16-in.-wide rabbet along the back. This rabbet helps position the molding to the case.

Miter the front corner joints of the molding, and cut the ends on the back side flush to the back of the case. Referring to the plans, cut out the two rear stub legs and mark the dovetails. Cut the tails on the stubs, and mark off the half-pins on the molding/feet. The last step is cutting out the profile for the legs on the molding. Because you have to do this six times, it's easier to make a template and trace the pattern onto the molding.

When I glue the molding in place, I back up my clamp with a piece of scrap molding that nests in place. Glue blocks are later added behind the miter joints and between the molding and case bottom.

Spice box has nine drawers

Size the drawers to the exact width of the divider openings but subtract 3⁄64 in. from the height to allow for expansion. (Later the sides can be planed or sanded if needed for a good fit.) Drawers are ¼ in. shallower than the full depth. Use figured wood for the drawer faces, and run a row of drawers from the same board, keeping the grain and figure oriented in the same direction.

The drawer fronts are ½ in. thick, and the sides and bottom are poplar and ¼ in. thick. I use half-blind dovetail joints on the fronts, with half-pins at the top and bottom. The drawer fronts get one extra joint: a rabbet along the bottom edge to receive the drawer bottom. Cut this first, and then lay out the dovetails. For the sides to backs, I use through dovetails.

Cut the drawer bottoms so that the grain runs in the same direction as the drawer fronts, and leave them a bit long. When assembling the drawers, the bottom panels are simply glued to the bottom edges of the drawers. This construction works well for very small drawers only. On anything larger, wood movement would cause them to come apart.

Fit the drawers by handplaning, and aim for a fit that's snug but loose enough to keep from sticking. The backs of the drawer bottoms (remember, you left those long) are planed down so that the drawer fronts are recessed just behind the rounded-over portion of the dividers.

Save some nice wood for the tombstone door

The front of the spice box is what you see first, so be sure to use your best piece of wood for the door panel. The rails and stiles are cut slightly oversized so the door, once assembled, can be trimmed for a good fit to the box.

Begin by drawing a full-scale plan (see the drawing detail on p. 39) on a piece of

A chisel squares panel corners. A panel-raising router bit leaves corner details unfinished. A chisel cuts the 90° angles at the inside corners.

Full-length tenons hold the frame together. The author dry-assembles the completed tombstone door. After glue-up, he trims the door to fit the case opening.

plywood, and include all the door measurements and joinery. Pay close attention when locating the center of the radii for the curved parts of the door and top rail. That center mark is ⅜ in. above the shoulders of the tombstone.

From the full-sized plan, set a compass to the radius of the curve on the top rail, and transfer it to another piece of scrap of plywood to be used for a template. Cut out the template, and use it to draw the arc on the top rail. Bandsaw the top rail, and sand the curve fair.

At the router table, using a ¼-in. beading bit with a pilot bearing, run a bead on the inside edges of all the frame members. Run this bead all the way to the ends of all the pieces. (Later, you will trim and miter the beads at the corners.) Switch to a slot-cutting bit, and then cut a ¼-in.-deep groove for the panel. Next cut the mortises and the tenons.

The frame won't fit together at this point because the beads need to be trimmed and mitered where they meet at the corners. Again, using the full-scale plan, mark where the beads are mitered. Then, using a straight bit and a router table, remove most of the waste from the bead, stopping just short of the miter. Pare the miters to 45° using a chisel.

Raise the panel on a router table—I use a table-mounted router with a traditional raised-panel bit even though my shop has a shaper. You have to be crazy to mill anything this small on a shaper.

Cut your panel to 9⅜16 in. by 11¼ in. Using a compass, draw the top arc of the tombstone onto the panel. Bandsaw off the waste, and finish by sanding to the line. At the router table, run the panel in several passes across the panel-raising bit to avoid tearing out the highly figured wood.

The corners of the tombstone need to be chiseled out because the router bit leaves this section rounded (see the photo at left above). After squaring the corner, refer to the drawing, and note the orientation of the two miters on each corner of the tombstone. The miters on each side are almost but not quite parallel.

To figure out how to pare this section, mark a line where the miters meet the corners. Then pare with a bevel-edge chisel to get crisp edges. Now you're ready to fit the frame and panel together (see the photo at right above).

Finishing with a touch of brass

Mortise 1¼-in.-long, milled brass butt hinges 1½ in. from the top and bottom of the door. To keep the door shut, use a mortise lock. Place the keyhole halfway down the stile. A brass escutcheon can be placed over the keyhole for added decoration.

I use round brass pulls on my drawers. They extend ⅜ in. from the drawer fronts and are centered. You can vary your hardware to suit your tastes (for more on hardware, see *FWW* #112, pp. 68-73). I like the quality and style of hardware available from Ball and Ball (610-363-7639), Horton Brasses (860-635-4400) and Whitechapel, Ltd. (800-468-5534).

Finishing is the last opportunity to make a mess of the project. My rule is to use finishes that I am experienced with, so I use shellac and wax. When I have this much invested in a project, now is not the time to experiment. □

D. Douglas Mooberry builds custom and reproduction furniture in Unionville, Pa.

***Basic bench chisels**—Bevel-edge chisel (left), firmer chisel and mortise chisel all have different tasks in the workshop.*

Three Everyday Chisels

Bevel-edge, firmer and mortise chisels take care of most chopping and paring needs

by Sven Hanson

The number one cleanup device in my shop isn't a broom or a vacuum, as any visitor can tell you. It's a chisel. Every ragged rabbet, gloppy glueline or oversized tenon can be improved by the touch of a sharp chisel. When fine joinery is required, it's a sure thing chisels will be part of creating the perfect fit. You need chisels to chop out hand-cut dovetails, to square the corners of router-cut rabbets and to trim countersunk plugs.

The bench chisel family tree has three main branches: bevel-edge chisels for a variety of trimming and paring work, mortise chisels for serious chopping, and the catchall category of firmer chisels for light-duty mortising or heavy-duty paring (see the photo above).

There are other, more specialized types of chisels. But your workshop will be well-equipped if you carefully choose a few chisels from each of the three main groups.

The main thing to consider when shopping for chisels is your needs. If you plan to do a lot of heavy chopping in hardwoods, the money invested in tools with reinforced handles and properly tempered steel will be well worth it. But if you use chisels infrequently or if you use them for light-duty work, you could get by with moderately priced tools. And if you need chisels to do some rough work, like chopping away at interior trim where there's the likelihood

Photos except where noted: Alec Waters

of hitting nails, buy inexpensive chisels.

Chisels demand proper striking tools. Handles with metal striking caps or ferrules at both ends can be whacked with a hammer; unreinforced handles require a mallet. Wooden mallets, which come in a variety of weights and shapes, give you the most control and are friendly to a chisel's handle.

Choose the chisels for your shop

I have collected a pretty full set of each style of chisel, but they're not all necessary. Bevel-edge chisels, so called because they have three bevels on their faces, fit easily inside dadoes and dovetails. I use my ½-in. and ¾-in. chisels all the time and chop out dovetails with ⅜-in., ½-in. or ⅝-in. chisels.

When picking out mortising chisels, select ones based on the size mortises you plan to chop. These are costly; there's no value in owning a whole set if you routinely chop out only ¼-in. mortises. I find ⅛-in., ¼-in., ⅜-in. and ½-in. mortise chisels serve most of my needs.

My firmer chisels play the utility infielder position, doing the work that might damage a thin-blade bevel-edge chisel or chopping small mortises on more delicate projects. You might need a few, ranging in size from ¼ in. to ¾ in.

Bevel-edge chisels are used in tight quarters

Along one leg of my Bermuda work triangle formed by bench, tablesaw and jointer, I've mounted a kitchen-style magnetic knife holder. It holds a handful of bevel-edge chisels, which I use more frequently than either my firmer or mortise chisels.

Bevel-edge chisels are sometimes called paring chisels, and there are two subcategories. Short, sturdy paring chisels are called butt or carpenter's chisels, and long-blade ones are known as dovetail chisels.

Butt chisels get into tight quarters—You'll find some version of the short, sturdy chisel in every carpenter's tool belt. You don't need a long, delicate chisel for chopping out a ⅛-in.-deep door hinge mortise. And if you're working inside a cabinet, the short butt chisel allows you room enough to swing a hammer without striking the other side of the case. This chisel is easy to hold and maneuver across a glued-up panel when scraping squeeze-out.

Dovetail chisels have long blades—A dovetail chisel's long blade makes it easier to see your work and gauge whether you're holding the tool perpendicular to the workpiece. Dovetail chisels have blades that are sharply beveled on the sides to allow you to work right into the triangular bottom of a dovetail joint (see the top photo).

I rely on countersunk and plugged screws to hold a lot of things together. Dovetail chisels are great for paring off the screw plug flush to the frame, because I can approach the cut with the long blade nearly flat on the wood. I take a careful trial cut across the top of the plug to find the paring direction that goes with the grain. I take roughly 1/16-in. slices off the plug to pare it flush to the surrounding surface. It's not as fast as beltsanding but if done carefully, you get better results with less noise and less risk to the surrounding surface.

Firmer chisels look like skinny mortise chisels

The firmer chisel is a compromise tool that is often too light for heavy-duty mortising but too thick to work inside the confines of

Bevel-edge chisel

Cleaning out a dovetail—*Beveled sides allow a dovetail chisel to squeeze into tight quarters.*

Firmer chisel

Paring a tight tenon—*Instead of heading back to the tablesaw to narrow a tenon, use a razor-sharp firmer chisel. Its square edge rides along a tenon's shoulder and makes paper-thin shavings.*

Facing page and top photo: Anatole Burkin

Mortise chisel

Chopping a mortise—*Mortise chisels are as thick as they are wide and are built to withstand the heavy forces inherent in chopping and prying out waste.*

furniture joints. This chisel is also called a sash mortise chisel, named by American makers of window sashes, or a registered mortise chisel. Firmer chisels have only one bevel on the face, like mortise chisels, and the blades are thinner than they are wide.

I own a set of ash-handled Greenlee firmers. They reside in their own drawer away from the squalor of everyday working-class tools. As a result, they're usually the sharpest of the bunch. These chisels come in handy when you have to pare down a tight tenon (see the bottom photo on p. 43). For good control when taking off a thin shaving, you can use their square sides to ride along the tenon's shoulder.

If you want to do some serious chopping, the double-hooped handle with leather shock ring at the blade's shoulder can take a hard shot with a 22-oz. framing hammer. The only maintenance besides sharpening is grinding off the mushroom edge that forms on the hoop that protects the butt end from splitting. I round it back by rolling the edge against the belt sander.

Mortise chisels need to be strong

Mortise chisels are the big brutes of the chisel world. They have rectangular blades that can be thicker than they are wide. You need this heft when prying out a chip that's wedged deep inside a mortise.

Quality mortise chisels have a very hefty tang, a steel extension of the blade that fits up into the handle. The sturdiest have reinforcing ferrules, also called hoops, at the tang and at the butt of the handle to prevent splitting when the chisel is struck with a hammer or mallet. If a mortising chisel does not have a ferrule at the striking end of the handle, it's meant to be used with a non-metal mallet.

To reduce the chance of splitting a workpiece when chopping mortises, I clamp a hand screw to the sides of the stock where the waste will be removed (see the photo above). A second clamp holds the whole piece firmly to the workbench. Besides preventing splitting, this clamp system lets you cut faster and with more control while keeping chips from creeping under the workpiece and dinging it.

Anatomy of chisels

There are two main components to chisels: the steel and the handle. Determining what kind of steel and how well a tool has been tempered can't be done by eye. You can get an idea about the strength of the handle by looking for reinforcing ferrules or striking caps and examining how it's fastened to the steel, whether by a socket (strongest) or a skinny tang (weakest).

I'm not obsessed with finding just the right hardness rating for my chisels. If you order tools from big mail-order outlets, you can usually find out about the type of tool steel and hardness of the chisels they carry. But if you pick up a set at the local hardware store, that information may not be available to you.

Michael Burke, technical advisor at Garrett Wade, a mail-order tool supplier, told me that "most chisels range around Rc58 to Rc61 (Rockwell C hardness scale) with Japanese chisels running about three points higher. The precise hardness doesn't really matter because a difference of a point or two is like the difference between 600-grit and 700-grit sandpaper."

I have noticed that the most inexpensive chisels on the market are often on the soft side, although I have seen a few that were quite hard and brittle. Hardness is both a function of the metal's carbon content (and other additives) and how the tool was hardened and tempered.

Good tool steel has enough additives to allow hardening, which is accomplished by heating the metal to cherry red and then quickly cooling the tool. It is then reheated to a lower temperature, which reduces or tempers the hardness, making it less brittle and easier to sharpen. A chisel with a very hard tip is prone to chipping.

Conversely, poor steel that has not been hardened properly or steel that has been tempered too soft will bend at the thin cutting edge when pounded into hardwood. It will, however, be easy to grind and sharpen. Toolmakers aim for a balance between these two qualities.

Good steel, quality control in hardening and tempering, and strong handles add to the price of a chisel. Medium- and high-quality chisels will cost about $10 to $30, sometimes more, apiece.

Sockets are found on the best chisels— Top-of-the-line older chisels were hand-forged with sockets. The blacksmith would pound one end of the metal around an anvil and create a conical section for the handle to fit inside. Modern socket chisels have their sockets machine-forged or welded on.

Sockets are available on all three types of chisels. When you strike a socket chisel,

the wooden handle compresses into the tapered socket, which keeps everything firmly united.

Look for a sturdy handle—The handle, not the blade, is the Achilles heel of most chisels. When chopping mortises, all the force of a hard-swung mallet strikes a spot that's 1 in. in diameter or less. Chisel handles made of wood come with and without reinforcing ferrules, which increase their strength. A lot of chisels are made with plastic handles, and I've found these to be very sturdy even though they don't have that traditional look and warm feel of wood. If you plan to use a hammer to strike them, buy ones with metal striking caps.

Wood tends to split if struck hard. To counter that, the makers of wooden tool handles taper them. The small-diameter end helps center the mallet's blow to the tool and reduces splitting. Toolmakers often add metal ferrules to the handle to keep the wood fibers squeezed tightly together. If the grain is straight and you avoid metal hammers, single-ferrule chisels are durable enough.

Many crafts people prefer a heftier handle. A chisel handle made of wood with ferrules at both ends can take a lot of force. These chisels can be used with metal hammers or large mallets.

There's another way to strengthen a handle. Some chisels are made with a thick leather washer pressed over a tenon round left projecting from the end of the turned handle. This evens the blow around the edge of the handle and prevents splitting. These are medium-duty chisels meant to be used by hand or with a light mallet.

Mallets deliver a little or a lot of power

You can use a hammer when striking chisels, but it's best to use a wooden or hard plastic mallet. They're much kinder on handles. Mallets, with their large faces, also make it easier to deliver the force of the blow to the chisel instead of, say, the hand holding the chisel. Good mallets run from $12 to $50.

Mallets come in various weights. I find that 16-oz. to 22-oz. mallets are suitable for chopping dovetails. For heavier work, such as chopping mortises, 22-oz. to 32-oz. mallets work well. There are some woodworkers who favor 3-lb. mallets, but it certainly takes a lot of strength to handle one of these behemoths for hours on end.

Mallets also come in different shapes. The big square mallets, called joiner's mallets, are usually the heaviest of the bunch and great for use with mortise chisels. For tight quarters or for chopping at odd angles, a round carver's mallet works well. You can also use a rubber mallet or a deadblow hammer.

Safety glasses protect your eyes from flying chips

Experience has taught me three rules for safe chisel use. First, keep all your body parts behind the tip of the chisel, well out of its path. Second, clamp down the workpiece unless it's so heavy that it won't move while chopping. And third, always wear safety glasses. Ordinary eyeglasses will do for paring on the benchtop, but when I use a hammer or work overhead, I'm partial to goggles.

One time, when I took a chisel to the underside of a teak handrail while wearing ordinary eyeglasses—not safety glasses—a tiny boulder rolled past my glasses into my eye, and it stuck. I learned my lesson. □

Sven Hanson builds custom furniture in Albuquerque, N.M.

Angling for precision cuts

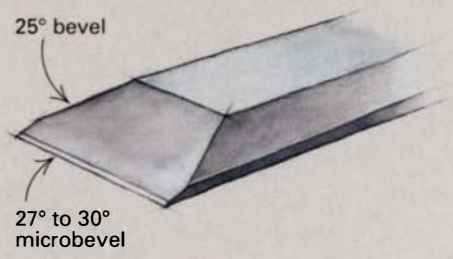
Not all bevels are created equal. If you cut hardwoods, a steeper bevel on your chisel will stay sharp longer. If you cut softwoods, you will need a shallow bevel angle to shear the wood fibers, not crush them. I use secondary, or microbevels, on all my chisels. The bevel-edge and firmer chisels get a very short microbevel at the cutting edge, which is created when I'm doing my final honing on a superfine stone. I lift the chisel up just slightly to create that microbevel. That way, when I resharpen, I only have to hone a very narrow edge, not the entire bevel.

For softwoods, a microbevel of 27° or so allows easier entry into the wood (see the drawing at left below). For hardwoods, a microbevel of 30° to 35° cuts cleanly enough and stays sharp longer than a more acute bevel. If you plan to do a lot of hand-paring, you'll want microbevels in the 27° to 30° range. But if you plan to use a heavy mallet, microbevels of 30° or more will hold an edge longer.

For fine work on delicate projects no matter what the wood, I use a 27° to 30° microbevel, especially when using the chisel without a mallet. This angle decreases the force necessary to cut. I pay for it with more frequent sharpening.

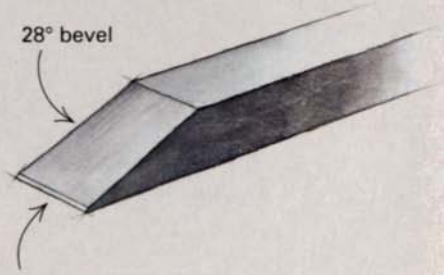
I modify the bevels on my mortise chisels by grinding the long bevel about 28° and honing a secondary bevel of about 35° to 40° at the tip (see the drawing at right). The long bevel permits easy passage of the chisel body into the nether regions of a cut. The blunt tip leaves more metal where it counts. —*S.H.*

Sharpening angles for bevel-edge and firmer chisels



For chiseling softwoods or hand-paring, grind a shallow microbevel of 27° to 30°. When working in hardwoods, a tip ground 30° to 35° will hold up longer.

Regrind mortise chisels with a long bevel



Drawings: Jim Richey

An Edge-Jointing Primer

Well-tuned tools and the right technique create joints that last

by Gary Rogowski

***By hand or by machine**—Edges may be jointed successfully with either handplane or machine. The basic approach is virtually the same: Read the grain of the wood correctly, and use sharp, well-tuned tools.*

Photos: Vincent Laurence

There was a time when I was convinced my jointer was possessed. It would thwart my every effort to make a crooked edge straight. Sort-of-straight edges became more humped, and wide boards became ever narrower at one end. Like many woodworkers, I found myself talking to my jointer, pleading for cooperation. My early efforts at handplaning edge-joints didn't go much better. When I would get an edge close to straight, it might not be square.

I have since happily discovered that edge-jointing problems, though common, are almost always correctable. A well-tuned jointer or handplane is essential, and some basic techniques will solve most problems. But the most overlooked detail when edge-jointing lumber is what the board looks like to start with.

To get a straight, square edge, you first need a flat reference face. If your boards are cupped or twisted, choose one face to be the reference face, and joint it or plane it dead flat. If you plane the other face parallel to the first, you can use either side against the jointer's fence to joint the edge. (For a complete discussion of stock preparation, see *FWW* #102, pp. 74-78.)

Read grain to prevent tearout

The edge of a board is where the work will actually take place. Whether you're handplaning or using a jointer, your success depends on knowing where to start cutting and in which direction. The object is to take down the high spots without touching the low areas and to plane with the grain to avoid tearout.

Wood fibers generally rise up in one direction to meet an edge, although they sometimes rise in opposing directions along the same edge or swirl in the board like eddies in a pool. When you try to plane or joint an edge against the grain, you're likely to get tearout. So how do you tell which way the grain is running?

The best analogy that I have for grain is fur. If you pet a cat from its head to its tail, the fur lies down smoothly. You're moving your hand with the grain. But if you pet the cat from its tail to its head, the fur will resist your hand and stand on end. You're going against the grain, and the cat may take offense at your insensitivity. With the cat, you risk a scratch; with a board, you risk tearout.

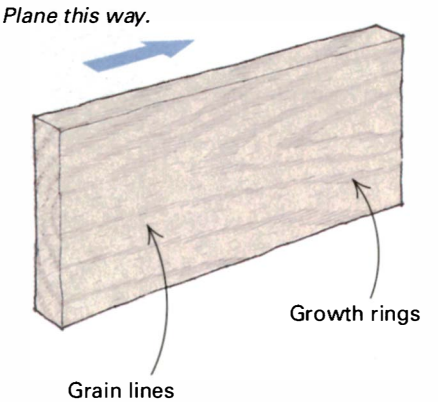
The first step is to read the grain direction on the face of a board to see how it rises up to meet the edge (see the drawing at right). Check both sides of the board if you're uncertain. Look closely enough to see the grain lines, not just the more prominent growth rings. These often will line up with the grain direction, but not always.

Check for high and low spots

If all edges were straight to begin with, we wouldn't need to joint them flat. But in the real world, most boards have high spots (humps) or low spots (hollows) along their edges. A humped board can pivot on its high spot when run across a jointer. Similarly, a handplane often will follow a hump, rather than flatten it. A hollow in a board can cause it to catch on the lip of the outfeed bed when pushed across the jointer.

Reading the wood

Sighting down the edge of a board quickly reveals humps and hollows (above) and tells the author where to start the straightening process. To avoid tearout with either a handplane or jointer, check grain lines, and establish the best direction of cut (below).



To check the edge of a board, hold it face up, one end at eye level and the other end on your bench or shop floor. Now, sight down along the edge of the board where it meets the face (see the photo above). If the board is grossly humped or hollowed, you'll be able to see it right away (I'll tell you more about dealing with that in a minute). If the board is nearly straight, showing only minor dips and humps, it can be taken right to a jointer. If you're handplaning the edge, however, you'll need to check it with a straightedge. Get a reliable metal straightedge (or a long board you've jointed flat and true), and set it on the edge of the board. If the board has a single high spot, the straightedge will spin freely as it pivots at the hump. If the edge is hollow,

Drawings: Jim Richey

Jointing an edge with a handplane

To avoid planing ramps at the leading or trailing end of a board, transfer pressure on the plane from front to back as you move along the edge. Skewing the plane slightly (above) will help give you a cleaner cut.

1. At the beginning of the stroke, all downward pressure should be on the leading hand, which is around the knob. The rear hand just pushes the plane forward and guides it.

2. Once the plane is completely on the board, apply pressure evenly at both ends of the plane.

3. As the leading edge of the plane moves beyond the end of the board, gradually transfer pressure to the hand on the tote, or rear handle.

the straightedge will make contact with the board at two points, and light will be visible between the straightedge and the edge of the board. In either case, mark the high spots where the straightedge makes contact. Now you can begin straightening an edge, concentrating on these spots before working on the full length of the board.

Technique is key to hand jointing

Working an edge by hand is best done with the longest handplane you have. Although you can do the job with a smooth plane, a jointer plane's longer sole is better designed to ride over a series of high spots or traverse a hollow. Work the plane at a slight angle to the edge of the board so the iron slices through the wood (see the top left photo). Skewing the plane like this will give you a cleaner cut, and it puts just a bit more plane body in contact with the wood, lengthening your reference surface.

Start the cut with all your hand pressure on the plane's leading edge (see the top right photo). As you move through the cut, transfer pressure to both hands, and finish with all the weight on the trailing hand. This way, you won't taper a board at its ends.

This technique works fine if your board is pretty flat to start with. If it has a serious hump in it, though, you need to deal with that first. Start by checking the edge of the board with a good straightedge and marking the hump with a pencil. After taking several passes across the hump, check the edge again. The high spot should be longer and flatter. Keep marking the ends of this plateau. Remove material until you can take one full pass along the edge.

To straighten a board with a hollow along its edge, the process is similar. You need to plane down the high spots to either side of the hollow until they're at the level of the hollow. Usually this means just planing at the two ends of the board at first and then gradually lengthening the areas you are planing until they meet in the middle of the board.

If you've gotten this far and the edge is flat, congratulate yourself. But there's more to consider. How square is the edge to the face? Check with a small square, and mark the high side at several points along the edge. Hold the plane square to the face when cutting. This can be tricky because it means the plane will not be fully supported on the edge at all times. Over time, you'll develop a feel for it.

Another tactic for planing an edge square by hand is to use a shooting board (see the

photo at right). My shooting board is a simple bench hook with a stop at the end and a fence on the inside. The edge I'm shooting extends beyond the shooting board so the handplane, held on its side, trims just the edge. The plane blade must be at precisely 90° to the shooting board.

Boards planed at complementary angles mate flat

The simplest method for getting two handplaned edges to mate perfectly is to plane boards as a pair. Clamp the two boards together in a vise, line up their edges and plane them flat, end to end (see the bottom photo). When the boards are removed from the vise and held together edge to edge, whatever angle one board has been cut at will be mirrored by the other. These angles are always complementary. Just the same, try to keep your plane as flat as possible from side to side, because a steeply angled joint will be more apt to slip when you're clamping it.

Jointer must be well-tuned for straight edges

To accomplish a task as precise as providing a straight, square edge over a long board, your jointer must be in tip-top shape. If its tables are twisted out of alignment or droop at either end, no amount of finesse is going to give you straight edges. You can check for twist with winding sticks, and a straightedge will tell you whether infeed or outfeed tables are drooping.

Assuming there's nothing seriously wrong with your jointer, the first thing to consider is the sharpness of your knives. If the knives are dull or pitted, take them out and have them sharpened. Sharp knives are essential to good edge-joints.

The relationship of the knives to the outfeed table is also critical. If you're getting snipe at the end of your boards, your outfeed table is set too low relative to the knives (see the top drawing on p. 50). When the board clears the infeed table, it's dropping into the cutterhead and taking a deeper cut. This is easily corrected by raising the outfeed table so it's precisely parallel with the top of the knives' cutting arc. Make sure the table is locked down securely.

When the outfeed table is too high, the result is taper (see the bottom drawing on p. 50). The board will seem as though it's cutting fine for most of its length. Then, toward the end of the cut, you'll notice that the knives are no longer cutting. As with snipe, this is easily corrected. You just need

Shooting board simplifies getting a square edge. *Once the plane blade is set correctly—at 90° to the bench—a square edge is almost automatic. The side of the plane uses the bench as a reference surface.*

Fold boards together, and plane as one. *When their edges are brought together, the two boards will be perfectly flat. Variation from 90° in one board is exactly offset by the other.*

to bring the outfeed table down a bit, so it lines up with the knives.

The jointer fence also needs to be set square to the tables. Use a square you can trust, and check the fence just past the knives on the outfeed table. By looking at the square with a light source behind it, you'll be able to see even the slightest deviation from square. Loosen the fence-lock lever, adjust as necessary and lock the fence without moving it.

Jointer technique is important

If one of my students is having problems with tearout and the board is being fed through the jointer in the proper direction, the first thing I check is depth of cut. For hardwoods, I keep it around 1/32 in.

Feed rate needs to be constant throughout the pass. An excessively fast feed rate will cause noticeable scallops along the edge of the board left by the arc the cutterhead passes through as it cuts. Moving stock over the jointer too quickly also can cause tearout. Too slow a feed rate, or pausing in the middle of a pass, can cause burning. Neither surface is optimal for gluing.

Pay attention to grain direction when feeding boards over the jointer. Because you're moving the board past the cutterhead, the grain should be trailing down and away from the knives. But if the board tears out anyway, turn it around, and try it in the other direction.

Reading the grain will almost always tell you the best feed direction, but on occasion, boards do tearout in both directions. Choose the feed direction that tears out the least, and take a light, slow cut. If your jointer permits, skew the fence to help give you a cleaner cut.

Your stance is also important. Keep your feet spread comfortably apart, and maintain your balance. That may sound like advice from a coach, but keeping the edge of a 7-ft.-long, 10-in.-wide piece of hard maple flat on the jointer can be something of an athletic event.

Be especially careful at the beginning of the cut. If you apply too much pressure on the leading edge of the board, it could kick back. If it does, there's nothing between your hands and the cutterhead. Just keep your downward pressure back from the leading edge until the board is safely on the outfeed table.

Once the board is on the outfeed table, keep one hand just past the knives, and apply pressure with this hand, down and in, toward the intersection of the jointer table and fence. This will keep the cut square.

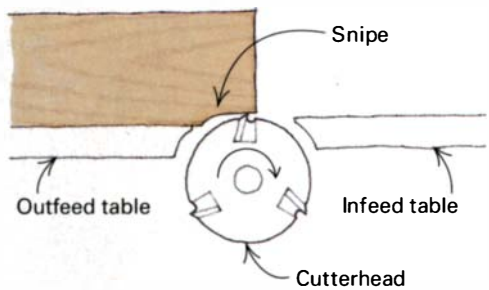
The length of a board will determine how you handle it. If it's short enough, place one hand near its leading end and your other hand at its rear. The forward hand will hold the board tight against the fence and table, and the rear hand will feed the board.

Longer boards will cantilever past the rear end of the infeed table, so you'll need to put pressure near the front of the board to keep it flat on the table. Start with both hands near the leading edge, and then use a hand-over-hand method to move the board along for a cut (see the photos at right on the facing page).

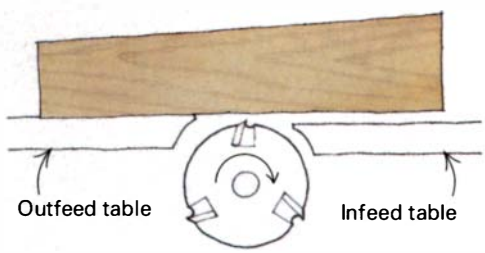
It's also essential to hold the board's jointed face tightly against the fence. If the edge of a board is angled so that it tips away from the fence when held on edge, it's easy to see. If the board tilts into the fence, though, it may appear to be tight against the fence when it's not. To be sure, look at the leading edge of the board before beginning the pass.

Diagnosing jointer outfeed table problems

A misaligned outfeed table leads to two of the most common problems with edge-jointing lumber: snipe and tapered cuts. Both problems are easily corrected by adjusting the height of the outfeed table.



Snipe results when the outfeed table is lower than the top of the knives' cutting arc.



Taper occurs when the outfeed table is higher than the arc of the knives. As the board becomes established on the outfeed table, it begins to lift off the infeed table. The board tapers until it's no longer in contact with the cutterhead.

Problem boards

If you're jointing a short board with a hollow along its edge, it's fairly easy going. The board will ride on its two ends, and if the jointer bed is long enough, it will only allow a cut at these two spots. After a few passes, you'll be jointing the board's full length, well on your way to a straight edge.

If the hollow is really long, though, the front end of the board may dive into the leading edge of the outfeed table and get stuck there. Lift the board carefully off the knives, and place it on the outfeed table to continue your pass. After a few passes, the ends will have flattened out enough so you can take a full-length pass. You could also take several passes just at the leading end right away, removing enough wood for the board to feed properly.

A hump along an edge is a bit more difficult to plane out. Guide the board at its leading edge, but exert all your hand pressure on the trailing end. This will lift its leading edge off the jointer table so that no wood will be removed until the high spot on the board gets to the cutterhead.

As soon as this happens, transfer all your pressure to the outfeed side, so the board essentially pivots on that high spot. This way, the trailing edge doesn't get cut either. All that gets cut is the top of the high spot. The high spot will gradually become a plateau, giving you enough of a flat surface that you can feed the board normally. If you don't use this technique, you'll end up jointing just the front end of the board, and it will taper. You could lose most of a board's width before getting a straight edge.

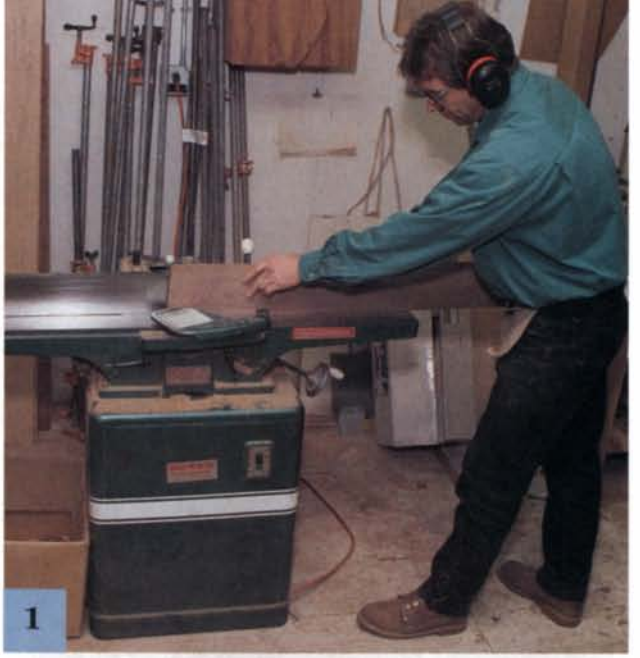
If you're having a hard time getting a square edge, you can joint complementary angles on mating boards just as you can with a handplane. On the jointer, though, joint just one board at a time, choosing the board with the most prominent grain direction. For the mating board, run its opposite face against the fence. If you're going against the grain, slow down your feed rate to avoid tearout.

Spring joint keeps glued edges together

After all this talk about getting a straight edge, now I'm going to tell you that you

Jointing a long board

Getting a straight, square edge on a long board means paying careful attention to how pressure is applied as the board moves over the cutterhead. But before you start, make sure the fence is square to the bed (above).



1. *Both hands push down on the board at the beginning of the cut, so the board stays flush against the jointer's infeed table. The leading hand keeps the board tight against the fence while the rear hand pushes the board forward.*

2. *As less of the board hangs off the infeed table and the leading edge moves onto the outfeed table, push the board forward by switching lead hands. Keep one hand just past the cutterhead, and hold the board down on the table and tight against the fence.*

3. *Continue feeding the board, hand-over-hand, until the weight of it requires two hands to hold it down on the outfeed table.*

don't want one. When I edge-glue two boards together, I intentionally put a slight hollow along their edges. This is called a spring joint.

Because most of a board's moisture exchange occurs at the end grain, building in a little compression at the ends helps ensure the joint will stay closed. I keep the space between the boards to 1/32 in. or less, looking for just a little light between the two edges when the two boards are held together. Even without looking, you can tell if an edge-joint fits correctly. If there's friction at the ends of the boards when you try to spin them, then they are either straight or slightly hollow. If the boards spin freely, then there's a hump along one or both of the edges. Holding an edge against the jointer's fence or table will tell you which board is humped.

You can create a spring joint in several ways. One method is to handplane it after the boards have been jointed flat. This lets you control the amount of spring you want along the joint.

Another approach is simply to press down harder at the center of the board as you're feeding it over the jointer. It seems impossible, but there is usually enough flex in a board to provide just a little spring joint along its edge.

Start with a board that's already jointed straight. At the beginning of the cut, apply just enough pressure to keep the board flush against the jointer table. When you're about a third of the way along the edge, start to push down harder. Push down hardest in the middle, and then start letting up two-thirds of the way along. Finish up with normal pressure.

You can also get a head start on a spring joint by taking a board you have already jointed straight, lowering the board down gently and starting a pass from its end about one-third of the way along its edge.

Take a normal cut until you reach approximately two-thirds of the way along, and then lift the board carefully off the cutterhead. Finish up by taking one full cleanup pass, pushing down a little in the center of the board. □

Gary Rogowski has been building furniture in Portland, Ore., since 1974. He has been teaching woodworking since 1980 and is a contributing editor to Fine Woodworking. *His video,* Router Joinery with Gary Rogowski, *was released last year. His book,* Router Joinery, *will be published by The Taunton Press in August.*

Veneering an Ellipse

Making a Sheraton-style inlay with borders

by John M. Van Buren

Much of the fun and challenge of woodworking, for me, comes from copying fine examples of 18th- and early 19th-century cabinetwork. Creative purists may malign this process of imitation, but these labors have provided furnishings of incomparable design for my home, without the financial outlay that purchasing antiques would have required.

The Sheraton-style card table is a case in point. I reproduced a pair of these tables from a photograph of one in The Metropolitan Museum of Art in New York City. I wanted to use mine as side tables—not game tables—so I made them without a second hinged leaf.

The oval in the center of the serpentine apron presented a technical challenge. After some experimentation, I discovered that veneering the oval with a border of black and satinwood inlays could be done with simple equipment and a little practice.

You need to start with a master pattern: a full-scale ellipse made with ¼-in. plywood cut out on the bandsaw and then sanded smooth around the edges. This master serves as a pattern to cut out the elliptical veneer field and as a bending form for the inlay borders.

Draw an ellipse to the required dimensions. In this case, the satinwood oval has major and minor axes of 9 in. and 2½ in. With the 1/16-in. inlay borders, or stringing, it is possible to bend to curves with as little as a ½ in. radius, like the ends of the one on the table shown above. The pattern is mounted on a second piece of ¼-in. plywood, about ⅜ in. larger all around, to serve as a clamping surface. Both pieces are, in turn, screwed to the edge of a block of ¾-in. wood that's wide enough to be held in a vise.

Heat and moisture do the job

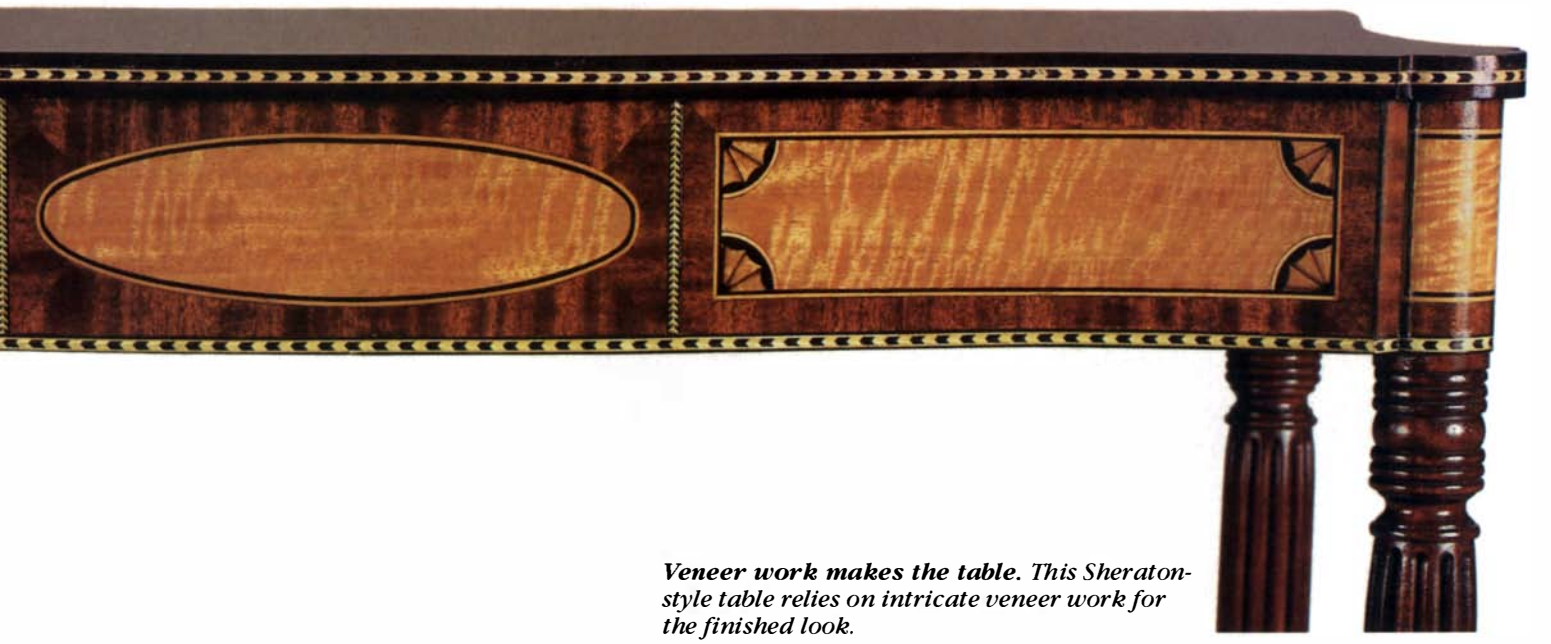
Dampen the borders by leaving them rolled in a wet towel for several hours. The dye in ebonized stringing leeches out with soaking, so it's important to keep it separated from the satinwood because it will stain the lighter veneer.

Bending form is also master pattern. *The smaller piece of ¼-in. plywood can be used to mark the veneer.*

Bend two at once. *Dampened light and dark inlay pieces are bent in pairs, as they'll appear around the ellipse.*

Work in small increments. *With a tight radius, the author heats and bends only about ¼ in. at a time.*

Photos: William Duckworth



Veneer work makes the table. *This Sheraton-style table relies on intricate veneer work for the finished look.*

I use an ordinary laundry iron, set between "wool" and "rayon," to heat the damp veneer for bending. With the bending form set in the vise, start the borders near the middle of the ellipse, and spring clamp them to the lower piece of plywood. Using the tip of the hot iron, heat the line until it steams. Nudge it against the pattern, and secure it with another spring clamp, working around the ellipse a little at a time. Be sure to heat the line well before attempting to bend it, or the inlay will fracture. Bend the ½-in.-radius curves on the ends in small increments, and clamp the borders to the pattern as tightly as possible. Flatter parts of the ellipse will need fewer clamps. After bending the inlays around the pattern, allow the ends to overlap for trimming. Keep the tip of the iron clean by rubbing it with steel wool.

Exactly when you bend the inlay after heating it is critical, and you may need some practice to get it right. If the 1/16-in. stringing is poorly made, it may fracture along a grain line. If so, try another piece. When the outline of the ellipse is completed and clamped, allow it to dry overnight. In the meantime, cut out the ellipse around which the stringing will be laid up. I mark the veneer in pencil using the ¼-in. plywood template. The African satinwood veneer I used for this project cut neatly with scissors. The two pieces of stringing will spring open somewhat when the clamps are removed, so they should be secured at once to the elliptical field with veneer tape or gummed craft paper. Pressing the entire inlay between flat surfaces, weighted down, will prevent curling until the ellipse has been laid up to the background.

The mahogany background was made as a frame from 2-in.-wide pieces of veneer. The veneer was taped together so that the grain pattern radiates from the center of the ellipse. Mark the cut with your actual veneer pattern, and make the cut into the background frame with a sharp razor knife. □

John Van Buren is a retired neurosurgeon. He has spent much of the last 30 years building furniture for his family.

After bending the inlay *completely around the form and clamping it in place, allow it to dry overnight.*

One clean strike with a razor *cuts the inlay for an angled seam that will virtually disappear when finished.*

Mark each piece separately. *A completed ellipse is used to mark the cutout in the background veneer.*

Building a Sleigh Bed

Sensuous curves and well-chosen details enhance a simple design

by Christian Becksvoort

I've been building furniture full-time for 21 years and have made more than 1,000 pieces, including dozens of beds. But until recently I had never built a sleigh bed. So when a friend and long-time customer asked me to build one for her, I had some research to do. The nicest one I found was designed and built by William Turner and featured in *FWW* #91 (pp. 46-51). To my eye, it was all a sleigh bed should be. It had classic lines, style, grace. The only problem was that it took 1,200 hours to build. My client's budget dictated that the bed be built in less than 100 hours. So I had to capture the essence of a sleigh bed, but build it efficiently.

The design work was left to me, with just a few stipulations: The bed was to be queen size, and both headboard and footboard were to be 54 in. high. I worked out several sketches for the post profiles, finally settling on the one on p. 56. Along with twin bands of cove-and-bead molding that ring the bed and rosettes at the top of each post, this profile gave the bed the classic look I wanted.

I saved time on this bed by using flat panels for the headboard and footboard, rather than coopering a curved panel or using a tambour. Also, instead of carving the rosettes, I turned them. It took less than an hour and a half (see the story on p. 61).

The bed is a very simple construction. The headboard and footboard assemblies are joined to a pair of thick rails with knock-

Photos except where noted: Vincent Laurence

down fasteners. These assemblies are each made up of two posts into which are tenoned a turned crest rail and a flat lower rail. A single large panel floats in grooves in both posts and in the crest and lower rails.

A template speeds fabrication of posts

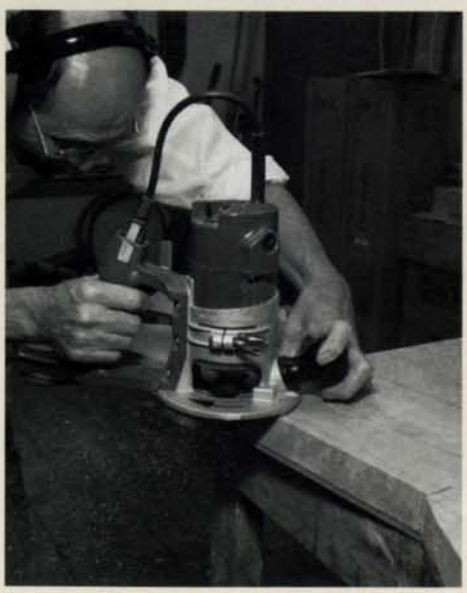
The crest rails had to be 61½ in. long, but my lathe's capacity is only 39 in. So I farmed them out to a local millwork shop where I used to work. While I was at the shop, I ordered eight 8-ft.-long pieces of cove-and-bead molding.

I glued up the posts and rails from 8/4 stock (about 120 bd. ft., in-

SHAPING THE BEDPOSTS

Use post template to transfer profile onto stock. *Take time to smooth curves on the template. The more accurate the template, the less sanding you'll have to do.*

Bandsaw the post profile. *Stay outside of the line; what remains can be routed or sanded. An outfeed table attached to the author's bandsaw makes maneuvering the large blank much easier.*

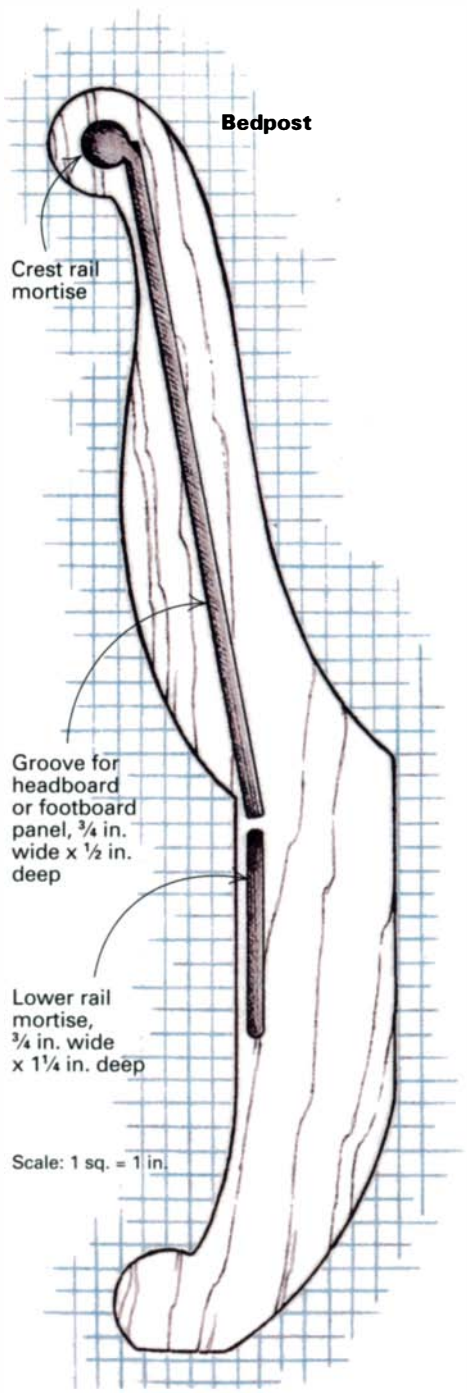


Use a flush-cutting, bearing-guided bit and a template to rout the profile. *Rout with the grain to avoid tearout. For sections where you can't rout with the grain, flip the post over, and reattach the template to the other side. Rounded areas at top and bottom are smoothed on a sander.*

cluding waste) and then planed the eight planks to a bit more than 1½ in. thick. I bandsawed a pattern from ⅜-in. plywood and carefully sanded the edges so that all the curves were smooth and fair. I transferred the post profile to the blanks and then bandsawed the posts, staying about 1/16 in. back from the line (see the top two photos on p. 55). I bored ⅜2-in. holes through the centers of all four crest circles and all four foot circles on the drill press. These holes were essential in indexing both the pattern and the rosette and in drilling the crest-rail mortise hole. On the finished bed, the top holes were covered by the crest rail and rosettes; the holes in the feet were plugged.

With the shape of the posts roughly bandsawn, it was time to template rout the posts to final shape—that is, attach the pattern to the posts and follow the template with a router and a flush-cutting, bearing-guided bit. Sounds good in theory, but there were a few problems. First, as with planing, you shouldn't rout into the grain. That meant having to make all downhill cuts on one side, switch the pattern to the other side of each post, and make the downhill cuts from that side. I penciled arrows onto the wood to indicate stop and start points for the bit.

I also discovered that a 1½-in. flush-cutting bit starts to burn after only a few minutes of chewing its way through 1½-in.-thick cherry. After seeing this on the first leg, I changed tactics. I sanded all the convex curves I could reach, including the crest and foot circles, using a stationary disc sander and a belt sander with an 80-grit belt. For the straight portion of each post, where the side rail meets the post, I ran the post over the jointer. As a result, the router had only half as much work, and the bit burned a lot less. On tight, inside corners, where the circles meet the curves, I used chisels, gouges and files to get a neat transition. Then the real fun started. All the edges of all four posts had to be sanded to 320-grit. I used a belt sander and a block plane here and there, but for the



Sleigh bed on a budget

This sleigh bed is relatively simple to build because all four posts are the same size and shape. Unlike more elaborate designs, this one calls for flat headboards and footboards.

Drawings: Heather Lambert

most part, it was burned fingertips. Incidentally, the 80-grit disc sander marks were easier to sand out than the router burns.

Laying out and cutting mortises

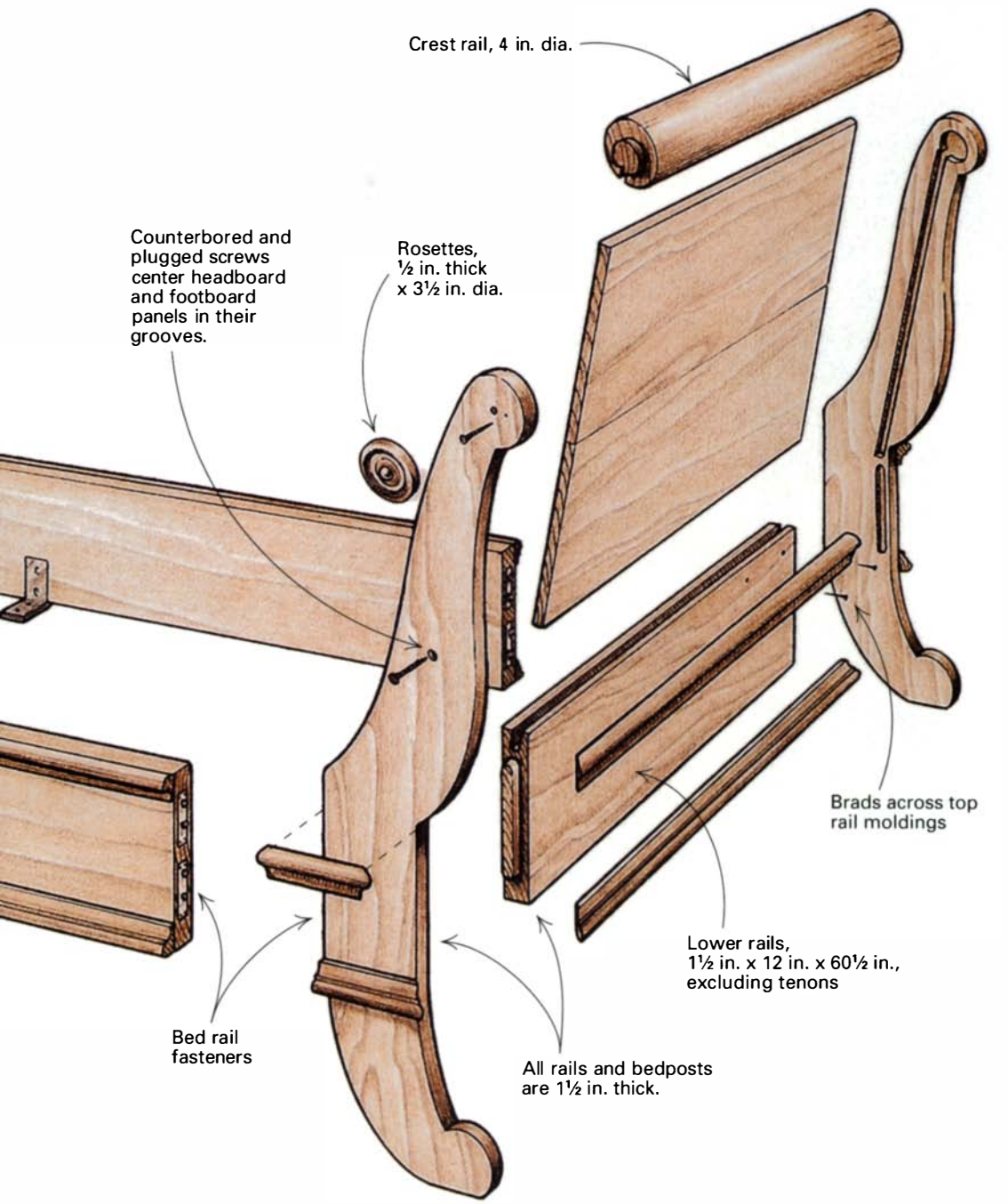
The next step was to decide which side of each post was going to be the face. I marked the faces with a pencil and then drilled a ½-in.-deep, 2-in.-wide hole on the inside center of each of the crest-rail circles. These holes matched the tenons turned on the ends of the two crest rails (see the drawing).

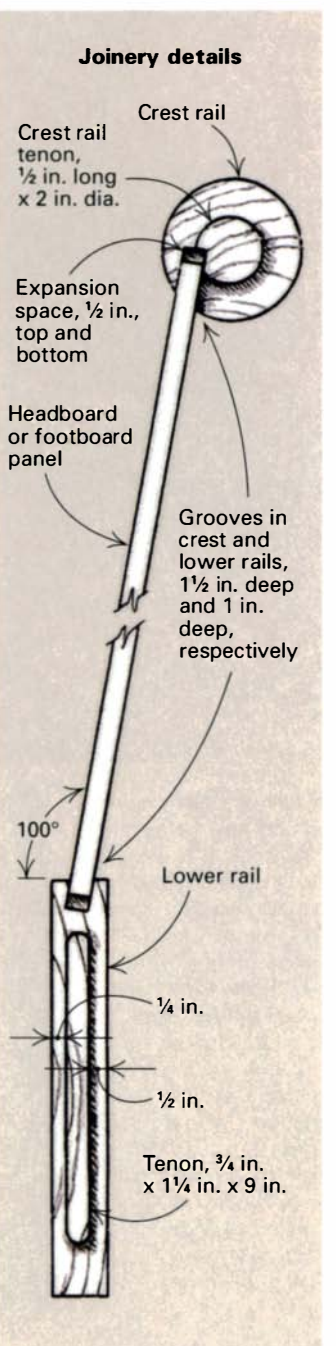
I then laid out the mortises for the lower head and foot rails. I offset the mortises to give more strength to the outside wall of the mortise. This gave me ½ in. of wood from the outside of the post to the mortise, a ¾-in.-wide mortise, and still allowed the rail to have a ¼-in.-wide shoulder on the inside (see the drawing detail below).

I routed the mortises using a fixture that has two parallel fences with pieces connecting them. (For more on this routing fixture, see *FWW* #119, p. 74.) The distance between the fences is the diameter of the router base. For ease of operation, I used two routers. The first, with a ⅝-in.-dia. bit, made three passes to achieve the mortise's full 1¼ in. depth. With the second router, I used a ¾-in.-dia. bit to take the mortise to its full width.

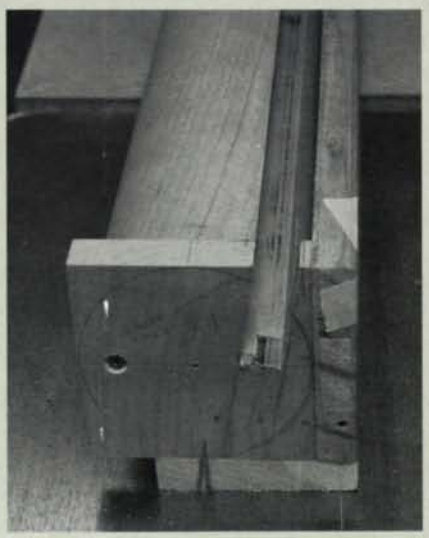
When all four mortises were routed, it was time to cut the end rails to length. Because this is a queen-size bed, I allowed 60½ in. between the posts. With the addition of a 1¼-in. tenon on either end, that brought the total rail length to 63 in.

I cut the rails to length and then cut the tenons (remember, they're offset—a ½-in. shoulder on the outside and a ¼-in. shoulder on the inside), leaving 1½-in. shoulders at the top and bottom for an overall tenon width of 9 in. I rounded the ends of the tenons with a knife, so they would conform to the routed mortises in the posts. Then I dry-fitted the rails in the mortises. Be sure that the rails are flush with or slightly in from the posts. It's much easier to





SAWING THE CREST RAIL GROOVE



Plow a groove in the crest rail *(above). A two-sided box with end caps holds the crest rail at a fixed angle to the blade and provides a flat surface to run against the fence. Tenons on the ends of the crest rail fit snugly in mortises in the end caps (right), which are screwed to the crest rail and to the two sides of the box.*

take a little off the back of the post than it is to sand down the whole rail.

Build a box to groove the crest rail— I needed to cut ¾-in.-wide by 1½-in.-deep grooves at 10° along the entire length of both round crest rails to accept the headboard and footboard panels. This required some creative thinking. My solution was to drill centered ½-in.-deep by 2-in.-dia. mortises in two 4-in.-sq. end caps and slip the caps over the tenons on the crest rail. I set the whole thing flat on the tablesaw and outfeed table and connected the end caps with two pieces of scrap—one on the side to run against the fence and another on the top to keep the jig from racking (see the photos at left). Screws through the end caps keep the crest rail from rotating while being cut. Remember to keep screws away from the area being grooved.

I laid out the location of the groove on the end cap, put the ¾-in. dado set on the saw and adjusted its height and angle. I set the fence to align with the marking on the end cap and ran the entire unit through the blade. Only one end cap had to be removed to repeat the operation with the second crest rail.

With the dado in place and already tilted, I cut the identical groove in the tops of the head and foot rails. Remember that head and foot panels tilt out from the bottom rails and, unlike the crest rails, cannot be reversed. Think before you cut.

Sized stick provides layout lines for head- and footboard panels— The next trick is to lay out the grooves for the headboard and footboard panels on the inside faces of the posts. To do this, I used a stick to align the grooves that were already in the crest and lower rails. I set one of the posts face down on a pair of low sawhorses and placed both the lower rail and crest rail in position. The top outside edge of the lower rail should meet the junction of the curved and the flat back sections of the post. This is essential if the molding is to align all the way around the bed.

I placed a straight stick, precisely ¾ in. wide and about 29 in. long, into the crest rail groove and turned the crest rail until I could drop the stick into the groove in the bottom rail. Perfect alignment. I marked the post on both sides of the stick, then removed it (see the photo at left on the facing page). Without shifting the crest rail, I marked inside the grooves so I'd know where to stop the groove.

I routed all four posts, using the same router fixture as before. To position the fixture, I cut a scrap so it fit perfectly between the two

LAYING OUT AND ROUTING THE SIDES

***Lay out the headboard and footboard panel grooves** (left). To guarantee alignment, cut a piece of scrap to fit between the crest and bottom rail grooves; then mark both sides of it.*

***Position routing fixture** (top). A piece of scrap as long as the space between the fences aligns the routing fixture. Marks indicating the width of the bit are lined up with the groove lines near both ends of the fixture. Then the fixture is clamped to the post.*

***Rout headboard and footboard panel grooves** (bottom). The author makes two passes with a 5/8-in.-wide bit, one at half depth and one at full depth. He makes one cleanup pass with a 3/4-in.-wide bit.*

fences, marked a ¾-in.-wide section at its center and moved the fixture around until the marking on the scrap matched the marking on the post at both ends of the groove (see the top right photo). As before, I took two passes with a ⅝-in.-dia. bit and a final cleanup pass with a ¾-in.-dia. bit for each ½-in.-deep groove (see the bottom right photo). I squared the ends of the grooves with a chisel.

Now the headboard and footboard assemblies can be dry-fitted. I cut the headboard and footboard panels to size (28½ in. by 61½ in.) and sanded both sides of both panels to 320-grit. Because the whole unit is so large and unwieldy, I first dry-fitted each edge of the panels in its respective groove and then dry-assembled the entire unit. I disassembled it, finished sanding the posts and eased all the sharp edges with a block plane.

Sizing side rails and adding hardware

To determine the length of the side rails, I laid one foot post and one head post down so the inside faces of the end rails would be 80½ in. apart (enough space around a standard queen-size mattress or box spring for sheets and covers). The distance from the inside face of the end rail to the inner edge of the post was 5¼ in., so I subtracted twice that from 80½ in. and cut the side rails 70 in. long.

Hardware for a bed this large proved to be difficult to find. I fi-

INSTALLING BED FASTENERS

Lay out mortises for bed fastener hardware. *Clamp all four legs together with their feet flush, and use a marking knife to get a crisp line.*

A couple of taps eliminate slop. *Because two bands of molding ring the bed, the posts and side rails have to be absolutely flush. The author used a center punch to eliminate all play in the bed fasteners.*

nally located some heavy-duty, zinc-plated knockdown bed fasteners in the Whitechapel catalog (800-468-5534). I ordered eight pairs, two for each rail end, because this is such a heavy bed.

To mark out the bed fastener locations, I clamped all four posts together with feet flush at the bottom (see the photo at left). This ensured that all eight mortises would line up precisely. For accuracy, I used a knife to make the scribe lines. Then I transferred those lines to the ends of the side rails and marked the top edge so that the rails couldn't be flipped upside down. The rails took the pin part of the fasteners; the slotted plates were fitted to the posts.

I did all the mortising on a horizontal mortiser, transferring the scribe lines from a bedpost to the fence of the mortising table. Then I set my stops and proceeded to cut. Because the bed hardware was about ⅞ in. wide, I used a ½-in. bit. I flipped the posts and rails over to make two overlapping cuts, which ensured a centered cut. Next I squared the ends of all 16 shallow mortises with a chisel and marked and mortised the deeper slots to accept the rail pins. The routing and inlaying could be done with a router and jig.

Before attaching the hardware, I checked mating pieces for a fit. I noticed about 1/32 in. of side-to-side play—very little really, but for this situation, still too much. The hardware had to align the rails perfectly flush with the posts so the moldings would line up. To remedy this situation, I took a metal punch and pounded a dimple on either side of the slots (see the bottom photo at left). It worked perfectly. Absolutely no play. With the hardware in shape, I drilled pilot holes in all the posts and rails and screwed all the bed fasteners into place.

Before gluing anything, I dry-fitted the entire bed to be sure that everything was in order and that the rails were interchangeable. Then I disassembled the bed and sanded all the parts to 320-grit.

Gluing up the head- and footboard assemblies

I set one post flat on a piece of carpet on the floor and another on a sawhorse within reach. I spread glue into the two round mortises for the crest rail and the two long mortises for the lower rail. Then I set the headboard panel into position, leaving a ½-in. gap at both the top and bottom of the groove. The headboard and footboard panels are not glued in; they must be free to expand and contract with seasonal changes in humidity. Holding the panel with one hand, I first slid the crest rail and then the lower rail into their mortises. Then I lowered the opposite post onto the lower rail and manipulated the crest rail into position. Before pounding the post home, I made sure that the headboard was centered in its groove. I pounded the post home, laid the unit gently down on its back and clamped it.

To make sure the panel's edges wouldn't be exposed when it contracted in the winter, I drilled counterbored holes into the posts at midpoint along the groove. I screwed the panels in place and plugged the holes. This ensured that the headboard panel would remain centered between the rails and that they would expand evenly top to bottom. Once both head- and footboard units were assembled, I pinned the tenons of the lower rails and screwed the crest rails through the posts with 2-in. drywall screws, just off center, to reinforce the mortise-and-tenon joint. Finally, I sanded the posts flush with the lower rails where they meet.

Molding and rosettes finish the bed

Before attaching the two bands of molding, I made sure that the rails were firmly seated all the way down in the hangers. It would be embarrassing to have the molding glued on only to have one

Turning rosettes

Reground block plane blade scrapes rosette. *The author ground an old blade into a scraper (right) to make the rosettes for his sleigh bed. To get the correct profile, he reshaped a grinding wheel with a dressing stick. The scraper is used to shape the face of each rosette on the lathe (left).*

A rosette is a great detail on a simple piece of furniture. You can buy rosette cutters for your drill press, but they're expensive, limited to certain designs and diameters, and intended to be used on square blocks for Victorian door and window frames. For this bed, I wanted round rosettes with slightly undercut edges, 3½ in. dia.

My solution was to grind my own lathe tool, a scraper essentially, from a spare block plane blade, as shown in the photo above right. (Don't buy a new one. Short, worn or chipped blades are available at most flea markets or used tool sales.) I honed the back of the blade flat, kerfed a piece of scrap with the bandsaw and screwed the blade to the scrap wood.

Then I screwed a 1½-in.-thick, 4-in.-sq. block of cherry to my 3-in. faceplate on the lathe, set my tool rest in front of it and began turning. I forced the tool straight in with a series of slow, shallow pushes. As I approached full depth, I lightened up on the cuts to reduce tearout. Then I marked the intended diameter and, using a parting tool, turned the square block round. Next, using a diamond point, I undercut the outside shoulder. I stopped the lathe, looked for blemishes and sanded from 100-grit to 320-grit, followed by 0000 steel wool.

I used a parting tool to just score the back edge of the rosette. Then I unscrewed the rosette from the faceplate and bandsawed it across the kerf created by the parting tool. I pared the middle of the back roughly flush and flattened the back of the rosette against the disc on my disc sander. —*C.B.*

section of the rail drop ¼ in. when the box spring was set in place.

Attaching the molding is pretty straightforward, but a few hints are in order. I did the top of the end rails first because it's the most difficult to attach. I fit, mitered, drilled brad holes about 8 in. apart along the center and glued and attached the molding with brads. The molding here is virtually impossible to clamp.

The short pieces of molding across the grain of the posts needed special attention because the post will change slightly in width. My posts were at about 11% moisture content. To allow for some shrinkage, I left about a 3/32-in. gap between this short piece and the side-rail molding. I tacked down this short strip with a brad at either end and one in the middle, and glued about two-thirds of the way from the miter to the end. The side rail moldings were cut to precisely the same length as the rails and glued using spring clamps and bits of molding cutoffs turned upside down to spread the clamping pressure. The procedure was the same for the lower band of molding.

To support the box spring, I marked and routed mortises for short (1¼ in. wide) sections of ¼-in.-thick, 4-in. steel angle iron I had cut for that purpose. I screwed those brackets directly to the side rails.

The crowning touch was attaching the turned rosettes (see the box above). I drilled a 3/32-in. hole into the center of the back of the rosette, tacked in a snipped off piece of 6d finishing nail to center the rosette with the post hole, and glued and clamped the rosette.

The bed was finished with three coats of Tried and True varnish oil (available from Garrett Wade; 800-221-2942). This is the only pure linseed oil on the market, with no additives or driers. It requires a good deal of elbow grease to wipe off, but the build and depth of shine is worth it.

For the record, the bed was completed in 96 hours. □

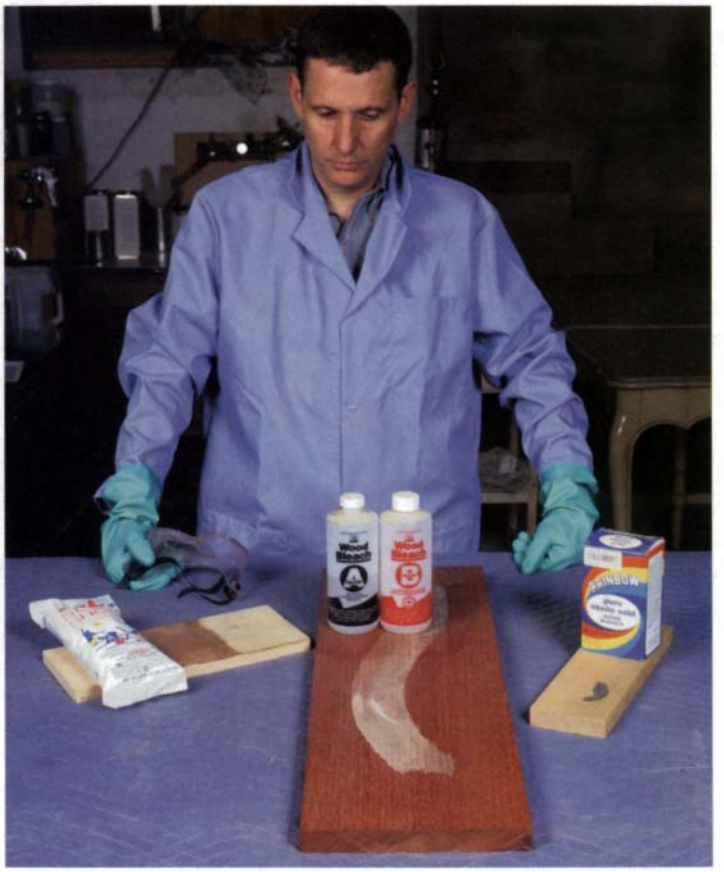
Chris Becksvoort is a professional furnituremaker in New Gloucester, Maine, and a contributing editor to Fine Woodworking. *Also, he's writing a book about Shaker furniture.*

Bottom photo: Dennis Griggs

Using Wood Bleach

These chemicals remove stains and lighten wood

by Jeff Jewitt



Pick the right bleach for the job. *These three types of wood bleach all have specific uses. No one bleach does it all.*

My client's dining table had been damaged in a move, and two of its leaves were missing. The French-style reproduction table, about 60 years old, was veneered with a fruitwood that looked like cherry in grain and texture. But the wood had mellowed to a yellow-gold color. Cherry was the natural choice for the new leaves. But the color would be too red and would darken significantly over time.

I solved the problem with bleach. It removed the natural color of the cherry, providing me with a neutral background so I could match the original with a dye stain. The bleach also halted the darkening process in the cherry leaves, so the color of the table would remain uniform.

Matching old wood to new is only one application for wood bleaches. Most finishers are aware that bleaches remove unwanted stains—food, black water and old dyes. But bleaches can do much more. They also even out tonal variations in dissimilar woods and produce blond or pickled finishes. The trick is knowing which bleach to use. For that, it helps to understand how wood bleach works (see the box on p. 64).

Photos: William Duckworth

For woodworkers, there are three general types of bleaches: peroxide, chlorine and oxalic acid. All three work by altering the way wood molecules reflect light, thereby changing the color in the process. But each type of bleach is suited to particular tasks; they are not interchangeable.

Ideally, a bleach should work selectively to remove color, meaning that it should only remove the color that you want and not the color of anything around it. In most cases you'll need to experiment, especially if you don't know the composition of the stain. Because most bleaches are highly poisonous and often very corrosive to skin, you should always wear good rubber gloves, a dust mask (if you're mixing dry bleach powders) and safety glasses.

Peroxide bleaches remove natural color

These bleaches are sold as two-part solutions, commonly labeled A and B. You'll find peroxide wood bleaches in most paint and hardware stores. The two chemicals are usually sodium hydroxide and a strong hydrogen peroxide solution. When used together, a powerful oxidizing reaction takes place that is effective in removing the natural color in wood, like the mahogany shown at right. To a lesser degree, peroxide bleaches will lighten some woods that have been treated with pigment stains. They are ineffective on dye stains.

The most common way to apply this product is to wet the wood thoroughly with sodium hydroxide (part A) and immediately follow with hydrogen peroxide (part B). It's important with some tannin-rich woods like cherry and oak that part A not sit too long before part B is applied because the sodium hydroxide may darken the wood. You can also mix the two parts together and apply them at the same time, as long as you do this quickly after the parts are mixed. Usually one application is needed, but a second application may be necessary to even out the bleaching effect.

Some dark woods, like ebony, are not affected by peroxide bleaches. You can use this to your advantage if you want to bleach a tabletop with ebony inlay. On some woods, especially walnut, a greenish tinge may appear in some areas if the bleach is applied unevenly. To prevent this problem, apply the bleach sparingly; use just enough to make the wood wet. Don't flood the surface.

Neutralize the alkaline effect of peroxide bleaches after the wood has dried by applying a weak acid, like white vinegar. Use one part vinegar to two parts water. Follow that with a clean water rinse.

***Peroxide bleaches work best** at removing the natural color of the wood. This piece of mahogany veneer changed from a deep red to a light blond color with one application of peroxide bleach.*

Peroxide bleaches will remove all the natural color variations in wood, so use them judiciously. I use them to match sun-faded wood or to provide a neutral base for a decorative finish like pickled oak. You can also use them to compensate for heartwood/sapwood variations, but I usually prefer to bring the sapwood in line with the heartwood by hand coloring or spraying the sapwood with a dye stain.

Chlorine bleaches eliminate dye colors

Chlorine is a strong oxidizer that will remove or lighten most dye stains (see the bottom right photo on p. 64). A weak chlorine-based laundry bleach such as Clorox

How bleach works

Color in an object is produced when the molecules selectively reflect light. These colored molecules may be organic, like those in dyes, or they can be inorganic, like those in pigments. Most bleaches, like peroxide and chlorine, work by disrupting the way that the molecules can reflect light. Other bleaches, like oxalic acid, convert the colored compound of a stain to a different, colorless one. The physics of these concepts may be difficult to understand, but the important thing to remember is that bleaches do not really remove the color of a substance. They simply change the material so it appears colorless.

As an example, tannic acid and ferrous sulfate when dissolved in water are colorless solutions. When mixed together, the two chemicals react and form a third compound, iron tannate, which is a grayish-black color. Iron tannate is the compound responsible for most of the black water spots on oak. When oxalic acid is added to this liquid, it converts the colored iron tannate molecules to iron oxalate, a colorless compound. When used in this respect, oxalic acid is a bleach.

Not every colored object can be bleached. Colors that are produced by inorganic molecules will not react to the bleach. Many pigments like carbon black (used in inks) and earth pigments (used in wood stains) will not react to bleach. These colors can only be completely removed by scraping or sanding the color off the surface of the wood. *–J.J.*

Chlorine bleaches remove dye stains. *The natural color of walnut (left) is virtually unchanged by an application of chlorine bleach. But most of the dye stain on the birch veneer (right) has been removed with the same solution.*

will work, but it will often take several applications to be effective. A much stronger solution can be made from swimming pool bleach—a dry chemical called calcium hypochlorite. It's inexpensive and can be purchased from a retailer of pool supplies.

The chief advantage of chlorine is that it will remove or lighten the dye without affecting the natural color of the wood. You can use laundry bleach or the stronger version—dry calcium hypochlorite powder mixed to a saturated solution in hot water. A saturated solution is created by adding the powder to water until no more powder will dissolve. Mix only in glass or plastic containers: The chemical will attack aluminum or steel. The mixture will lose its effectiveness if stored, so I make up only what I'll use right away. Cool to room temperature before using, and filter out solids.

Apply the solution liberally to the wood and, in some cases, the dye will immedi-

ately disappear. Some dyes may take longer to bleach, and some may only lighten but not disappear. Wait overnight to determine the full bleaching effect. If the color hasn't changed after two applications, applying more bleach won't help. You'll need to try another technique. Chlorine bleaches are usually ineffective on pigment-based stains. The only way to remove these are by sanding or scraping.

Oxalic acid for iron stains and weathering

Oxalic acid is unique in that it will remove a specific type of stain formed when iron and moisture come into contact with tannic acid. Some woods, like oak, cherry and mahogany, naturally contain a high amount of tannic acid. A black stain results when the tannic acid reacts with water containing trace amounts of iron. Oxalic acid will remove this discoloration without affecting the natural color of the wood (see the photos at right).

Oxalic acid also lightens the graying effects of outdoor exposure. It is the active ingredient in some deck brighteners. If used on furniture that has been stripped for refinishing, it will lighten the color and reestablish an even tone to the wood.

Iron-based stains are fairly easy to spot. They are grayish-black and usually ring-shaped. They may also show up as a splotchy appearance on oak that has been stripped. Before applying oxalic acid, remove any finish first.

In a plastic container, mix a solution from dry crystals of oxalic acid (available from most woodworking supply stores) in hot water. Allow the solution to cool to room temperature, and apply it to the entire surface, not just to the stain. Several applications may be needed with overnight drying in between. Once the surface of the wood is dry, any residual oxalic acid must be removed before sanding or finishing because the acid will damage subsequent finishes. Several water rinses will remove most of the oxalic acid crystals left on the wood surface. Neutralize the acidic wood surface with a solution made from one quart of water and two heaping tablespoons of baking soda. Then rinse off the baking soda solution with water.

Solving special staining problems

Stains that form on wood during the drying process are varied in their composition. Sticker stain, brown stain, streaking and light "ghost" stains are all common problems. Some can be removed by bleach. The composition of the stain may be chemical or biological, so a trial-and-error approach may be needed when attempting to remove a stain. I often start with oxalic acid and then follow with chlorine. Peroxide bleaches are a last resort because the removal or acceptable lightening of the stain can result in bleaching the surrounding wood.

Stains like grape juice, tea and fruits can be removed with a chlorine bleach. Remember to wipe the entire surface to get an even effect. Some blue and black inks with an iron base can be eliminated with oxalic acid, but carbon-based inks, like India ink, can't be removed by any bleach. □

***Oxalic acid removes the stain** but not the color of the wood. The author used a deck brightener, which has oxalic acid as an active ingredient, on this piece of white oak.*

Jeff Jewitt repairs and restores furniture in North Royalton, Ohio. He's the author of Hand-Applied Finishes. *The book and its two companion videos are available from The Taunton Press.*

Designing the Wedged Mortise and Tenon

Attention to detail yields exceptionally strong joints

by Carl Swensson

A door can be slammed only so many times before the tenons pull out of their mortises. Even the sturdiest chair will not survive an overweight, hyperactive teen who tilts back on the chair's rear legs. These are extremes. Most furniture that falls apart has not been abused. When a chair squeaks or a table wobbles, it's usually just bad joinery design.

Good design buys time against the use and abuse that all furniture will bear. Unless you plan to make all your furniture exclusively for your grandmother, you must choose and design furniture joints to withstand years of stress. Many antique stores offer living proof that well-made furniture can outlive its maker. Look closely at an old chair or door, and you may find the distinctive bands of wedges still holding through tenons in place.

The wedged mortise and tenon is a simply made and very effective woodworking joint (see the photos at right). Two kerfs cut in the tenon accept wedges to make the tenon dovetail-shaped. To accommodate the wedged tenon, most of the mortise wall is relieved (or cut) at the same angle as the tenon wedge. This joint is particularly good at resisting racking, a common stress on table and chair legs. And as a visible and beautiful joint, it will add value beyond its structural contribution.

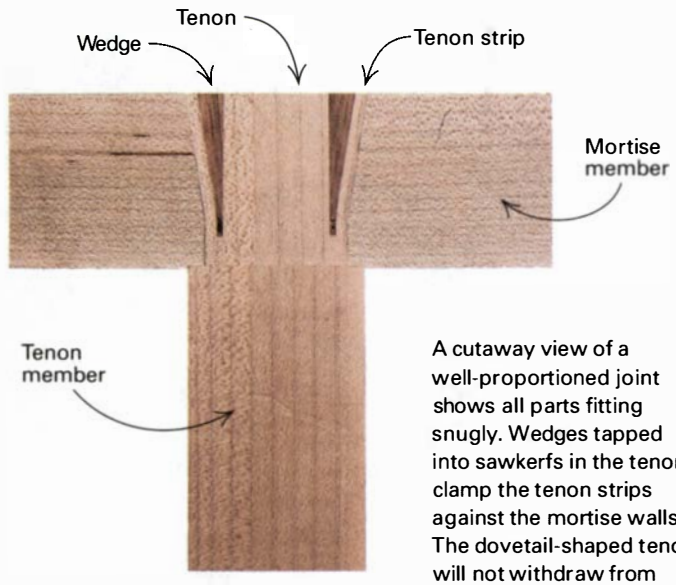
There are no simple guidelines to cutting a successful wedged mortise and tenon. There are no best angles or right lengths for the wedges nor any proper thicknesses for the tenon strips. Designing the wedged mortise and tenon must take into account not only the many stresses the finished piece must withstand but also the particular characteristics of the wood, even of the particular boards you use. The design process must leave the drawing table and become part of the construction process.

The stresses that break joints

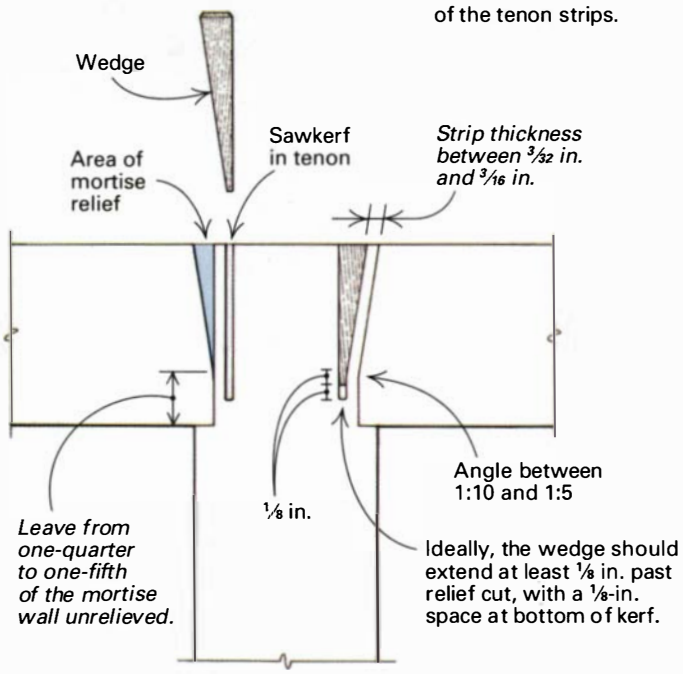
There are two types of forces that work joints loose: internal, from the seasonal expansion and contraction of the wood, and

The author taps in wedges that won't come out. *Careful design will yield a joint that is nearly impossible to pull apart.*

The wedged mortise and tenon



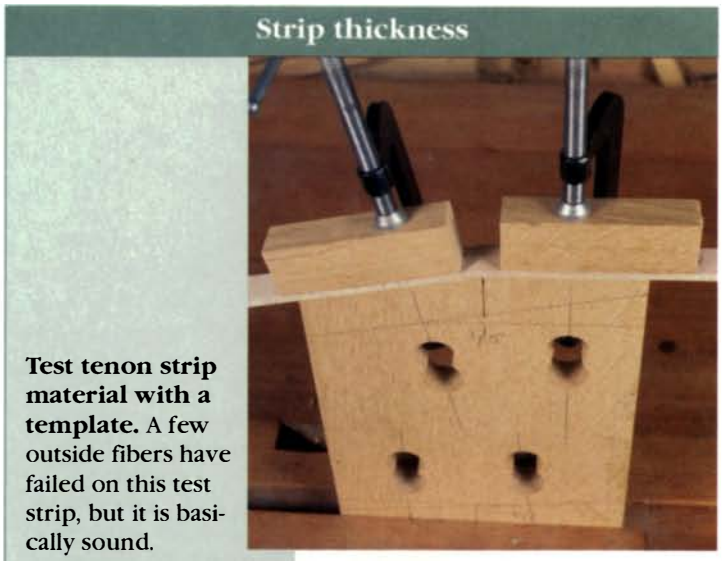
A cutaway view of a well-proportioned joint shows all parts fitting snugly. Wedges tapped into sawkerfs in the tenon clamp the tenon strips against the mortise walls. The dovetail-shaped tenon will not withdraw from the mortise under tension, but joint integrity depends mainly on the strength of the tenon strips.



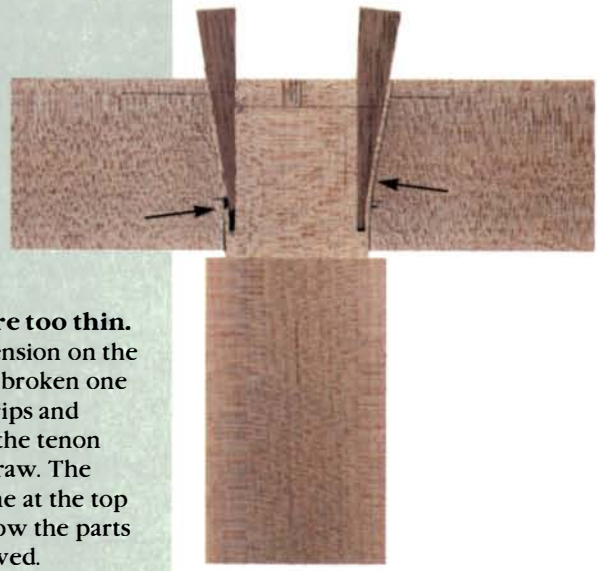
external, from human use. Unless you live in an environment with perfectly controlled humidity, variations in the wood's moisture content are inevitable. Because of the cross-grain construction in joints like a mortise and tenon, these seasonal changes are a long-term threat to the joint's integrity. Quartersawn lumber is more stable than flatsawn and should be used for all joints. This grain orientation ensures that the wood will move the least along its greatest width. It also minimizes the wood's movement against itself.

Normal use will put several forces on a joint: compression and tension, shearing, racking and twisting. The connection between the internal faces of the mortise and tenon does most of the work in keeping the joint together, though the tenon's

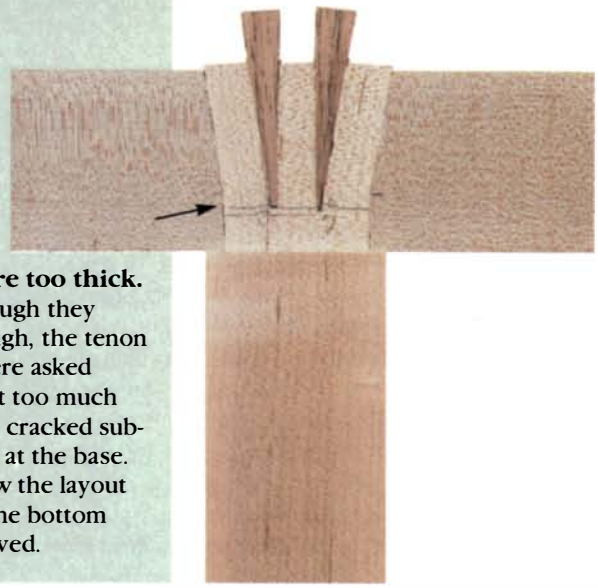
Photo above right: Scott Phillips; drawing: Vince Babak



Test tenon strip material with a template. A few outside fibers have failed on this test strip, but it is basically sound.



Strips are too thin. A little tension on the joint has broken one of the strips and allowed the tenon to withdraw. The layout line at the top shows how the parts have moved.



Strips are too thick. Even though they were tough, the tenon strips were asked to deflect too much and have cracked substantially at the base. Note how the layout lines at the bottom have moved.

shoulders help to prevent compression.

Twisting forces are often overlooked in joint design. Kicking a table leg or leaning back on the rear legs of a chair can create very strong twisting forces on a joint. A mortise near the end of a board is particularly vulnerable to this stress because of the short grain. It is better to keep the mortise at least twice the width of the tenon away from the end of the board. These forces will be less likely to cause joint failure.

Wedging the tenon against tension

A simple glued mortise-and-tenon joint with shoulders will resist compression, shearing, racking and twisting forces quite well. But this joint does not respond well to tension. In time, when the glue crumbles away, the tenon will come out almost as easily as it went in.

Wedging the tenon creates an internal dovetail shape that is extremely resistant to tension and does not compromise the joint's strength in any other way (see the drawing on p. 67). Under tension, the mortise walls exert an even clamping pressure along the side of the tenon. This pressure holds the wedges firmly inside the tenon and does not squeeze them out of their kerfs. As long as the tenon keeps its dovetail shape, it will not withdraw under either tension pressure.

The key to the strength of this joint is the integrity of the thin strip of tenon between the wedge and the mortise wall. The joint is nearly impossible to break under tension if the strip remains intact. However, if both strips break, the tenon will not resist withdrawal any more than a plain tenon would. The variables affecting the soundness of the tenon strip are its thickness, the mortise-relief angle, the length of the mortise-relief angle and the length of the kerf in the tenon. Each of these must be determined in turn. As the examples on this and the facing page show, it's easy to misjudge one of these factors.

Templates to test thicknesses and angles

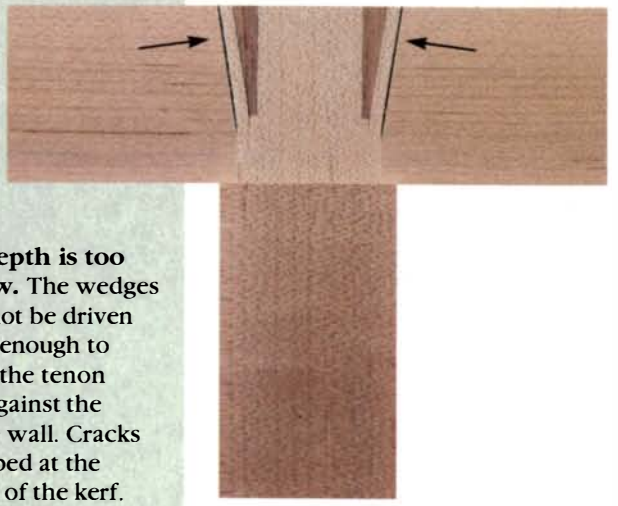
Determining the tenon-strip thickness and mortise-relief angle as a working unit depends largely on the properties of the wood you are using. Hard maple will often work in a wide range of thicknesses and angles. More brittle woods, such as cherry, may require a very low angle ratio and a thin strip to work. Even variations from board to board make it necessary to test the angle and strip for each project.

Make a series of templates with slope ratios from 1:10 to 1:5 to simulate the mortise-relief angles in the actual joint (see the top photo at left). File or chisel a slight round at the angle, both on the test jig and in the actual joint. This slightly reduces the chances that the tenon strip will kink, crack or break when it bends around the angle. Next make five to six strips of various thicknesses from the same wood as the tenon, preferably from the same board. I recommend making them not less than 3/32 in. and not more than 3/16 in.

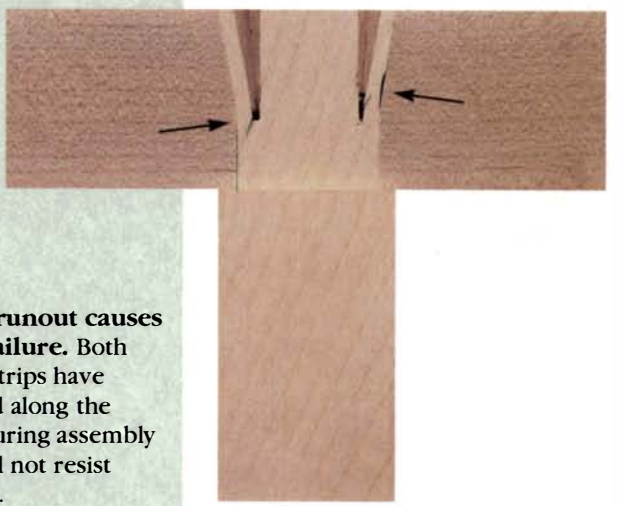
Clamp the strips to the different templates until you find the combination of greatest thickness and highest angle that will not break the strip. A higher angle gives better withdrawal resistance, but requires a thinner and more vulnerable strip (see the center photo at left). A lower angle can accommodate a thicker strip, which is less likely to break, but will not offer as much resistance to tension. However, really thick strips do not bend as easily and may crack if bent too far (see the bottom photo at left). As a rule, I start testing with a strip 3/32 in. thick

Photos except where noted: Strother Purdy

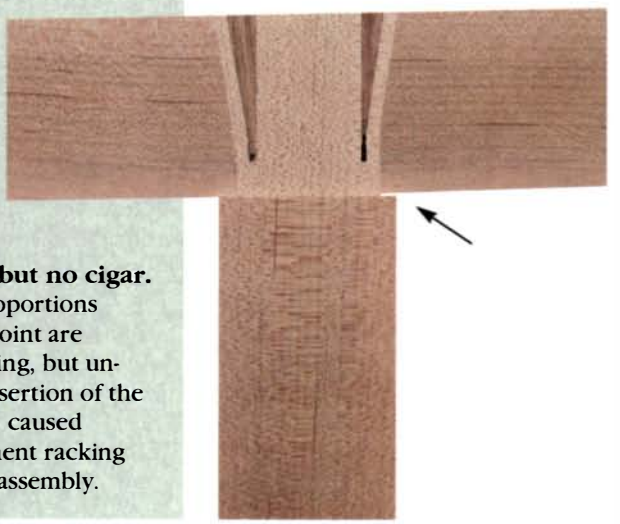
Problem joints



Kerf depth is too shallow. The wedges could not be driven deeply enough to deflect the tenon strips against the mortise wall. Cracks developed at the bottom of the kerf.



Grain runout causes strip failure. Both tenon strips have cracked along the grain during assembly and will not resist tension.



Close, but no cigar. The proportions of this joint are promising, but uneven insertion of the wedges caused permanent racking during assembly.

and a slope ratio of 1:7 and increase either the ratio or the thickness or both from there to find the best balance.

Proportions for mortise wall relief and tenon kerf

You now know the angle to relieve the mortise wall and to cut the wedges. The next step is to determine how much of the mortise wall you should relieve. This will, in turn, determine the length of the wedge and the depth of the kerf in the tenon.

The deeper the mortise-relief cut is, the more surface area you create on the mortise wall to resist tension. However, you must leave some room at the base of the tenon so the wedge can be driven past the end of the mortise relief. Leaving from one-quarter to one-fifth of the mortise wall unrelieved works well.

The sawkerf in the tenon should extend beyond the mortise-relief cut, but not by much. This allows the wedge to be driven farther than the end of the mortise relief without bottoming out in the kerf. That ensures the tenon strip will be pressed snugly against the entire relieved mortise wall. Driving the wedge beyond the relief cut also allows the wedge to support the weakest side of the strip where it bends. If the kerf is too shallow, the wedge will bottom out, and the strip cannot be compressed against the mortise wall (see the top photo at left). Trying to insert the wedges farther during assembly may cause a split in the tenon.

If the tenon has grain runout, splits that develop during assembly may follow the grain out of the wood, causing complete joint failure (see the center photo at left). The first defense against such splits is selecting straight-grained wood for the tenon member. Deep sawkerfs and the snug fit of all the parts in the joint also will help prevent this problem.

Another way to keep a strip from splitting is to drill a ⅛-in.-dia. relief hole at the bottom of the kerf. It will distribute the stress at this point. The hole also thins the strip where it bends, helping it to take the bend without cracking. This step should not be necessary if the grain is straight and the relief angle and strip thickness are well-balanced.

The wedges for final assembly

Perhaps, without realizing it, you have already designed the wedges. The angle of the wedges is the same as the slope ratio of the mortise relief. The thickness of the wedges at their tip should be a little less than the tenon kerf. The wedges should be at least ⅜ in. longer than the kerf is deep to make it easier to tap in during assembly.

Final assembly, however, is not the time to relax. Much of the joint's integrity depends on how well the parts come together. If you hammer the wedges in unevenly, the joint will rack to one side (see the bottom photo at left). Keep the joint square and the tenon firmly in the mortise as you tap in the wedges.

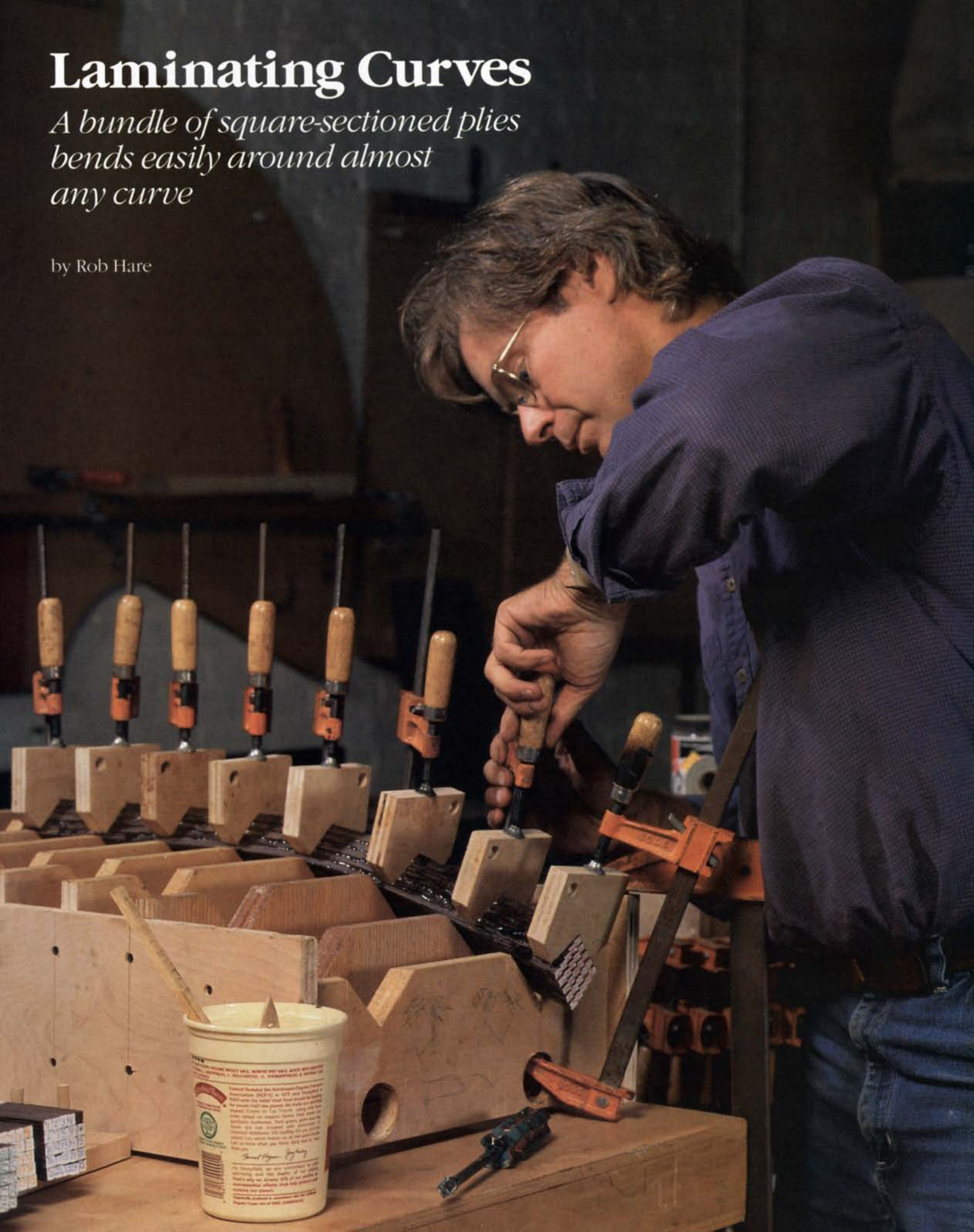
Yellow wood glue, because it sets fast, can make this joint even trickier to assemble. It sets so fast you won't have much time to make sure all the parts are aligned properly. For this joint, I use a glue with a slower set up time. If you have avoided design mistakes, the result should be a very tight, strong joint and an ornament to your work. □

Carl Swensson is a professional woodworker and furniture designer. He has built tracker organs, doors for a Buddhist temple in Japan and countless Appalachian-style chairs. He lives in Baltimore, Md.

Laminating Curves

A bundle of square-sectioned plies bends easily around almost any curve

by Rob Hare



A couple I know wanted a special table, something low with a top that tilted up to hold sheet music. The table would go in a formal room. They looked at possible designs and settled on one with delicately tapered legs of wenge that curved outward at the corners. The legs needed to be strong and graceful, with grain lines that emphasized their curved shape.

I worked through my options for making the legs and chose a technique I call bundle laminating. The legs are made from a bundle of square-sectioned plies all cut from the same blank, each ply limber enough to bend around the compound curve of the leg. To get the best grain matching possible, I number the plies before resawing the leg blanks and glue them back together in the same order. The result—a strong curve with grain so well matched it's hard to see the gluelines (see the photo at right).

Bundle laminating is not as difficult as it may look, but it does require more time and care than many other methods of lamination. I use a jig similar to the type boatbuilders call a strongback (see the photo at left). It has a strong outer frame that holds a series of upright molds notched to contain the bundles as they bend around the curve. The method is well-suited for any compound curve, like stair railings or the backs of Windsor chairs.

Drawing the curve to design the jig

To build the jig, I start by drawing the leg's critical curve—its outer corner—which goes face-down in the jig. I scale a few points from my design sketch and then transfer them to a piece of plywood (see drawing 1 on p. 72). Next I bend a clear oak batten about ¼ in. by ¾ in. by 4 ft. through the marked points just to see how the curve will look. Rarely is the first curve quite right to my eye, so I move the batten around until I find just the curve I want and then trace that on the plywood. The line represents the outside corner of the leg.

The leg measures 2¼ in. diagonally, so I use the batten to draw a second line parallel to the first and 2¼ in. away from it. This line represents the inner corner of the leg. Finally, I draw a line midway between the first two lines to represent the remaining corners (see drawing 2 on p. 72).

I can now draw parts for the jig, full size, around the leg. I begin by drawing a baseline about 6 in. below the lowest part of the curve to represent the benchtop. Then I draw vertical lines every 3 in. to represent the plywood molds (see drawing 3 on p. 72). The spacing of the molds isn't critical; my rule is to space the molds evenly, use as many molds as I can and leave at least 2½ in. between them to operate the clamps.

At this point, I have all the information I need to build the jig except for the shape of the notches that hold the plies. The notches are square where the leg is not curved. But as the curve increases, the notches become more diamond-shaped because the molds are no longer perpendicular to the axis of the leg. Figuring out the exact shapes of the notches may sound complicated, but they easily can be taken from the full-sized drawing. The bottom drawing on p. 72 explains how to do it.

Build a strong and accurate jig

The jig is a ladder frame made from ¾-in. plywood. The molds are the rungs of the ladder, and they are set in ¼-in. dadoes and glued and screwed to the sides of the frame. It's essential that the molds be located in the frame in exactly the same location as in the drawing. A discrepancy of only a fraction of an inch means the jig won't produce a smooth curve.

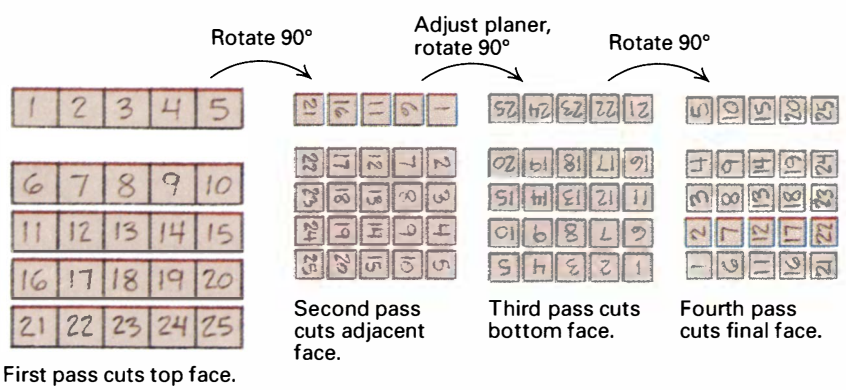
Before I fasten the jig together permanently, I set it up and bend a square-sectioned test ply over it. The test piece should nestle into the bottom of every notch. Any major gaps between the strip and the bottom of a notch are usually the result of an error in measurement in the mold location or the notch. I remove the mold (and sometimes those on either side) to check it against the drawing. I'm more likely to find small gaps between the test ply and the notches in a few molds.

To improve the fit, I have to determine if the gap is the result of a notch being cut too deep or if the notch in one of the molds on either side is too high. I glue shims in the notch or use a rasp as

Mark stock before cutting plies. *Plies are numbered (above) so they won't get mixed-up as they are bandsawn and then run through a thickness planer (right).*

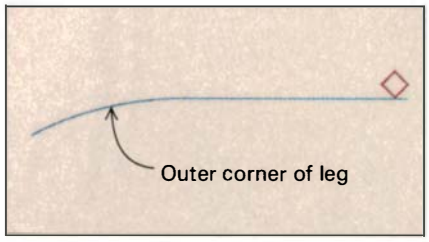
Thickness the plies one row at a time

To remove bandsaw marks, lightly plane the plies in the sequence shown below. The planer is reset only once, after the second pass, to the correct finished thickness.

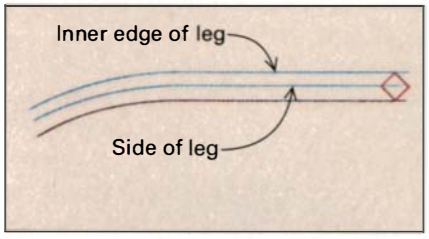


Photos: Aimé Fraser

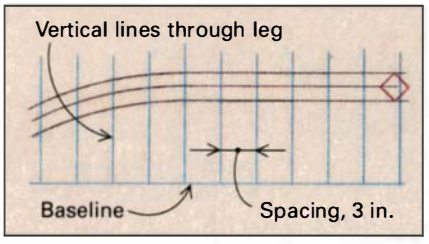
An accurate jig starts with a full-sized drawing
For bending smooth curves, the jig must be accurate. This is easy to do by drawing the leg full size and designing the jig around it. Build the jig exactly as drawn; fine-tune the notches with shims or a rasp.



1. Use batten to establish curve of outer edge of leg.



2. Use batten to draw inner edge of leg parallel to first line and 2¼ in. above it. A third line midway between the first two defines the side corner of the leg.



3. Once the leg is drawn full size, draw the parts of the jig under it. Draw a baseline about 6 in. below the lowest part of the curve to represent the bottom of the jig. For the molds, draw evenly spaced vertical lines about 3 in. apart.

necessary, frequently checking with the test strip. Changing one mold affects those on either side. Only when the test piece fits into all the notches do I glue and screw the molds into the frame.

Size the plies for strength and beauty

By using a straight-grained wood and a little care, I can assemble a bundle lamination so the grain is matched and the gluelines are almost invisible. I do that by cutting all the plies for each bundle from one blank and then planing all four sides of each ply. Some material is lost in the process, so before I do any cutting, I have to figure out three things: the thickest ply that will bend over my jig, the number of plies that will make up a bundle with specific finished dimensions, and the size blank that I will need to yield that bundle.

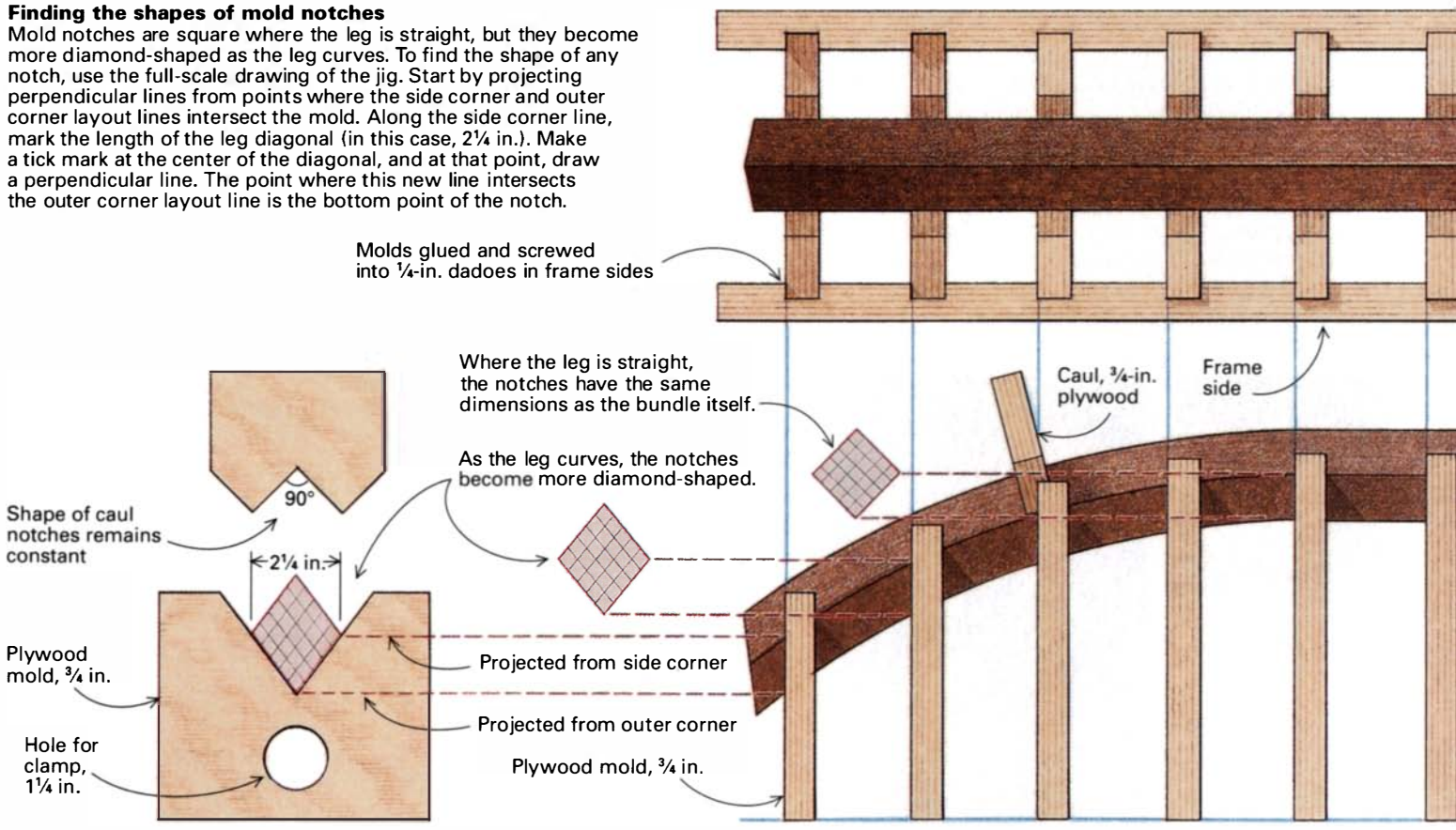
To find the thickest ply that would bend around the coffee table leg jig, I cut a ½-in.-sq. piece of wenge. When I tried to bend it around the jig, it broke. Working down in increments of 1/32 in., I found that a 11/32-in.-sq. blank was the largest section that would bend over the jig without breaking.

Simple division told me that if a 1⅝-in. leg were made of 16 plies (four on each side), they would be too thick to bend around the curve. So I divided the finished dimension into 25 plies (five on a side) and found that each ply would be very close to 21/64 in., only slightly smaller than the maximum section that bent around the jig.

I wanted to use 2-in.-sq. material for the leg blanks, but I wasn't sure that I could resaw it into 25 plies, plane the sawmarks out of all four sides of each ply and still be able to reassemble them into a bundle 1⅝ in. sq. To find out if this would work, I ran a few tests on my bandsaw and planer.

I started by setting my bandsaw fence to rip a 2-in. blank into five

Finding the shapes of mold notches
Mold notches are square where the leg is straight, but they become more diamond-shaped as the leg curves. To find the shape of any notch, use the full-scale drawing of the jig. Start by projecting perpendicular lines from points where the side corner and outer corner layout lines intersect the mold. Along the side corner line, mark the length of the leg diagonal (in this case, 2¼ in.). Make a tick mark at the center of the diagonal, and at that point, draw a perpendicular line. The point where this new line intersects the outer corner layout line is the bottom point of the notch.



Drawings: Vince Babak

strips of wood. Without changing the fence setting, I took one of those strips and resawed it into five square plies. Each ply ended up ⅜ in. on a side, which was larger than the section that would bend around my jig, but not by much. I ran a test ply through the planer set to make a very light cut. It was possible to plane away the sawmarks without losing too much material. Armed with this knowledge, I could lay out and cut my plies from a 2-in.-sq. blank.

Lay out and machine the blanks for grain matching

To match the grain in my bundle laminations, I glued up the pieces as they came out of the plank. Keeping track of all the pieces during the many steps of matching can be difficult. I cut the wenge into 2-in.-sq. blanks (I always make at least one extra blank). I selected the end of each blank with the straightest grain and painted it white. When the paint was dry, I used a different color pencil for each leg, drew a 5x5 grid and numbered each box. Then I looked at the grain in each blank and decided which corner I wanted facing outward. I put a tick mark in that corner of each box. I used the bandsaw to cut the wenge blanks into plies, stacking them in a holder while ordering them by the numbers on the end.

Planing all four sides of each ply is not as hard as it sounds (see the drawings on p. 71). I set the planer to remove one-half of the material required to reach the finished dimension and run the bundle through, row by row planing the top face. As each row comes out of the planer, I rotate it 90° and place it in another holder. Then I run the top face of each row through the planer, rotate it 90° and stack it in a holder. At that point, I reset the planer to the final dimension and plane the third and fourth sides.

Throughout the process, I inspect the stacks for proper number orientation and squareness. Sometimes one piece is out of place, usually the result of feeding an entire row through the planer in the wrong order. If this happens, you might be able to reduce the final dimension of the bundle and rework the stack. But it's usually easier to start over with the spare blank.

Prepare for the glue-up with a dry run

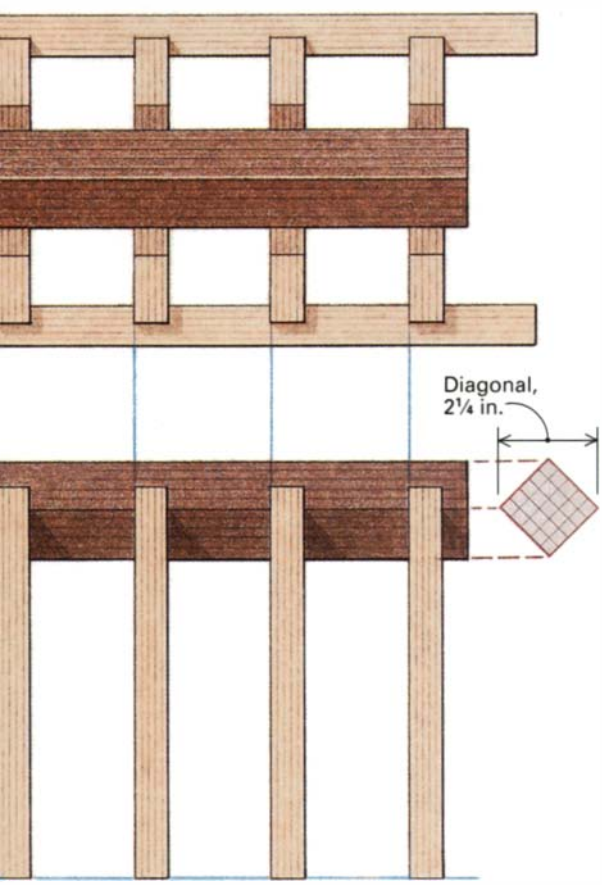
Given the number of pieces involved and the tendency toward confusion, I always make a dry run of the glue-up. This allows me to find and solve any problems with the jig and clamps. When I know that everything works, I put two coats of varnish and a coat of wax on the mold notches and cauls so the bundles won't stick to them.

To keep the glue-up as hassle-free as possible, I use West System epoxy with a slow hardener. When mixed up and left in the pot, the epoxy has a gel time of about 20 minutes, but once it's spread on the plies, I have at least an hour to get the bundles arranged. I mix small batches as needed; rarely does a batch of epoxy sit in the pot long enough to kick.

Before I start gluing, I arrange the bundles so I can easily lift a ply, spread the glue over all four sides with a bristle brush and lay it in the jig in the proper order. When all the plies are glued, I check the numbers one last time to make sure every piece is in its place. Then I clamp the bundle just as I did in the dry run. Before the glue is dry, I clean up as much of the excess glue as I can using scrapers, sticks and paper towels dampened with alcohol.

When the blank comes out of the mold, it's mostly clean and smoothly bent. All it needs is to be tapered to its final shape. □

Rob Hare designs and builds furnishings and sculpture in both wood and metal. His home and studio is in Kingston, N.Y.



EVOLUTION OF A LEG

***1.** Popped out of the mold, the laminated leg still bears the imprints of the notched molds and some glue squeeze-out.*

***2.** Cleaned up, the leg can be marked for final shaping.*

***3.** The final result is a graceful shape in which grain lines follow the leg's curves and gluelines are virtually invisible.*

Making Small Scrapers

Old tool steel, especially from throwaway dovetail saws, is a great raw material for scrapers

by William Tandy Young

Photos: Vincent Laurence

There's nothing like a thin scraper for leveling a coat of lacquer or varnish, for easing an edge or for bringing a delicate inlay flush with its surroundings. I especially like scrapers that are small and thin. I can use them in tight corners with one hand if I have to. And small scrapers are much less likely to damage delicate details because they're easier to control than standard scrapers. Best of all, these invaluable scrapers are easy to make from pieces of good steel that find their way into my scrap-metal drawer.

I've made scrapers from old Sawzall blades and pieces of wide bandsaw blade, but old handsaws are one of the best sources of thin steel. When the teeth get dull on an ordinary $10 dovetail saw, I don't bother resharpening it. It's just not worth it. Instead, I recycle the parts and buy a new saw. I tap off the handle and remove the back from the old saw. The handle gets fitted to some other tool, the back gets tossed in the scrap-metal drawer and the blade gets made into scrapers, as shown in the photos at right.

Full-sized (2½ in. by 5 in. or 6 in.) thin scrapers, both rectangular and curved, are also available from Garrett Wade (161 Avenue of the Americas, New York, NY 10213-0459; 800-221-2942). I prefer .40mm (about .015 in.) scrapers; they're half as thick as a standard Sandvik.

You can use these store-bought thin scrapers without alteration, but I usually chop them down just like the old dovetail saw. I find that thinner steel works better in smaller sizes. A thin scraper that's full size tends to flex too much during vigorous use, especially if you push rather than pull it. □

William Tandy Young is a furnituremaker and conservator in Stow, Mass.

Making a scraper from a sawblade

***1. Score the sawblade** with a Dremel tool or die grinder fitted with a grinding wheel. The grinding wheels are available from most hardware stores. Score both sides until the piece can be bent. If you don't have a Dremel tool, an electric drill probably would work as well.*

***2. Bend tip back and forth** until blade breaks off.*

***3. File off scored edge and teeth.** File the edge square to the scraper's sides.*

***4. Hone sides and edges.** Work from your coarsest stone through a medium-grit stone. A quick, light burnishing with a piece of hard steel readies the scraper.*

Fine-Tuning a Bandsaw

Vibration and wandering cuts are signs your bandsaw needs a checkup

by Robert Vaughan

An improperly adjusted bandsaw will do everything but cut well. It may throw, break or dull blades quickly. Or it may produce cuts that wander like a drunk failing a roadside sobriety test.

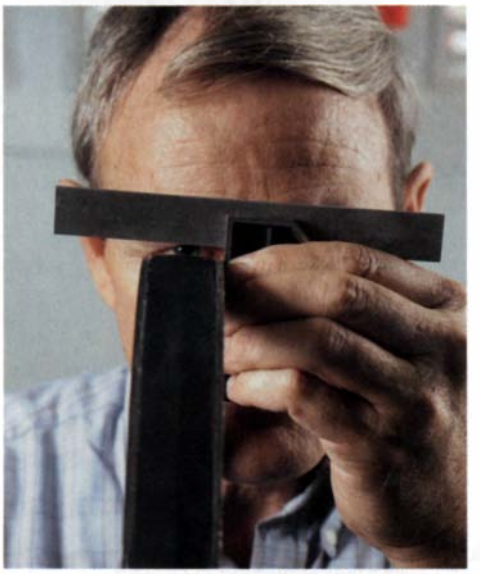
I've performed surgery on a lot of bandsaws, and I have discovered there's no single saw component that causes most ills. Many jumping and tracking problems can be traced directly to worn-out tires. But a vibrating bandsaw may just as likely be handicapped by a beaten-up drive belt. A saw that refuses to cut squarely may be affected by a guidepost that is out of alignment, or the saw may have one of its wheels out of line (see the box on pp. 78-79).

Solving many of these problems doesn't require a lot of fancy equipment. Basic tools such as wrenches, try squares, a file and some washers for shims are often all you need. A few diagnostics and adjusting techniques will bring out the best performance your saw has to offer. The basics include checking your tires for wear, wheel alignment, guidepost alignment and adjusting the guides and blade tension. Begin your tune-up by unplugging your machine.

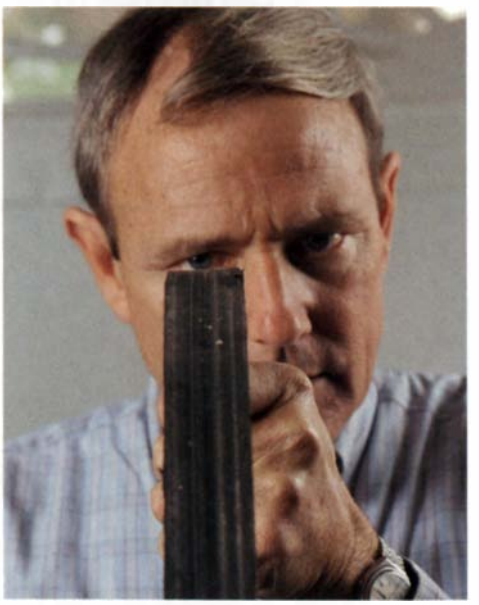
Tires must be smooth and crowned

I begin a tune-up by opening the wheel housings and blasting the works with compressed air to clear out the sawdust. Then I look at the wheels and tires. If a wheel is broken or badly bent, there's not much you can do except replace it.

If your bandsaw tracks poorly or jumps excessively, chances are the tires are worn. The majority of bandsaw tracking and jumping problems begin and end here. Tires should be whole, not missing large chunks, and without hairline cracks.



Tires need a crowned surface. *A smooth tire with a slightly crowned surface, like this one, will make a bandsaw track accurately and run smoothly.*



Worn-down tires need replacement. *The author recommends replacing tires before they get this bad.*

The surface should be smooth, clean and slightly crowned (see the top photo). The crown defines where the blade tracks. Blades have a tendency to wander back and forth on the surface of uncrowned tires. A crown also keeps the teeth from cutting grooves in the tire's surface. A grooved surface will make tracking unpredictable (see the bottom photo).

If you cut a lot of resinous woods, you may have a gummy buildup on the tires, which can create a false crown. That condition can foul the blade's tracking, allowing it to drift. You can check this by turning on the machine and letting it idle.

Check the crown and drive train—To see whether a bandsaw needs its wheels crowned, you don't have to remove the wheel. First remove the wheel guards, and back off the blade-guide components. Install a ¼-in. blade, and set the tension normally. Adjust the tracking so the blade stays in the middle of the tire when the wheels are turned by hand. With a scrap of wood, push on the back of the blade using the same kind of force you'd use for cutting wood (see the photo at right). Hold the block in place for three or four revolutions of the blade, and then release the pressure against the blade and turn it a few more times.

If the blade's position on the tire surface doesn't change even though the blade deflects slightly from the pressure of the wood block, then the crown is in good shape. If the band moves off the center position under pressure and returns when pressure from the wood block is released, the crown is showing signs of wear but is still functional. If the blade moves and doesn't return to its original position, then crowning is needed. You can do this yourself (see *FWW* #95, pp. 50-53).

Tires need replacing from time to time.

Photos: Anatole Burkin

Checking for crown wear—The author spins the bottom wheel by hand while pushing against the blade with a block of wood using normal cutting pressure. If the crown is in good shape, the blade's position won't change.

Most machines that have less than a 16-in. capacity use a rubber-band type of tire. Larger machines may have tires of a specialized configuration; some have a fitting groove in the middle of the wheel's surface. When ordering replacements, note your saw's model number; I've seen different tires used on similar models.

While you're in the machine's innards, examine the saw's pulleys. Those that are worn or bent can cause vibration. Worn belts develop knots at the factory joint, creating a bumping sensation. Replace these inexpensive items when they show signs of wear. And check all bolts and setscrews for tightness.

Align the blade to the guidepost

The guidepost should move up and down in a line parallel to the blade. Otherwise, the upper guide components must be readjusted with each change in stock thickness—a nuisance that eventually gets ignored until blades start breaking or cutting-precision deteriorates. For most small bandsaws, there are few, if any, adjusting mechanisms for the guidepost itself. But you can reposition the wheels to compensate for an out-of-line guidepost. This is a tedious, trial-and-error process, but just think of all the time you'll save not having to readjust your guide components every time you raise or lower the guidepost.

Checking the guidepost's alignment starts with the table. Remove the upper guide bracket, and raise the guidepost all the way up. Turn the wheels by hand for a few revolutions to make sure the blade's tracking is properly adjusted. Using two try squares, check to see if the table is perpendicular to the blade (see the photo on p. 78). Adjusting the table side to side is done through the trunnion stops. To adjust it front to back, install flat washers between the trunnion bolts and the bottom of the table to raise a section that suffers from a dip (see the top photo on p. 79). If so equipped, be sure that the taper pin or locking bar is installed in the split of your tabletop. Tabletop flatness in this region is controlled by tapping the pin in or out. Perfection may be elusive here; get it as close as you can.

Lower the guidepost, and check it with the try squares (see the bottom photo on p. 79). The guidepost should also be perpendicular to the table. If it's off by 1/16 in. or more over 6 in. of height, you'll need to make adjustments.

Some professional-duty bandsaws have separate adjustments for the guidepost travel path. Light-duty machines, such as 14-in. bandsaws, usually have no such provisions. To adjust them, you'll need to be creative and use shims or file down certain components to shift the upper wheel alignment. You are trying to get the blade to run parallel to the guidepost (see the drawings and photos on p. 80).

If your guidepost tilts to the left or right, filing down the tilt adjustment hinge,

Troubleshooting guide for bandsaws

Problem	Blade comes off wheels when machine is running.	Blade comes off wheels when backing out of a cut.	Machine jumps when running.	Blade seems to dull very quickly.	Machine cuts truncated cones instead of cylinders.
Causes	Tires need crowning; wheel bearings are loose or worn; wheels are out of line; top wheel carriage is loose.	Wood is pinching blade and dragging it out; blade tooth set has been worn out; tires need crowning; wheel bearings are loose; top wheel carriage is loose; wheels are out of alignment.	Tires need truing; wheels are out of balance; blade has kink in it; drive belt is worn; drive train pulleys are bent; machine is not sitting squarely on floor.	Back guide bearing has moved away from blade; wrong blade for the wood.	Guidepost is out of alignment; blade is not perpendicular to table; upper wheel is out of alignment.

***Guidepost alignment procedure—** Using try squares, determine whether the blade is perpendicular to the table. Adjust the table's tilt mechanism as needed for side-to-side alignment. Then check front-to-back alignment.*

located behind the upper wheel, on one side and shimming the other will get the blade more in line with the guidepost.

If the guidepost tilts fore or aft, you'll need to shim one of the wheels with a washer. Be careful about what kind of washer you use here. If the wheel has a bearing pressed into its hub, standard flat washers will work because the wheel is kept square to the shaft by the bearing. If the wheel doesn't have a bearing, you'll need to use precision machined washers to avoid introducing a wobble, which can be caused by hardware store variety washers that aren't very flat. You can order a machined washer from Delta (part no. 904-061-4982) to fit the 20mm lower shaft of a 14-in. bandsaw.

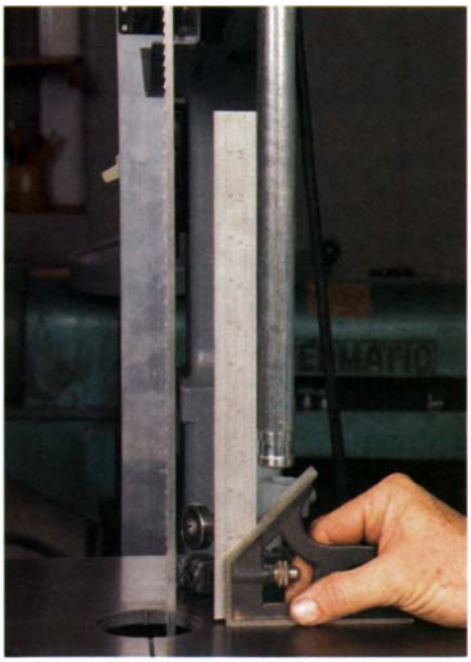
After shimming a wheel, you will have to square up the blade to the table again. Then check the guidepost alignment. There's a bit of trial and error involved in finding the right amount of shim.

The true test of just how well you've aligned the guidepost will make itself evident when you adjust your guides and then raise or lower the guidepost. If you need little or no adjustment to the guides over the travel of the guidepost, you've done a good job.

All this work will be an exercise in futility if your bandsaw's guidepost is flimsy and deflects under normal cutting pressure. To see whether you have this condition, raise the upper guide about

Blade moves in and out when machine is idling.	Ticking blade sound when machine is running.	Blade doesn't cut straight when resawing.	Guides don't close in tightly enough on blade.	Blade drifts and won't follow line.	Scraping noise when upper guide is raised.
Wheels are bent or warped; blade is not welded straight; blade has kink in it; pitch buildup on tires.	Blade weld joint is not ground smooth at sides or back; blade has kink in it; blade is cracked and ready to break.	Incorrect blade is being used; wrong tension on blade (too loose); feed rate is too fast; guidepost is misaligned.	Blade guide channels need cleaning; blade guides are grooved or worn.	Not enough set in blade; upper guide is set too high; side guides are set too wide; feed rate is too fast.	Top of guard is misaligned and rubbing wheel.

***Front-to-back adjustment**—A flat washer inserted between the table and either the front or back trunnion will help square the table to the blade.*



***Now check the guidepost.** It should be perpendicular to the table. If it's out by 1/16 in. or more over 6 in. of its height, the saw's performance can be improved by additional adjustments.*

1½ in. off the table, and push against the guidepost. When the guide starts to deflect, you have determined how hard you can push your stock before knocking the blade out of alignment.

Wheels in a twist will cause tracking problems

The wheels of a bandsaw must be in parallel planes. Having them in the same plane (coplanar) is preferable, but it's not necessary. And it's impossible if you have moved a wheel to correct a misaligned guidepost.

Wheels in a twisted configuration will cause the most problems. However, I've seen bandsaws where a good tire crown offset minor wheel misalignment. If your bandsaw has good, crowned tires yet still suffers from tracking problems, check the wheel alignment. Unfortunately, on the most common 14-in. bandsaws, there are no easy adjustments that you can make to correct twisted wheels. You'll need the services of a machinist to modify the upper axle housing. Industrial quality machines have adjustment provisions built into them.

To check alignment, turn the wheels forward by hand for a few turns, and watch where the blade tracks. Next turn the wheels in reverse. If the blade's position on the crown changes, the wheels are in a twist. A pronounced twist will allow the blade to fly off the wheels.

You may find that your wheels are slightly misaligned, but there's no problem directly attributed to that condition. So leave things alone.

Adjusting blade guides

Blade-guide components, like tires, are wear surfaces meant to be replaced or renewed. There are many varieties of guides, from simple solid-steel blade guides to costly bearing-type guides. All do the same thing: They keep the blade from moving side to side and front to rear when under a load.

Solid-steel guides should be reground flat and filed smooth from time to time. The bearings should be checked for free rotation, and the screws and guide channels should be cleaned regularly to allow quick and easy adjustments. The bottom guides should be checked more frequently than the top guides because they are constantly being flooded with sawdust.

Guide components should never be adjusted so tightly that they constrict blade movement. They should be just close enough to restrict blade deflection under cutting pressure.

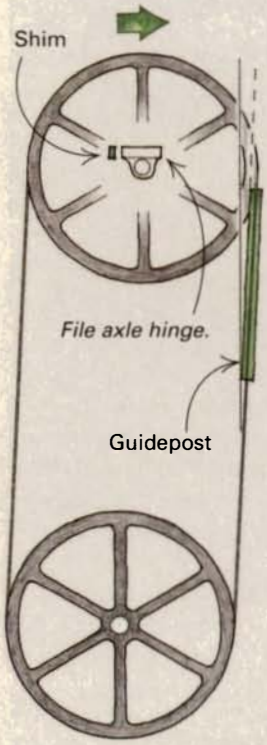
I don't find that it's necessary to use measuring devices to check the clearance between the blade and guide blocks or thrust bearings. I make these adjustments by sight and sound.

Here's a foolproof way to do this. First loosen all the guide components, and move them back from the blade. Adjust the blade tension. No two experts seem to agree on how to make this adjustment, so suit yourself. I get on my tiptoes and sight down the front edge of the blade from the top wheel and tighten the adjusting knob. As the blade tension increases, the blade straightens out. When it stops straightening, I give the adjusting knob a half revolution or so, and I'm there.

Begin adjusting the guides by spinning the top wheel by hand and gently pressing one guide block until it just kisses (but does not deflect) the blade. At

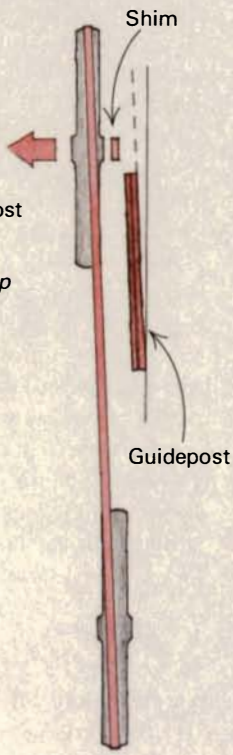
Correcting bandsaw guidepost alignment

You can't adjust a misaligned guidepost on most small bandsaws. The solution is to reposition the wheels so the blade runs parallel to the guidepost. After repositioning the blade, you must again align the table to the blade at 90° by adjusting and/or shimming the trunnions.



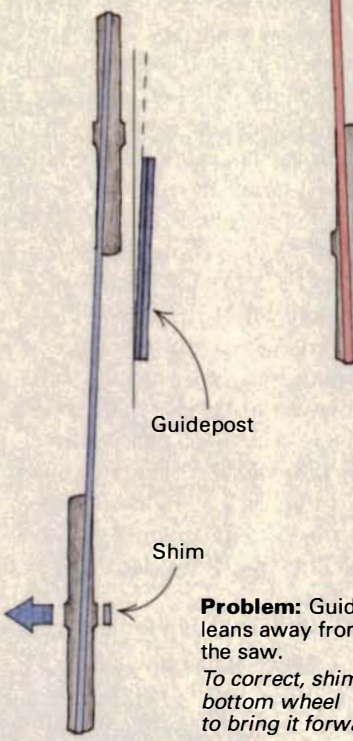
Problem: Guidepost tilts to right.
To correct, move upper wheel to the right. Dismantle the axle hinge, and file the right side. When reinstalling it, slip flat washers equal in thickness to the amount filed on the left side of the axle. To move the wheel the other way, file the opposite side of the axle hinge.

Top wheel to right or left



Problem: Guidepost leans toward front of the saw.
To correct, shim top wheel in the same direction.

Top wheel toward front



Problem: Guidepost leans away from the saw.
To correct, shim bottom wheel to bring it forward.

Bottom wheel toward front

the same time, make sure that the guide block is aligned just behind the gullet of the blade's teeth.

Once those components are in position, tighten the lock screws. Then press the opposing guide block until it just touches the blade, and tighten it. Spin the blade by hand some more, and observe the contact against the guide blocks. If the blade rubs constantly, back off the guide blocks just a hair so that the blade runs freely. Adjust the other pair of guide blocks the same way.

To adjust the thrust bearings, I bring one up gently against the blade, spin the blade, back the adjusting screw off until the bearing only ticks against the blade once or twice over the course of a complete revolution. Then I do the other one the same way. All these guide components need to be readjusted each time a new blade is installed.

I don't bother using plastic guide blocks. I think they create friction, don't last and may even smell up the shop when they get overheated.

A few other details

Because machines aren't perfect, I'm always looking for ways to improve them. Simple modifications sometimes make all the difference in the world. For example, I replace adjusting screws on bandsaws with matching socket-head screws and adjusting nuts with wing nuts. The fewer tools you have to hunt down, the faster it is to adjust the machine and change the blades.

If the saw's power switch is located on the stand, then consider relocating it to the arm. That way, you won't have to put your face near the blade to turn the machine on or off. A flexible work light aimed at the blade also comes in handy.

Beef up a flimsy sheet-metal stand with plywood panels screwed and glued on with construction adhesive.

Consider modifying the stand for convenient dust deflection or collection. When positioning a bandsaw in your shop, find a level spot on the floor, or level the saw's legs with shims or some other kind of leveling device. Moving a bandsaw around the shop can distort the frame and create slight misalignments. □

Robert Vaughan is a contributing editor to Fine Woodworking *magazine, and he repairs and restores woodworking machinery in Roanoke, Va.*

Drawings: Jim Richey

When Run-of-the-Mill Won't Do

One-of-a-kind and premium boards come from specialty lumber producers

by Vincent Laurence

Flitchsawn boards are the specialty. *At Joe Kleinberg's suburban New York facility, logs are sawn through and through and stacked in the same order they came off the log. This allows a woodworker to pick out book-matched boards easily.*

When I first began woodworking, I didn't venture far to buy lumber. After all, I reasoned, cherry is cherry. Then in 1991, a friend asked me to go with him to a few specialty lumber dealers in Pennsylvania's hardwood country.

We left before dawn. I was as excited as I had been at 8 going to a Fish and Game pancake breakfast on opening day of fishing season. What I saw changed how I look at lumber: Curly maple grouped according to tightness of curl, whole trees sawn through and stickered in the order they'd been sawn, 28-in.-wide pear crotches, planks of walnut one person couldn't move.

Specialty lumber producers don't try to compete with regular lumberyards. Some of their lumber is one-of-a-kind, and some of it is simply a better quality product. Of course, this kind of lumber doesn't come cheap. Prices up to $15 a board foot are common. But when you consider how much of a project's cost is labor, it starts to make more sense. Last year, I visited six specialty lumber producers to find out how they got started, how they turn trees into lumber and why they do what they do.

A second life for great redwoods

Last September, I went looking for some special wood in a forest about an hour east of Fort Bragg, Calif., with Roger Moore and his

Photos except where noted: author

Salvaged logs are seldom conveniently located. *These trees fell over after a stream overflowed its banks and washed away the soil around their roots. Removing them took 10 days, but the valuable lumber they contained would have been lost otherwise.*

partner, Monroe Robinson. We were after a curly redwood log that Robinson had seen on a reconnaissance hike a few weeks earlier. After clambering down a 60° slope, we found it. The log was huge—about 4 ft. across and more than 8 ft. long, with ripples undulating along its surface.

As Moore went for the ⅝-in. steel cable they use to winch logs to their truck, Robinson lopped a disc off the end of the log to check its condition. Before it hit the ground, Robinson yelled to Moore, "Forget it." The log was punky to the core. This beautiful, curly log had been on the ground too long. Not unlike gold mining or drilling for oil, the business of salvaging logs and producing timber from them is filled with as many disappointments as delights.

Moore and Robinson started their business, Pinocchio's Timber Products, five years ago. They both had undertaken large construction projects and needed lots of rot-resistant, old-growth redwood. They weren't about to buy timber that had been logged from the last of the standing old-growth forest. Someone offered Robinson salvaged logs. After accumulating more than 5,000 bd. ft. of logs, he realized he could sell what he didn't use. He bought a Wood-Mizer bandsaw mill and started producing lumber (see the photo at right on the facing page); a year later, Moore bought one, too.

About 80% of their logs come from the forest. They buy the right from the State Department of Forestry to remove trees that are already down (see the photo above). The other 20% of their logs are purchased from river barge operators who raise logs that sank while being floated from forest to sawmill as long ago as 150 years. Quite a few of the sinkers are more than 1,000 years old, and many are streaked gray to black from mineral staining. The contrast with the normal brick-red color of the redwood is striking.

What distinguishes Moore and Robinson's operation is that they

Photo above: Bill Brazill

Portable bandsaw mill makes less waste. *Roger Moore (right) and Monroe Robinson of Pinocchio's Timber Products check out a log they've just opened. Bandsaw mills generate less waste than chainsaw mills because the blade kerf is so much thinner.*

were both professional furnituremakers before they became lumber producers. As a result, when a log is being milled, an aesthetic impulse will guide the cut. These guys are trying to make beautiful lumber. And at $10 a board foot and up for wider stock, it's likely that more of it will end up being used for furniture or paneling in a library than for hot tubs or decks.

Saving and sawing trees for the fun of it

Three thousand miles away, in suburban Rockland County, just outside of New York City, Joe Kleinberg is also working hard to turn salvaged trees into lumber. Fifteen years ago, his father, a retired industrial arts teacher, complained about the price of wood. Kleinberg, a landscape contractor, responded, "Wood comes from trees, Dad. Let's make our own." Crude experiments with freehand chainsaw milling led to the purchase of a chainsaw mill and then three more. Last year, to reduce waste and increase production, Kleinberg bought a Wood-Mizer.

Right from the beginning, Kleinberg's emphasis has been on acquiring the trees. Through his contacts as a landscape contractor, he's developed an extensive network of informal scouts, including local tree services, road crews and builders who let him know when a tree is available. And whether it's an historic tree or just a large tree that has to go because a highway is being widened, Kleinberg would rather mill it than see it burned, chipped or dumped.

Although Kleinberg's operation has expanded far beyond his original intentions, the spirit of it remains the same. He's doing it largely for the fun of it and because he's passionate about big trees, especially walnuts. As a result, he's done more sawing than marketing, and he has several sheds jam-packed with thick, flitchsawn boards in large dimensions (see the photo on p. 81). I saw one gigantic walnut tree in a corner. The stickered slabs were 3 in. thick, 5 ft. across and nearly 14 ft. long. The first time I visited Kleinberg's yard, he and sawing partner Rick Johnson were slabbing up an ash tree that nearly broke their 12-ton crane (see the photo on p. 84).

How much do boards like these cost? Depending on quality and size, from $12 to $15 per board foot. Anyway you look at it, that's a lot of money. But there's something magical about a really tremendous plank, a 3-in.-thick slice through a tree that is a tabletop all by itself. George Nakashima was right when he described making furniture from such boards as giving a tree a second life.

A passion for quartersawing

Sam Talarico understands the appeal of massive boards. The first two pieces of furniture I saw when I walked into his Mohnton, Pa., house last December were a large, free-form walnut bench and a dining table whose top is just two book-matched planks of figured bubinga. But Talarico also understands a quieter, more refined beauty, and that's what he's built his business on.

As he tells it, a friend who restores furniture was working on an antique made of quartersawn sycamore. Talarico saw it, and the golden, ray-flecked wood being used to repair it, and said, "That's the most beautiful wood I've ever seen." Not long after, he started buying logs and having them quartersawn. He enjoyed the process

Monster ash requires chainsaw milling. *With its 79½-in. bar, this chainsaw mill requires two of Stihl's largest motors for power. Joe Kleinberg, in the foreground, and Rick Johnson have since bought a portable bandsaw mill as well.*

so much that he began buying white and red oak logs as well. Before long, local woodworkers were asking him to sell some. He did, and Talarico Hardwoods was born.

These days, Talarico buys veneer logs because they yield the best quality boards with the least waste. He explains, "You can produce bad lumber from good logs through faulty sawing or seasoning, but there's no way you can make premium lumber from mediocre logs." He has the logs sawn in one of the best mills in Pennsylvania and supervises all sawing himself. The wood is then air-dried for at least two years before being kiln-dried.

Talarico's prices are based on characteristics that furnituremakers can relate to: Slow-growth (tight grained) wood costs more than regular, curly costs more than unfigured and any wood costs more as thickness and width increases. Prices range from about $7.50 a board foot for 4/4, quartered white oak planks less than 8 in. wide to more than $20 a board foot for book-matched 12/4 planks of white oak wider than 12 in. Talarico also grades a few boards #1. It's his own designation—not an industry grade. These boards cost 25% more but are of such quality that Talarico thinks he might never see their equal again.

An obsession becomes a business

In the same way that Talarico has staked out his niche as *the* source for premium quartersawn lumber, Norman Hughes of Good Hope Hardwoods has claimed curly maple and wide walnut as his turf. Plenty of other lumber dealers carry these woods; some even call it their specialty. Like Talarico, though, Hughes starts with the logs. He also supervises their sawing and dries the wood himself.

Hughes started buying logs nearly 30 years ago, intending to use the wood for his own furniture and to restore his 18th-century farmhouse in the southeastern corner of Pennsylvania. Work and farming got in the way of his woodworking, but his appetite for buying and sawing logs never diminished. His lumber pile just kept growing, and when he retired from his job as a mechanical

'There's something magical about a really tremendous plank. Nakashima was right when he described making furniture from such boards as giving a tree a second life.'

engineer six years ago, he had 50,000 bd. ft. of lumber in his barns.

He started Good Hope Hardwoods by selling off that stash and focusing on the woods he loves: curly maple, cherry and walnut, both claro and eastern black. Prices are based on width, thickness, clarity and figure. The range is from $3 a board foot for plain cherry to $15 a board foot for figured claro walnut up to 54 in. wide.

Newsletter sells lumber

After more than a decade of struggling as a furnituremaker, Redmond Manierre decided he'd rather make lumber than furniture. He took out a loan, bought a Wood-Mizer and a kiln and hasn't looked back since. He paid off the loan last summer and has built a solid business doing something he clearly has a flair for.

What distinguishes Manierre's operation from some of the others I visited isn't so much the product, but the marketing. Manierre lives in The Plains, Va., about an hour west of Washington, D.C. He gets some walk-in business, but he also sells a lot of lumber to woodworkers he might never see in person. What allows this to work is that instead of having a straightforward price list, Manierre sends out a quarterly newsletter called *What's Cookin'* that details what's going into and coming out of his kilns, and what it costs. The newsletter is as entertaining as it is informative, often going into great detail about the logs Manierre is cutting.

Last winter's newsletter had this tidbit: "...there are two trees in particular that merit your special consideration when they become available next year. The first was a very old white oak that fell down on an estate dating from the 18th century in neighboring Clarke County just west of here across the Shenandoah River. The butt log was only 8 ft. long, but being 4 ft. in diameter, it yielded over 700 board feet of truly quartersawn material, some of it over 20 in. wide.... Most white oak logs that come through here have 8-10 growth rings per inch. This old boy had 16-20; it's a slow growing, ancient giant that deserves to be made into something really memorable." Prose like that sells lumber.

Manierre gets all his logs locally, and species vary with each newsletter. Some of the more unusual stuff he's had in recent issues include apple, mulberry, osage orange and sassafras. Prices run to $7.50 for cherry boards 21 in. wide.

A specialty lumber supermarket

You could liken most of the specialty lumber producers I visited to farm stands or corner delicatessens: they're small, they specialize and most of their product is locally produced. Groff & Hearne Lumber was the exception. With about 500,000 bd. ft. of lumber in its Quarryville, Pa., yard when I visited last December and sales of nearly 400,000 bd. ft. in 1996, Groff & Hearne could only be considered a gourmet wood super store. Since my visit, Bill Groff and Rick Hearne have parted company amicably, each retaining half of the inventory. Groff is remaining at the same location; Hearne is moving his operation down the road about five miles. Both are staying in the specialty lumber business. And in April, Hearne opened a facility in Little Rock, Ark. A third location outside of Denver, Colo., is scheduled to open later in the year.

The pair started logging and sawing in 1982 to make some extra cash during the winter. Hearne was a leather worker who built an occasional piece of furniture. Groff was a farmer. The business grew rapidly, soon becoming a full-time endeavor. In the 15 years they were in business together, Groff & Hearne became known as the best place to look if you needed really wide or unusual boards (see the photo above). That's not going to change. When I talked with them in February, they told me that their respective businesses would continue to provide a wide range of unusual species and unique planks. How unique? When I asked Rick Hearne what his most expensive product was, he smiled and handed me a 2-in.-thick piece of quilted maple. The depth of the figure was unlike anything I'd seen before. He said, "$130—it's a solid-body electric guitar blank." In shock, I asked, "You want $130 for this piece of wood?" "No," he said, "$130 *a board foot* for this piece of wood." I'm still having a hard time getting used to the idea. □

Bird's-eye elm crotch? Yep. *Rick Hearne holds up a lumber rule to this one-of-a-kind tree to show its width. Hearne doubts he will see another tree like it.*

Vincent Laurence is an associate editor of Fine Woodworking.

WOODWORKER'S MART

WOODWORKER'S MART

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Next generation random-orbit sander from Bosch

Bosch has introduced a professional-grade random-orbit sander with a number of improvements over earlier versions. It is one of the quietest and smoothest running sanders that I've had a chance to use.

The new model is a double-bearing, vertical-shaft palm sander with a variable-speed 3.3-amp motor (see the photo at right). It comes in two sizes: 5 in. (model 3725) and 6 in. (model 3727).

I tested the 6-in. machine and was immediately impressed with how quietly it ran. That's due to a magnesium motor housing, which provides both strength and noise insulation. The tool is also well-balanced because the motor is centered over the sanding disc.

The 3727 can be controlled with front and rear handles, or it can be held in the palm of your hand. The grip in front can be easily removed. The machine will sand flush over a 270° range.

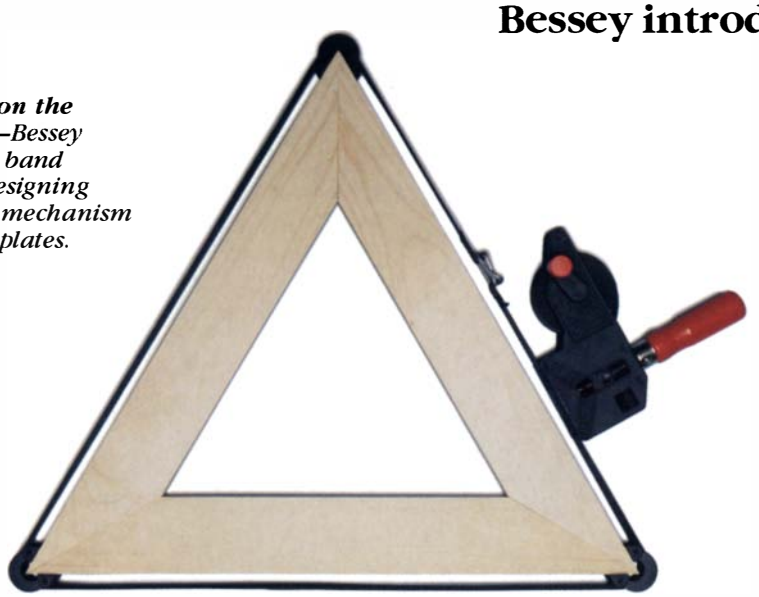
A six-position thumb wheel sets the speeds. It's positioned where your thumb normally sits—on the top front of the handle—so it's easy to reach whether you're right- or left-handed. As you work, you can adjust maximum orbits per minute from 4,500 to 12,000 rpm. A button on the left side locks the motor on.

The double bearings at the lower end of the shaft are, perhaps, the most important improvement over earlier models. These eliminate the minor but annoying cyclic wobble common to random-orbit sanders. I found that it was easier to sense exactly where the machine was sanding.

***Smooth random-orbit sander**—Bosch's new variable-speed, 6-in. random-orbit sander (model 3727) has double bearings at the base of the shaft, reducing vibration.*

The 3727 comes with a damper ring. This flexible rubber gasket fits between the magnesium housing and the sanding pad. It brakes the hook-and-loop pad when the machine is lifted off the work surface. The pad doesn't resume spinning until contact is made, which reduces sanding marks. The gasket also seals the gap between the pad and dust-suction blade. A powerful turbine-flywheel combination pulls air and dust through six vent holes in the pad and blows it into a canvas dust bag under the handle. Bosch also sells disposable paper dust bags and a vacuum hose to use with an auxiliary vacuum. The 3727's discounted price is about $150; the 3725, its 5-in. brother, costs $5 less. *—Sven Hanson*

Bessey introduces improved band clamp



***A new twist on the band clamp**—Bessey improved the band clamp by redesigning the clamping mechanism and pressure plates.*

Every now and then, a variation on an old tool comes along that makes you wonder why someone didn't make the improvement a long time ago. Bessey's new interpretation of the venerable band clamp is a perfect example (see the photo at left). The band or web clamp is indispensable for jobs where other clamps just won't work, such as pulling together oddly shaped objects or clamping up polygons. Still, it badly needed improvement.

The traditional band clamp is a pain to use. The webbing is cumbersome: Its long length drapes everywhere and snags on everything in sight. The take-up spool requires either a socket wrench or a large

Top photo: Sven Hanson; bottom photo: Craig Wester

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screwdriver and at least three hands to manipulate: one to hold the webbing in place, another to support the ratchet and a third to work the wrench or screwdriver. Because the webbing can mar the workpiece, you need to place pressure plates at the bearing points. Unfortunately, the plates that come with most band clamps are designed for a 90° angle. The clamps work for square frames but are worthless for other applications.

Bessey's new Vario Angle strap clamp addresses these shortcomings. The clamp body houses the 23-ft.-long webbing in a reel, which allows you to draw out only as much as needed. A crank quickly pulls in the excess after wrapping the workpiece. Instead of a ratcheting mechanism for tightening, the Bessey uses an integral turn screw similar to most other clamp fixtures. This eliminates the need for a wrench or screwdriver. To protect the workpiece, the clamp comes with four variable-angle, self-adjusting plastic pressure plates. The pivoting feet of the plates allow them to bear against any angled surface from 60° to 180°.

The clamp is easy to use. One potential drawback I see is the size of the tool's body, which in a tight situation may get in the way. The clamp's list price is about $50. Call Bessey at (800) 828-1004 for dealer locations. *—Jim Tolpin*

Woodburst color stains

Brightly colored stains—*Woodburst's line of color stains are intense, but they still let you see the grain of the wood once applied.*

Occasionally, I get the urge to introduce some color into a piece that I am working on. A new line of primary color stains from Woodburst has opened up a rainbow of choices for me. These vibrant stains are made with finely ground pigments suspended in tung oil.

Woodburst stains more like a dye. You can get brilliant colors and still see the grain. The product is easy to work with. You flood the piece with stain and wipe dry. Lap marks are not a problem, and the stain can be blended or recoated any time.

Woodburst stain colors are available individually and in kits. The Woodburst rainbow kit consists of 2-oz. bottles of red, orange, yellow, green, blue and violet. With this range of basic colors, you can mix practically any color you want. Woodburst recently introduced a line of wood-toned stains, which include brown mahogany, Colonial oak, honey maple, Early American walnut, dark walnut and cherry. Also, there are many individual colors to choose from, such as salmon, driftwood, black olive, smoked oyster, rosewood, black, white and a variety of brown and rust shades.

Individual colors cost between $4 and $6 and are available through mail-order catalogs. For more information, contact Emerald City Color Co. (206-859-2726).

—Roland Johnson

Portable panel saw system

Straight cuts on sheet goods—*Penn State Industries' portable panel saw system works with circular saws and routers and allows the user to cut unwieldy sheet goods with ease.*

Penn State Industries' portable panel saw system solves many of the problems of straightedge guides for circular saws and routers. The backbone of the system is a length of L-shaped aluminum alloy, which acts as a fence. The other component is a five-bearing, guided trolley, or saw tracking plate. The manufacturer says all circular saws will work with the system.

To use the tool, clamp the fence to the workpiece, attach a saw or router to the trolley and slip the trolley over the fence. After a few practice cuts with a saw, I felt comfortable with this tool. Routers work

Top photo: Anatole Burkin; bottom photo: Gary Katz

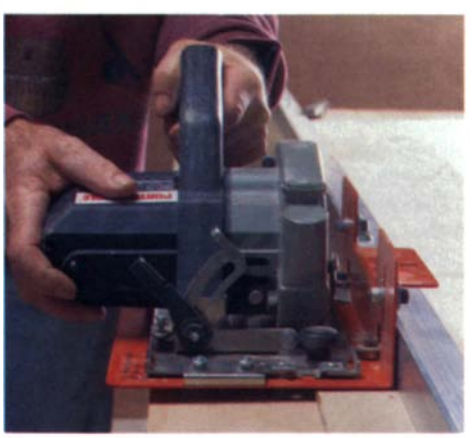
well in the trolley, too, once equipped with a custom baseplate that you can buy or make yourself. The system comes with a 108-in. rip fence and a 64-in. crosscut fence, so you can rip or crosscut 4x8 panels.

I encountered two problems with the system. The 8-ft. aluminum straightedge came with a 1/16-in. bow. To straighten it, I attached a plywood cutting guide to the base of each fence, as the instructions advised. Then I tightly pulled a piece of 20-lb. fishing line across the fence, end to end. And as I tightened the bolts securing the aluminum straightedge to the plywood base, I straightened the fence to the fishing line. I was pleased by test cuts, which butted against each other with hardly any gaps.

Aligning a tool in the trolley so it's parallel to the fence is a bit clumsy and time-consuming. Two mounting clips and four hex-head screws and nuts hold the tool to the trolley. It takes some fiddling to line up all the components correctly. If the manufacturer substituted quick-release knobs, the tool would be greatly improved.

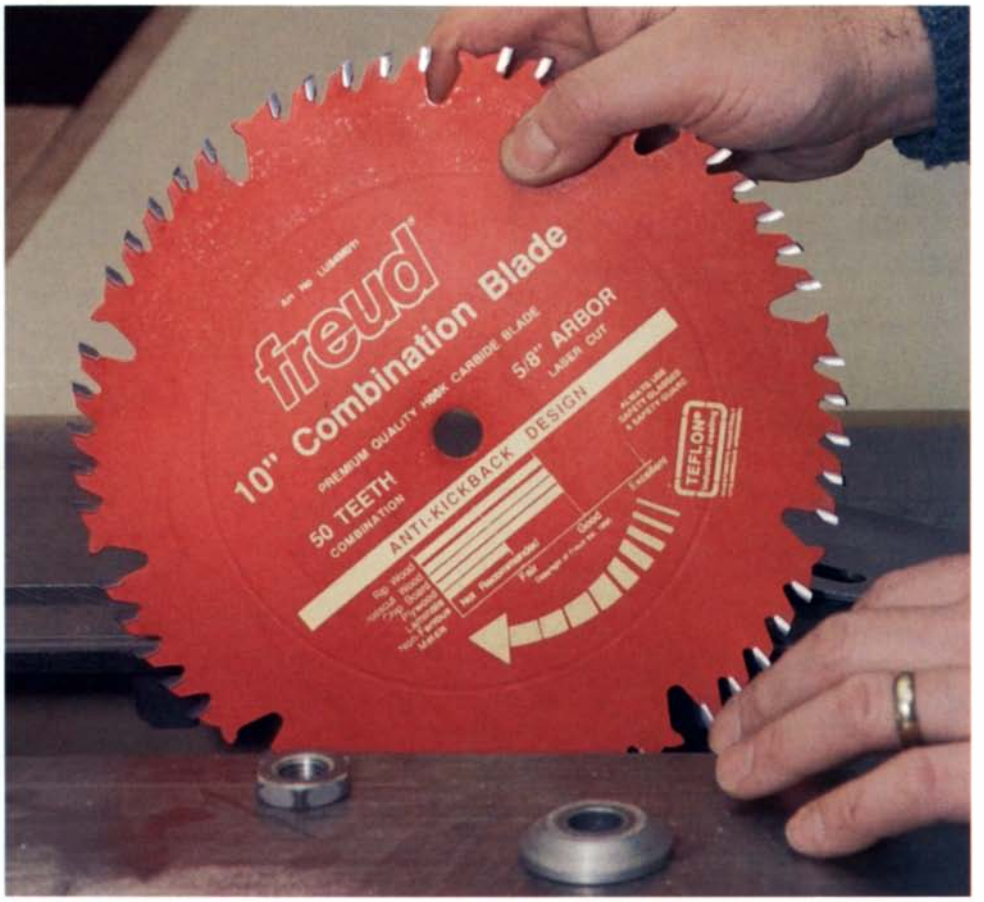
Though this system is called a portable panel saw, it shouldn't be confused with a true panel saw. But I'd recommend the portable panel saw system to amateurs and beginners who don't have tablesaws and aren't practiced enough to control a circular saw freehand. I'd also recommend this system to professionals who have to make tricky job-site cuts, such as miters and scribes that can't be made with a tablesaw. At $89, this tool is a great alternative to spending more than $1,000 on a panel saw. For information on the panel saw system, contact PSI (800-656-4767).

—Gary M. Katz



Tool attaches to trolley. *A circular saw must be aligned to the right side of the panel saw system's fence.*

Freud anti-kickback combination blade



A slippery combination sawblade—*Freud's 50-tooth combination blade has a new-generation Teflon coating that helps reduce friction.*

Freud's new anti-kickback combination blade (LU84M) will stand out in your shop for no other reason than the bright-red color. The red material is a new Teflon coating that is supposed to reduce friction, pitch buildup and corrosion.

The 50-tooth blade (see the photo above) is designed with a deep gullet every fifth tooth to aid in chip removal when ripping. A non-cutting shoulder projects above each gullet, which limits the maximum bite of the following tooth, providing the blade with an anti-kickback feature. To function as both a crosscutting and rip blade, it's designed with one flat-top raker for every four alternate-top bevel teeth.

The combination blade performed well on the cuts I expected it to handle: ripping solid lumber and plywood and crosscutting solid stock. There was some chipout when crosscutting 3/4-in. birch plywood.

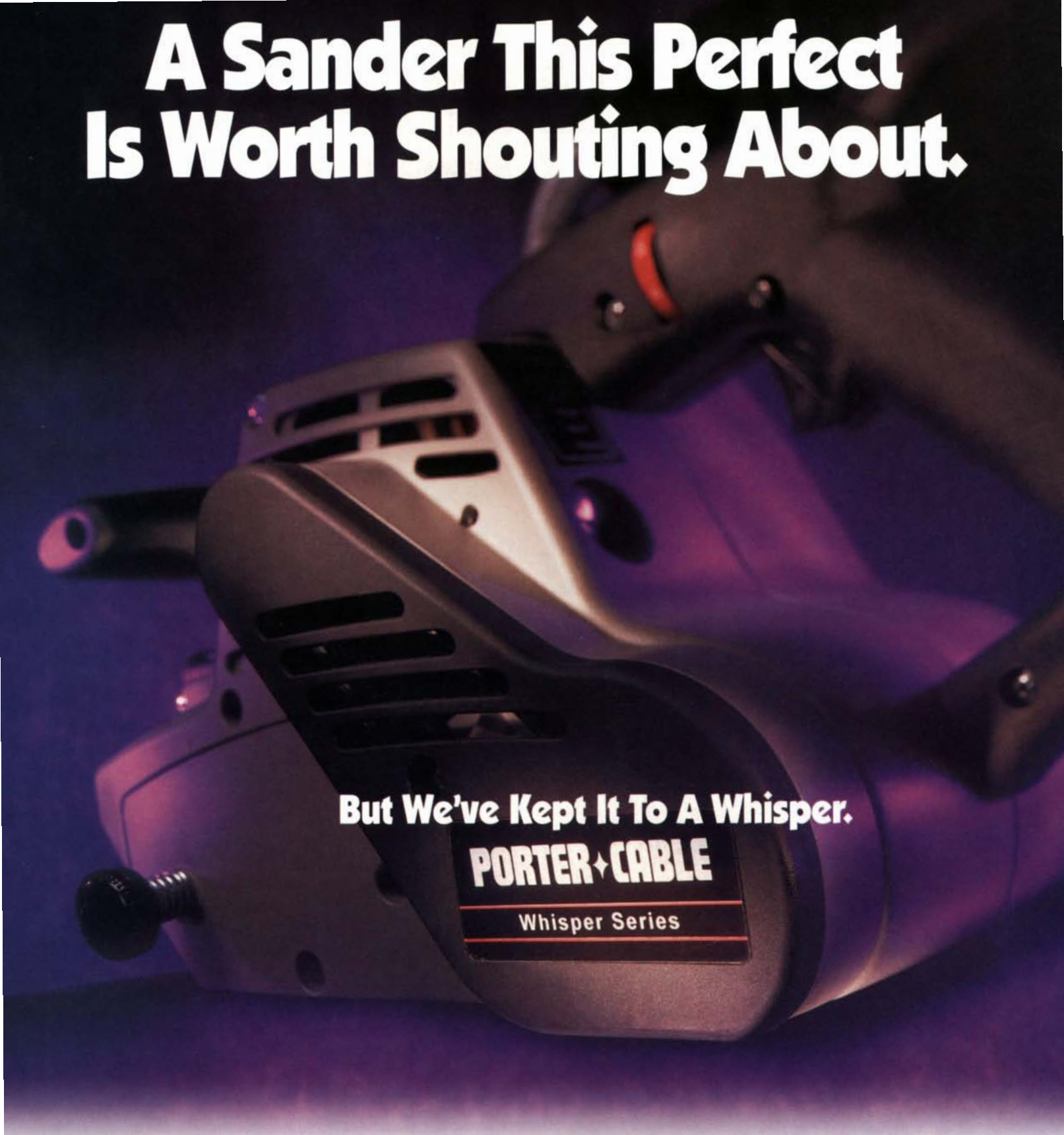
What really surprised me about this blade was how the Teflon coating reduced friction. While I was ripping a dozen board feet of 5/4 maple into narrow strips, I kept waiting for the motor to overheat and trip the circuit breaker. That eventually happened, but I had to push the stock faster than I normally do. For comparison, I installed my carbide-tipped rip blade and confirmed my observation. The Teflon coating had a noticeable effect. On a more powerful saw, this might not matter much. But my tired old saw's motor behaves like it just gained 1/4 hp. The blade is available discounted for about $40.

—Anatole Burkin

Sven Hanson builds custom furniture in Albuquerque, N.M. Jim Tolpin, of Port Townsend, Wash., is a cabinetmaker and author. Roland Johnson restores and builds furniture in St. Cloud, Minn. Gary Katz is a carpenter in Reseda, Calif. Anatole Burkin is an associate editor of Fine Woodworking ***magazine.***

Top photo: Anatole Burkin; bottom photo: Gary Katz

A Sander This Perfect Is Worth Shouting About.



Usually when Porter-Cable makes a remarkable improvement in a tool, we sing its praises as loudly as we can. However, it doesn't seem right for us to shout about a tool that actually makes so little noise.

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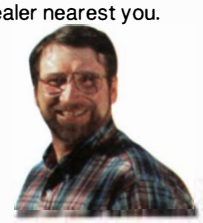

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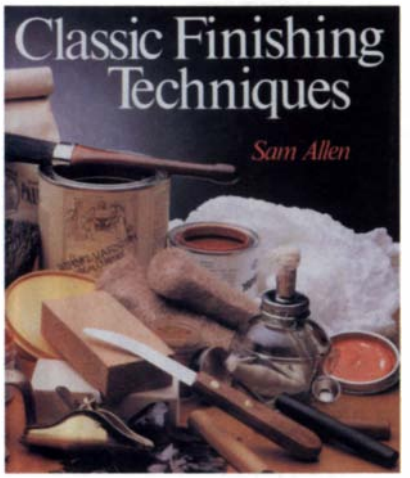
READER SERVICE NO. 169

Classic Finishing Techniques by Sam Allen. *Sterling Publishing Co., New York, N.Y. (800-367-9692); 1994. $14.95, paperback; 128 pp.*



I have always admired, even envied, woodworkers who can do a good French polish. I can't—but not for lack of information. I've read hundreds of articles and book chapters on the subject. None have helped, at least until this book.

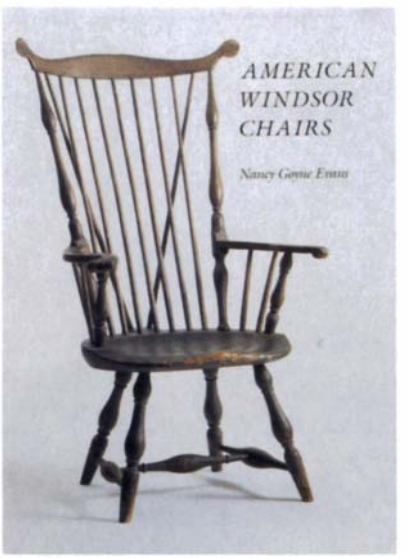
Roughly half the book is devoted to French polishing. The other half is a partial history of finishing, covering a number of varnish, oil, wax and stain finishes. Mr. Allen's easy-to-follow teaching style, coupled with ample illustrations, makes this one of the best explanations of French polishing I've seen. Best of all, the author not only teaches the art of French polishing but also shows the reader how to fix those inevitable application blunders. The tips and helpful tidbits throughout this section are worth the price of the book. Armed with this new information, I think I'll try French polishing again.

The many other old finishes that Mr. Allen describes are only interesting from an historical perspective. Where does one find logwood extract or oil of lavender? The author fails to provide a source of supply. Some Internet surfing will turn one up, but be prepared to pay through the nose. For instance, the materials needed to make one pint of Roubo's White Varnish cost $70. That problem renders this section practically useless.

Aside from the chapters on wax finishing and milk paint, this half of the book lacks the professional insights and hints that make the French polishing chapters so useful. I got the impression, more from what was not said than what was, that Mr. Allen does not actually use these old methods in his daily furniture work but just writes about them.

—Chris Minick

American Windsor Chairs by Nancy Goyne Evans. *Hudson Hills Press, New York, N.Y. (212-889-3090); 1996. $125, hardback; 744 pp.*



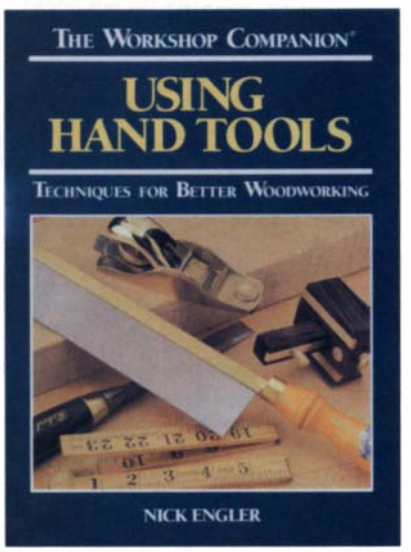
Any further research on the Windsor chair will be touch-up and small corrections. The work has been done. This book contains a lifetime of work, covering the entire history and development of the Windsor chair in America. Like all of the finest scholarly work, this book is more than facts about furniture. It is a gloss to the times, simultaneously telling the makers' stories and describing the world they lived in. Anyone wishing to understand the development of American culture can start here.

All the chairs and all the makers are here. From the many unsigned early Windsors to the odd designs of Samuel Gragg, to the pinnacle of refinement in John Lambert's 1786 Philadelphia comb-back. The author knows her chairs—not just their history. She even took time off from her study at the Winterthur Museum to take a chairmaking workshop with Curtis Buchanan.

What isn't here are writing-arm chairs. There are two late tablet-topped ones, but none of the classic large ones with elegant paddles, drawers and candle stands. I suspect her editor cut them, realizing that if the book took on any more pages, it would need wheels.

Perhaps this is what also happened to the index. It is woefully inadequate and will produce howls of outrage from readers for years to come. A shame. This is a book for the ages. *—Harriet Hodges*

Using Hand Tools by Nick Engler. *Rodale Press, Emmaus, Pa. (800-848-4735); 1995. $19.95, hardback; 128 pp.*



Like the rest of *The Workshop Companion* series, this volume is just the ticket for the beginner. Engler asks right away, "Why use hand tools at all?" He answers plainly that you can't do everything with power tools. His experience as a woodworker and teacher shines through in a book filled with straightforward text, clear drawings and invaluable tips.

Engler covers measuring and marking tools, handsaws, planes and scrapers, hand drills and bits, and chisels and gouges. He ends the book with a section on making some simple hands tools.

—Mario Rodriguez

Chris Minick is a finishing chemist, woodworker and contributing editor to FWW. *Harriet Hodges is a Windsor chairmaker in New Castle, Va., and is the indexer for* FWW. *Mario Rodriguez teaches woodworking in Warwick, N.Y., and is a contributing editor to* FWW.

Listings of gallery shows, major woodworking fairs, lectures, workshops and exhibitions are free but are restricted to happenings of direct interest to woodworkers. Only workshops sponsored by not-for-profit groups are listed. 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.

ALABAMA: **Meetings**-The Alabama Woodworkers Guild meets the second Thursday of each month at 7:00 p.m. at Acton Moulding & Supply Co., Helena. For info, contact Steve Onisick at (205) 942-8075.

ALASKA: **Meetings**-Alaska Creative Woodworkers Association meets at 7:00 p.m. on the fourth Monday of each month at the Anchorage Museum. (907) 345-3077.

ARKANSAS: **Meetings**-Woodworker's Association of Arkansas meets the first Monday of each month at 7:00 p.m.; Central Arkansas Woodcarvers meets the second Tuesday at 7:00 p.m. and the fourth Tuesday at 6:30 p.m. J.T. Shannon Lumber Co., Woodworkers Center, 6200 Sears Drive, Little Rock, 72209. (501) 565-1510.
Meetings-Ozark Woodturners meets the third Saturday of each month in Mountain Home. For more information, call Michael Kornblum at (501) 424-5893.

CALIFORNIA: **Exhibition**-Expressions in Wood: Masterworks from the Wornick Collection, thru July 20. Oakland Museum of California, 1000 Oak St., Oakland. For more info, call (510) 238-2200.
Show-California Carvers Guild woodcarving and wood crafting show, June 7-8. Madera District Fairgrounds, 20 miles north of Fresno on Highway 99 and Cleveland Ave. exit. For more information, call Lola Nelson (209) 229-7906.
Exhibition and classes-Student works, May 17-June 9, planemaking, July 28-Aug. 1, marquetry, Aug. 4-9, Woodfair '97, July 11-13, open house, May 15. College of the Redwoods, 7351 Tompkins Hill Road, Eureka, 95501-9300. (707) 445-6700.

COLORADO: **Workshops**-Workshops in Woodworking and furniture design. Anderson Ranch Arts Center, P.O. Box 5598, Snowmass Village, 81615. (970) 923-3181.

CONNECTICUT: **Workshops**-Woodworking workshops held year-round. Brookfield Craft Center, P.O. Box 122, Route 25, Brookfield, 06804. (203) 775-4526.
Show-Woodcarvers Day at Olde Mistick Village, Mystic, July 5 (rain date July 6). Mystic Carvers Club, P.O. Box 71, Mystic 06355. Contact Tom Davies (860) 572-1404.
Call for entries-Gallery 12's woodworking show, Oct. 5-Nov. 2. Deadline: July 12. Gallery 12, 29 Whitfield St., Guilford, 06437. (203) 458-1196.

DISTRICT OF COLUMBIA: **Exhibition**-Washington Wood '97, May 1-26. Works by Washington Woodworkers Guild members. Rock Creek Gallery, 2401 Tilden St. N.W. (202) 244-3510.

FLORIDA: **Meetings**-South Florida Woodworking Guild meets every second Monday at 7 p.m. Constantine, 1040 E. Oakland Park Blvd., Ft. Lauderdale. (954) 561-1716.
Meetings-Central Florida Woodworkers Guild meets the second Thursday of each month. Woodcraft Supply, 246 E. Semoran Blvd., Casselberry. For more info, contact Bob Elliott (407) 695-8960.
Meetings-Tallahassee Woodcrafters Society meets the second Tuesday of each month. For info, contact Walt Behrle at (904) 668-6653 or Austin Tatum at (904) 386-6876.
Meetings-St. Petersburg Woodcrafters Guild meets the fourth Thursday of every month at 7 p.m. Montgomery Electric and A/C, 1200 19th St. N., St. Petersburg, 33713. For more info, contact Don Montgomery at (813) 898-0569.

GEORGIA: **Meetings**-Woodworkers Guild of Georgia meets the second Monday of every month. Southern College of Technology, 1100 S. Marietta Parkway, Marietta. For more information, call (404) 299-3972.
Exhibition-Sam Maloof, chairs tables and other furniture, thru June 1. Connell Gallery, 333 Buckhead Ave., Atlanta, 30305-2305. (404) 261-1712.

ILLINOIS: **Classes**-Ongoing woodworking classes, all levels. Elston Woodworking School, 2228 N. Elston Ave., Chicago, 60614. (312) 342-9811.
Meetings-Fox Valley Woodworkers Club meets at 7:30 p.m. on the first Tuesday of every month in Batavia. For more information, call (708) 469-9517.

KENTUCKY: **Meetings**-Kyana Woodcrafters meets the first Thursday of each month. Bethel United Church of Christ, 4004 Shelbyville Road, Louisville, 40207. (502) 426-2991.

MAINE: **Meetings**-Guild of Maine Woodworkers meets the first Wednesday of every month. Call (800) 805-5100.

MARYLAND: **Show**-Columbia art and craft show, June 27-29. Columbia Art Center, 6100 Foreland Garth, Long Reach Village, Columbia. For info, contact Rebecca Bafford at (410) 730-0075.
Show-Second annual woodworking show presented by Galleries at Savage Mill and Historic Savage Mill Foundation, thru May 10. For prospectus, send SASE to Joan Bevelqua, Mill Box 2007, Savage Mill, Savage, 20763. (301) 490-0187.

MASSACHUSETTS: **Classes**-Woodworking classes, most of the year. Contact Boston Center for Adult Education, 5 Commonwealth Ave., Boston, 02116. (617) 267-4430.
Classes-Year-round intensives in woodworking and wood carving. Horizons New England Craft Program, 108 N. Main St., Sunderland, 01375. (413) 665-0300.
Workshops-Classes in woodworking held year-round. North Bennet Street School, 39 North Bennet St., Boston, 02113. (617) 227-0155.
Show and workshops-Woodworking Through the Ages, June 14-15; workshops on joinery, cabinetmaking, more. Hancock Shaker Village, P.O. Box 927 Pittsfield, 01202. (413) 443-0188.
Workshops-Classes in woodworking for beginners, women and retirees. New England School of Architectural Woodworking, Box 7, One Cottage St., Easthampton, 01027. (413) 527-6103.

MICHIGAN: **Meetings**-Metro Carvers of Michigan meets second Tuesday of each month (except July and August) at 7:30 p.m. Helen Keller High School, 1505 N. Campbell Road, Royal Oak. (810) 771-1040.
Meetings-Michigan Violinmakers Association panel discussion on violin making, July 27. For more information, call David Brownell (313) 665-4255.

MINNESOTA: **Meetings**-Minnesota Woodworkers Guild meets the third Tuesday of each month at 7:15 p.m. Demonstrations presented each month. Contact Richard Gotz at (612) 544-7278.
Classes-Workshops in finishing, refinishing and conservation, thru July. Dakota County Technical College, 1300 145th St. E., Rosemount, 55068-2999. (612) 423-2281.

MISSOURI: **Meetings**-The Kansas City Woodworkers' Guild meets the third Wednesday of each month. For more information, contact Eugene Caples at (816) 452-6379.

NEBRASKA: **Meetings**-Omaha Woodworkers Guild meets at 7 p.m. the third Tuesday of every month. Westside Community Center, Omaha. For more information, contact John Cahill at (402) 334-5550.

NEW HAMPSHIRE: **Classes**-Various woodworking classes. The Hand & I, P.O. 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.
Show-Wood Day, May 3. Canterbury Shaker Village, 288 Shaker Road, Canterbury, 03244. (603) 783-9511.

NEW JERSEY: **Auction**-C.R.A.F.T.S. annual spring tool auction, May 10. Flemington Elks Lodge, Route 31. For more information, contact Joseph Hauck (908) 221-7648.
Workshops-Furnituremaking, carving, finishing, guitar building and more (beginner to advanced), June thru August. For more information, contact Peters Valley Craft Center, 19 Kuhn Road, Layton, 07851. (201) 948-5200.

NEW YORK: **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-Traditional and contemporary woodworking with Maurice Fraser, Bill Gundling, Jack Van Deckter and Susan Perry. The Craft Students League at the YWCA, 610 Lexington Ave., New York City. (212) 735-9731.
Meetings-Long Island Woodworker's Club meets the first Wednesday of every month, September thru June. Brush Barn, 211 Jericho Turnpike, Smithtown. (516) 360-1216.
Classes-Experimental Woodworking: Designing with Directly Harvested (green) Wood, June 16-July 30. Purchase College State University of New York, 735 Anderson Hill Road, Purchase, 10577-1400. (914) 251-6500.

NORTH CAROLINA: **Meetings**-North Carolina Woodturners meets the second Saturday of each month. For more information, contact the North Carolina Woodturners, P.O. Box 1833, Hickory, 28603. (704) 324-5960.
Exhibition-Gallery Americas Southern furniture exhibition, May 1-June 16. Contact George Melone, Gallery Americas, Historic Carr Mill, Carrboro, 27510. (919) 929-1002.
Call for entries and workshops-The Chair Show II. Deadline: June 4. Judges include Sam Maloof and Wendy Maruyama. Contact Katherine Duncan, Chair Show; workshops on carving, whittling, bent willow furniture, more. Southern Highland Craft Guild, P.O. Box 9545, Asheville, 28815. (704) 298-7928.

OHIO: **Meetings**-Cincinnati Woodworking Club meets from 9:00 to noon on the second Saturday of January, March, May, September and November. Reading High School, 801 E. Columbia Ave., Reading. For more info, contact the club at 10125 Montgomery, Cincinnati, 45242.
Meetings-Woodworkers of Central Ohio meets on the second Saturday of November, February, April and June. For more information, call Chuck at (614) 457-3704.

OREGON: **Meetings**-Cascade Woodturner's Association meets every third Thursday. For more information, contact Cascade Woodturners, 11575 S.W. Pacific Highway, #104, Tigard, 97223. (360) 834-6325.
Meetings-The Guild of Oregon Woodworkers meets the third Wednesday of each month (except December) at 7 p.m. For further information, contact the guild at P.O. Box 1866, Portland, 97207-1866. (503) 492-1515.
Show-With the Grain III: Works in Wood, thru May 27. Cook Gallery, 705 Oregon St., Port Orford, 97465. For info, call (541) 332-0045.

PENNSYLVANIA: **Show**-Fourth annual Wharton Esherick Museum woodworking competition and exhibition. Deadline: July 1. For more information and application, send SASE to Wharton Esherick Museum, P.O. Box 595, Paoli, 19301-0595.

TENNESSEE: **Workshops**-Turning, carving and more, year-round. For more information, contact Arrowmont School of Arts and Crafts, P.O. Box 567, 556 Parkway, Gatlinburg, 37738-0567. (423) 436-5860.
Classes-Lumber selection and more. For more information, contact Tennessee Valley Authority, 17 Ridgeway Road, Box 920, Norris, 37828-0920. (615) 632-1656.

TEXAS: **Meetings**-Woodturners of North Texas meets the last Thursday of every month, 7:30-10:00 p.m. Paxton Beautiful Woods Store, 1601 W. Berry St., Fort Worth, 76110. (817) 927-0611.
Meetings-North Texas Woodworker's Association meets the third Tuesday of each month. For info, contact Bruce May, P.O. Box 831567, Richardson, 75083. (214) 271-0125.
Symposium-American Association of Woodturners symposium July 18-20, Municipal Auditorium, San Antonio. For more information, call Mary Redig (612) 484-9094.

UTAH: **Symposium**-1997 Utah woodturning symposium, June 5-7. Brigham Young University, Provo. For more information, call (801) 378-2021.

WYOMING: **Show**-Art and Healing, art created or influenced by the healing or dying process. Oct. 4-Nov. 11. Deadline: July 10. Send a SASE to Mary-Alice Huemoeller, Coordinator, P.O. Box 256, Wilson, 83014. (307) 733-4462.

CANADA: **Association**-Canadian Woodturners Association, Markham, Ont. For more information and to receive newsletter, call (905) 479-0755.
Meetings-West Island Woodturners Club (Montreal) meets every Tuesday, thru May. For more information, contact Dennis Brown, 8817 Cure Legault, Lasalle, Que., H8R 2V9. (514) 366-6071.
Association-Superior Woodworking Association meets 7:00 p.m. the last Monday of each month. Confederation College, Ont. Contact Vic Germaniuk at (807) 767-5964.

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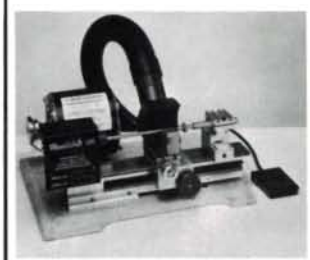

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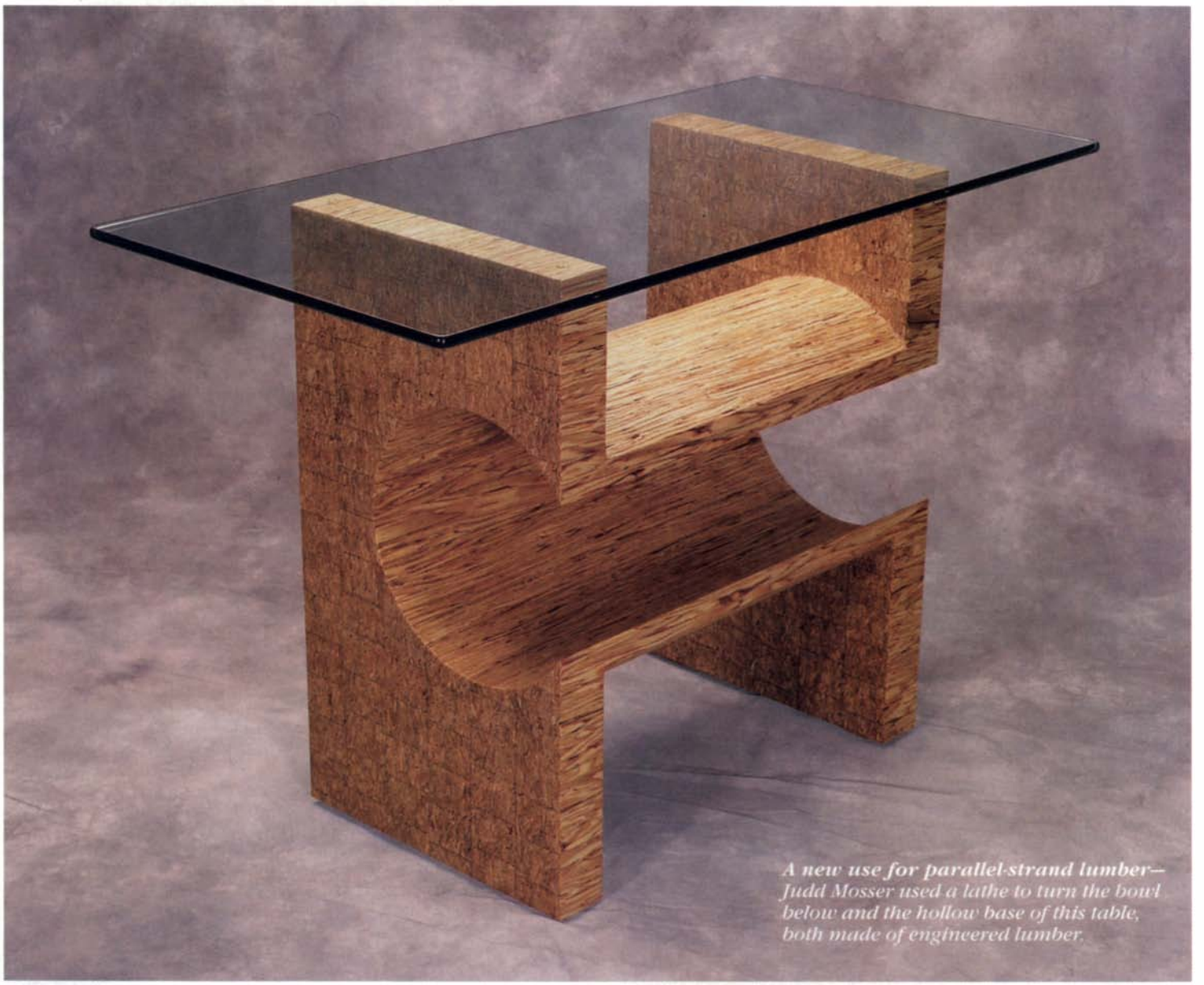
Turning engineered lumber into furniture



A new use for parallel-strand lumber—Judd Mosser used a lathe to turn the bowl below and the hollow base of this table, both made of engineered lumber.

I first discovered parallel-strand lumber at my local lumberyard. On the counter was a sample of Parallam, which is made of long, thin strands of softwood veneer glued up into billets. The material is used to make support beams for residential and commercial construction.

I thought the material might make some interesting turning stock, so I placed an order. A week later, my 3½-in. by 18-in. by 12-ft. beam arrived on the back of a truck. Because it was winter, my beam was coated with road salt and grit. I cut it in half and, with the help of my wife, lugged it into my basement workshop. Even though

Photos this page: Judd Mosser

READER SERVICE NO. 144

these beams are manufactured to 8% moisture content, they are often shipped uncovered and stored outdoors. My sample showed high moisture content, so I let it sit in my basement for a year.

When it was dry, I tried turning a bowl with a piece of it. Like softwood plywood, the material splintered at the edges. That meant my design had to be a simple form with few edges. As for the edges that did splinter, well, I figured that's what cyanoacrylate glue is for. I finished the bowl with oil and resin. Because of the voids, bowls made of this material are strictly decorative.

Once I had a feel for turning this material, I moved on to a bigger project: a table (see the top photo on p. 110). I laminated pieces to get the size I needed and then mounted the billet on my lathe to turn the inside and outside walls of the cylinder. I had to develop a few new turning tricks to complete this large piece.

Because this was my first segmented turning, I had some concerns about attempting it. But I've come to accept and appreciate that kind of fear for what it represents. Too often our human nature allows self-satisfaction to overcome us, strangling our willingness to experiment and expand our expression. The title of the table, *My Demons Follow*, expresses my acknowledgment of that. It is a motivating force that helps to keep me moving and growing in my woodworking so I don't allow those demons to overtake me. For me, that fear is good. *–Judd Mosser, E. Aurora, N.Y.*

Furnituremakers create Web site to show off work

The American Society Of Furniture Artists has put together a home page on the World Wide Web that offers information and images on woodworking and custom furniture. ASOFA, a Houston, Texas, trade association, is banking on the internet to help its members advertise their work through the on-line virtual galleries.

There are links at the ASOFA site for those who want to purchase custom furniture as well as links to other topics of interest to woodworkers. ASOFA's World Wide Web site is http://www.asofa.org.

–Anatole Burkin, associate editor

Build it, and then burn it

***Bonfire of humanity**—About 10,000 spectators witnessed the 11th annual Burning Man festival, held on Labor Day, 1996, in the Nevada desert.*

Every Labor Day for the last 11 years, a large human form built from wood is raised to an upright position and set ablaze in the Nevada desert. What started out as a solstice whim has blossomed into a huge arts festival. In 1996, upward of 10,000 people came to see what has come to be known as the Burning Man festival.

I, along with several other San Francisco Bay area volunteers, have built the last four "men" in my backyard. And I've seen all four of them go up in flames (see the photo above) while thousands cheered and flailed in a frenzy of dancing and drumming. Each year the Burning Man's form changes slightly. The first "man" stood 8 ft. tall. The one we built in 1996 stood on an 8-ft. pedestal and topped out at 48 ft. Built from dimensioned lumber, his spine was a 14-ft.-long 4x6, his legs were 22-ft.-long 4x6s and the arms were 10-ft.-long 2x4s. A series of hoops and ellipses made up the contours of his body. His head was a four-sided pyramid with shoji screens on two sides.

After all the components were built, we trucked the Burning Man out to the Black Rock desert in Nevada and assembled him. His human form, standing high, was in stark contrast to the featureless playa, a place where conditions can be harsh. Cloudless skies can cook bread. Dust storms with 40 to 60 mph winds pop up without warning. Rainstorms turn the ground to pudding. Survival skills are useful. People die out here and have for millennia.

Participants gather from all over the country, and the world, though mostly from the San Francisco Bay area, to build a community in the middle of nowhere for a week. Some of the participants construct their own elaborate structures and forms, each sharing a similar fate.

Those of us who participate in the event find it therapeutic to see something we've spent many hours building go up in flames. Ultimately, it's letting go of what is perceived as valuable or sacred. I've always looked at my craft as leaving a mark in the world, but on the San Andreas Fault, where I live, marks can be quickly erased. With this project, my work ended up in the hearts and minds of the thousands who witnessed its destruction.

Maybe some of you assembled model kits as kids, spending hours painstakingly perfecting each detail. Then after several months on display, you blew them apart with barrel bombs. If the urge still persists, there's a venue in the desert awaiting your performance. *–Chris Campbell, South San Francisco, Calif.*

Notes and Comment

We welcome news stories, anecdotes about the triumphs and pitfalls of woodworking, tales of government regulators, photos of unusual work—anything you think other woodworkers would like to know about. We pay for material we use. Send submissions to Notes and Comment, Fine Woodworking, *P.O. Box 5506, Newtown, CT 06470-5506.*

Photo this page: Dale Scott

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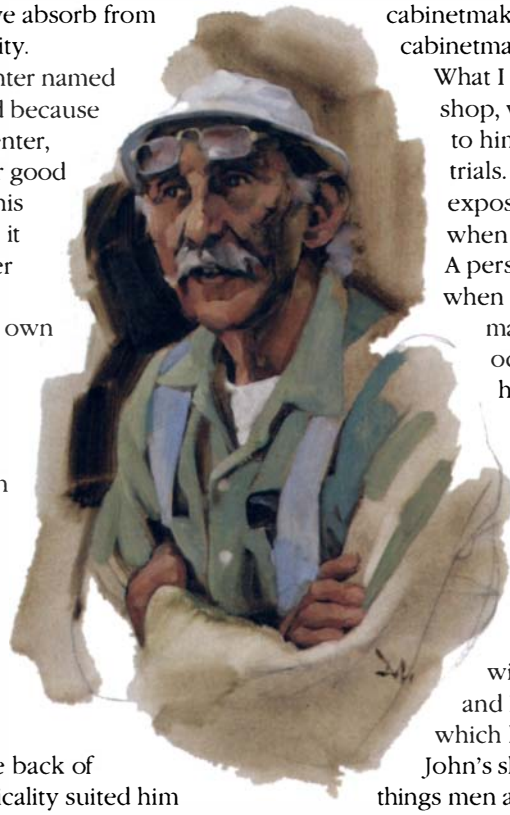
Learning Cabinetmaking by Alchemy

How does anyone teach woodworking? Beats me. Early on, it seemed clearer, but now I can't even tell you how to straighten a piece of lumber. My own approach has become variable and unpredictable. It depends on what I find as I proceed. And, in fact, that unthinking and fluid response to the changing demands of material and design has become one of my chief delights.

The biggest task, the hardest job, is acquiring manual skill and experience, which has to be done entirely on one's own. There are things we learn from more experienced woodworkers. We all have walked into someone's shop, caught sight of a clever construction or novel approach and stolen it. But that's not what I'm talking about. I'm talking about what we absorb from the complete package, the whole personality.

Early on, I worked with an elderly carpenter named Butch Lameroux. Because I was young and because he was that rare bird, a fine, life-long carpenter, Butch had a strong effect on my career. For good and for bad. On the one hand, I absorbed his measured, orderly approach. On the other, it was years before I realized there was a finer sandpaper grit than 80.

A few years later, when I was starting my own shop, I met an older local cabinetmaker named John Paradis. John grew up in the Pacific Northwest and moved to the Southwest for his wife's health. His father had been a carpenter and builder, and John followed him into the trade. He set up his own shop in the late '60s (almost by accident, as he tells it) when a client of his suggested he make sets for the local movie industry. Almost overnight, he developed a reputation as an unusually fine and versatile cabinetmaker—and a formidable personality.



He used to have a wonderful space in the back of the local armory, whose dilapidated theatricality suited him to a T. But even his new space, a nondescript block building in the industrial part of town, has that crowded but fertile disorder of tools and equipment and half-completed projects that I find completely seductive. John's sense of functional order and mine are congruent: We share an innate conviction that the position of greatest creativity is somewhere between chaos and absolute order. I've always felt that shops are exteriorizations of their owners, which is part of what can make them interesting.

Walking inside John's shop is like walking inside his skin. Everything inside it has been touched, paid attention to and marked by his personality. Not even necessarily made beautiful or more functional, but unmistakably transformed. He buys a cheap magnet lamp for his lathe. It's too short, so he makes new arms in wood, lovingly reproducing every useless detail of the old plastic. He's offended by the detailing on his bandsaw, so he reworks it all, turns new steel handles, makes a new tensioner. Can't stand the spring on his strip sander, so he makes a new positive tensioner for that. Needs a thickness sander, so he makes one for his lathe. Needs a longer lathe, so he adds 3 ft. to the bed. Gets a three-jaw chuck and cross slide for his lathe, so he can turn metal. Needs a specific profile for the shaper. Grinds a new pair of knives and another, and another and another.

John became—what? A mentor? Too strong a word. Of course, I went to him with questions and robbed ideas from him for all I was worth. But by the time I got to know him well, I was already launched and secretly too cocky to take much advice. And anyway, as John himself said to me one day when I succumbed to sentimentality and bemoaned his possible retirement: "Good cabinetmakers don't need help. That's why they're good cabinetmakers." And you know, he's right.

What I got from John I got from walking into his shop, watching him for a moment at work, listening to him go on about his latest excitements and trials. What I got from John, I got from being exposed to that alchemy of personality that occurs when a person has spent a lifetime making things. A personality alchemizes into interesting forms when one has spent a lifetime doing anything that matters. But something particularly interesting occurs when someone has spent years up to his elbows in the physical world.

Maybe I'm just being sentimental, a fault to which I am liable. John appeals to me because in his breadth of his skills he seems straight out of the late 19th century. But it's not just that. What I absorbed from John was the unthinking confidence with which he manipulated materials; the delight of making things, the joy in work, the freedom with which he addressed the physical world and I will say the imperious orneriness with which he dealt with fools who wasted his time.

John's shop was also a reminder of the beautiful things men and women can, with attention, produce, not just in what left the shop, but in what stayed. Perhaps, in his case, particularly in what stayed: the machines John had fooled with, improved and made more congenial; the stacks of jigs, shaper knives and endless contraptions that stated and restated his inventiveness; the piles of projects complete and incomplete, testimony to the fecundity of his practical imagination.

John's shop also confirmed in me a secret conviction: Certain men and women are capable through force of character, dint of labor or special gift of infusing the physical objects they use or make with some small, actual living bit of themselves. Standing in John's shop, I know it's true. □

Andrew Davis is a poet and cabinetmaker in Santa Fe, N.M.

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Alabama furnituremaker and sculptor Craig Nutt's long-standing fascination with vegetables may have reached its zenith with *Corncorde*, a 10-ft.-long flying ear of corn on display at the International Concourse at the Atlanta (Ga.) airport. Nutt's work was among 27 commissions installed last year just in time for the Olympics. *Corncorde* is made of 400 bd. ft. of 8/4 tulip poplar that has been turned, carved and painted. What Nutt calls the "shuck span" is 10 ft.

Photos: Craig Nutt