Quick and Clean Bookcases

Lumberyard pine with biscuits make a sturdy bookcase

by John Kelsey

Sure, I like to show off my finest pieces of hardwood furniture, but they're only some of what I build. Much of the output from my home workshop is what I'd call useful and sturdy rather than highly refined or fancy.

Bookcases, for example. In a lifetime of woodworking, publishing and book collecting, I've had to house yards and yards of books. I've evolved a design and a technique that's right for the task and also right for my tools and for my own style of working.

The last points, appropriateness to my shop and how I like to work, are perhaps the most important. I don't have a big investment in machinery, and I don't have to earn a living woodworking. I do it because making things with my hands helps me stay sane.

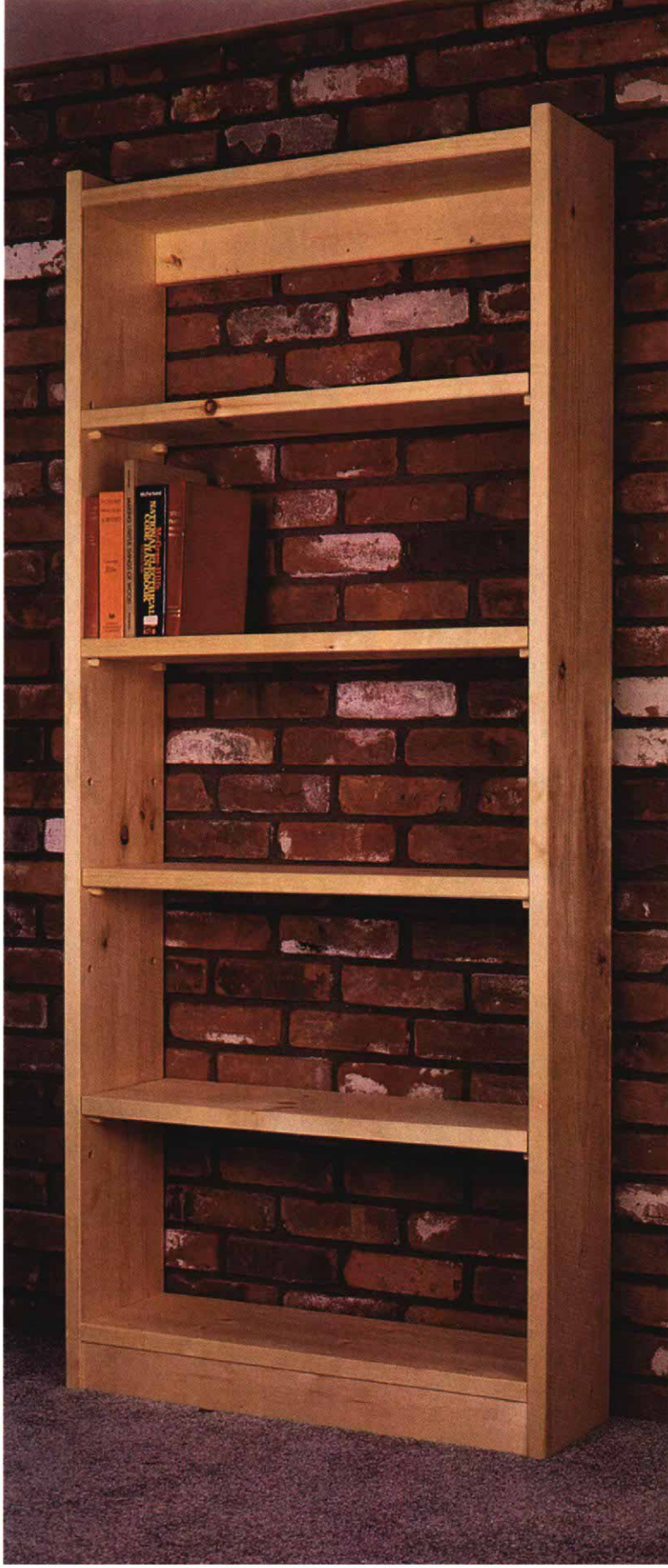
Basic bookcases

When your books are breeding uncontrollably, what defines an appropriate design solution? A bookcase performs an essentially utilitarian task, so these units should be economical of materials and time. The shelves have to be as deep as the books and adjustable in height, or else they waste space and the books will gather dust; shelves can't sag under the considerable weight of art books, LP records or magazines; the case should be reasonably sized and not too big—you don't often move them, but when you do, they have to thread through doorways, up stairs and down hallways. Finally, wood surfaces should be worked to a quality that can be painted, varnished or left unfinished.

The way I approach utility problems like this is not through function but through material. The question is, what's the best local deal you can find? When I lived in Ohio, 4/4 poplar offered the most wood for the buck. Farther north in New England, it might be maple or birch. But around here in Connecticut, it's 5/4 #2 western white pine from the local lumberyard. This wood has all the right characteristics: it's sturdy, it's cheap, it's already planed and it's available. Books are heavy, so the wood's thickness is important. The approach I'm describing here does not work with 4/4 #2 pine, which is just not stiff enough.

The basic bookshelf design I've evolved, as shown in the drawing 011 p. 65 and the photo at right, is a face frame-less, back-less case with two cross braces to resist racking. The case sides extend beyond the top and bottom shelves, which join to the sides with plate-joinery biscuits. Adjustable shelves held by hand-whittled pegs (see the bottom photo on p. 65) make the case more versatile and also lend it a touch of crafty charm.

The bottom brace below the lowest shelf finishes off the front



A simple, sturdy 5/4 pine bookcase *gets magazines, books and records off the floor with a minimum of fuss. This bookcase represents a kind of utility woodworking that all of us do, but which is rarely written about.*

Photos: Sandor Nagyszalanczy; drawing: Bill Jurgens

edge of the case at the floor. But the location of the top shelf and brace depends on the case's height. When the case is shorter than about four feet, the brace goes on top of the top shelf to form a lip that keeps small stuff from rolling off. If the case is tall, the brace goes under the top shelf. When it goes against a wall, a single nail through the brace and into a stud keeps the unit in place.

Shorter bookcases can be left freestanding or hung on the wall. The bottom edge of the top brace is beveled and hooks over a matching hanger board screwed into two studs, as shown in the drawing detail on p. 65. A taller freestanding case needs a back, so I run a groove for ¼-in. plywood and glue it in during assembly. Hinge doors on this construction, and you've got a cabinet.

Most books will be at home on a 10-in.-wide pine board—that's *nominally* 10 in. wide, actually 9¼ in. wide. LP records measure a full 12 in., whereas the widest lumberyard pine, nominally 12 in. wide, actually measures about 11¼in. A nominal 8-in. board glued to a nominal 6-in. board comes out about 12½in. wide.

In most regions, *#2* pine is relatively cheap, but on the East Coast, 10-in. boards still cost $1.60 per running foot. My friend Jim thinks it's cheaper to make bookcases out of birch plywood, which he can buy for $35 a sheet. But look: To fill a 6-ft. by 6-ft. wall space, I'd make two cases out of six 14-ft. planks, which would cost about $130. Jim would make a trio of 2-ft. plywood cases (the ply sags when it's wider), he'd have to glue a finished edge onto all those exposed edges and by the time he'd bought shelf hardware, he'd have spent $165. Even so, his method suits his needs, as mine suits me.

Sizing and crosscutting the parts

What dimensions should a bookcase be? A lot will depend on your needs and the size and layout of your room. I don't make

Selecting #2 pine is a knotty problem

My local lumberyard stocks 5/4 *#2* western white pine, kiln dried and planed on all four sides, in a variety of sizes. The designation *5/4* means the roughsawn hoards were 1¼in. thick after drying. The actual thickness varies from a bare 1⅛to a full 1 3/16after planing. I could save money by buying roughsawn lumber and planing it myself, and when I'm broke, that's what I do.

My local lumberyard allows me to pick through their racks as long as I leave everything neatly restacked. I start by scanning the endgrain for boards that do not contain the pith, or center of the tree, all of which I pull out for a closer look. I always take the time to turn through the entire pile to find boards without too many defects, such as spike knots and pith, crotch grain, loose black knots, waney edges and mill damage.

Once I've selected the best boards, I'm ready to load them on my car's roof rack. Fourteen-footers are the longest planks I can comfortably lug and load; the rack can support 16 planks before it slumps. After I buckle the pile down with a pair of canoe straps, it's ready for the trip to my shop and the radial-arm saw where crosscutting begins the building process. Here is a glossary that explains some of pine's attributes (also see the photo below).

Pith of the tree: All branches radiate from the center of the tree, so all knots point toward the pith, and the pith side of a plank is liable to show more knots than the bark side. A plank sawn through the pith usually includes some whole branch stubs, encased or cut lengthwise: these are spike knots. Also, a plank sawn with the pith on one surface is liable to warp. Avoid the pith when you want wide, flat boards. But when you want narrow quartersawn stock for rails and stiles, buy these same pithy boards. If you rip the juvenile wood out of them, you'll have premium quartersawn stock at #2 prices.

Loose knots: All knots were once branches, so there's stress and wild grain in the wood around them. Black knots are dangerous because they're often loose and liable to fall out and hang up on a machine's fence or table, causing a misfeed. Crosscut the loose knots out of your stock, or knock them out before you rip or joint. Tight red knots may crack and split, but they won't fall out. You can't cut any joint on the end of a board that was sawn too close to knots, so crosscut the knots out, and keep these resinous scraps for starting your barbecue. Otherwise, organize your cuts so that tight red knots will fall into the center of your parts, leaving clean wood for joinery at the ends.

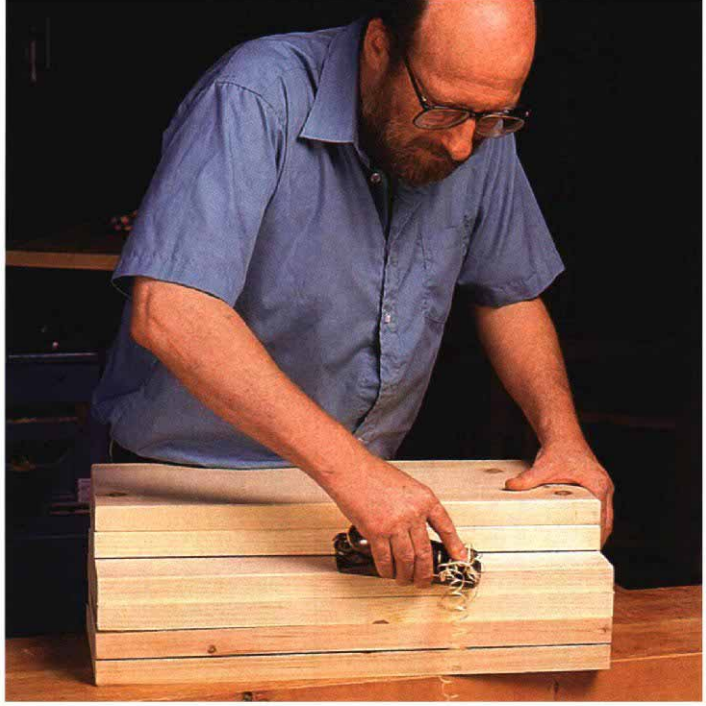
Pitch pockets: Pine is a notoriously resinous wood, and its gooey sap often collects in pockets that can ooze out during machining, gumming up sawblades and table surfaces, and your hands. Worse, pine can bleed sap from these pockets after the piece has been completely finished, even years later. Avoid problems by cutting around obvious pitch pockets. If your tools get gummy, clean them off with mineral spirits or turpentine.

Mill damage: The #2 grade often includes boards that were mangled during manufacturing and shipping. In particular, watch out for deep scars left by the steel dogs that clamped the log during sawing. Also, reject boards with edge dents left by steel shipping straps. Sometimes you find a honey of a plank, clear and clean, but with a single hideous ding. If you can cut around the ding or use most of the board, take it.

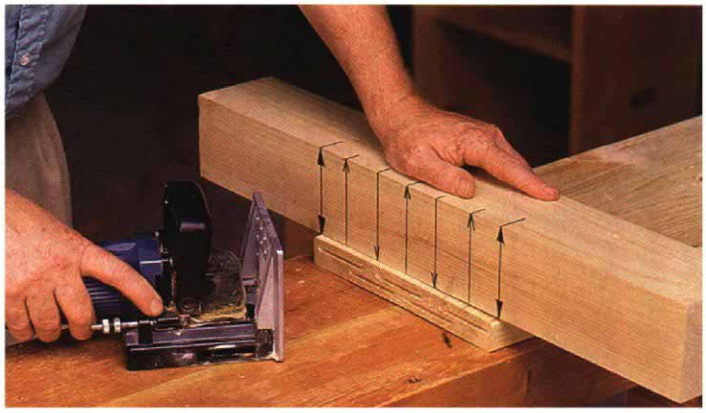
Fast growth: Pine grown in favorable conditions, on a tree plantation for example, grows very rapidly. This is good for the tree farmer but bad for the woodworker. This pine is liable to be soft, even punky. Slow-grown timber, with closely spaced annual rings, is denser, stronger and firmer under tools.

Strays: The label *western white pine* can encompass several species of pine. Most of it is quite uniform in texture and color, but you often find stray boards that are denser, or darker in color, or very hard-and-soft across the grain lines. Depending on what you are making, you might or might not want these strays. —*J.K.*

***Defects in pine boards** can cause problems. All knots radiate from the tree's center, so boards containing pith also contain spike knots (top). Black knots (bottom) are encased stubs of broken branches. They're dangerous if they fall out during machining. Tight red knots (center) may crack and split, but they don't fall out.*



The block plane makes short work of chamfering edges. *Chamfer the top board in the stack, offset it a few inches to get at the next board, and carry on down the whole stack before turning or rotating to a new corner.*



To slot the ends of shelves, *the author relies on the plate joiner's fixed distance of 5/16 in. from the baseplate to the cutter. With the stock flat on the bench, a smooth chunk of 4x4 serves as a layout gauge and hold-down, with arrows to mark edges of stock and slot centers. Flip the stock over for the second row of slots.*

To slot the faces of the uprights, *square a line that locates one edge of the fixed shelf. Clamp the 4x4 gauge right on the line, and with the machine vertical, run the first row of slots. Then place a spacer—5/16 in. thick in this example—between the machine's base and the 4x4 to cut the second row of slots.*

bookcases wider than about 40 in.; they're hard to clamp, awkward to move, and heavy books on spans wider than 40 in. will cause even 5/4 stock to sag. Better to make two cases standing side by side. How many shelves? Once you've decided how tall the sides are, round down to the nearest ten inches, divide by your closest shelf spacing, and add one. The extra shelf gets ripped in half for cross braces. Add another if you plan closely spaced shelves for paperbacks or tapes.

Crosscut the clearest, cleanest wood to make the two case sides. But before you cut anything, take five minutes to square up your radial-arm saw (see Mark Duginske's adjustment method in *FWW* #73). If you're using a chop saw, it's probably square already, but check anyway. If you're sawing by hand, knife a good line and pause to square up your self.

To determine the final length of shelves for the top, bottom and braces, subtract 2⅜ in. from the case's finished width. Clamp a stop block to the saw fence, and crosscut and mark two pieces for the top and bottom, plus a third piece to rip for the braces. Brush the chips away before each cut. Now tap the stop block an eighth of an inch closer to the blade, and saw all the adjustable shelves.

Knock the corners off

I take the cut pine straight from the saw to the bench to remove the millmarks, manufacturing dings and grade stamps. Because I don't like noise and dust, I rarely sand anything. Instead I handplane the wood, and it's not because I am nostalgic for the old days. It's just that a quick and quiet once-over with a sharp #4 or #4½ smooth plane leaves a gleaming surface. I plane out the worst of the deviations from flatness, but what I'm after is cleanliness and smoothness, not perfection. I like to plane the whole stack of boards, faces and edges, in a sweaty burst of shavings that leaves a gleam on me, too.

Planing the boards puts me in touch with their defects, so I decide now which way to orient each board in the case. I mark the fixed shelves so their heart side goes down; if they cup, the concave side will be on top. It's just an idiosyncrasy, but whenever possible, I turn the case sides so they arc oriented the way they grew: pith toward the center of the case, crown end (if I can figure it out) upward and, if possible, edge knots to the back.

Now I chamfer all the ends and edges of every board, except the ends of the two shelves marked for top and bottom, and the braces. I take off about 3/16 in., so nobody will rap a knuckle on a sharp corner and if the case will be painted, to let the paint stick better. The chamfer not only leaves the boards hand-friendly but also makes them eye-friendly because it disguises variations in stock thickness and width.

To chamfer, I set a block plane cockeyed, so the iron takes nothing on its left edge, a lot on the right (see the top photo at left). After stacking up the boards, I whack several thick shavings plus a thin finishing cut off the far edge of the top board, pull it a couple of inches toward me, and whack the corner off the next board down. If the wood tears, I plane from the other direction. Then I turn the stack and do it again.

Biscuit joinery

Plate-joinery biscuits and yellow glue hold this case together. The plate-joining machine may be noisy and dusty, but it's quick, and the resulting joint is strong. The 5/4 pine is thick enough for a double row of #20 biscuits, offset from one another, so in ten inches of width, one row has three plates and the other has two (see the center photo). To avoid error, I always locate the row of three toward the bottom of the joint. I use a chunk of 4x4 as a layout gauge, fence and hold-down, to guide the plate joiner for all the slot cuts.

Before assembling the case, I make a layout stick to mark and drill the half-inch holes in the case sides for the pegs that support the adjustable shelves. It's tedious to drill every inch or two all the way up, so I mark two vertical lines on each side and drill only two sets of holes: One for spacing shelves 10½ in. apart and a second set for 13 in. spacing. Drill each hole at least halfway through the wood.

When you glue the sides to the top and bottom shelves, brush glue on the endgrain and the mating face grain; make sure to work the glue well down into the biscuit slots, and then go back over the endgrain. Clamp with cauls to avoid dents, measure the diagonals of the case for squareness and adjust the case, if needed, soon after clamping. Let the glue dry, and take off the clamps before you glue the braces in place.

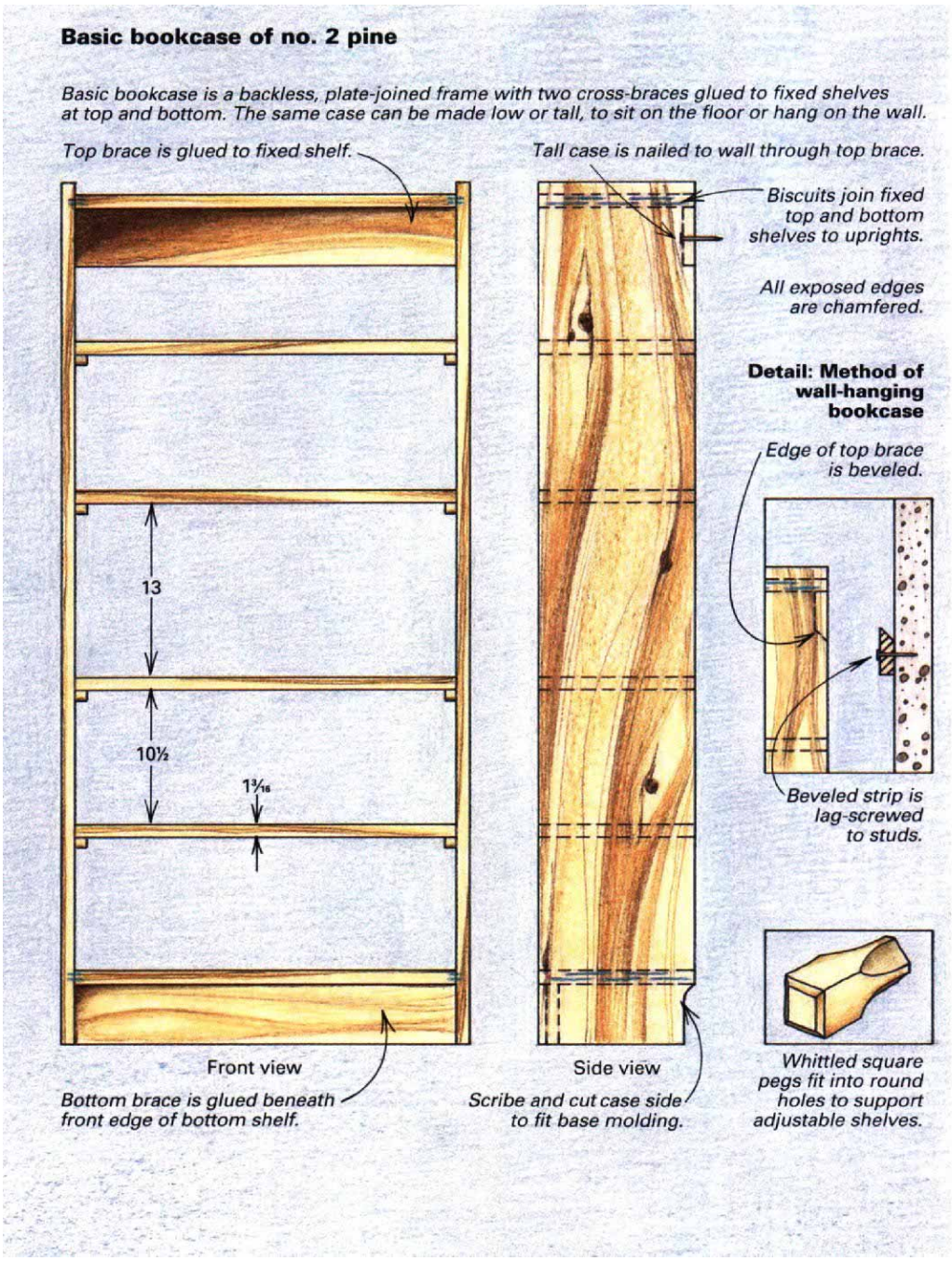
Square pegs in round, holes

I don't like the cheesiness of metal shelf hardware, so I whittle good-looking support pegs out of scraps that are always left over from a project such as this. A ½-in. square peg about 1¼in. long, with the corners whittled off, plugs tightly into a ½-in, hole. I like to whittle them with a crooked knife that's shaped like a hockey stick but sharpened on the edge that could never scrape ice (see the top photo below). No doubt many suppliers carry such a knife; I got mine from Highland Hardware in Atlanta, Ga. (800-241-6748). Four long cuts make the insertion end of the peg, and four short cuts chamfer off the sharp corners at the other end, very quick and easy. Four pegs hold up one shelf.

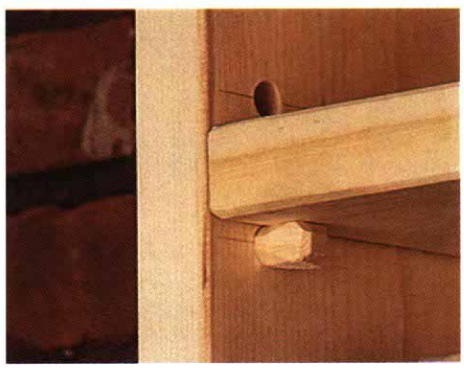
Pegs like these not only look good against the pine shelves but twisting them in their holes can make a shelf sit flat even when the wood is warped. After all, this is #2 pine. Tap the pegs in with a little hammer, plant the shelf and then twist a rear peg with pliers to eliminate rocking shelves.

As said, this way of working suits my tools and my own workshop habits. Yet presenting my approach in this magazine may seem like another kind of square peg in a round hole: I risk a pounding by more highly refined woodworkers who might consider these pine cases somewhat crude. But along with any guff, I hope to receive some good and practical advice that will help me work more effectively. That land of shop sharing is what I like best of all. □

John Kelsey is editorial director at The Taunton Press.



***Whittling with a crooked knife**, which is bent like a hockey stick, permits a controlled draw grip that melts the wood off a shelfpeg. Power for the cut comes from clenching the fist so that the knife always stops short of the thumb holding the blank.*



***Adjustable shelves** are supported by square pegs whittled to fit in round holes drilled in the case sides. Twisting the pegs can level a warped shelf.*